# Appendices

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

appendix a

# Community Workshop and Survey Reports

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TOLAY LAKE REGIONAL PARK
Master Plan Project

# TOLAY LAKE REGIONAL PARK MASTER PLAN

SUMMARY OF PHASE 1
COMMUNITY QUESTIONNAIRE RESULTS

prepared by:

MIG

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Kenwood, CA 95452

*August 2013*

# I. Introduction

Between January and June 2013, the Tolay Lake Regional Park Master Plan project team conducted a variety of public engagement activities designed to solicit stakeholder and community input regarding desired future activities in the park. The two properties comprising Tolay Lake Regional Park are relatively recent acquisitions, and the park is currently open to limited public access through the Day-Use Permit Program, as outlined in the 2008 Interim Plan. The Sonoma County Regional Parks Department is now preparing a long-term Master Plan for the park which will address the creation of permanent improvements and increased public access.

The master planning process, which will take approximately two years, is divided into three major phases. The Community Questionnaire was part of Phase 1, "Discovery."

The Community Questionnaire was presented through three methods. A print version of the questionnaire was distributed throughout the 2012 Tolay Fall Festival, held October 11-14 and 17-21, 2012. An online version of the questionnaire was available from November 7, 2012 to July 15, 2013. The online version was also reproduced and distributed at Community Workshop #1 held on June 15, 2013.

# II. Outreach

The availability of the Community Questionnaire was promoted and advertised through a variety of methods, including posting on the Sonoma County Regional Parks website, and Regional Parks Facebook page.

# III. Results

A total of 659 questionnaires were submitted by community members. Questionnaire responses are detailed below.

In the tables detailing questionnaire response data, answer options are listed in order from most to least popular. Please note that all percentages given represent the percentage of those who answered the question who gave that particular answer; neither counts nor percentages include the "no answers."

Comments submitted in response to open-ended questions are summarized in this document; for a full transcription of all comments submitted, please see the "Community Questionnaire Comments" appendix.

Question 1, summarized in the tables below, was the only question which differed on the two versions of the questionnaire, and therefore responses to the print and online versions are summarized separately.

| Question 1<br>Please tell us how you use Tolay Lake Regional Park.<br>*(check all that apply)* | | |
|---|---|---|
| **Print Questionnaire Results** | **Response Percent** | **Response Count** |
| This is my first visit to the park for the Fall Festival | 49% | 57 |
| I have only been to the park before for the Fall Festival | 36% | 42 |
| Other | 9% | 10 |
| I have taken the park training, have an access card and have visited the park at least once | 8% | 9 |
| I visit the park regularly | 5% | 6 |
| I have participated in docent-led hikes in the park | 4% | 5 |
| I visit the park occasionally (2 to 4 times a year) | 4% | 5 |
| **TOTAL** | **N/A*** | **116*** |
| **Online Questionnaire Results** | **Response Percent** | **Response Count** |
| I have taken the park training, have an access card and have visited the park at least once | 51% | 264 |
| I visit the park occasionally (2 to 4 times a year) | 34% | 176 |
| I have only been to the park for the Annual Festival | 22% | 114 |
| Other | 22% | 113 |
| I have participated in docent-led hikes in the park | 19% | 100 |
| I visit the park regularly | 14% | 75 |
| **TOTAL** | **N/A*** | **523*** |

*Note: Since respondents were asked to check all responses that apply, the percentages of each response selected may add up to more than 100%, and the response count total is larger than the number of respondents to the question.*

The following park uses were most commonly specified under "Other:"

- Respondents had not visited the park. Many noted they were looking forward to doing so.

  A number of these respondents, as well as respondents who had taken the permit training but not visited, noted they would be more likely to visit, or would visit more often, if visiting was less restricted and the park was open on weekdays
- Other responses included:
  - Visit for volunteer activities including bird counts, volunteering at the Fall Festival, participating in the Regional Parks Mounted Assistance Unit, leading nature walks or other outings
  - Would visit more often if hang gliding or paragliding was available at the park

- Visit for equestrian uses, would visit more often if improvements were made for equestrian use
- Would visit more often if disc golf was available at the park
- Visit for tribal meetings or events

| **Question 2**<br>**What type of experience would you like to have when you come to the park?** *(check all that apply)* | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| Enjoy quiet, serene environment | 80% | 515 |
| Enjoy active, fitness-oriented activities | 50% | 325 |
| Learn or practice a new skill | 26% | 169 |
| Other | 16% | 101 |
| **TOTAL** | **N/A*** | **646*** |

*Note: Since respondents were asked to check all responses that apply, the percentages of each response selected may add up to more than 100%, and the response count total is larger than the number of respondents to the question.*

The following types of park experiences were most commonly specified under "Other:"

- Educational or interpretive experiences including:
  - Environment and natural history, including plants, astronomy, etc.
  - Culture and cultural history including Native American
  - Agriculture
- Trails for walking and hiking. A number of these respondents felt the trails should be limited to hiking only.
- Equestrian use
- Disc golf; hang gliding and paragliding
- Enjoying nature and wildlife
- Mountain biking
- Lake-related activities such as swimming, boating, fishing

| **Question 3**<br>**What activities would you like to be able to do at Tolay Lake Regional Park in the future?** *(check all that apply)* | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| Hiking/walking | 88% | 579 |
| Wildlife viewing | 67% | 441 |
| Picnicking | 60% | 394 |

| | | |
|---|---|---|
| Photography | 55% | 363 |
| Attend special events, like the Fall Festival | 44% | 291 |
| Educational programs and activities about park natural resources & restoration | 43% | 282 |
| Educational programs and activities about Native American culture and resources | 42% | 275 |
| Camping/overnight stays | 40% | 262 |
| Dogwalking | 39% | 256 |
| Canoeing or kayaking | 33% | 218 |
| Educational programs and activities about agriculture and agricultural history | 30% | 197 |
| Mountain biking | 30% | 196 |
| Trail running | 29% | 192 |
| Fishing | 28% | 183 |
| Horse back riding | 28% | 182 |
| "Citizen science" opportunities | 25% | 164 |
| Other | 20% | 132 |
| **TOTAL** | **N/A*** | **656*** |

*Note: Since respondents were asked to check all responses that apply, the percentages of each response selected may add up to more than 100%, and the response count total is larger than the number of respondents to the question.*

The following activities respondents would like to be able to do at the park in the future were most commonly specified under "Other:"

- Hang gliding and paragliding
- Disc golf
- Volunteer opportunities and training

### Question 4
### Are there any activities you think should not be allowed in Tolay Lake Regional Park?

The most commonly specified activities they did not feel should be allowed in the park are listed below in approximate order of popularity. The top two responses (no or limited mountain biking, no motorized vehicles) were mentioned at least twice as often as all other responses.

- No mountain biking or limited mountain biking
    - A number of respondents were opposed to mountain biking because it does not mix well with equestrian uses.

- No motorized vehicles, (or motorized vehicles limited to specific areas), including:
  - Motorcycles, motorized bikes
  - ATVs
  - RVs
  - Boats
- No large and/or commercial events, large groups or parties or uses that create noise, such as:
  - Races or other athletic events
  - Festivals
  - Concerts
- No overnight camping or very limited overnight camping (including no RV hookups)
- No dogs or no dogs off leash
- No hunting or shooting
- Nothing that disturbs or is at odds with:
  - Quiet, natural atmosphere of park
  - Environment, including the lake
  - Native American traditions
  - Archaeological sites
- No disc golf
- No equestrian activities or limited equestrian activities
- No smoking or alcohol

| Question 5<br>What amenities would you like to see at Tolay Lake Regional Park in the future? *(check all that apply)* | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| Hiking only trails | 52% | 318 |
| Multiple use trails | 49% | 301 |
| Visitor/educational center/museum | 46% | 282 |
| Environmental/walk-in camp sites | 40% | 245 |
| Native plant nursery for restoration | 39% | 243 |
| Reserved area for group picnics | 35% | 215 |
| Native plants/basket weaving/ ethno botanical garden | 33% | 205 |
| Indoor & outdoor interpretive displays | 33% | 203 |
| Work farm ranch | 31% | 192 |
| Indoor and outdoor gathering/event areas | 29% | 182 |
| Workshop/classroom space | 25% | 153 |
| Car camping | 25% | 152 |
| Biking only trails | 24% | 150 |
| Yurts/tent cabins | 24% | 146 |
| Group campsites | 23% | 144 |
| Food service (e.g. Café) | 22% | 133 |
| Equestrian stables/center | 21% | 128 |
| Horseback riding only trails | 21% | 127 |
| Other | 10% | 64 |
| Bunkhouse | 9% | 54 |
| **TOTAL** | **N/A** | **617** |

*Note: Since respondents were asked to check all responses that apply, the percentages of each response selected may add up to more than 100%, and the response count total is larger than the number of respondents to the question.*

The following desired park amenities were most commonly specified under “Other:”

- Facilities for hang gliding including launch areas, training areas, wind socks
- Disc golf course
- Equestrian camping facilities
- Restrooms throughout the park, on trails, etc.; some specified permanent restrooms rather than porta-potties
- Corrals and other equestrian amenities
- Improved trails including loop trails

## Question 6
## Are there any amenities you think should not be at Tolay Lake Regional Park?

Respondents listed a variety of amenities they thought should not be at the park. The most commonly specified are listed below in approximate order of popularity. The top two responses (no overnight camping or RV/car camping facilities, no café or food service) were mentioned at least twice as often as all other responses.

- No overnight camping facilities of any kind. Some specified no RV and/or car camping facilities
- No café, restaurant or food service
- No commercial activity
- No equestrian stables or other equestrian amenities
- No mountain biking-only trails
- No amplified music or other noisy features
- The fewer amenities the better; preserve natural quality of park
- No more buildings outside the main compound

**Question 7**
**When would you be most likely to visit Tolay Lake Regional Park?**

| | Response Percent | Response Count |
|---|---|---|
| Weekends – Saturday and Sunday | 64% | 411 |
| Weekdays – Monday through Friday | 40% | 257 |
| **TOTAL** | **100%** | **638** |

## Question 8
## Please provide any additional comments.

Below is a summary of the most frequent comments:

- Keep the park quiet and natural. Prioritize natural conservation and restoration, including: lake and wetlands, native grasslands, bird and other wildlife habitat; as well as education. Plan access and visitor activities to be consistent with these priorities.
- Please open the park on weekdays. A number of respondents would also like to see hours expanded to include earlier mornings or evenings.
- The park is beautiful; we love it.
- Please allow hang gliding/paragliding at the park.
- Thank you for good work on the park so far, making it available and giving us the opportunity to provide our input.

- Please improve trails and trail maintenance. Create more multi-use trails, loop trails.
- Please improve the road leading into the park.

## DEMOGRAPHIC QUESTIONS

At the end of the survey, respondents were asked a brief series of demographic questions in order to help ensure that the process has broad, representative participation. Results are detailed below.

| Question 9<br>What is your zip code? | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| 94952 (Petaluma) | 17% | 103 |
| 94954 (Petaluma) | 16% | 96 |
| 95476 (Sonoma) | 7% | 44 |
| 95472 (Sebastapol) | 4.9% | 29 |
| 94928 (Rohnert Park) | 4.7% | 28 |
| 95401, 95404 (Santa Rosa) | 4.4% | 26 |
| 95405 (Santa Rosa) | 3.6% | 21 |
| 95403 (Santa Rosa) | 3.4% | 20 |
| 95407 (Santa Rosa) | 2.5% | 15 |
| 94931 (Cotati), 95492 (Windsor) | 2.4% | 14 |
| 95409 (Santa Rosa or Kenwood) | 1.5% | 9 |
| 94558 (Napa), 94951 (Penngrove) | 1.4% | 8 |
| 95446 (Guerneville) | 1.2% | 7 |
| 94945, 94947, 94949 (Novato) | 0.8% | 5 |
| 94611 (Oakland or Piedmont), 94704 (Berkeley), 95442 (Castro Valley), 95465 (Occidental) | 0.7% | 4 |
| 94110 (San Francisco), 94559 (Napa), 94709 (Berkeley), 95448 (Healdsburg) | 0.5% | 3 |
| 94114, 94117, 94530, 94534, 94591, 94609, 94707, 94903, 94904, 94925, 95060, 95402, 95462 | 0.3% | 2 |
| 89508, 90210, 92211, 93907, 94043, 94062, 94063, 94115, 94118, 94122, 94303, 94505, 94508, 94510, 94549, 94567, 94577, 94590, 94596, 94597, 94605, 94610, 94618, 94701, 94706, 94708, 94720, 94801, 94923, 94926, 94930, 94939, 94941, 94955, 94971, 94975, 95003, 95073, 95425, 95433, 95436, 95439, 95441, 95444, 95445, 95475, 95487, 95497, 95746, 95757, 95952, 95954, 96003, 97456 | 0.2% | 1 |
| **TOTAL** | **100%** | **591** |

| Question 10<br>**What is your age**? *(please check one)* | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| 26-55 | 53% | 324 |
| 55-65 | 29% | 176 |
| 65+ | 13% | 80 |
| 18-25 | 4% | 23 |
| Prefer not to answer | 2% | 10 |
| 17 and under | 0% | 0 |
| **TOTAL** | **100%** | **613** |

| Question 11<br>**What is your race or ethnic identification?**<br>*(check all that apply)* | | |
|---|---|---|
| | **Response Percent** | **Response Count** |
| White | 82% | 494 |
| Prefer not to answer | 9% | 54 |
| Asian or Pacific Islander | 4% | 23 |
| American Indian or Alaska Native | 5% | 30 |
| Spanish, Hispanic or Latino | 3% | 20 |
| Other | 3% | 16 |
| Black/African American | 0.3% | 2 |
| **TOTAL** | **N/A*** | **599*** |

*Note: Since respondents were asked to check all responses that apply, the percentages of each response selected may add up to more than 100%, and the response count total is larger than the number of respondents to the question.*

**Question 12**
**Please provide your contact information below if you would like to be kept informed about the Tolay Lake Regional Park Master Plan project.**

Contact information provided was added to the Tolay Lake Regional Park Master Plan contact list.

# TOLAY LAKE REGIONAL PARK MASTER PLAN
# SUMMARY OF COMMUNITY WORKSHOP #1

prepared by:

MIG

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*June 2013*

# I. Introduction

Between January and June 2013, the Tolay Lake Regional Park Master Plan project team conducted a variety of public engagement activities designed to solicit stakeholder and community input regarding desired future activities in the park. The two properties comprising Tolay Lake Regional Park are relatively recent acquisitions, and the park is currently open to limited public access through the Day-Use Permit Program, as outlined in the 2008 Interim Plan. The Sonoma County Regional Parks Department is now preparing a long-term Master Plan for the park which will address the creation of permanent improvements and increased public access.

The master planning process, which will take approximately two years, is divided into three major phases. Community Workshop #1, covered in this summary, was part of Phase 1, "Discovery." The Community Workshop took place on June 15, 2013, at Tolay Lake Regional Park.

# II. Outreach

The workshop was promoted and advertised through a variety of methods, including:

- Direct mailing of postcard to Tolay Lake Regional Park mailing list that has been compiled from events, planning meetings, and inquiries through various planning and outreach projects since before the acquisition in 2005 to the present
- E-mail announcement to Regional Park Members, Tolay Lake Regional Park Day Use Permit Holders, and E-News subscribers
- Posting on the Sonoma County Regional Parks website, and Regional Parks Facebook page
- Press release to local media

# III. Workshop Format

The workshop was conducted by Sonoma County Regional Park Department (SCRP) staff with assistance from the Sonoma County Agricultural Preservation and Open Space District (SCAPOSD), Master Plan consultants MIG, Inc., and Master Plan project partners. Each participant received an agenda, a fact sheet, a copy of the community questionnaire, a handout on how the public can continue to be involved in the Master Plan process, and a comment card. The workshop was opened by Caryl Hart, Director of SCRP, who welcomed participants and introduced team members. Next, Steve Ehret, SCRP Park Planning Manager and Master Plan project manager, and Jacob Newell of SCAPOSD gave a brief overview and history of the properties comprising Tolay Lake Regional Park. Carolyn Verheyen and John Baas of MIG followed with a PowerPoint presentation which provided an overview of the Master Plan project, including a summary of input received from stakeholders and the public to date.

At the conclusion of the overview presentation, workshop attendees were directed to take part in the "walking workshop" that followed. This consisted of three different

stations where participants could view a map of the park, learn about different aspects of the master plan and contribute ideas relevant to each subject. The three stations were as follows:

- Natural and Cultural Resources and Agricultural Practices
- Recreation and Trails
- Education and Helping People Visit Tolay Lake Regional Park

The "walking workshop" period was split into three sessions of twenty minutes each. A bell was rung to mark the end of each session, and participants were encouraged to move from station to station, although they were free to remain in place if they were particularly interested in one subject area. During each session, facilitators asked the group questions specific to the subject matter and recorded participants' ideas and comments on flipchart paper.

Two additional unstaffed stations were set up to receive participant input through written comments. Station 1, entitled "Park Vision: Ideas We've Heard," summarized public and stakeholder input so far regarding the overall vision for Tolay Lake Regional Park, and provided a large sheet of butcher paper and a map for participants to contribute their further visioning ideas. There was also a separate comment station where participants were welcomed to write any further general comments.

After one hour of "walking workshop" discussions, the larger group reconvened for a final question-and-answer and comment period. The meeting facilitator then reminded participants of the next steps in the process and additional participation opportunities including visiting the project website for further information. Participants were asked to submit comments prior to July 15th, when the next phase of planning begins, with additional workshops and other opportunities to participate. Participants were also encouraged to provide additional written comments via comment cards and to complete the Community Questionnaire if they had not already done so, either at that point or prior to July 15th.

# IV. Workshop Participation and Results

## *Participation*

Over 50 stakeholders and members of the public attended the workshop. The majority were Sonoma County residents, although there were also a number of attendees from the greater Bay Area. A variety of stakeholder groups were represented, including residents, local land owners, the Federated Indians of Graton Rancheria (FIGR), various public agencies, and representatives of specific user groups.

## *Results*

Participants' comments are summarized below by workshop station and subject matter. Comments that were submitted through comment cards, emails or the general comment

board at the workshop have been combined with comments from each workshop station depending on subject.

## Station 1: Park Vision: Ideas We've Heard

Station one included a poster with a summary of ideas that SCRP has heard so far regarding an overall vision for the park, as follows:

- Tolay Lake Regional Park is an outdoor recreation destination.
- Tolay Lake Regional Park is a thriving, ecologically functioning landscape.
- Tolay Lake Regional Park has high potential for innovative and interactive interpretation and environmental education.
- Tolay Lake Regional Park has deep spiritual significance.

Participants contributed comments on all of these aspects of the vision. These comments are summarized below.

- A wide range of preferences for recreational options or uses was expressed. While many participants contributed ideas for specific recreational and/or sporting uses, others urged an emphasis on preserving and supporting the existing natural and cultural resources and maintaining the serene nature of the park.
- Many participants expressed concerns about controlling dogs within the park, both for the protection of wildlife and increasing visitors' enjoyment of the park's natural resources. Suggestions ranged from a complete ban on dogs to keeping dogs on leash or within a limited, possibly fenced area away from trails and sensitive habitats.
- A number of participants emphasized the importance of protecting the spiritually significant aspects of the park for Native American culture and traditions.
- A few participants noted that it might be difficult to contain all these interests within the park to everyone's satisfaction, and some suggested solutions involving the creation of zones for different uses.

## Station 2: Natural and Cultural Resources and Agricultural Practices

### *Natural Resources*

At Station 2, the following questions regarding natural resources were posed to participants:

- What are the most appropriate approaches to grasslands management?
- What types of habitat (oak woodlands, riparian areas) should be restored or expanded?
- What is the best way of controlling invasive species and erosion?

Participants commented that the following considerations regarding protecting natural resources in the park were important:

- Protection and planting native plants, grasses and trees; removal of invasive plant species
- Protection of wildlife and wildlife habitat, including:
  - Keeping trails, dogs (and people) away from wildlife habitat and environmentally sensitive areas
  - Protecting birds (either in general or making reference to specific species).
- Approaches to restoration of natural resources including focusing on particular areas, long-term approach to monitoring and adaptive management
  - Grazing can be used as a method of grassland management.
- Restoration of Tolay Lake
- Maintaining and facilitating enjoyment of the scenery and views; facilitating connections to other regional resources

### *Cultural Resources*

Participants were also asked the following questions regarding cultural resources:

- What level of protection should be considered for historic resources?
- How should costs of protection be addressed?
- How can pre-historic resources best be protected?
- How should historic and pre-historic cultural resources be managed to enhance visitor experiences?
- How should historic buildings be used to enhance visitor experiences?

Participants expressed a number of ideas for protecting and managing cultural resources, as follows:

- It is important to protect historic and pre-historic cultural resources. Education is an important part of doing so.
  - Use cultural resources to educate visitors. Clarify the link of cultural resources to habitat restoration and the use of natural resources.
  - Use appropriate interpretation to educate visitors about historic and pre-historic resources and to place them in context.
  - Recreate historic culture in a respectful and quiet fashion – not “Disneyland.”
- Historic buildings and other features can be restored or re-used.
- However, a balance needs to be found between fully addressing the park’s history and the prohibitive cost of restoring all cultural resources.
- It’s crucial to protect and feature Native American culture, and involve the tribe in education, interpretation and preservation.

### *Agriculture*

Questions asked at Station 2 regarding agriculture in the park were as follows:

- How can grazing and other agricultural practices be carried out so they are compatible with recreational uses?
- How can pre-historic, historic and current agricultural practices best be preserved and interpreted?
- What types of participatory agricultural activities should be available?

Participants' comments regarding the use of agriculture in the park are summarized as follows:

- Many participants would like to see a certain amount of agriculture in the park. Suggestions included adding working gardens or farms, possibly a community garden, and that the focus be on local, organic and sustainable practices. These could also be used as an educational resource, demonstrating diverse agricultural methods.
- Grazing, used as a method of vegetation management, could also include an interactive educational element.
- Various other ideas about how to incorporate agriculture in education at the park were expressed at Station 4.

## Station 3: Recreation and Trails

Participants at Station 3 were asked the following questions regarding recreation and trails:

- What types of trails would you like to see at Tolay Lake Regional Park?
- What types of recreation activities are appropriate at Tolay Lake Regional Park?
- What types of overnight use (camping, bunkhouses) are appropriate at Tolay Lake Regional Park?
- What types of special events are appropriate at Tolay Lake Regional Park?

The wide variety of participants' suggestions regarding recreation and trails included:

- Trails for observing nature, including bird watching trails with blinds (possibly around the lake) and interpretive trails.
- Trails tailored for various uses including equestrian, running, or leading to sports areas.
- Expanding the trail system and linking to other regional trails or locations. Several noted that it's necessary to consider private property issues when doing this.
- A few participants recommended specific changes to trails such as removing the causeway over the lake.
- Activities focused on enjoyment of natural resources and wildlife, including: bird watching (with birdwatching trails, blinds created around the lake); viewing native plants (this could also include sales of natives.)

- Hiking and walking activities, including: educational hikes and nature walks for school classes and different age groups; dog-walking.
- Equestrian use and features supporting it including: a place for horse trailers to park and appropriate trails.
- Sports uses, lessons and education including: biking/mountain biking; hang gliding/paragliding; Frisbee golf; races or marathon events (biking, cross-country); and archery.
- Volunteer assistance activities including: trails work; vegetation management.
- Camping, including tent camping or perhaps cabin accommodations for school or scouting groups.
- Allowing night access, which could include activities such as stargazing/astronomy or night hikes and moonlight tours.
- Many participants urged that protection of natural resources be considered in all recreational uses. Areas could be limited, and visitors must be educated about this.
- Suggestions for special cultural events and festivals included: outdoor theatre or music; art festivals; festivals and events focused on natural and cultural resources and history; agriculturally themed events; and holiday events. The park could include a community events center of some kind.
- A few noted that all these recreational events and uses could be revenue generators for the park.

## Station 4: Education and Helping People Visit Tolay Lake Regional Park

### *Accessibility and Ease of Visiting*

The following questions were asked of participants at Station 4 regarding making the park easier for everyone to visit:

- How can we make Tolay Lake Regional Park easier to visit for all types of people?
- What should be done at Tolay Lake Regional Park to make it accessible for the disabled?

Comments made by participants regarding accessibility and ease of visiting are summarized below.

- Improve the entrance road, perhaps create an alternative entrance.
- There need to be at least some accessible trails for disabled and seniors. Americans with Disabilities Act (ADA)-accessible trails, paved trails, and possibly boardwalks in wet areas could all be useful.
- Create multi-use bridges to improve access over waterways.
- Add more and more accessible restrooms and rest areas – along trails, around park – and also accessible picnic areas.

- Make it easier to get to the park via transit or without driving. This might include creating better bike access.
- Other general ideas for making it easier to visit the park included: expanding the park hours to include more days, evening and nighttime hours; good maps; and more parking.

### *Education and Technology*

Participants at Station 4 were also asked the following questions regarding education and the use of technology at the park:

- What types of educational programming should occur at Tolay Lake Regional Park?
- How should technology be used to enhance visitor experiences at Tolay Lake Regional Park?

Participants' many suggestions for educational programs and the use of technology to support them included:

- A variety of tours, talks, storytelling and classes. These could be used to publicize the park and draw more users.
- Use local resources and groups that are already involved with the park; bring in events/groups that are part of the Fall Festival such as the animal groups to the park at other times of year.
- Create a park docent program with training. All stakeholders could participate in supporting this program.
- Could also create volunteer opportunities, such as trails work or patrols.
- Provide education for all ages, including children/school groups.
- Environmental classes and stories, including subjects such as nature and wildlife in the park and avoiding natural hazards.
- Agricultural and gardening practices for all levels; permaculture and organic land management, ecosystem management; gardening and nutrition; sustainable pest management; also related features such as a farmers' market.
- Education on themes such as the history, future and stewardship of the land. Emphasize a sense of place and the sacred/magical aspect of the land, noting that the park can also be a place to come and just enjoy the land.
- Education on cultural history including historic house or farm exhibits, Hispanic history, and Native American cultural traditions.
- Nighttime programs including astronomy. This would also serve the purpose of providing activities for campers.
- Health-oriented programs for various ages including fitness, meditation and retreat programs.
- There could be interpretive signs or panels, historic photos, etc. throughout the park.

- Focus on using online resources to enhance the park experience. This includes enhancing the website, including more information on the park and what to expect when you visit; using interactive social media; and ideas such as live webcams to watch migrating birds.
- Possibly create specialized apps for the park, and include scan panels on interpretive signs. Also provide podcasts or tapes for self-guided tours.

## Comments on Public Participation

A number of workshop attendees commented on their appreciation of the opportunity to contribute input and that they felt the workshop was well-organized and facilitated.

# Tolay Lake Regional Park Master Plan Workshop #1
# June 15, 2013
# Appendix A: Participant Comments

## *Station 1: Park Vision: Ideas We've Heard*

- Daytime music and arts faire
- Native plant restoration of all types – grasses, bushes, trees, etc. Get out the invasives. All the different habitats present: woodlands, riparian, wetlands, grasslands. Get the animals back – Elk?
- Dogs on leashes with responsible owners
- No dogs please. They drive out native animals. Also – visitors will see much less wildlife with dogs allowed
- Fenced dog park away from sensitive wildlife areas – i.e. Ed Leven Park in Santa Clara
- Develop park with connectivity of historic road (No cars, 2 access points), but have uses within zones (hiking, horses, emergency vehicles)
- Move the parking lot for horse trailers to the old barn at the top of the hill so that trucks and trailers that can't make it up the hill can still come to enjoy the park
- Tolay Lake could be the premier hang gliding and paragliding training center (and only one to date in Sonoma County)
- Entrance off of 121?
- Overnight camping
- Archery range
- Astronomy
- Benches (dedication)
- Remove causeway trail from the lake. Should not be trail in the sacred lake
- Continuation of the East ridge trail to hook up behind Vista Pond
- My concern is for all the grassland bird species of special concern. There needs to be protection of these species, especially from dogs and people going off the trail. Keep trails away from sensitive areas.
- Cultural resource protection – very important
- Local agricultural products – flowers, food education
- No dogs, or dogs limited to certain areas
- No dogs on horse trails.

## *Station 2: Natural and Cultural Resources and Agricultural Practices*

### Natural Resources

- Concentrate in a few areas to restore
- Support and protect birds
  - Pacific flyway
- Bird blinds along lake
- Lake restoration improvements for natural and cultural reasons
- Prevent mosquito habitat

- Facilitate views
  - Connections to other special places like Mt. Diablo and Mt Tam
- Don't cluster many uses around or near lake; keep that area peaceful
- Education is a huge part
- No dogs off leash near farm animals or wildlife
  - Consider dog-free zones
- Protect grassland birds
  - Dogs off leash - how to enforce this?
- Need long approach to monitoring/assessing impacts, and uses
  - Adaptive management
- Acre feet of lake?
- Grazing
- Grazing improvement for vegetation management for fire protection
  - Private land

## Cultural Resources

- Display to explain cultural resources and history
  - Link to habitat restoration
    - Plant uses: medicine, tools etc.
  - Re-creation of housing, life crafts
  - Not a Disneyland feel
  - One of the most sacred places -- must respect this
  - Quiet experience
- Use to demonstrate what Central Valley was
- Restore old historic road from 121 - but not for cars
- Consider secondary access
- Building condition
  - Several buildings can be re-used

## Agricultural Practices

- Some agriculture is OK
- Native plants - demo garden
  - Nursery
- Local gardens: Vegetation/flowers
- Add a working farm - organic and sustainable
- Farm - possibly lease this out
- Include an interactive element in grazing and farm practices
- Show diverse agricultural methods from small farmer
- Trace the evolution of the Cardoza Era (e.g., economic, environmental, cultural)
- Essential to protect prehistoric resources from theft
  - Need appropriate interpretation
  - Contextualize it
- Cost-prohibitive to address all of history
  - Don't feel need to preserve all buildings
  - Keep all stories alive
  - Be present to this time

## *Station 3: Recreation and Trails*

- Bird watching
- Equestrian
- Hike in camping
- Fall festival
- Education series
  - Kids
  - Adults
  - Class hikes
  - Nature walks
- Bicycling
- Dog-walking
- Hang Gliding and Paragliding
- Frisbee golf
- Scouting: camping
- Adopt-a-trail with high schools
- High school cross-country races
- High school mountain bikers
- Running events - marathon fundraisers
- Farm and ranch events
- Trail work - development maintenance
- Canoeing, kayaking
- Dispersed picnic area
- Trails - multi-use and specialty trails use
- Single track and fire road - multi-use (Annadel)
- Loop trails
  - Connections - varying sizes
- Trail to hang gliding launch
- Bird watching trails around the lake
- Interpretive trails
- Maximum number of miles of trails to accommodate users
- Limiting use for dog walk trail areas
  - Compatible uses
- Links to local and regional trails
  - Be considerate of private property issues, easements
- Overnight use
- Keep in park center
- Night sky stargazing
- Equestrian trailers
- Scout jamborees
- Tent camping
  - Could benefit visitors from farther away
- Yurts/bunkhouses for school groups (in park center)
- Revenue generator
- Vegetation management
  - Including restoration of native plants, burning, grazing, etc.

- Recreation
  - Understand sacred areas
    - Interpretation/awareness
- Night access
  - Observing nature, astronomy
  - Special guided tours, permits
- Overnight use
  - Small camping area in park center
  - Moonlight tours
- Special Areas!
- Renaissance faire
- Limited amplification
- Cultural history events
  - Mission days
  - Agricultural history (scything)
- Music concerts
- Lesson set for hang-gliding
  - Exposition of sport
- Equestrian event
  - Poker ride, Wildflower ride, cultural ride and limited distance
  - Trailer rodeos
- Full moon events
- Archery festival
- Art festival
- Sheep herding for dogs
- Shakespeare - outdoor performances
- Outdoor theatre
- Special Events
  - Fourth of July fireworks viewing from East Ridge
  - Fall festival (noncommercial)
  - Spring festival (focused on native tribes)
    - Lake, river
- Native plant sale
  - Native plant nursery on site
- Consider issues of trespassing onto adjacent properties
- Dirt trails for running
- Expanded system
- Extend ridge trail and loop (to raceway)
- Lose the causeway trail
- Blinds on trails to observe nature
- Include interpretive signs
- Remove invasive plants - e.g. star thistle

## *Station 4: Education and Helping People Visit Tolay Lake Regional Park*

### Accessibility

- Fix roads
  - Fill in ditches – if not needed for drainage
  - Flatter?
- A few paved paths for access
- Need good accessible trails if hosting low impact exercise for seniors
- Continued tribal use
- Access
  - More days, evening hours
  - Full moon - night time
- More transit
- Adopt-a-neighborhood program?
- Restrooms
  - Between two parks
  - Rest areas
  - Along trails
- ADA trails - loop around lake
  - Boardwalks in wet area
- Multi-use bridge – creek crossings at Sears Point Rd.
- Having shuttles for access
  - Transit from Petaluma (non-driving)
    - Bikes?
- Expanded parking
- Accessible picnic areas
  - Easy to get to – transportation to them for ADA
- Well printed maps

### Education

- Astronomy events
  - School trips
- Environmental classes
  - Farming
    - History of ranch, cultural history
  - Birding
- Wildflowers
- Awareness of natural hazards
  - Ticks, snakes, etc.
- Historic aspect of ranching
- Native American history
- Features of Annual Festival - have year-round or at other times
  - Reptile group
  - Animal rescue
- Historic house set-up

- Astronomy
- Gatherings on history, natural history
  - Give tours with stories
- Learning Centers
  - Gardening - all levels
  - Permaculture
  - Organic pasture and land management - for park and neighbors
  - Pest and weed cycles, weather - How to prepare
- Ecosystem management
- Traditional ecological knowledge
  - Gardening and wildland practices
  - Nutrition/gardening
  - Use local resources
- Farmers market
- Low-impact exercise for seniors – flat terrain
  - Need good trails
- All history - talks
  - Hispanic
  - Native
  - California (CA) history society is a resource
- Storytelling
  - For kids
- Wildlife info/stories
  - for kids (at pumpkin patch)
- Full moon – night time programs
  - Meditation
  - Programs for campers (help control, provide activities)
  - Evening dinners
  - Retreats (no RVs)
- Publicize the park through oral history programs
  - Everyday life
  - Farming
  - Cultural traditions
    - Miwok stories
  - Geography speaks for itself with view of all 4 highest mountain peaks in area
- Beautiful historic photos with info in parking lot and buildings
  - Tule Elk
  - Grizzly
- Docent-led theme hikes
- Interpreter panels all over
  - On trails
- Docent training
- Photography workshops
- Volunteer opportunities
  - Trail maintenance
  - Patrols

- Use existing resources to create educational programs
  - Astronomical society
  - Existing groups/programs
    - Native plant society
    - Graton Rancheria
- Continuation of child education
- Education on themes
  - History (and future!) of land
    - Stewardship
  - History of sacred aspect of land (not Disneyland!)
- Also a place to come, do nothing!
- Create a sense of place with the land - especially for kids
- Opportunities to help with stewardship
  - The sense of arriving at a magic place
- Docent training
  - All stakeholders participate
  - Rich, deep store of knowledge

### Use of Technology

- Self-guided tours
  - Podcasts or tapes
- Educational Apps
  - Have scan panels on interpreter signs
  - Have embedded signage and interpreter panels
  - Cows destroy them otherwise – have portable fencing to keep them out?
- Enhanced website
  - History
  - What to expect
  - More info for new visitors
  - Create specialized apps for park
- Apps/Facebook – use interactive social media
  - Reach youth, all groups
- Live webcams
  - migrating birds
- Solar panels or wind for power

## *General Comments*

- Community events center – 150 people, resident Lakeville
- Are the flowers around the park native flowers?
- Short-eared owls have been seen here, yes? If so, they should be added to the list of special-status wildlife occurrences. Wintering habitat is important even if they are not nesting here.
- Why is it that plants like the ones we have around the park aren't sold in the stores?
- A place for community gardens

- It sounds and looks like the park wants to satisfy too many diametrically opposed interests to do a good job on any of them. Needs to define what public services and direction it should emphasis for this unique location
- Some plants and flowers have a mixture of colors. Is that their exact natural color?
- Why are most of the trails hidden
- Most of these flowers are rare like the animals. Is this true?
- Thank you Ranger Brandon for welcoming horses!
    - Thank you!!

## *Comment Cards*

- Wonderful! Lots of good ideas. The right people attended. Thanks!
- I was very impressed with the format of the workshop! We are very excited about all of the activities proposed and look forward to the next step in the process.
- Thank you for the opportunity for public forum. Great workshops and facilitation.
- Thank you for the workshop. It was a good format. I have concerns that I would not like to see hang gliding. I would like to see active Native American tribe Graton Rancheria be involved in the education, interpretation, land restoration – that's in order for tribal use of cultural practices, gatherings, etc. I would like to see ecological knowledge be incorporated in land management and restoration of land.
- Please emphasize the unique resources here in planning activities and facilities. Do not need all the activities (people, cars, etc.) offered elsewhere. Keep the serene nature of the park – restore the lake, permits, with low-moderate intensity of activities.

## *Comments Submitted via Email*

### Email Comment #1

I want to support ideas for equestrians, especially a circular route that goes up to 3 Bridges and comes down on the other side.

Gates that open towards the center of the trail rather than facing a drop off would also be appreciated (one in particular above the vineyard).

Some native trees along the trails would be much appreciated. Perhaps native trees had been removed to make the place more farmable.

It would be great to have one place under a tree near a trail where bicyclists, hikers, or equestrians can stop on a bench and enjoy a view while sitting. I would consider contributing by dedicating a bench for my late husband who enjoyed riding his horse there with me. For that and other reasons, Tolay is very special to me to be user friendly for horses.

### Email Comment #2

I am a dog owner and enjoy walking and hiking with my dog. However, I would like to advocate that Tolay be a dog-free zone.

For approximately ten years I lived in Los Altos near the Rancho San Antonio open space park. Dogs were not allowed in that park. I was not aware of that during the time I used the park, but was struck by it when I visited the park again after having moved to back to Petaluma. When I ran or hiked in Rancho San Antonio, I often saw wildlife. In some cases, I shared the trail with the wildlife. This ranged from wild turkeys and deer to bobcats and snakes. When I hike in parks around Petaluma, I rarely see wildlife. I know it is there, but I don't see it. I can't help but think that this is due to the fact that dogs are allowed in almost every park near Petaluma. The only park nearby that bans dogs is Olompali, but that park is adjacent to an area that does allow dogs. I have seen dogs in Olompali, chasing deer.

Unfortunately, no matter how many dog owners are responsible, there is no way to police an entire park and there are always dog owners who ignore leash rules. At a park as large as Tolay, it would be very difficult to effectively guarantee all dog owners would follow the rules.

I would really like to have one park nearby that is dog free and where wildlife can become accustomed to seeing people without fear of being chased.

### Email Comment #3

This Park needs a frisbee golf course.

### Email Comment #4

I'd like to make a few short general comments:

1. I'm all in favor of keeping the park as quiet and unspoiled as possible for wildlife and people. Dirt trails rather than asphalt. Hiking, rather than mountain bikes or horses. Maximize opportunities for quiet walks in nature viewing wildlife - without disturbing it, so far as that is possible. Minimizing games, noise, etc. except perhaps in small, limited areas closest to the buildings and parking lot.

2. It would be wonderful if it would be possible to attempt some native grassland restoration to replace some of the vast amounts of nonnative invasive grasses.

3. Whatever is most respectful to the Native Americans in terms of returning the "charmstones" to where they feel they ought to be…

Thank you for the opportunities for public comment!

# TOLAY LAKE REGIONAL PARK MASTER PLAN
# SUMMARY OF COMMUNITY WORKSHOP #2

100 Adobe Canyon Road
Kenwood, CA 95452

*February 2014*

# I. Introduction

The Sonoma County Regional Parks Department is currently preparing a long-term Master Plan for Tolay Lake Regional Park. The two properties comprising Tolay Lake Regional Park are relatively recent acquisitions, and the park is currently open to limited public access through the Day-Use Permit Program, as outlined in the 2008 Interim Plan. The Master Plan will address the creation of permanent improvements and increased public access.

The Tolay Lake Regional Park master planning process, which will take approximately two years, is divided into three major phases. During Phase 1, "Discovery," which took place between January and June 2013, the Tolay Lake Regional Park Master Plan project team conducted a variety of public engagement activities designed to solicit stakeholder and community input regarding desired future activities in the park. During Phase 2, "Plan Development," the project team is developing the Master Plan based on this input, as well as evaluations made on the basis of consistency with existing Regional Parks policies; impacts on health and safety; impacts to neighbors; costs to build, operate, and maintain; and consistency with federal, state and local environmental laws. The first step in Phase 2 was to develop conceptual plan alternatives for park development. The purpose of Community Workshop #2 was to get stakeholder and public feedback on the conceptual plan alternatives. This feedback will be factored into development of the draft Master Plan. Community Workshop #2 took place on January 16, 2014, at the Petaluma Community Center.

# II. Outreach

The workshop was promoted and advertised through a variety of methods, including:

- E-mail announcement to Regional Park Members, Tolay Lake Regional Park Day Use Permit Holders, and E-News subscribers
- Posting on the Sonoma County Regional Parks website, and Regional Parks Facebook page
- Advertisement in La Voz, a bilingual English-Spanish newspaper serving Sonoma and neighboring North Bay counties
- Press release to local media

# III. Workshop Format

The workshop was conducted by Sonoma County Regional Park Department (SCRP) staff with assistance from the Sonoma County Agricultural Preservation and Open Space District (SCAPOSD), Master Plan consultants MIG, Inc., and Master Plan project partners. Each participant received an agenda backed with information on how the public can continue to be involved in the Master Plan process; handouts on the park Vision, conceptual plan alternatives and interpretive concepts; and a comment form.

The evening began with a half-hour Open House, during which participants were encouraged to view displays depicting existing conditions at the park and detailing conceptual plan options. Three alternatives were detailed, with Alternative Option A having the smallest development footprint and Alternative Options B and C having successively larger footprints. Potential interpretive concepts and "story zones" giving information about different aspects of the park's natural, cultural and agricultural history were also listed, with a map displaying where these zones might be located. The following displays were included:

- Site Alternatives Framework, including:
  - Vision for Tolay Lake Regional Park
  - Highlights for Tolay Plan Alternatives
  - Potential Interpretive Concepts and Story Zones
- Plan Alternatives Table showing Planning Issues as addressed in Alternatives A, B and C
- Existing Conditions Maps:
  - Overall Project Area
  - Northern Park Core Area
- Conceptual Plan Maps:
  - Interpretive Plan with Proposed Interpretive Elements for Overall Project Area
  - Conceptual Site Plan Maps for Overall Project Area: Option A, B and C
  - Conceptual Site Plan Maps for Northern Park Core Area: Option A, B and C

The workshop portion of the evening was opened by Caryl Hart, Director of SCRP, who welcomed participants and introduced team members. Next, John Baas of MIG gave a PowerPoint presentation which provided an overview of progress on the Master Plan process to date and information regarding next steps.

At the conclusion of the overview presentation, Carolyn Verheyen of MIG explained the format of the "walking workshop" that followed. This consisted of two different stations where participants could view maps showing conceptual plan alternatives for the park, ask questions and contribute their feedback. (Three stations had originally been planned, but the number was reduced in order to allow more time for participants at each station.) The two stations were as follows:

- Station 1: Alternatives for Planning Issues; Conceptual Plan Options for Overall Project Area; Proposed Interpretive Elements
- Station 2: Conceptual Plan Options for Northern Park Core Area; Proposed Interpretive Elements

Workshop attendees were split into two groups of approximately equal size and given approximately 25 minutes to participate in discussion at each station. A bell was rung to mark the end of each session, at which time the groups switched places. During each session,

facilitators and project staff answered participants' questions and recorded their feedback on flipchart paper.

At the conclusion of the "walking workshop" discussions, the larger group reconvened for a final question-and-answer and comment period, facilitated by Ms. Verheyen. She reminded participants of the next steps in the process and additional participation opportunities including visiting the project website for further information. Participants were asked to submit comments prior to February 10th, when the next phase of planning begins, including an additional workshop and other opportunities to participate.

Participants were also encouraged to provide additional written comments via comment form. Since several participants had individual discussions with team members that were not recorded, Ms. Verheyen also urged participants to make sure they included any comments from these discussions on their comment forms. Ms. Verheyen clarified that participants need not support all elements of any given Alternative as a whole, but that they were free to "mix and match," or to make other suggestions. To this end, she also suggested that participants could mark their copy of the Alternatives Table handout to show which option they preferred for each planning issue.

# IV. Workshop Participation and Results

## *Participation*

Over 40 stakeholders and members of the public attended the workshop. The majority were Sonoma County residents. A variety of stakeholder groups were represented, including residents, local land owners, the Federated Indians of Graton Rancheria (FIGR), various public agencies, and representatives of specific user groups.

## *Results*

Participants' questions and comments, both those spoken during the workshop and written comments submitted via comment form or another method provided, are summarized below.

### General Comments

During the workshop and on their comment forms, participants commented on a wide variety of aspects of the conceptual plan alternatives and the plan process.

#### *Intensity of Park Development and Impacts*

A number of participants expressed reservations regarding the intensity of proposed development in the park, particularly of Alternative Option C with its fairly large footprint, and possible impacts on the park's serene, wild nature. Several noted that increased, unpermitted use will require greatly increased maintenance and management to ensure fee collection and rule enforcement, as well as calling for user responsibility. They referred to examples of other parks in the region where the property and features such as trails have degraded quickly due to popularity and inconsiderate use. Although many participants hope to see expanded features

and opportunities for activities at the park, there was some concern expressed that since the park is isolated and not easy to get to, development at the level of Option C would outstrip demand. Representatives of the FIGR also requested that certain vulnerable or sacred areas be protected from the impacts of greater park usage.

Participants noted concerns as well with the idea of overnight stays – whether camping or in buildings – and the associated impacts. It was suggested that such uses at least be concentrated in one part of the site, leaving large areas of the park open to landscape and wildlife. Some concern was also expressed that the cost of overnight stays in buildings would be exclusionary – campsites might be more inclusive and less disruptive.

Many participants were interested in seeing a mix of the options presented. It was noted that the master plan could be scalable; it's easier to plan for maximum use but not necessarily carry out all provisions of the plan, or to develop the park in phases.

### *Accessibility*

Participants expressed concerns about accessibility to and within the park, both in general and as regards access to roads and trails. They commented that the main access road, Cannon Lane, needs grading or paving and improved drainage, and that this should be addressed no matter what level of development is chosen for the rest of the park. It was also noted that the adobe soil makes trails hard to maintain, with cracked, uneven surfaces for which it is difficult to compensate.

### *Other Development Issues*

Other issues addressed included the location of parking, which some participants commented should remain where it currently is, or near the building at the top of the Cannon Lane entrance Road. Some comments addressed the renovation of buildings. It was noted that, while some of the buildings certainly need renovation in order to enhance their usage – the uneven floor surface in the Old Stone Barn was called out as an example – it's important to preserve their historic character. Participants made suggestions regarding funding of renovations or new buildings, including using donated funds to avoid an increase in County park taxes.

### *Trails, Hiking and Equestrian Uses*

Many participants strongly support expanding trails throughout the park, with more trails, bigger loops and clear directional signage. Opinion on the level of trail development and the types of trails was divided, however. Some participants favor multi-use trails allowing bicycling and horse riding. Others were chiefly interested in using the trails for hiking and to enjoy the landscape, plants and wildlife. Some of those in the latter group expressed a desire to limit or even outright opposition to multi-use trails, maintaining that the trails are destroyed by bikes and horses, and that such uses should be limited to established roads.

A number of strong advocates of equestrian use among the attendees detailed specific accommodations that they would like to see at the park, including equestrian parking in an

open and level area, water troughs with an easily accessible water source, and equestrian trails of varying length with features such as picnic tables and hitch rails in natural settings.

### *Involvement*

Regular users of Tolay Lake Regional Park were well represented among the attendees, and they showed strong enthusiasm and support for the enhancement of the park. Several participants commented on their appreciation of the opportunities provided for them to give input, and their approval of the process as well planned and inclusive.

### *Questions*

Participants also asked a number of questions throughout the workshop, on subjects including the following:

- How the conceptual plan alternatives differ, and whether the different options can be combined or phased
- Levels of development
- Historic conditions and uses of the park
- Timing of transfer of property to the County by the Sonoma Land Trust, and when development might begin
- Impacts on and potential restoration of plants, wildlife and the landscape
- Nature of trails planned (number, mileage, seasonality) and rules regarding trails
- How camping and overnight stays will be administered, and concerns regarding affordability of these options
- Details of specific uses such as equestrian use
- Funding for park development and ongoing operations, and issues related to possible revenue-creating uses
- Requests for information including availability of conceptual maps and volunteer opportunities at the park

## Support for Alternative Options

The comment form was set up to allow participants to indicate their level of support for the Alternative Options A, B and C for each of the three park areas, as well as to provide general or specific comments regarding park features or amenities they support or oppose. Nineteen comment forms were received, and two participants submitted a marked-up copy of the Alternatives Table to indicate their preferences for specific planning issues.

### *Northern Core Area*

The majority of comment form respondents supported Alternative Options A and B for the Northern Core area. Response to Alternative Option C was more evenly divided, with a slight majority in opposition. A number of respondents expressed concern about the larger footprint of Option C, with its potential for damage to the natural environment and necessity for expanded oversight. Rather than adding features such as overnight accommodations in houses,

food service and additional buildings, they would rather see what is already there preserved, developed and upgraded, with an emphasis on the natural environment and interpretation of the agricultural, historic and cultural aspects of the site. Some of these respondents are in favor of overnight camping, but not a bunkhouse or stays in buildings. Other respondents were more supportive of intensive development, including the opportunities for revenue provided by overnight stays, food service and other amenities.

Respondents' opinions regarding alternatives for existing buildings on the site also varied. There was a fair amount of support for some degree of renovation to the buildings, at least those that are in better condition, for varying uses including overnight stays, interpretation, equestrian uses and an artist-in-residence program. Some supported the idea of renovating the Stone Floor Barn for use as a Visitor Center; an equal number opposed it, with one suggesting a new building closer to the parking area. A few respondents supported improvement of the existing "Miwok Village" as a cultural gathering area, as well as continuing to use some of the buildings for maintenance and storage.

Respondents also were in favor of more trails and trail improvements. Suggestions included ensuring that at least some trails are smooth, walkable and ADA-accessible. Trail connectivity, with provision of connecting loop trails, was also called out as important, and it was suggested that accessible trails should run from the buildings out to the lake area.

A number of respondents commented on the north park entrance drive. They were unanimously in favor of improving it, at least to the extent of improved grading and drainage, although not necessarily creating a paved, two-way road. Participants also provided comments in support of specific uses such as bird watching and equestrian use.

***Central Park Area***

Comment form respondents' levels of support or opposition for the Central Park area alternative options were more varied than those for the Northern Core. Response to Alternative Option A was evenly divided. Option B was supported by twice as many respondents as opposed it; response to Option C was the other way around.

Only a handful of respondents provided comments to explain their response. Those who commented on their opposition to Option C were again concerned about overly intensive development threatening wildlife and habitat preservation, as well as the experience of wilderness. There was some support for more trails in this area; one respondent commented that their support for Options B and C was based on ensuring that there are sufficient trails.

***Southern Tip Area***

Altogether respondents indicated a greater level of support than opposition for all three Southern Tip area options, although a number were strongly opposed. Some respondents repeated the concerns they had voiced regarding options for the Central Park area.

There was some support for more trails and hiking access in this area, with the suggestion made that the trail plan for Options B or C be added to Option A. Several respondents supported more campsites in this area, but others felt that camping and other development in this area should be minimal due to its environmental sensitivity.

# Tolay Lake Regional Park Master Plan Workshop #2
# January 16, 2014
# Appendix A: Participant Comments

## *Station 1: Southern Tip and Central Park Area*

- What is total # of miles of trails under each option?
- What is the timing of the transfer of the land deed from Sonoma Land Trust to SCRP?
- Will the maps be made available online?
- What constitutes saturation of use?
- Tolay not easy to get to -- destination park
- Intensive uses historically: cattle more impactful than people
- What about resident owl if barn is renovated?
- Difficult to walk on floor in barn
- Not intensive uses in any options
    - Walk-in camping only
    - Equestrian uses
- Option "A" plus some trails from "B" would be good. Option "C" may be too much due to sensitive resources and water constraints.
- Isn't enough demand for option "C," don't see draw due to lack of trees, amenities
- Like extra trails in "C" with option "A" amenities
- Support "B" or "C" for hikers and equestrians
    - Need more trails and bigger loops
    - Need to spread out more
    - Signage is key
- Will trails be seasonal?
- What are key differences in the options?
- Can we phase in from "A" to "C" as more money becomes available?
- Why more ranger residences?
- What is impact on animals and plants?
- Like idea of more trails to enjoy plants and animals
- Is there a plan to restore all native plants?
- Change from pastoral landscape?
- With equestrian center, will there be boarding or day use?
- Are people allowed to go off trail?
- Are there volunteer opportunities?
- Residence for ranger in camping area?

## *Station 2: Northern Park Core*

- Was the lake larger in historic times?
- How will overnight stays work?
- Where is the North Core?
- Is there a map showing all three options?
- When will the property be transferred to the County by the Land Trust?
- FIGR would like to know more specifically where the viewpoints will be located. Also, what exactly will be built or disturbed?
- Where does operations money come from? How will it be financed? Bonds?
- Can high-value options from "C" be added to "A?"
- When can development begin?
- Are we creating a two-tier system, where only affluent visitors have overnight stays?
- Rancheria wants some areas protected
- Concerns regarding ADA compensation on trails: Adobe spoils underlying trails, is uneven and difficult to negotiate. Little can be done about cracks.
- Access is important, especially around lakes
- Equestrian parking – needs to be one big open area (dairy barn)
- Will there be accessible water for water troughs at horse parking?
    - Like idea of equestrian parking on west ridge, not up and down hill
- Please improve access roads
- More bird watching trails
- Include Cannon Road to bottom of hill by ranger residence – bad spot. Pave – even consider in option "A."
- Option "A" – does that include improving drainage on the access road?

## *Comment Forms*

### Level of Support and Associated Comments

| PARK AREA: NORTHERN CORE | | | | |
|---|---|---|---|---|
| | | | | |
| 1 | Strongly Support | Strongly Support | Strongly Support | I support business profit center models for development of income generating structures - go upscale and charge $200/night rentals and do full service, including food for sale like Yosemite does |
| 2 | -- | Strongly Support | -- | -- |
| 3 | Support | Support | Support | -- |
| 4 | Strongly Support | Support | Strongly Oppose | • Option C has too much human footprint, too much oversight by SCRP. (ie overnight places to stay in bldgs.)<br>• Ensure connecting loop trails<br>• Ensure ADA trails from bldgs. Out near lake area<br>• Option A has too few trails |
| 5 | Support | Strongly Oppose | Strongly Oppose | -- |
| 6 | -- | -- | -- | • Don't renovate stone barn - expand equestrian use.<br>• Upgrade road access.<br>• No bunkhouse.<br>• Overnight stays in residences |
| 7 | Support | Strongly Support | Support | • Improve access roads and trails, like idea of overnight building or camping<br>• As soon as possible open central and southern hiking<br>• Bird watching |
| 8 | Strongly Support | Support | Strongly Oppose | Option C has too much development—too much human footprint. Seems to take away from natural environment |
| 9 | Support | Strongly Support | Support | I like Plan "C" but would not want to disrupt the animals and plants in a harmful way. |
| 10 | Strongly Oppose | Support | Strongly Support | -- |
| 11 | Support | Strongly Oppose | Strongly Oppose | -- |
| 12 | Strongly Oppose | -- | -- | Oppose using stone floor barn as visitor center. |
| 13 | -- | -- | -- | • Want to see use of the existing buildings. Do not use barn for visitor center.<br>• B v C = no food trucks or café<br>• B v C = no overnight in buildings. Camping ok. |

| PARK AREA: NORTHERN CORE | | | | |
|---|---|---|---|---|
| **Commenter #** | **Option A** | **Option B** | **Option C** | **Comment** |
| 14 | -- | -- | Support | • Would prefer parking lot location of "A."<br>• Would prefer visitor center near parking area - new building recycled wood/blending with the farm<br>• Small café (not machines) |
| 15 | Support | Support | Oppose | -- |
| 16 | Strongly Support | Support | Oppose | • I don't think that the site as it is now will draw enough people to support the more intensive alternatives.<br>• The place needs more trees<br>• More wildlife habitat, more places to sit, if possible more walkable (smooth) trails. |
| 17 | Support | Oppose | Strongly Oppose | • Not clear why overnight accommodation in houses in necessary or desirable; will revenue be worth it?<br>• Develop and upgrade what is there now rather than adding on<br>• Needs to maintain working farm feel and seriously upgrade the native elements which are scarcely visible. |
| 18 | Support | Strongly Support | Strongly Oppose | -- |
| 19 | Support | Strongly Support | Support | • Like the stone floor barn as VC. New VC would be nice but is it necessary?<br>• Support use of existing structures for accommodation and revenue |
| 20 | Support | Support | Strongly Oppose | -- |
| 21 | Support | Support | Strongly Oppose | -- |

| PARK AREA: NORTHERN CORE | | | | |
|---|---|---|---|---|
| | | | | |
| **Alternative Option A** | 4 | 11 | 0 | 2 |
| **Alternative Option B** | 6 | 8 | 1 | 2 |
| **Alternative Option C** | 2 | 5 | 2 | 8 |

| PARK AREA: CENTRAL | | | | |
|---|---|---|---|---|
| | | | | |
| 1 | Strongly Support | Strongly Support | Oppose | Too many camp sites - when hiking I want to see landscape and not keep running into tents and people eating. One large contained site for ease of management. |
| 2 | -- | Strongly Support | -- | -- |
| 3 | Strongly Support | Strongly Oppose | Strongly Oppose | -- |
| 4 | Strongly Oppose | Support | Support | • Support for more trails, maybe not as many as "C." but we need to plan for as many as possible to disperse use and available future trail openings<br>• "A" does not have enough miles of trail. |
| 5 | Oppose | Strongly Oppose | Strongly Oppose | -- |
| 6 | -- | -- | -- | -- |
| 7 | -- | -- | -- | -- |
| 8 | Strongly Oppose | Support | Support | -- |
| 9 | -- | -- | Strongly Support | -- |
| 10 | Strongly Oppose | Strongly Support | Strongly Support | -- |
| 11 | Oppose | Strongly Oppose | Strongly Oppose | |
| 12 | -- | -- | -- | -- |
| 13 | -- | -- | -- | -- |
| 14 | -- | Support | -- | -- |
| 15 | Oppose | Support | Strongly Support | -- |
| 16 | Strongly Support | Support | Oppose | • Again, I don't think the site warrants intensive development.<br>• I'm concerned about the wooden structures and not tent access creating a location that is focused upon the wealthy |

| PARK AREA: CENTRAL | | | | |
|---|---|---|---|---|
| **Commenter #** | **Option A** | **Option B** | **Option C** | **Comment** |
| 17 | Strongly Support | Oppose | Oppose | -- |
| 18 | Strongly Support | Oppose | Strongly Oppose | -- |
| 19 | Support | Strongly Support | Oppose | • More trails and campsites are great but wildlife and habitat preservation should be the determining factors.<br>• Support individuals back country campsites. |
| 20 | Support | Strongly Support | Oppose | -- |
| 21 | Strongly Oppose | Strongly Support | Oppose | -- |

| PARK AREA: CENTRAL | | | | |
|---|---|---|---|---|
| | | | | |
| **Alternative Option A** | 5 | 2 | 3 | 4 |
| **Alternative Option B** | 6 | 5 | 2 | 3 |
| **Alternative Option C** | 3 | 2 | 6 | 4 |

| PARK AREA: SOUTHERN TIP | | | | |
|---|---|---|---|---|
| | | | | |
| 1 | -- | -- | -- | -- |
| 2 | -- | Strongly Support | -- | -- |
| 3 | Strongly Support | Strongly Oppose | Strongly Oppose | -- |
| 4 | Strongly Oppose | Support | Support | • Support for more trails, maybe not as many as "C." but we need to plan for as many as possible to disperse use and available future trail openings<br>• "A" does not have enough miles of trail. |
| 5 | Strongly Oppose | Strongly Oppose | Strongly Oppose | -- |
| 6 | Strongly Support | Support | Oppose | • Balanced addition of more trails some campsites and equestrian usage. Like ability to hike more miles in southern portion of park.<br>• Tent sites. |
| 7 | Support | Support | Strongly Support | More access trails for bird watching. |
| 8 | Strongly Oppose | Support | Support | -- |
| 9 | -- | -- | Strongly Support | I like more hiking and trail access |
| 10 | Strongly Oppose | Support | Strongly Support | • Master plan for maximum use; you can always not build something.<br>• If you master plan for "A" then want/need more facilities, it's hard to do. |
| 11 | Oppose | Strongly Oppose | Strongly Oppose | A very environmentally sensitive area - minimal development. No camping. |
| 12 | -- | -- | Strongly Support | "C" more hiker specific trails would be great. |
| 13 | -- | -- | - | Supports "C"' with trails, add to plan "A" |
| 14 | -- | -- | Strongly Support | • More campsites. Old stone floor barn as interpretive center<br>• Many trails |

| PARK AREA: SOUTHERN TIP | | | | |
|---|---|---|---|---|
| **Commenter #** | **Option A** | **Option B** | **Option C** | **Comment** |
| 15 | Strongly Oppose | Oppose | Support | -- |
| 16 | Strongly Support | Support | Oppose | Like the other sections, I think less is more appropriate for this area |
| 17 | Support | Support | Support | -- |
| 18 | Strongly Support | Oppose | Strongly Oppose | -- |
| 19 | Support | Strongly Support | Support | -- |
| 20 | Support | Strongly Support | Support | -- |
| 21 | Strongly Oppose | Strongly Support | Oppose | -- |

| PARK AREA: SOUTHERN TIP | | | | |
|---|---|---|---|---|
| | | | | |
| **Alternative Option A** | 4 | 4 | 1 | 6 |
| **Alternative Option B** | 4 | 7 | 2 | 3 |
| **Alternative Option C** | 5 | 6 | 3 | 4 |

## General Comments

Commenter #5

- If park personnel were even to be able to manage this property once it is opened up (without a permit), they will need many more personnel to manage it, and ensure fee collection and rule enforcement!
- If there is a desire to build a new visitor center or restore an old barn then perhaps donated funds can be focused on this to avoid County park taxes increasing.
- I certainly hope this beautiful, unique, one of a kind, rare property will not be degraded in just a short time (decade?) Thank you in advance!

Commenter #8

- As an equestrian myself and one who advocates/represents equestrian interests, I am primarily proposing an expanded trail system with short and long loops, ample parking, water troughs, picnic tables and hitch rails within natural settings. Thank you for providing this workshop for user input.

Commenter #9

- The people putting this project together and presenting it to the public and neighbors have done a wonderful job. The process is well planned and inclusive. Thank you all I feel secure that you are doing the best job possible on a wonderful project.

Commenter #11

- The equestrian community sure has a strong voice. Do they own trail maintenance? As with all parks - the public will come. This area will degrade like the past parks. Look at the use of Taylor Mountain and it has been open how long?

Commenter #12

- Multi-purpose trails should be limited - horses and bikes destroy trails - keep them on the established roads. We don't need another Annadel Park with destroyed trails. Overall I support option "C."

Commenter # 13

- Some trails for hiking only multi use trails are destroyed by bikes and horses.

Commenter #14

- Keep parking as one drives in
- No backtracking of cars
- Keep buildings authentic

Commenter #17

- Strongly support development of more walking and riding trails; more lookouts
- Dogs off leash, hot air ballooning etc. - ridiculous! This is not Disneyland!

## Plan Alternatives

| Planning Issues | Preferences: Commenter #20 | Preferences: Commenter #21 |
|---|---|---|
| **Planning Issue:** North Park Entrance Drive | **Option A:** Improved grading and drainage | **Option A:** Improved grading and drainage |
| **Planning Issue:** Visitor Center | **Option A:** Renovate Old Stone Floor Barn | **Option A:** Renovate Old Stone Floor Barn |
| **Planning Issue:** Cultural Gathering Area | **Option A:** Improve existing "Miwok village" | **Option A:** Improve existing "Miwok village" |
| **Planning Issue:** Green House | **Option B:** Renovate and interpret site | **Option C:** Renovate for overnight stay |
| **Planning Issue:** Yellow House | **Option A:** Renovate for overnight stay | **Option C:** Renovate for overnight stay |
| **Planning Issue:** Old Stone Floor Barn | **Option A:** Renovate for Visitor Center | **Option A:** Renovate for Visitor Center |
| **Planning Issue:** Old Dairy Barn | **Option B:** Preserve framework for interpretation, incorporate equestrian parking | **Option C:** Reconstruct for Equestrian Center & Visitor Stables and incorporate equestrian parking |
| **Planning Issue:** Creamery/Winery | **Option A:** Stabilize and interpret | **Option A:** Stabilize and interpret |
| **Planning Issue:** Granary | **Option A:** Renovate for artist-in-residence | **Option A:** Renovate for artist-in-residence |
| **Planning Issue:** Old Shop | **Option A:** No change (storage) | **Option A:** No change (storage) |
| **Planning Issue:** Tractor Barn | **Option A:** No change (maintenance storage) | **Option A:** No change (maintenance storage) |
| **Planning Issue:** Storage/Equipment Shed | **Option A:** No change (equipment shed) | **Option A:** No change (equipment shed) |
| **Planning Issue:** Trails Development | **Option B:** Expansion of trails | **Option C:** Extensive new trail system for entire park |
| **Planning Issue:** Equestrian Activities | -- | **Option B:** Expand parking & staging at Old Dairy Barn |
| **Planning Issue:** Overnight Accommodations | **Option A:** One home for overnight stays in Cardoza Ranch residence | **Option C:** Overnight stays in four Cardoza residences, plus new bunkhouse accommodations |
| **Planning Issue:** Food Service | **Option A:** None | **Option C:** Small café with Ethnobotanical Center |
| **Planning Issue:** Single Unit Tent Camping | **Option B:** Single tent hike-in sites in backcountry | **Option C:** Expanded single tent hike-in sites in backcountry |
| **Planning Issue:** Group or Equestrian Camping | **Option A:** One hike-in group/equestrian site in backcountry | **Option C:** Three group/equestrian hike-in sites in backcountry |
| **Planning Issue:** Interpreted Historical Ranch Buildings | **Option A:** Visitor Center at Old Stone Floor Barn, at Green House, and Creamery | **Option C:** Old Stone Floor Barn |
| **Planning Issue:** Park Staff Housing | Leave to park staff decision | **Option A:** No change (two ranger residences in existing ranch homes) |
| **Planning Issue:** Park Maintenance Facilities | Leave to park staff decision | -- |

# TOLAY LAKE REGIONAL PARK MASTER PLAN
# SUMMARY OF COMMUNITY WORKSHOP #3

prepared by:

MIG

100 Adobe Canyon Road
Kenwood, CA 95452

*May 2015*

# I. Introduction

The Sonoma County Regional Parks Department (SCRP) is currently preparing a long-term Master Plan for Tolay Lake Regional Park. The Park Master Plan is being prepared for two properties that will constitute the future park, the current Tolay Lake Regional Park acquired by SCRP in 2006 and Tolay Creek Ranch currently owned by the Sonoma Land Trust. Tolay Lake Regional Park is now open to the public providing limited access only through the Day-Use Permit Program in accordance with the approved 2008 Park Interim Plan. The Park Master Plan will address increased public access to the park and the creation of permanent park improvements.

The Tolay Lake Regional Park master planning process is divided into three major phases. During Phase 1, "Discovery," which took place between January and June 2013, the Tolay Lake Regional Park Master Plan project team conducted a variety of public engagement activities designed to solicit stakeholder and community input regarding desired future activities in the park.

During Phase 2, "Plan Development," which is currently ongoing, the project team is developing the Master Plan based on community input, as well as evaluations made on the basis of consistency with existing Regional Parks policies; impacts on health and safety; impacts to neighbors; costs to build, operate, and maintain; and consistency with federal, state and local environmental laws. The first step in Phase 2 was to develop conceptual plan alternatives for park development. These alternatives were presented at Community Workshop #2, held on January 16, 2014, for feedback from stakeholders and the public. Community members were also able to provide input through correspondence submitted through the project website or via email. The input collected was compiled, a preferred alternative identified, and a final working draft layout for Tolay Lake Regional Park created. This includes trail alignments, lake restoration alternatives, groundwater source identification, a wastewater system plan and an interpretive plan.

Community Workshop #3 took place on April 22, 2015, at the Petaluma Community Center. The purpose of Community Workshop #3 was to present the final working draft layout and other draft plans for the park, answer questions and gather any additional feedback.

# II. Outreach

The workshop was promoted and advertised through a variety of methods, including:

- E-mail announcement to Regional Park Members, Tolay Lake Regional Park Day Use Permit Holders, and E-News subscribers
- Postcards mailed to Regional Park Members, Tolay Lake Regional Park Day Use Permit Holders, and other interested parties
- Posting on the Sonoma County Regional Parks website, and Regional Parks Facebook page

Press release to local media

## III. Workshop Format

The workshop was conducted by Sonoma County Regional Park Department staff with assistance from Master Plan consultants MIG, Inc., and Master Plan project partners. Each participant received an agenda backed with information on how the public can continue to be involved in the Master Plan process, a factsheet giving details of some of the facilities that the park will include, and a comment form.

The evening began with a half-hour Open House, during which participants were encouraged to view maps and displays depicting preferred options and draft plans for various aspects of the park. There were two general displays summarizing potential new options for the park, with the remainder of the displays organized into three stations corresponding to different areas of the park, as follows:

General Displays

- Site Options Framework, including the Vision for Tolay Lake Regional Park, Highlights for Tolay Plan Options A-C and the Preferred Option, and potential interpretive concepts and "story zones" giving information about different aspects of the park's natural resources, cultural resources and agricultural history
- Potential New Features, with example photographs of potential new park features

Tolay Park Interior

- Map of Draft Preferred Trails Plan for entire park
- Map of Draft Conceptual Interpretive Plan for entire park showing interpretive story fields and themes, existing and proposed self-guided interpretive trails, and potential media types used
- Map of potential Park Restoration Areas and Biological Communities
- Map of proposed Emergency Access Plan

Northern Park Core Area

- Map of Draft Preferred Conceptual Site Plan for Northern Park Core Area
- Map of proposed Emergency Access Plan for Northern Park Core Area
- Map of proposed Cannon Lane Road Improvements Plan
- Map of proposed Wastewater Improvement Plan for Northern Park Core Area
- Map of proposed Test Groundwater Borehole Location Plan

Tolay Lake Restoration

- Tolay Lake Restoration Goals
- Tolay Lake Restoration Alternatives – Pros and Cons
- Evaluation of Three Alternative Lake Restoration Designs using Water Budgets
- Details of Preferred Tolay Lake Restoration Alternative #1

The workshop portion of the evening was opened by Caryl Hart, Director of SCRP, who welcomed participants and introduced team members. Welcoming addresses were also given

by Sonoma County Supervisor Rabbitt and Carol Eber of the Sonoma County Parks Foundation. Next, John Baas and Katrina Hardt-Holoch of MIG gave a PowerPoint presentation which provided an overview of progress on the Master Plan process to date and information regarding next steps.

At the conclusion of the overview presentation, participants were encouraged to ask questions regarding the process, and also to provide written comments via comment form. Participants' comments will be received until May 21, 2015. All materials from the workshop were posted on the project website on May 8, 2015. The input received will be compiled and evaluated and incorporated into the preparation of the comprehensive Draft Master Plan. The completion of the Draft Master Plan will conclude Phase 2, and Phase 3 of the process, the "Environmental Impact Report (EIR)," will begin.

Carolyn Verheyen of MIG explained the format of the "walking workshop" that followed. Workshop attendees were encouraged to divide themselves up into smaller groups and visit each of the three display stations for a period of approximately 20 minutes. At the end of each 20-minute period, attendees were encouraged to switch stations. During each session, facilitators and project staff answered participants' questions and recorded their feedback on flipchart paper.

# IV. Workshop Participation and Results

## *Participation*

Approximately 40 stakeholders and members of the public attended the workshop. The majority were Sonoma County residents. A variety of stakeholder groups were represented, including residents, local land owners, the Federated Indians of Graton Rancheria (FIGR), various public agencies, and representatives of specific user groups.

## *Results*

Participants' questions and comments, both those spoken during the workshop and written comments submitted via comment form or another method, are summarized below.

### Comments on the Park Interior

#### *Trail Features and Accessibility*

Participants made a number of comments and asked questions regarding trail features and accessibility. They would like to see use of the park maximized for hikers, bikers and equestrians, and trails implemented before other features. Suggestions regarding the nature of the trails included that they be usable in all weather and that they be planned to allow for growing levels of use. Participants expressed concerns that cyclists will use de-commissioned trails, and that cattle in the park will make grooves in trails that are a detriment to use. They would like to have the trails with features for rest, shade and water clearly identified. They asked whether hiking-only trails will be constructed by hand, and whether stream crossings will feature bridges.

### *Equestrian Parking and Access*

Participants commented on the need for designated horse trailer parking to support equestrian use. They called out both good and bad examples set by other multi-use parks with heavy equestrian use, noting that having horse trailer parking well marked and appropriately sited will keep it from being overrun by cars, and that features such as horse troughs are also appreciated.

### *Other Park Interior Features*

Participants also suggested shuttles (e.g., golf carts) to provide access to the park interior for mobility-challenged visitors, simple structures such as yurts for single-family overnight use, and that the natural character of the park be maintained.

## Comments on the Northern Park Core Area

Participants had a variety of questions regarding features of the Northern Park Core Area, the portion of the park accessible from Cannon Lane.

### *Road Improvements*

Several participants wanted to know about road improvements to be made, how roads would be widened, where the roads will be paved, how equestrian staging would work, and how money would be raised for these improvements. They also expressed that improvements must be made to allow for increased traffic into the park from Cannon Lane.

### *Northern Core Features and Park Accessibility*

Participants asked about entry into the park and the accessibility of various Northern Core area features. They were curious to know at what time of the year the park is currently open to three-day-a-week use, whether permit holder key cards will continue to work, when the Visitor Center will be built, and whether the Northern Core will be busy in the future. They expressed concerns regarding accessibility of the lake area. Participants also inquired where camping will be located, and whether it is true that no large vehicles such as campers will be allowed. One participant made suggestions regarding occasional evening events such as movies, music and lectures.

Comments on the map displays included a discussion of the Emergency Access Plan map and the suggestion that symbology on maps and signage be consistent with that used elsewhere in the region. Participants also asked questions regarding the proposed Test Borehole Location map, including whether the soil type changes, whether there is already water on the property, and when testing will take place.

## Comments on Lake Restoration Options

Participants' questions about the lake area and lake restoration options included whether there would be exclusionary areas, whether there was concern about the lake's impinging on cultural resources, whether it will be a "real" lake, what the planned depth of the restored lake will be, and whether there is a policy against beavers establishing themselves. They also expressed

their support for the lake restoration and suggested features such as living history and pre-history exhibits, including a linear timeline of the lake's history.

# Tolay Lake Regional Park Master Plan Workshop #3
# April 22, 2015
# Appendix A: Participant Comments

## *Park Interior Station*

Concern that cyclists will use de-commissioned trails

Cattle/bulls make grooves that are difficult for bikers (and all users)

Maximize use for hikers, bikers, and equestrians

Implement trails first

Will crossing be bridges?

Will hikers-only trails be cut by hand?

Make sure these are all-weather trails

Keep it all natural

Plan trails to complement growing levels of use

Consider simple structures (e.g., yurts) for single-family overnight use

Consider shuttles (e.g., golf carts) to provide access to interior of park for mobility-challenged

Identify which trails have features for rest, shade, and water

## *Northern Park Core Area Station*

Who raises money for road improvements? Have to do something to deal with traffic

Concerns raised regarding accessibility of the lake

Discussion of Fire Plan:

- Use uniform symbols

Will North Core be busy?

When will Visitor Center be built?

Will key cards keep working?

When does 3-day-a-week use begin?

Questions re camping:

- Where is camping?
- Is it true there will be no big vehicles allowed?

How will roads be widened?

- What will be paved?
- How will equestrian staging work?

Questions regarding borehole map:

- Does soil type change?
- Is there already water on the property?

- When will testing take place?

Suggestion of including evening movies, music, lectures (till 8:30 pm)

- Put in a small amphitheater
- Like Sugarloaf
- Summer concert series
- If moving old native village area, that would be a good place
- Neighbors might sponsor these events

## *Lake Restoration Station*

Will there be exclusionary areas?

Lots of specific questions…but much support

Is there concern about the lake impinging on cultural resources?

Would the lake impact any heritage areas?

Add living history (and pre-history) exhibits

Is it a real lake?

Planned depth of restored lake?

Ideally there would be a linear timeline of history

Is there a policy against beavers establishing themselves?

## *Comment Forms*

### Commenter #1

We would like to have group horse trailer parking facilities – not just back country camping. See Lake Sonoma for an example. The current parking lot would work.

Good job on the trails plan! Also like the Lake Restoration preferred option.

### Commenter #2

Please maximize hiking trails.

### Commenter #3

As an equestrian in Sonoma County, I am interested in Tolay as a trail riding opportunity. I would recommend looking at Shiloh as an example of a multi-use park that is heavily used as a trailering-in horse riding area. One thing that really works there is that the trailer parking area is not welcoming for car parking by being further from the restrooms, not paved, and off the main paved entrance. This works. What doesn't work so well is, for example, the parking lot for the Laguna trail off Highway 12. The horse trailer parking is not well marked, and frequently is filled with cars. And - don't worry about putting in hitching rails – everyone just uses their trailers. But horse troughs are much appreciated.

appendix b

# Conceptual Site Plan Options

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

## Developing Conceptual Site Plan Options

Three site plan options were developed for the Park. Options included built features and access to the Park, features that provide visitor services (e.g., kitchen, overnight bunkhouse) and addressing park administration, operations, and maintenance needs (e.g., new ranger residence). Proposed features were located to avoid impacts to natural and cultural resources.

As concepts were developed, options were evaluated against six screening criteria that included: support of the Park Vision, support of public interest, most compatible with stakeholder concerns, protection of public health and safety, minimizes environmental impacts, and avoids prohibitively high costs. Site plan options were evaluated in a "pass/fail" manner; all options had to pass each of the six criteria referenced above. The three options (Figures 5-1 through 5-6) provide a range of intensity of development and are summarized below.

Alternative Option A

- Smallest footprint
- Stone Floor Barn becomes the Visitor Center
- Improve existing "Miwok Village"
- New equestrian staging area
- Overnight use in Yellow House
- Single unit camping
- ADA upgrades to existing roads/trails
- Minimum new hiking trails in southern area

Alternative Option B

- Larger footprint
- Tractor Barn becomes Visitor Center
- New tribal focused gathering area
- Expanded equestrian staging
- Overnight use in all former residences
- Limited single unit & group walk in camping in backcountry valley floor
- Expand multi-use & hiking trails

Alternative Option C

- Largest footprint
- New Visitor Center constructed
- Tribal focused area and multi-cultural gathering area at "Miwok Village"
- Overnight uses in all former residences
- Expanded group walk-in sites in backcountry valley floor and single unit sites
- Extensive new multi-use and hiking trail system for entire park

Table 5-1 shows the design planning issue and the conceptual site plan components for options A, B, and C.

| Table 5-1 Preliminary Conceptual Site Plan Components and Options | | | |
|---|---|---|---|
| Design-Planning Issue | Option A | Option B | Option C |
| Cannon Lane Access | Improved grading and drainage<br>2-way spur to and from equestrian staging area | Paved, 2-way traffic | Paved, 2-way traffic |
| Parking | 128 spaces in Park Complex<br>6 equestrian spaces at Old Dairy Barn location | 130 spaces in Park Complex<br>20 equestrian spaces and 5 auto spaces at Old Dairy Barn location | 100-172 spaces in Park Complex<br>20-38 equestrian spaces and 5 auto spaces at Old Dairy Barn location |
| Visitor Center | Renovate Stone Floor Barn | Renovate Tractor Barn | New building |
| Cultural Gathering Areas | Improve existing “Miwok village” | New tribal focused gathering area north of ranch complex | New tribal focused gathering area north of ranch complex plus Multi Cultural Gathering Area at existing “Miwok Village” |
| Little Green House (1) | No action | Stabilize house for overnight stay | Stabilize house for overnight stay |
| Bunkhouse (2) | No action | Stabilize house for overnight stay | Stabilize house for overnight stay |
| John Cardoza House (3) | No action | Stabilize house for overmight stay | Stabilize house for overmight stay |
| Green House (4) | Demolish & Interpret Site, OR Demolish and construct new ranger residence? | Stabilize House for Overnight Stay | Stabilize for Overnight Guest Stay |

| Table 5-1 Preliminary Conceptual Site Plan Components and Options | | | |
|---|---|---|---|
| Design-Planning Issue | Option A | Option B | Option C |
| Yellow House (5) | Overnight Guest Stay | Artist-in-Residence | Overnight Guest Stay |
| Old Stone Floor Barn (6) | Visitor Center | Interpretive Center / Museum | Interpretive Center / Museum |
| Old Dairy Barn (7) | Demolish & interpret | Preserve framework for interpretation, incorporate equestrian facilities | Reconstruct for Equestrian Center & Visitor Stables |
| Creamery/Winery (8) | Stabilize & interpret | Stabilize & interpret | Stabilize & interpret |
| Granary (9) | Renovate for Artist-In Residence | Renovate for Artist-In Residence | Renovate for Ethnobotanical-Healthy Foods Center |
| Old Shop (12) | No Change (Storage) | No Change (Storage) | No Change (Storage) |
| Tractor Barn (13) | Keep Existing Use | Visitor Center | Keep Existing Shop Use |
| Storage/Equipment Shed (14) | Keep Existing Shop Use | Keep Existing Shop Use, Add Interpretation | Renovate for park & visitor Living History use |
| Slaughterhouse (15) | No Action | Preserve and Interpret | No Action |
| Trails Development | Upgrade selected existing roads to ADA standards, plus minimum new hiking trails in southern area | Expand multi-use and hiking trails primarily in northern core | Extensive new multi-use and hiking trail system for entire park |
| Equestrian Activities | Parking & staging at Old Dairy Barn<br>Equestrian water, and portable restrooms | Expanded parking & staging at Old Dairy Barn | Parking & staging at Old Dairy Barn, and at south entrance |

| Table 5-1 Preliminary Conceptual Site Plan Components and Options | | | |
|---|---|---|---|
| Design-Planning Issue | Option A | Option B | Option C |
| Overnight Accommodations | Limited stays in Cardoza Ranch residence<br>New bunkhouse, showers and restrooms | Overnight stays in all existing Cardoza residences | Overnight stays in all Cardoza residences, plus new bunkhouse accommodations |
| Food service | None | Vending machines | Small café with Ethnobotannical Center |
| Single Unit Tent Camping | Limited single walk-in tent sites north of Cardoza Road Trail (Eucalyptus Lane) | Limited single tent hike-in sites in backcountry valley floor | Expanded single tent hike-in sites in backcountry valley floor |
| Group or Equestrian Camping | No group camping | Limited hike-in sites in backcountry valley floor | Expanded group hike-in sites in backcountry valley floor |
| Park Staff Housing | No change to existing | New staff housing | New staff housing |
| Park Maintenance Facilities | No change | New farm operations and park maintenance outside historic area | Involve park visitors in Living History Program where possible |

| Table 5-1 Preliminary Conceptual Site Plan Components and Options | | | |
|---|---|---|---|
| Design-Planning Issue | Option A | Option B | Option C |
| Picnicking areas | Add group picnic shelter south of causeway by Tolay Lake<br>Add covered group picnic east of Cardoza Creek, southwest of Yellow House<br>Add picnic area west of Upland Pond Trail loop, east of Fish Pond<br>Add picnic area east of Upland Pond Trail loop, east of Vista Pond | Add group picnic shelter south of causeway by Tolay Lake<br>Add covered group picnic east of Cardoza Creek, southwest of Yellow House<br>Add picnic area west of East Ridge Trail, in northernmost point of park<br>Add picnic area west of Upland Pond Trail loop, east of Fish Pond<br>Add picnic area east of Upland Pond Trail loop, east of Vista Pond<br>Add picnic area by stream crossing near Roche Access Road | Add group picnic shelter south of causeway by Tolay Lake<br>Add covered group picnic east of Cardoza Creek, southwest of Yellow House<br>Add covered group picnic west of Cardoza Road Trail, near the perpendicular trail junction.<br>Add picnic area west of East Ridge Trail, in northernmost point of park<br>Add picnic area west of Upland Pond Trail loop, east of Fish Pond<br>Add picnic area east of Upland Pond Trail loop, east of Vista Pond |
| Visitor Center | Old Stone Floor Barn becomes visitor center | Tractor Barn becomes visitor center | Construct new visitor center |
| Turf and Landscaping | Screen plantings along southern fork of Cannon Lane/Northern Access road<br>Screen plantings along northeast Modern Barn<br>Greenhouse/garden located at existing garden | Screen plantings along southern fork of Cannon Lane/Northern Access road<br>Screen plantings along northeast Modern Barn<br>Greenhouse/garden located at existing garden | Screen plantings along southern fork of Cannon Lane/Northern Access road<br>Screen plantings along northeast Modern Barn<br>Ethnobotanic/healthy food demonstration located at existing Granary/Museum |

| Table 5-1 Preliminary Conceptual Site Plan Components and Options | | | |
|---|---|---|---|
| Design-Planning Issue | Option A | Option B | Option C |
| | Pedestrian walkway located between storage shed and corrals | Boardwalk northeast of Hay Barn, creating a connecting loop to causeway by Tolay Lake<br>Pedestrian walkway located between storage shed and corrals | Boardwalk northeast of Hay Barn, creating a connecting loop to causeway by Tolay Lake<br>Pedestrian walkway located between storage shed and corrals |

*Source: Tolay Lake Regional Parks staff and MIG (2015)*


# Northern Park Core Area Option A

## Existing Elements*

1 - Cottage / Julie's House / Little Green House
2 - Bunkhouse / Ranger Residence
3 - John Cardoza Sr. House / Ranger Residence
4 - George & Vera Cardoza / Green House
5 - John Jr. & Beatrice Cardoza / Yellow House (Park Offices)
6 - Hay Barn / Old Stone Floor Barn
7 - Old Dairy Barn
8 - Creamery / Wine Storage
9 - Granary / Museum
12 - Old Shop / Work Shop
13 - Tractor Barn / Equipment Barn
14 - Storage Shed / Equipment Shed
15 - Slaughter House
17 - Modern Barn
19 - Garden
20 - Corrals
21 - Picnic Site / Group
* Building numbers correspond to Historic Structures Report

## Proposed Elements

A - Cultural Gathering Area
B - Viewpoint
C - New Equipment Shed
D - Screen Plantings
E - Entry Station
F - Entry Road Improvements
G - Covered Group Picnic
H - Parking
I - Demolish Dairy Barn / Equestrian Staging
J - Demolish and Interpret Site
K - Visitor Center / Renovate
L - Preserve and Interpret
M - Green House / Garden
N - Artist in Residence
O - Riparian/Wetland Restoration
P - Pedestrian Walkway
Q - Common
R - Single Walk-in Campsites
S - Sales/Group Picnic Shelter
T - Renovate for Overnight Stay

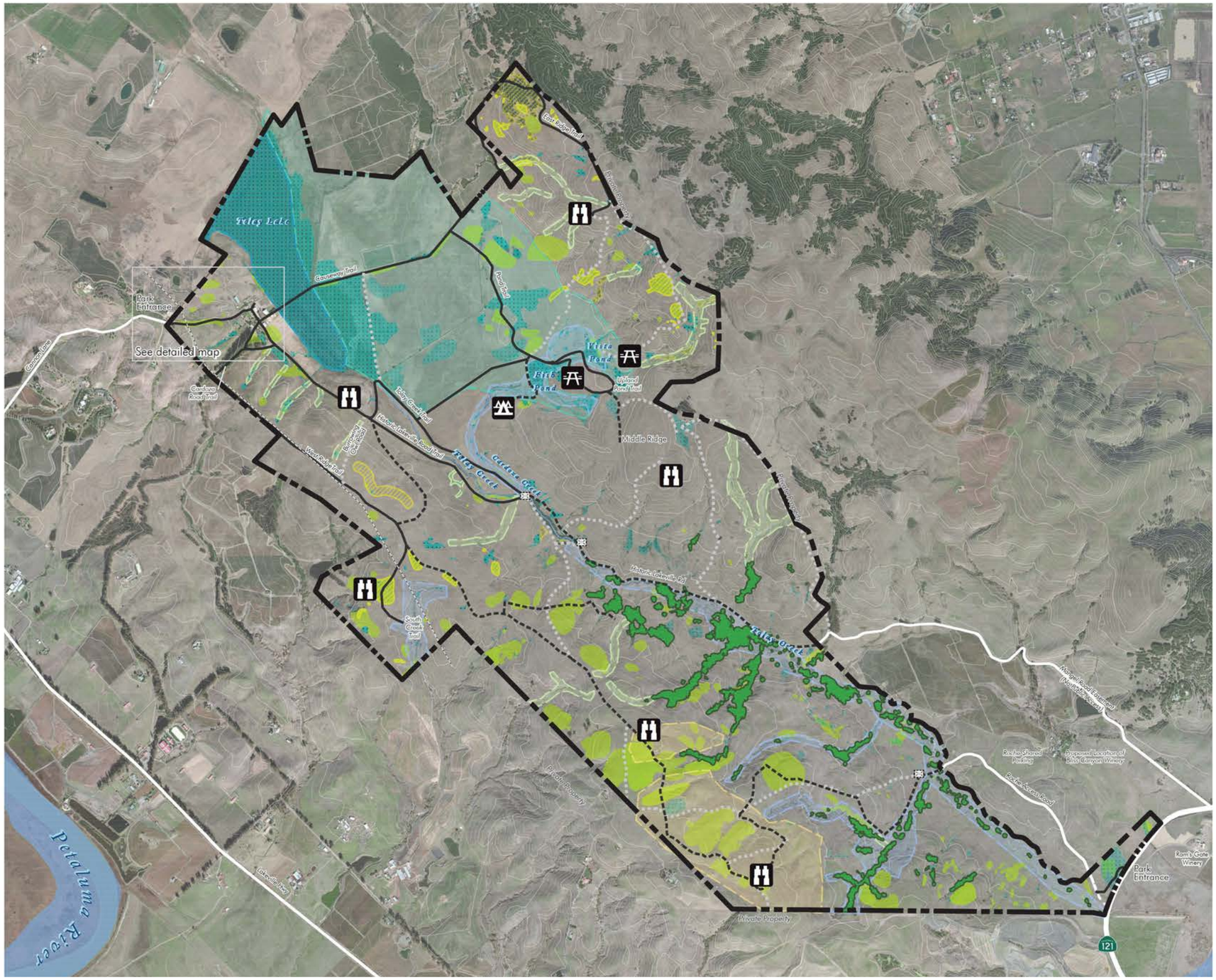
N

0 100 200 Feet



**Figure 5-1**
Option A for Park Complex

# Overall Project Area
Option A




Overnight Facilities

Backcountry Camping Area, Group Sites / Equestrian

Interpretive and Environmental Education Facilities

Viewpoint

Day Use Facilities

Picnic Area

Proposed Creek Crossings

Data Sources:
Sonoma County Parks, LSA, WRA, 2013 Cultural Landscapes Inventory, 2012 Historic Structures Report for Cardoza Ranch, 2013 Field Visits by MIG, Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 0.25 0.5 Miles



**Figure 5-2**
Option A for Park Interior


# Northern Park Core Area Option B

## Existing Elements*

1 - Cottage / Julie's House / Little Green House
2 - Bunkhouse / Ranger Residence
3 - John Cardoza Sr. House / Ranger Residence
4 - George & Vera Cardoza / Green House
5 - John Jr. & Beatrice Cardoza / Yellow House
6 - Hay Barn / Old Stone Floor Barn
7 - Old Dairy Barn
8 - Creamery / Wine Storage
9 - Granary / Museum
12 - Old Shop / Work Shop
13 - Tractor Barn / Equipment Barn
14 - Storage Shed / Equipment Shed
15 - Slaughter House
17 - Modern Barn
19 - Garden
20 - Corrals
21 - Picnic Site / Group
* Building numbers correspond to Historic Structures Report

## Proposed Elements

A - Cultural Gathering Area
B - Viewpoint
C - New Equipment Shed
D - Screen Plantings
E - Entry Station
F - Entry Road Improvements
G - Covered Group Picnic
H - Parking
I - "Ghost Frame" Partial Reconstruction of Dairy Barn and Equestrian Staging
J - Demolish and Interpret Site
K - Visitor Center / Renovate and Addition
L - Preserve and Interpret
M - Green House / Garden
N - Artist in Residence
O - Riparian/Wetland Restoration
P - Pedestrian Walkway
Q - Common
S - Sales/Group Picnic Shelter
T - Renovate for Overnight Stay
U - Staff Residence
V - Drop-off
W - Boardwalk

N

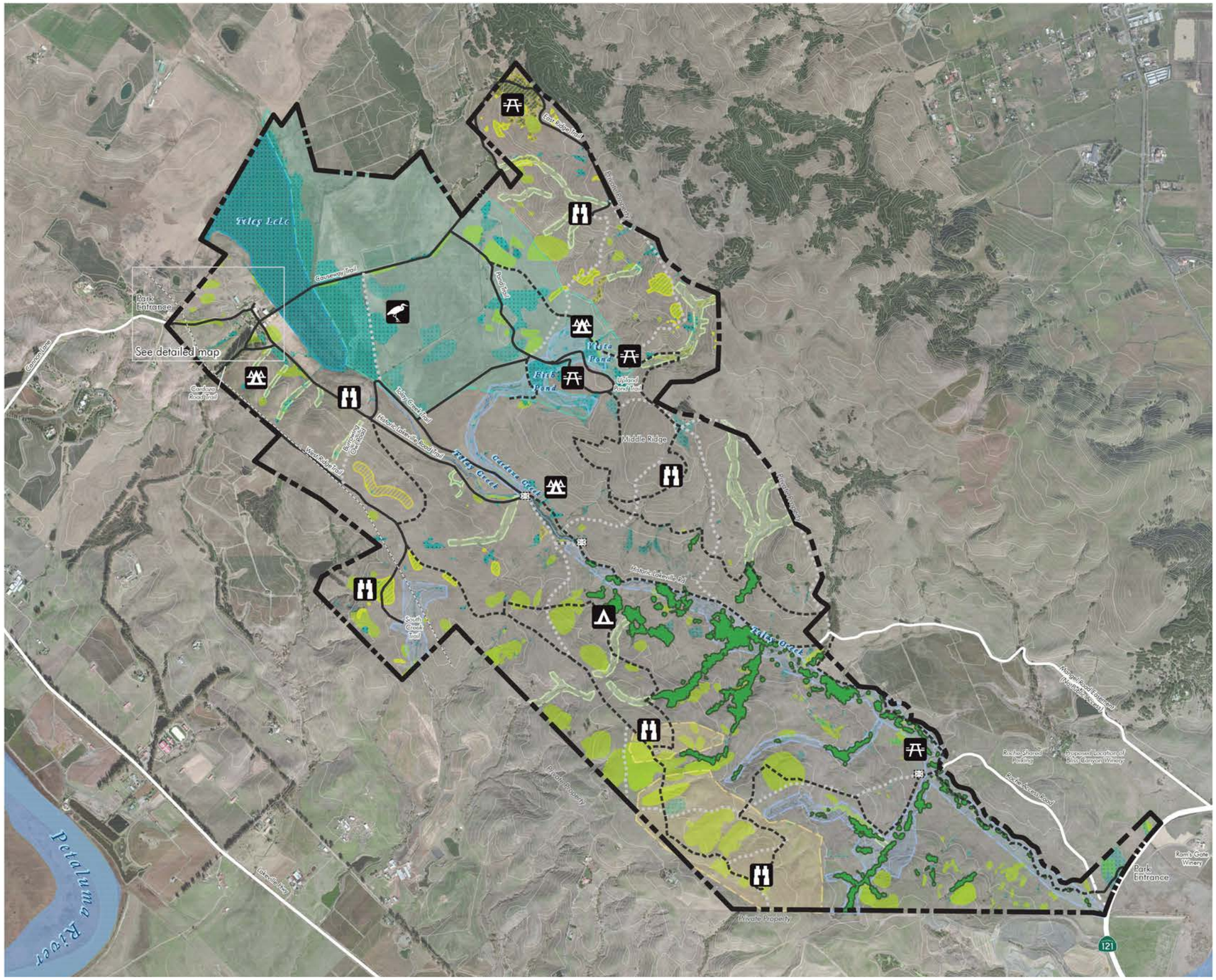
0 100 200 Feet

TOLAY LAKE REGIONAL PARK
Master Plan Project



**Figure 5-3**
Option B for Park Complex

# Overall Project Area
Option B




Overnight Facilities

- Backcountry Camping Area, Single Sites
- Backcountry Camping Area, Group Sites / Equestrian

Interpretive and Environmental Education Facilities

- Viewpoint
- Wildlife Viewing Platform
  (Can be positioned anywhere along the east side of the lake.)

Day Use Facilities

- Picnic Area

- Proposed Creek Crossings

Data Sources:
Sonoma County Parks, LSA, WRA, 2013 Cultural Landscapes Inventory, 2012 Historic Structures Report for Cardoza Ranch, 2013 Field Visits by MIG, Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 0.25 0.5 Miles

TOLAY LAKE REGIONAL PARK
Master Plan Project



**Figure 5-4**
Option B for Park Interior


# Northern Park Core Area Option C

## Existing Elements*

1 - Cottage / Julie's House / Little Green House
2 - Bunkhouse / Ranger Residence
3 - John Cardoza Sr. House / Ranger Residence
4 - George & Vera Cardoza / Green House
5 - John Jr. & Beatrice Cardoza / Yellow House
6 - Hay Barn / Old Stone Floor Barn
7 - Old Dairy Barn
8 - Creamery / Wine Storage
9 - Granary / Museum
12 - Old Shop / Work Shop
13 - Tractor Barn / Equipment Barn
14 - Storage Shed / Equipment Shed
15 - Slaughter House
17 - Modern Barn
19 - Garden
20 - Corrals
21 - Picnic Site / Group
* Building numbers correspond to Historic Structures Report

## Proposed Elements

A - Cultural Gathering Area
B - Viewpoint
C - New Equipment Shed
D - Screen Plantings
E - Entry Station
F - Entry Road Improvements
G - Covered Group Picnic
H - Parking
I - Renovated Barn Equestrian Center / Visitor Stables
K - Visitor Center
L - Preserve and Interpret
M - Green House / Garden
N - Artist in Residence
O - Riparian/Wetland Restoration
P - Pedestrian Walkway
Q - Common
S - Sales/Group Picnic Shelter
T - Renovate for Overnight Stay
U - Staff Residence
W - Boardwalk
X - Ethnobotanic / Healthy Food Demonstration
Y - New Visitor Bunkhouse Accomodations
Z - Overflow Parking

N

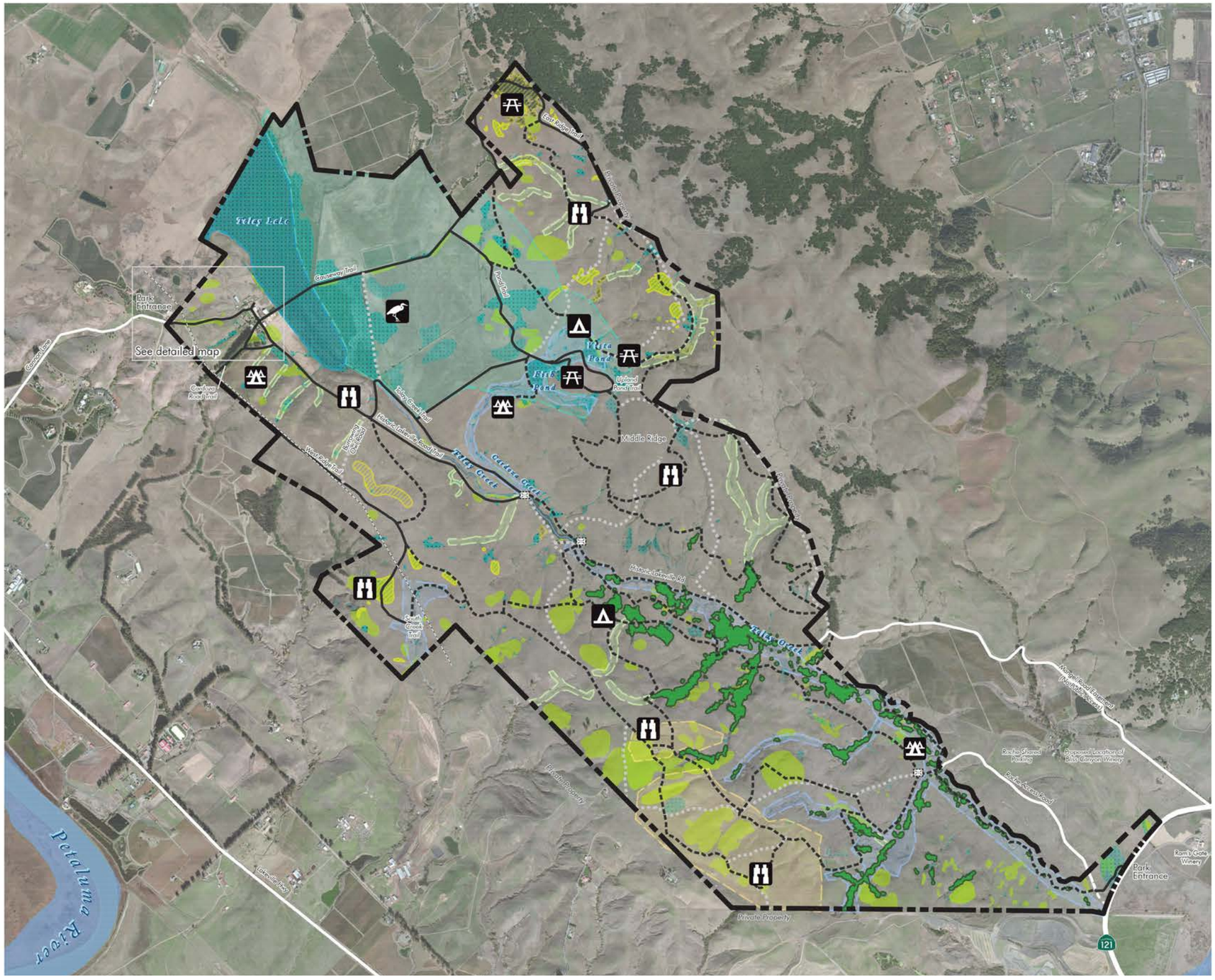
0 100 200 Feet

TOLAY LAKE REGIONAL PARK
Master Plan Project



**Figure 5-5**
Option C for Park Complex

# Overall Project Area
Option C




Overnight Facilities

- Backcountry Camping Area, Single Sites
- Backcountry Camping Area, Group Sites / Equestrian

Interpretive and Environmental Education Facilities

- Viewpoint
- Wildlife Viewing Platform
  (Can be positioned anywhere along the east side of the lake.)

Day Use Facilities

- Picnic Area

- Proposed Creek Crossings

Data Sources:
Sonoma County Parks, LSA, WRA, 2013 Cultural Landscapes Inventory, 2012 Historic Structures Report for Cardoza Ranch, 2013 Field Visits by MIG, Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N

0 0.25 0.5 Miles



**Figure 5-6**
Option C for Park Interior

appendix c

# Historic Structures Report

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# TOLAY LAKE
# CARDOZA RANCH

# HISTORIC STRUCTURES REPORT

Prepared for:

**SONOMA COUNTY REGIONAL PARKS DEPARTMENT**

Prepared by:

Architectural Resources Group, Inc.

Draft November 16, 2012

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# INTRODUCTION

## PURPOSE OF THE HISTORIC STRUCTURES REPORT

ARG is part of a team led by MIG to prepare a Master Plan for Tolay Lake Regional Park. This historic structures report provides background information on the historic buildings of the Cardoza Ranch, at the heart of the Tolay Lake Regional Park. This report does not cover all of the structures at the Cardoza Ranch. Some of the buildings – the New Shop (16) and the Modern Barn (17) – are not included because they are not historic. The John Sr. House (3) and the Bunkhouse (2) are not included because they are currently used for ranger housing and will continue in that function under the master plan. The hunting lodge, which is located away from the Ranch, is not included because a viewing station is anticipated at that location.

## METHODOLOGY

ARG did not conduct additional historical research for this report, but relied on the previous documentation provided by the County of Sonoma.

ARG visited the site on October 4 and October 17, 2012 to assess the buildings and record their conditions. ARG photographed the buildings and sketched the building plans for review and analysis. Preparation of CAD building plans was not part of the project scope.

### *Descriptions*

The descriptions of the buildings are based on the visual inspection during the site visits. No non-destructive or destructive testing was conducted at any of the buildings. Likewise, no material testing was performed. Some building components were not visible and therefore cannot be fully described or assessed for conditions.

### *Character Defining Features*

A character-defining feature is an aspect of a building's design, construction, or detail that is representative of the building's function, type, or architectural style. Generally, character-defining features include specific building systems, architectural ornament, construction details, massing, materials, craftsmanship, site characteristics and landscape features within the period of significance. In order for an important historic resource to retain its significance, its character-defining features must be retained to the greatest extent possible. An understanding of a building's character-defining features is a crucial step in developing a rehabilitation plan that incorporates an appropriate level of restoration, rehabilitation, maintenance, and preservation.

Character-defining features do not include building features that do not contribute to a building's historic significance or that post-date a building's period of significance. Unfortunately, periods of significance have not been assigned to the buildings at the Tolay Lake Cardoza Ranch site. In the absence of defined periods of significance, ARG has excluded from the lists of character-defining features those elements that are clearly less than 50 years of age and that were clearly added after the building's original construction (for example, the stucco cladding of Buildings 4 and 5.)

### *Existing Condition*

Conditions of spaces and features were evaluated based on standard preservation criteria and guidelines. There are four criteria used to categorize the observed conditions: good, fair, poor and very poor. In some instances, in cases of seriously deteriorated spaces or features, a condition may not be categorized, but described more specifically.

**Good** The term *good*, as used in this report, indicates that the space or feature is sound, but in need of minor rehabilitation and possible repair.

**Fair** The term *fair*, as used in this report, indicates the space or feature shows a degree of disrepair and neglect. Rehabilitation and repair is required.

**Poor** The term *poor*, as used in this report, indicates the space or feature is deteriorated and in disrepair. Substantial rehabilitation and repair or replacement is required.

**Very Poor** The term *very poor*, as used in this report, indicates the space or feature is severely deteriorated and in complete disrepair. Replacement will likely be required, since the space or feature appears to be beyond rehabilitation and repair.

## SUMMARY OF FINDINGS

In general the buildings at the Cardoza Ranch are in fair to poor condition.

# DEVELOPMENT HISTORY

## HISTORICAL OVERVIEW AND CONTEXT

### *Project Setting*

The Cardoza Ranch sits along the western edge of seasonal Tolay Lake in Sonoma County, in a small valley (Tolay Valley) between the Petaluma River and Sonoma Creek. The Ranch is located in the westernmost portion of the approximately 1,737-acre Tolay Lake Regional Park, approximately 6.5 miles southeast of downtown Petaluma. The Ranch site generally has a northwest-southeast orientation, with Cannon Lane bisecting the site before turning westward to meet Lakeville Road. A dirt road – the Causeway Trail – extends northeast from the Ranch site, traversing the seasonal lake bed.

According to LSA Associates' 2008 Cultural Resources Study for the area:

> [Tolay Lake Regional Park] is situated in the Coast Ranges geomorphic province, an approximately 600-mile stretch of mountain ranges and valleys that extends from the Oregon border south to the Santa Ynez River in Santa Barbara County, California. The Coast Ranges are divided into north and south subprovinces, with San Francisco Bay marking the division between the two. [Tolay Lake Regional Park] is in southern Sonoma County, within a northwest-southeast oriented valley with gentle-to-steep sloping hills. The valley is drained by Tolay Creek, which flows southerly into San Pablo Bay (the northern arm of San Francisco Bay). To the west of [Tolay Lake Regional Park] is the Petaluma River Basin, to the east and north are rolling hills and low mountains, and to the south is the southern end of Tolay Valley, which opens to the tidal marshes of northern San Pablo Bay.[1]

### *Ethnographic Summary*

Prior to Euro-American settlement, the Tolay Lake area was inhabited by speakers of Coast Miwok, a Penutian language group whose settlement area included all of present-day Marin County and much of southern Sonoma County. According to the Cultural Resources Study that LSA Associates completed for the Tolay Lake Regional Park in March 2008:

> Coast Miwok settlements were organized according to "tribelets," which constituted the basic ethnic, political, land-holding units throughout much of California. Within each tribelet's territory were several semi-permanent settlements, along with campsites in outlying areas that were used on a seasonal basis. Settlement locations were chosen for such factors as proximity to water, firewood, food resources, and well-drained soils. Smaller occupation sites were often clustered around a tribelet's principal village, which was the location of the ceremonial roundhouse.
>
> The *Alaguali* tribelet of the Coast Miwok likely inhabited the Tolay Lake area at the time of contact. The name *Tolay* possibly refers to the chief of the Alaguali tribelet, whose name appears on the San Francisco mission register on February 17, 1817. Other important Coast

[1] LSA Associates, "A Cultural Resources Study for the Tolay Lake Regional Park Project," March 28, 2008, 8.

> Miwok tribelets in the vicinity include *Petaluma* (where Mariano Vallejo established the headquarters of his Petaluma Rancho to take advantage of laborers from this village) and *Kotati*, from which Cotate Rancho and the city of Cotati derived their names….
>
> The Coast Miwok were rapidly incorporated into the mission system, with only a few individuals escaping conversion. Enforced conversion occurred from the time that the missions were established at San Francisco (1776), San Rafael (1817), and Sonoma (1823), which dislocated the population and resulted in the disintegration of traditional lifeways. Members of the Alaguali tribelet were incorporated into the three closest missions: Mission San Francisco de Asis, Mission San Jose, and Mission San Francisco Solano. From 1811-1817 50 Alaguali went to Mission San Francisco de Asis and another 70 went to Mission San Jose in 1816 and 1817. Most of the Alaguali survivors from the missions were eventually transferred to Mission San Francisco Solano.[2]

### *Historical Overview*

The following historical overview of the site is taken from the Cultural Resources Study that LSA Associates completed for the Tolay Lake Regional Park in March 2008. Relevant pages of this report (including full citations) are included below in an appendix.

> The earliest visit of a non-native person to [Tolay Lake] occurred in June 1823. At this time, Governor Arguello advised Father Jose Altamira to establish a new mission at Sonoma and transfer the missions at San Francisco and San Rafael there due to the deteriorating conditions of the neophytes at these missions. Father Altamira, who arrived from Spain in 1819 to assist at Mission San Francisco de Asis, promptly traveled north to explore sites for the new mission. Altamira's June 27, 1823 diary entry noted his visit to *Laguna de Tolay* while en route to found the new mission, so named after the Coast Miwok man who was chief of the tribelet from this area. At the time of his visit, Altamira estimated Tolay Lake's dimensions as 150-200 varas (415-500 feet) wide and 1,200 varas (3,500 feet) long. Altamira would establish the last of California's 21 missions, Mission San Francisco Solano, in Sonoma only days later on July 4, 1823. The missions were secularized in 1834.
>
> In 1833, Lieutenant Mariano G. Vallejo was ordered by Governor Jose Figueroa to explore and settle the country north of Mission San Rafael, largely as a means to monitor the nearby Russian colony at Fort Ross. Vallejo applied for and received a 44,000-acre land grant for Rancho Petaluma, which encompassed Lake Tolay, from the governor in 1834. The land grant was confirmed and its size increased by 22,000 acres by Governor Manuel Micheltorena in 1843. This sprawling rancho, one of the largest in the state, stretched eastward from the Petaluma River to Sonoma Creek, from the bayshore north to approximately present-day Glen Ellen. Vallejo's Rancho Petaluma operation relied on Native American labor to produce hides and tallow, agricultural products, blankets, candles, and shoes. The Tolay Lake margins and foothills would have served as rangeland for the large herds of cattle, horses, and sheep owned by Vallejo. Once one of the wealthiest men in

[2] LSA Associates, "A Cultural Resources Study for the Tolay Lake Regional Park Project," 15-19.

the state, legal challenges to Vallejo's land-holdings and squatters forced him to sell his Rancho adobe in 1857.

William Bihler purchased the area that was to become the 1,737-acre Cardoza Ranch in 1865. In 1870, Bihler, noted as a 39-year-old single farmer and native of Baden, was residing on the ranch with a Russian housekeeper and her two children, seven farm laborers, and two cooks (one from Nova Scotia and another from China). Their residence was recorded as being in Vallejo Township, with a Petaluma Post Office address. During his tenure on the property, Bihler reputedly drained Lake Tolay so that he could use it for farming the land. A decade later Bihler was still noted as a farmer, and residing with the same housekeeper (noted as Prussian at this time), a foreman, eight farm laborers, four milkers, a butcher, and a saddler. Ten Chinese farm laborers and one cook were residing in the adjoining household, and presumably working on the same ranch. That same year the Agricultural Production Census noted that Bihler's 430-acre ranch had produced 100 tons of hay, 2,000 bushels of wheat, 400 bushels of apples, 360 dozen eggs, and 300,000 pounds of grapes the previous year.

Although the exact location and dates of operation of the Lake District School are unknown, one source noted that the school was located near the "site of the vanished Lake Tolay" and may have been within the boundaries of the present ranch. Apparently, the school was attended by children of the local ranchers and farmers.

Bihler sold the ranch in the 1880s, and between approximately 1885 and 1894 it was owned by James G. Fair, who had amassed a fortune in the Comstock Lode and served as a United States senator. Fair raised thoroughbred horses and cattle, and operated a vast vineyard that produced prize-winning grapes and brandies, as well as operating the "first continuous brandy distillery on the Pacific Coast."

The ranch was purchased from Fair's heirs by Arthur W. Foster in 1905, who operated it for the next two decades. Foster, president of the San Francisco North Pacific Railroad, operated the ranch as the Lakeville Stock Farm. Foster eventually owned most of the land between Petaluma and Sonoma Creek, purchasing small homesteads and combining them into his large landholdings along his railroad line. He also planted the eucalyptus trees along Lakeville Road, with hired men carrying barrels of water to irrigate them. The trees also line the Foster/Cardoza Road (a segment of the Sears Point-Lakeville Road), the original ranch entrance from Lakeville Road, as Foster reputedly didn't like to ride in the full sun.

Foster, his wife Louisiana, and their nine children never lived on the ranch; they resided instead at their home in San Rafael with numerous servants, in a house now occupied by the Marin Academy as Foster Hall. Foster apparently constructed the elaborate irrigation and drainage system at the ranch, as the date "1907" is incised in some of the concrete work, although some of it may have been constructed earlier.

The ranch was granted to the North Bay Farms Company in 1922, which retained ownership until 1943, the year that it was sold to John S. Cardoza, Sr., George S. Cardoza, and John S. Cardoza, Jr., natives of the Azores, who acquired the property in co-

partnership. John Cardoza, Sr. was a dairyman who also raised sheep and Hereford cattle on the ranch.

According to descendant Marvin Cardoza, the ranch was in poor condition, undoubtedly due to absentee owners, when John Cardoza, Sr., purchased the property. During the late 1940s and early 1950s, John set about restoring the ranch as a viable livestock and dairy operation, demolishing many of the old buildings and using the timber, lumber, windows, and other architectural elements to build new structures and rebuild others, including barns, equipment sheds, and other amenities. Other buildings were moved around, with the Cottage (1) relocated from the location of the present Bunkhouse (2) area, and Foster's Line Shack (11) moved from the field to a site adjacent to the granary.

The old house on the property was knocked down in 1950 and a new California Ranch style home (3) built for John, Sr. on the site. Two other California Ranch style homes were built for other family members: one for George and Vera Cardoza in 1946 (4), and another for John, Jr. and Beatrice in 1947 (5) (recently the home of Marvin and Rita Cardoza).

The large Dairy Barn (7) on the hill west of the ranch complex was torn down and rebuilt in the late 1940s or early 1950s, with the milk taken to the stone creamery for processing. During this period the original stone Creamery (8) was enlarged and improved with a concrete floor, foundation, side walls, and a frame addition to the east elevation. The creamery was later converted to a winery, and the dairy barn to a sheep shed. The Workshop (12) was evidently one of the few buildings untouched by the Cardozas except for regular maintenance.

The Hay Barn (6) and Tractor Barn (13) were torn down and rebuilt in the early 1950s. A bunkhouse was built during the same period, as was an equipment shed. Corrals, fencing, water troughs, and other amenities were added or improved.

Cattle were butchered in the Slaughterhouse (15), with the offal fed to the hogs and chickens in pens and sheds (no longer extant) located on the hillside below. Hereford cattle grazed the hills, and hay and grains were planted in the fields. Grain was processed in the granary, which had a mill to chop the grain to feed the cattle. The Granary (9) was later converted to a combination museum and event center, primarily for the Cardoza's annual Pumpkin Festival.

In 1979, George S. and Vera Cardoza granted the property to Rita and Marvin Cardoza, who sold the ranch to the Sonoma County Regional Parks Department in 2005. During Marvin and Rita's tenure on the ranch, two new metal barn were erected, one in 1980 and another in 1992.

Portuguese Farmers

Although there is evidence of Portuguese and Spanish Sephardic Jews arriving in the United States as early as the mid-1660s, it wasn't until after 1870 that a sizeable permanent community was established. The first to arrive settled primarily in New England and California and engaged in whaling, fishing, and textile ventures, and in Hawaii, where they

worked in the sugar cane industry. In California they engaged in whaling and fishing to a small degree, but their major interest lay in gold mining and agriculture.

The second immigration stage, from 1870 to 1920, saw the decline of both the New England whaling industry and the California Gold Rush. During those years, 60% of the Portuguese in California worked on farms, primarily engaging in the self-supporting, small-scale production of fruits and vegetables and the raising of sheep. Between 1920 and 1960 they became prominent in the dairy industry, comprising 65% of California's dairy farmers.

The vast majority of the Portuguese who came to California emigrated from the Azores, an archipelago approximately 900 miles west of mainland Portugal comprised of nine islands: Corvo, Faial, Flores, Graciosa, Pico, Santa Maria, Sao Miguel, Sao Jorge, and Terceira. Settlement from mainland Portugal began in 1489 and the Azores became important for grain and cattle production for Portugal. Because of their strategic location, the islands became a stopping point between America, Europe, and Africa in the 16th and 17th centuries. In 1976, the Azores became an autonomous region of Portugal, and still produce dairy beef for export. Its primary industry, however, is tourism.

In California in the early years, the Azoreans who were involved in agriculture settled in the Sacramento Valley, Mission San Jose, San Leandro, Oakland, and Castro Valley. By 1880, 84% were living in rural areas, primarily owning or operating farms. Between 1890 and 1910, numerous Portuguese migrated primarily to the San Francisco Bay Area, where several dairies were established in Marin County. Around the turn of the 19th century, many Azoreans moved to the San Joaquin Valley to farm, and the area is still the center of their population. As noted by historian Robert Santos:

> Dairying and the Azoreans are like the euphemistic phrase "goes together like hand and glove." Being unskilled and using very few tools and implements, most Azorean farmer peasants brought only their hands and their farming knowledge to the United States for a livelihood.

His description of dairy farmers in the San Joaquin Valley also characterizes the Azorean experience in Sonoma County:

> Dairying provided security for those who practiced it. For one, there was always a monthly milk check providing constant revenue. The investment was solid because one owned land, equipment, and cattle which could always be sold in an economic crisis. For the thrifty minded Portuguese who save their money continuously, the initial investment was something they could afford. They saw opportunity in something that an unskilled, mostly illiterate, and non-English speaking Azorean peasant could do with success and profit.

Santos goes on to state:

> The Azoreans are family-oriented people who sacrifice and work together as a unit towards a common goal. This family effort is the basic reason why they became so

> successful in dairying. No dairy partnerships are formed outside the family because the children inherit the dairy.
>
> This last description is particularly apt for the Cardoza family, an Azorean family who arrived in the area in 1943, purchased the ranch in partnership, worked together to improve the property, and whose children inherited and continued the ranching operation until the property was acquired by [the Sonoma County Recreation and Parks District] in 2005.[3]

## CHRONOLOGY OF DEVELOPMENT AND USE

*Note: Chronological information has been drawn from LSA Associates, "A Cultural Resources Study for the Tolay Lake Regional Park Project," March 28, 2008.*

| | |
|---|---|
| 1823 | Father Jose Altamira visited *Laguna de Tolay* en route to founding a new Mission in Sonoma. |
| 1834 | Mexican Governor Jose Figueroa granted 44,000-acre land grant (Rancho Petaluma), which included Tolay Lake, to Lieutenant Mariano G. Vallejo. |
| 1843 | Mexican Governor Manuel Micheltorena expanded Rancho Petaluma land grant to 66,000 acres. |
| 1857 | Vallejo sold his Petaluma Adobe. At one time the largest privately-owned adobe building in Northern California, the Petaluma Adobe is California Historical Landmark #18 and is now the centerpiece of the state-owned Petaluma Adobe State Historic Park. |
| 1865 | William Bihler purchased the area that would become the 1,737-acre Cardoza Ranch. Bihler reputedly drained Tolay Lake in order to farm the land. |
| 1880s | Bihler sold the ranch. |
| c.1885-c.1894 | Ranch owned by U.S. Senator and Comstock Lode millionaire James G. Fair. |
| Late 1800s | Workshop (12) constructed. |
| 1905 | Arthur W. Foster purchased the ranch from Fair's heirs, who had maintained ownership following Fair's death in 1894. Foster, president of the San Francisco North Pacific Railroad, operated the ranch as the Lakeville Stock Farm, and evidently constructed the elaborate irrigation and drainage system at the ranch. |
| 1922 | Ranch acquired by North Bay Farms Company. |
| 1943 | Ranch sold to John S. Cardoza, Sr.; George S. Cardoza; and John S. Cardoza, Jr., who converted the ranch to a dairy and cattle operation. |
| Late 1940s- | Cardozas demolished several buildings at the ranch, reusing the lumber, windows |

[3] LSA Associates, "A Cultural Resources Study for the Tolay Lake Regional Park Project," 19-24.

| | |
|---|---|
| Early 1950s | and other architectural elements to build new structures and rebuild others, including barns and equipment sheds. Some buildings (including the Cottage (1) and the Line Shack (10)) were left intact but relocated on the property. During this time, the Dairy Barn (7) on the hill southwest of the ranch complex was rebuilt and the Creamery (8) was enlarged with a concrete floor, foundation, side walls, and frame addition to the east elevation. |
| 1946 | George Cardoza and Vera Cardoza House (4) constructed. |
| 1947 | John Cardoza, Jr. and Beatrice Cardoza House (5) constructed. |
| 1950 | John Cardoza, Sr. House (3) constructed. |
| Early 1950s | Hay Barn (6) and Tractor Barn (13) rebuilt. Bunkhouse (2) and Storage Shed (14) constructed. |
| 1979 | George S. Cardoza and Vera Cardoza granted the property to Rita Cardoza and Marvin Cardoza. |
| 1980 | Metal Barn (16) constructed. |
| 1992 | Modern Barn (17) constructed. |
| 2005 | Rita Cardoza and Marvin Cardoza sold the property to the Sonoma County Regional Parks Department. |

## SIGNIFICANCE AND INTEGRITY

### *Significance*

In the Cultural Resources Study that they completed for the Tolay Lake Regional Park in March 2008, LSA Associates found the Cardoza Ranch complex to be

> eligible for listing in the National Register under Criterion A due to its association with the Azorean Portuguese dairy and ranching industry in Sonoma County and California, an industry dominated by them from the 1920s through the 1960s, and Criterion C since the ranch features, while lacking individual distinction, represent a significant distinguishable entity that can trace its history to one family and one operation.[4]

LSA Associates also concluded that the Cardoza Ranch complex is National Register-eligible both as its own district and as a contributor to the larger Tolay Valley Historic District. This latter district, which was identified by LSA Associates, generally corresponds to the boundaries of Tolay Lake Regional Park and consists of 21 prehistoric archaeological sites, historic-period built environment resources, and resources with both prehistoric and historical components.[5]

### *Integrity*

LSA Associate's Cultural Resources Study states that "Pre-Cardoza elements and the Cardoza Ranch retain a high degree of integrity of setting, location, workmanship, materials, feeling, and association."[6]

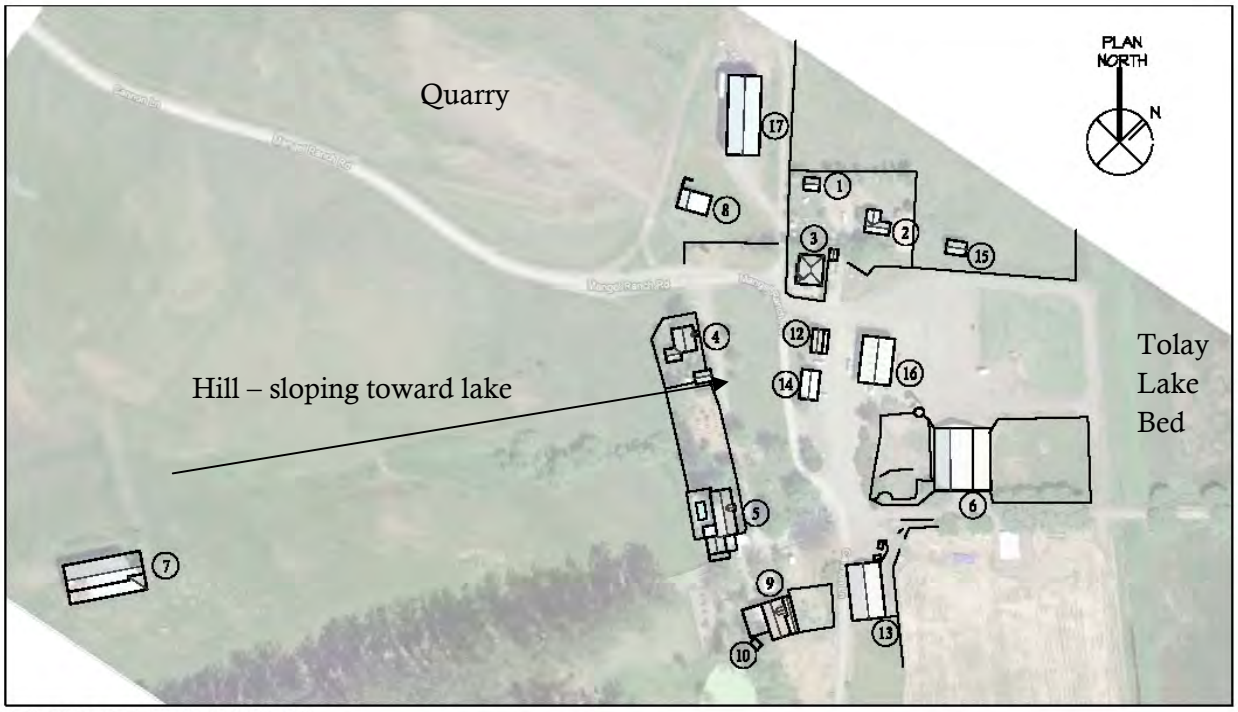
The LSA Associates study also states that although some of the buildings were used for operations different than originally intended at the time of the study (i.e. the Creamery as a winery, the Granary as a museum), "the landscape within which the ranch is situated has retained the integrity of its period of significance, and reflects a period of time and place when Portuguese dairy farms dotted the rural landscape of Sonoma and Marin counties. Therefore, the Cardoza Ranch appears to possess integrity."[7]

[4] LSA Associates, "A Cultural Resources Study for the Tolay Lake Regional Park Project," 59.
[5] Ibid., 46.
[6] Ibid., 47.
[7] Ibid., 59.

# PHYSICAL DESCRIPTIONS, CONDITIONS, & TREATMENT RECOMMENDATIONS

See the introduction for definitions of condition ratings. Treatment recommendations are divided into two broad categories: basic treatments and use-specific treatments. The basic treatments include repairs to deteriorated elements and stabilization of the buildings. Use-specific treatments include modifications to the buildings related to the proposed new use(s).

## SITE




### *Physical Description*

The Cardoza Ranch site generally follows a northwest-southeast orientation, in accordance with the contour of the low hills southwest of the Ranch and the edge of the Tolay Lake lakebed to the northeast. The Cardoza Ranch site is accessed by two roads: Cannon Lane from the west and Cardoza Road from the southwest. The ranch buildings and structures are clustered around the portion of Cannon Lane that turns southeasterly to meet Cardoza Road. Multiple dirt paths and limited access dirt roads cross the site. The most notable is the dirt road that extends northeasterly

along the causeway that bisects the lakebed of Tolay Lake. Fencing is used throughout the site, to demarcate both residential yards and livestock pens.

The Cardoza Ranch site, and the buildings thereon, can be broken into two sections: the upland half to the southwest, and the comparatively flat half to the northeast. The upland portion of the site includes the George and Vera Cardoza House (4) and the John, Jr. and Beatrice Cardoza House (5), along with the Granary (9), the Line Shack (10), the Creamery (8) and the Modern Barn (17). Several trees have been planted around the Granary and the two residences, and mature Eucalyptus line Cardoza Road as it leaves the Ranch site. A pond sits immediately south of the Granary. At the Ranch site's highest elevation, a small quarry has been dug into the hill immediately west of the Creamery. The dairy Barn (7) sits several hundred feet away from the main ranch on the hill to the southwest.

The other buildings occupy the flat half of the Ranch site. These buildings include three residences (the Cottage (1), the Bunkhouse (2) and the John Cardoza, Sr. House (3)) and the Slaughterhouse (15) at the northwest end, and a collection of barns and storage sheds (Hay Barn (6), Old Shop (12), Tractor Barn (13), Storage Shed (14), and Metal Barn (16)) to the southeast. Trees, which are fewer in number here than in the Ranch site's upland half, are concentrated along the Causeway Trail and near the residences at the northwest end. A concrete silo stands between the Hay Barn and the Metal Barn.

## BUILDING 1: COTTAGE/JULIE'S HOUSE/LITTLE GREEN HOUSE


**Image 1 - Entrance to Cottage, south side**

**Image 2 – Northeast corner of Cottage**

### *Physical Description*

The Cottage is currently located on the north side of the Ranch, behind John Cardoza, Sr.'s House (3) and beside the Bunkhouse (2). It was moved to this location by the Cardozas from the area where the Bunkhouse sits. It is on a relatively flat portion of the site and along with the other nearby houses is fenced off on the north, east and west sides. The Cottage is accessed via a shared driveway that runs between John Cardoza, Sr.'s House and the Bunkhouse. It likely dates from the early 1900s with later modifications.

The Cottage is a simple rectangular form with a gabled roof. The main building is 16 feet deep and 26 feet wide. The southern-facing enclosed porch is 6 feet deep and 26 feet long, and has a shed roof. The framing is enclosed, but is assumed to be standard wood framing.

The exterior walls are clad with three-inch-high rounded edge siding except at the south porch wall, which is clad in eight-inch-high V-groove siding. The roof is covered with asphalt shingles over wood singles.

The Cottage is entered via wood steps, a small landing and a door centered on the south porch. The steps and landing have wood railings. The door has a fixed union jack lower panel and an upper panel of diamond-shaped lights filled with amber-colored bull's-eye glass. The south side of the building has four sliding aluminum windows, with wood trim. There are two double-hung wood windows on the east wall, two on the north wall, and one on the west wall. All of the windows have a single pane of glass per sash. There is a wood-framed foundation vent at the east wall.

The interior of the porch has all painted wood finishes: wood flooring, plywood on the north wall, exposed wood framing and sheathing on the other walls and exposed board sheathing and rafters at the ceiling. The porch is used as the laundry room and contains the water heater, washer and dryer. The east end of the porch is portioned off as the bathroom with a shower, sink and toilet. The walls in the bathroom are painted vertical wood boards, and the ceiling is the exposed structure, also painted.

There is a small step up from the porch to the rest of the Cottage. The door from the porch to the cottage leads directly into the living room. The living room also serves as the kitchen. Along the south wall, there is a counter and sink. Above the sink is a sliding aluminum window, looking into the porch. On both sides of the window are wall mounted cabinets. These cabinets wrap the southwest corner and extend about four feet along the west wall. The floor of the living room and kitchen are painted wood boards. The walls have a random combination of wood siding and paneling. The ceiling consists of painted wood boards.

The bedroom is located in the northeast corner of the cottage and is entered through the east wall of the living room. The closet is located in along the east side of the cottage, between the bedroom and bathroom and is entered form the south wall of the bedroom. Like the living room, the bedroom and closet have painted wood floors, walls and ceilings.

The Cottage has electrical and water service. Gas is provided from a nearby propane tank. The electrical meter is located at the east wall and the panel is located inside the porch, on the north wall. Heat is currently provided with a wall heater on the west wall. However, there are at least two previous heating systems: there is an in-floor grill for a below-the-floor gas heater and there is an old metal flue at the northwest corner from a stove.

**Image 3 - Bedroom with various types of wood paneling**

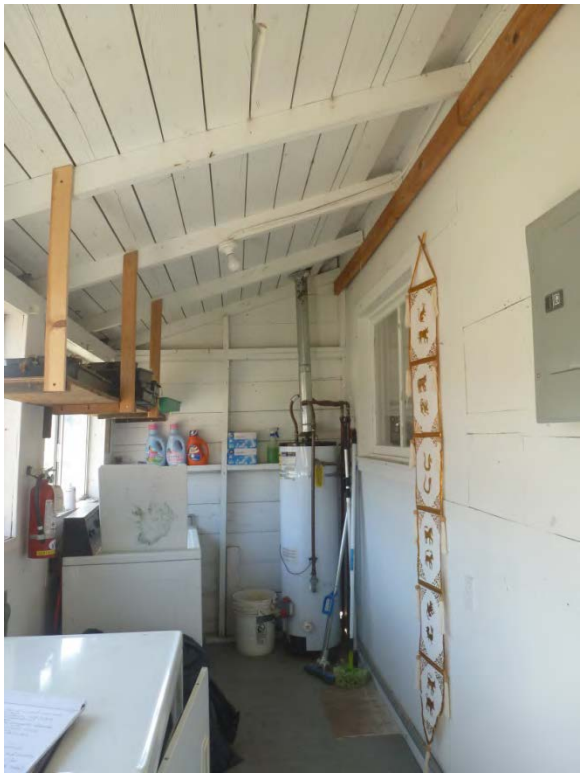


**Image 4 - Enclosed porch used as laundry room**

### *Character-Defining Features*

- One-story height
- Rectangular plan
- Side gable roof with shed roof porch
- Wood siding with wood rakes
- Double-hung wood windows with wood surrounds

### *Existing Conditions*

The Cottage is in poor condition overall.

Foundation

The building does not have a foundation and is resting on the ground.

Structural Framing

The building lacks approved cripple-wall bracing below the floor at exterior walls. The building lacks diagonal or structural sheathing at exterior walls. The building lacks structural sheathing at the roof.

Exterior

*Roofing*

The asphalt shingle roofing is in poor condition. There is no flashing where the lower roof meets the cottage wall; shingles have been wrapped up the face of the wall, but underlying wood is exposed and deteriorated. The gutter along the south eave has no downspout and drains out its open ends.

**Image 5 - Enclosed porch roof at Cottage**

**Image 6 -Typical wood to earth contact**

*Cladding*

The wood siding is in fair to poor condition. The paint finish is worn. There is wood-to-earth contact on all sides of the cottage and the wood at the base of the walls is very deteriorated.

*Doors and Windows*

The front door, likely a replacement, is in good condition. Both the wood and aluminum windows are in poor condition. Settlement has caused wracking of some window frames.

**Image 7 - Window at east wall showing frame wracked due to settlement**

*Trim*
All of the exterior wood trim is in poor condition, with particularly serious deterioration at the window sills and at the base of the front door trim and corner boards.

*Features*
The front porch, steps and railings are in poor condition. One porch board has been replaced; the steps are unstable.

Interior
*Floor*
The painted wood floor in the cottage is in fair condition; on the enclosed porch, several sections have been patched with plywood. The single step at the door between the cottage and enclosed porch presents a trip hazard.

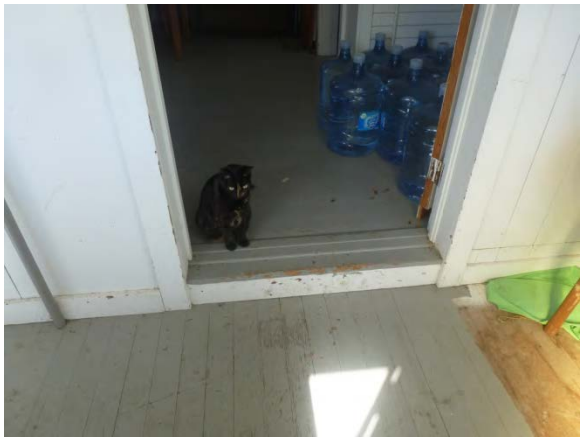


**Image 8 - Step between enclosed porch and cottage**

**Image 9 - Random interior wood paneling at Cottage**

*Walls and Ceilings*
The various types of wood paneling, including the exposed sheathing at the enclosed porch, are generally in fair condition, though the reused wood was installed in a haphazard, poorly fit manner.

*Trim*
Painted wood trim throughout the interior of the Cottage is in fair condition.

*Doors*
The interior wood doors are in good condition, except for wear and tear, mainly at the bottom edge.

*Features*
Washer and dryer are used by park staff and are assumed to be in good condition. The wood cabinets, laminate counter and sink are in fair condition.

Electrical
The circuit breaker and surface mounted conduit to junction boxes in each room are relatively new and in good condition. It does not appear that there is any substandard wiring in use.

Mechanical and Plumbing
The original floor and wall heaters are not functional. The gas water heater and wall heater and two air conditioners are newer and assumed to be functional. Both the water heater and wall heater are properly vented.

Accessibility Issues
The Cottage is not accessible from the exterior. Once inside, the Cottage is generally deficient as regards accessibility and ADA compliance (path of travel, bathroom, etc.). Required level of accessibility will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | R-3 single family residential |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 10,500 square feet |
| Actual Area | 572 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 3 stories |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet /occupant | 3 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 1 |
| Other considerations | The asphalt shingle roof over the wood shingles is a non-compliant condition per CBC 1510.3, paragraph 2 |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Provide concrete foundation.
- Re-grade to provide positive drainage away from building.
- Add necessary seismic connections, shear walls, and plywood sheathing at roof.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Replace asphalt shingle roof on cottage, rolled roofing on enclosed porch; install new flashing, gutters and downspouts.
- Repair or replace damaged wood siding and trim: estimate replacement of 20% of siding and 50% of trim; eliminate all wood to earth contact.
- Realign and restore wood windows: estimate replacement of 50% of window components.
- Replace aluminum porch windows with wood to match those in cottage.
- Remove old woodstove vent pipe.
- Rebuild front steps and landing.
- Provide minor repairs to doors and hardware as needed; replace front door sill.
- Paint all wood elements.

*Interior*

The interior does not require any rehabilitation for its current storage use.

*Systems*

- Have all systems evaluated by a licensed contractor or engineer.
- Replace plumbing piping and all fixtures.
- Remove crawl space heater.

Treatments Contingent on Use

The preliminary recommended use for the Cottage is residential.

- Insulate walls and attic, including enclosed porch.
- Add finish over insulation at enclosed porch walls and ceiling.
- Repaint entire interior, including wood floor.
- Completely rehabilitate bathroom.
- Replace sink and counter with functional kitchen.
- Consider constructing a wall separating laundry area from entrance.

## BUILDING 4: GEORGE AND VERA'S HOUSE/GREEN HOUSE

**Image 10 –Front entrance to George and Vera's House, east side**

**Image 11 – George and Vera's Garage**

### *Physical Description*

This 1946 Ranch style house is located on the west side of the ranch complex, north of John Jr. and Beatrice's house (5) and south of the Creamery (8). The site slopes gently to the northeast, with a slightly leveled area around the house. The front door of the house faces east towards the Old Shop (12) and the lake. Vera still lived in the house when the Ranch became a regional park in 2005.

This house originally had the same general layout as John Jr. and Beatrice's house (5), but differing additions and modifications have since obscured the original form of both houses. This house is slightly smaller and originally had two bedrooms, not three like the other house. The original form was a simple rectangle. This house has an addition off of the southwest corner. A detached garage is located to the south of the house. The original house was 30 feet deep and 36 feet wide. The garage is 26 feet deep and 24 feet wide. The addition is about 17 feet wide and 30 feet deep. The original house has a half basement that is approximately 36 feet wide and 15 feet deep.

The exterior walls have stucco over wood V-groove siding. The front porch is wood framed with a metal railing and posts. The stairs, ceiling, and fascia have been covered with stucco. The garage also has stucco over wood siding. The main roof is asphalt shingles over wood shingles. The addition has asphalt shingles. The garage has asphalt shingles.

The main entrance door is a six panel door. The mud room door is a two panel door with glass in the upper panel. Both doors have screen doors. The door to the basement is a wood sliding door. The garage overhead door is a metal single section lift door; there is a wood man door in the south wall of the garage.

There are two large wood-framed picture windows at the living room, and the other original windows are double-hung with a single pane of glass per sash. The windows in the addition are a combination of fixed wood framed casements and double-hung windows. Most of the double-hung

windows have aluminum screen at the exterior. The attic is vented through pointed metal vents at the gable ends. The foundation is vented through metal vents at the east and west walls.

The current layout is as follows. The front door enters into the living room. To the left is the kitchen, which is open to the dining area to the south straight through the living room is the door to the hallway. The mud room is located in the southwest corner of the kitchen. To the west of the hallway are two bedrooms and a bathroom. A second hallway has been added through the second bedroom. This hallway is L-shaped and connects the two bedrooms in the addition and the mud room. The basement is unfinished and contains a freestanding shower, and a two compartment sink.

**Image 12 - Kitchen with original cabinets and counters**

**Image 13 - Bedroom in addition**

**Image 14 - Bathroom with original tile and fixtures**

The interior finishes are primarily painted plaster walls and ceilings, with some gypsum board at the additions and modified areas. The mud room has a sheet vinyl floor and wainscot with wallpaper above. The bathroom has a tile floor and wainscot with wallpaper above. The kitchen has wood cabinets with tile counters and backsplashes. The kitchen walls are covered with wallpaper. The floor in the living room is carpet, but the rest of the house has sheet vinyl flooring.

The garage floor is exposed concrete. The garage has no interior finishes. Roof and wall framing and sheathing are exposed.

The electrical meter is on the north wall of the house, and power enters the building through the attic. The house has propane gas, which is supplied from a tank. The gas water heater is in the basement. There is an in-floor heater in the main hallway. The mud room has hookups for a washer and a gas dryer.

**Image 15 - Interior of garage showing stepped foundation walls**

**Image 16 - Terraced patio on south side of garage**

## *Character-Defining Features*

- One-story height
- Rectangular plan
- Side gable roof with verge board
- Double-hung wood windows
- Picture windows at living room
- Gabled front porch with metal posts and railings

## *Existing Conditions*

George and Vera's House is in poor and unstable condition. Significant structural movement has occurred.

Structure

The foundation has failed. It appears the expansive soils are creeping in the downhill (east) direction and are taking the house along with it. The north and west basement walls are cracked and leaning as much as 1.5 inches in 12 inches. Basement walls appear to be unreinforced concrete.

Cripple walls supporting the floor framing above the basement walls have failed and are leaning. Numerous interior girder-support posts are missing, leaning or have inadequate foundation support. Wood scraps and miscellaneous wood debris are littering the crawl space, attracting termites and leading to decay.

The front porch framing is decaying and failing; the porch and steps are pulling away from the house, and the porch roof is sloping along the eave lines.

The interior floor is sloping. Interior door frames are distorted and there are numerous cracks in the interior walls.

Exterior

*Roofing*

The asphalt shingle roofing is in poor condition. The original gutters are deteriorated and likely not functional. New gutters and downspouts on the back of the house are in good condition and connect to a drain pipe at the northwest corner. The rooftop vents and chimneys are corroded and in poor condition.

*Cladding*

The stucco finish on the house is in generally poor condition with significant cracking due to the building's movement. There is an almost continuous horizontal crack at the foundation; there is serious cracking and spalling where concrete walls meet stucco at the basement stairway and at both porches. The underlying tongue and groove wood siding could not be observed; there is likely some deterioration at grade due to wood to earth contact where planting beds about the stucco.

**Image 17 - Deteriorated shingles and debris**

**Image 18 - Stucco at basement stair and door**

*Doors*

The doors are in fair condition; their frames and screen doors are in poor condition. Wood sills are very deteriorated.

*Windows*

The wood and aluminum windows are in fair to poor condition. Sills are deteriorated. Some wood windows are out of plumb due to building settlement and are not operable. Window screens are in fair to poor condition; some are ill-fit due to settlement and some are missing. Wood basement windows are misaligned due to building settlement.

*Trim*

All wood trim at the roof, doors and windows is in poor condition.

**Image 19 - Front porch separated from wall of house**

**Image 20 - Poorly constructed ramp and stairs at south entrance**

**Image 21 - Stairs to basement**

*Features*

The covered front porch is not level; it has separated from the house due to differential settlement. The concrete slab and steps and the stucco facing are cracked and deteriorated. The ornamental railing and roof supports are rusted and out of plumb.

The porch at the south entrance is very poorly constructed. Modifications made to add the ramp created an unsafe stair approach. The supporting structure is extremely deteriorated.

*Paving and Stairs*

Concrete paving around the house has cracked and settled, creating trip hazards. The terraced concrete patio west and south of the garage has extensive settlement and structural cracking.

The concrete stair to the basement and the adjacent retaining walls are in fair condition. The stairway is filled with leaf debris, clogging the drain at the bottom; water can freely enter the basement. The wood fences surrounding the stair are in very poor condition and collapsing. This is a hazardous condition.

**Image 22 - Multiple layers of flooring**

**Image 23 - Settlement damage**

Interior

*Floor*

Linoleum and vinyl flooring throughout the house is in poor condition; carpet in northeast room is in fair condition.

*Walls and Ceilings*

The plaster finish throughout the house is in fair to poor condition with a significant number of cracks due to settlement. Tile wainscots and shower surrounds are in fair to good condition.

*Trim*

Painted wood trim throughout the house is generally in good condition, except in areas where settlement has led to open joints and some deterioration at window sills.

*Doors*

Wood doors are in good condition, except for wear and tear, mainly at the bottom edge.

*Features*

Wood kitchen cabinets and tile counters are in good condition. Miscellaneous built-in casework elsewhere in the house is also in good condition.

*Basement*

Condition of the exposed framing and foundation in the basement is described above. There are water stains on the concrete walls and floor and also on the wood framing above.

Electrical

Wiring throughout the house is substandard and potentially hazardous.

**Image 24 – Mix of knob and tube and newer wiring in attic**

Mechanical and Plumbing

The original under floor heater appears to have been removed. The floor grille remains. The gas fired water heater is located in an area of movement in the basement.

The plumbing piping is old and corroded; leaks are evident in the basement. Plumbing fixtures, including stall shower and sinks in the basement, are in poor condition.

Garage

*Structure*

The garage structure is in fair condition, lacking structural sheathing at the roof. The crack in the north foundation wall does not appear to have caused significant damage to the wood structure.

*Exterior*

The asphalt shingle roofing is in poor condition; the gutters are badly corroded and partially missing. In addition to the structural crack in the north wall, the stucco finish has numerous cracks, mainly at the lower part of the walls. The door, overhead garage door, and windows are in fair condition. The higher grade outside the south door allows water to enter the building. Wood trim is in fair condition.

**Image 25 - Garage roof and corroded gutter**

**Image 26 - Structural crack in north wall**

*Interior*

The wood structure and the roof and wall cladding exposed on the interior are addressed above. The floor slab is in fair condition. The electrical wiring is not in accordance with code.

Accessibility Issues

The house is not accessible from the exterior; the existing ramp is not code-compliant. Once inside, the house is generally deficient as regards accessibility and ADA compliance (path of travel, bathroom and kitchen, etc.) The garage is not accessible. Required level of accessibility for both buildings will depend upon use.

Code Analysis

*House*

| | |
|---|---|
| Occupancy Classification | R-3 single family residential |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 10,500 square feet |
| Actual Area | 1,527 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 3 stories |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 8 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 2 |
| Other considerations | The asphalt shingle roof over the wood shingles is a non-compliant condition per CBC 1510.3, paragraph 2 |

*Garage*

| | |
|---|---|
| Occupancy Classification | U - garage |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 160 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 12 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 1 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 1 |
| Other considerations | The asphalt shingle roof over the wood shingles is a non-compliant condition per CBC 1510.3, paragraph 2 |

## *Treatment Recommendations*

Basic Treatments

The primary issue with this building is the failed foundation. There are three primary ways to deal with this: the first is to build a new foundation, the second is to completely rebuild the entire house and the third is to demolish the house and not rebuild. The recommendations listed below assume the first option.

*Structure*

- Conduct a geotechnical investigation near the house to determine the soils composition.
- Stabilize soils as recommended by geotechnical report.
- Move the house off of the existing failed foundation. Pour a new reinforced concrete foundation based on the geotechnical report findings. Move the house back to its original location over the new foundation.
- Provide additional shear strength at the walls and roof to resist the seismic loads.
- Improve attachments at the roof to wall connections.

- Eliminate basement and stair to basement.
- Remove existing porch and rebuild steps in concrete.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Remove asphalt and wood shingles. Install new plywood sheathing and new asphalt shingle roof. Install new gutter and downspouts.
- Repair cracks in stucco.
- Insulate exterior walls and attic.
- Repair windows and replace deteriorated elements as needed.
- Replace screen doors.
- Replace thresholds at doors.
- Repair and repaint metal railings at front porch.
- Provide new accessible ramp to kitchen door.
- Replace missing decorative shutters.
- Paint stucco walls and all wood elements.
- Move plantings away from building foundation.
- Add foundation drainage along the uphill side of the house.

*Interior*

- Insulate walls and attic.
- Replace all floor finishes.
- Repair cracks in walls and ceiling.
- Remove wallpaper and repaint all walls.
- Repair door frames where cracked.
- Repair windows; replace badly deteriorated windows to match.
- Repair and reuse wood cabinets in kitchen.
- Remove old heater and patch hallway floor.

*Systems*

- Have electrical system evaluated by a licensed contractor or engineer and upgrade as required.
- Replace light fixtures as needed.
- Replace plumbing fixtures in bathroom and mudroom.
- Provide new heating and air conditioning system.

*Garage*

- Seismic upgrade: install structural sheathing at roof and walls.
- Repair foundation and bolt framing to foundation.
- Install asphalt roof with gutters and downspouts.
- Re-grade around garage to keep soil at least six inches below the wood sill.
- Remove vegetation from around foundation.
- Minor repair of windows.

- Repair cracks in stucco.
- Paint stucco walls and all wood elements.
- Repair or replace patio at south side so that water doesn't drain into garage.
- Add perimeter drain at back of garage.
- Add area drain at side door.

Treatments Contingent on Use

Preliminary use options for the house are guest rental, staff housing, or office space.

- Upgrade kitchen, possibly as ADA-compliant.
- Completely rehabilitate bathroom, possibly as ADA-compliant.
- Upgrade lighting.
- Widen door openings for accessibility.
- Consider alterations to interior layout depending on use.

## BUILDING 5: JOHN JR. AND BEATRICE'S HOUSE/YELLOW HOUSE

**Image 27 – Front of John Jr. and Beatrice's House, east side**

**Image 28 - John Jr. and Beatrice's House, with addition and garage at south end**

### *Physical Description*

This 1947 Ranch style house is located on the west side of the ranch complex, south of George and Vera's House (4) and north of the Granary (9). The site slopes gently to the east, with a slightly leveled area around the house. The front door of the house faces east towards the Hay Barn (6) and the lake.

This house originally had the same general layout as George and Vera's house (4), but differing additions and modifications have since obscured the original form of both houses. This house was eight feet wider and had three bedrooms instead of two. The original form was a simple rectangle. This house has had a least four different additions. The first addition was the two-car garage to the south of the house. The second addition connected the house and the garage, converted the living room into a bedroom, converted the garage into a living space, and expanded the kitchen dining area. The third addition was a covered patio at the corner between the house and garage. The fourth addition was a shed on the south side of the garage. The original house was 30 feet deep and 44 feet wide. The garage is 26 feet deep and 24 feet wide. The connection between the house and the garage is 30 feet deep and 16 feet wide. The covered patio is about 18 by 20 feet and the shed is 30 feet deep and 14 feet wide. Adjacent to the patio, behind the original house, is a concrete paved terrace with an in-ground swimming pool. The original house has a partial basement that is approximately 20 feet wide and 15 feet deep.

The east side of the garage and the south side of the house have lapped wood siding with a brick wainscot. The other exterior walls have stucco over wood V-groove siding. The front porch is wood-framed with a wood railing and posts. The stairs, ceiling, and fascia have been covered with stucco. The chimney, on the north wall, is made of red brick. The main roof is asphalt shingles over wood shingles. The garage has asphalt shingles. The covered patio has a corrugated metal roof, and the shed has corrugated fiberglass panels.

The main entrance door is a six panel door with glass in the upper four panels. The kitchen door, on the south wall, is a panel door with a union jack panel at the lower half and six panes of glass above. The kitchen door has a small metal awning over it. The garage east doors are two pairs of doors that match the kitchen door. The door from the garage to the covered patio is a two panel door with a flat wood panel below and a single pane of glass above. The door from the second addition to the back patio matches the doors at the front, but also has a screen door of similar design as the door. The door to the shed is a single panel door.

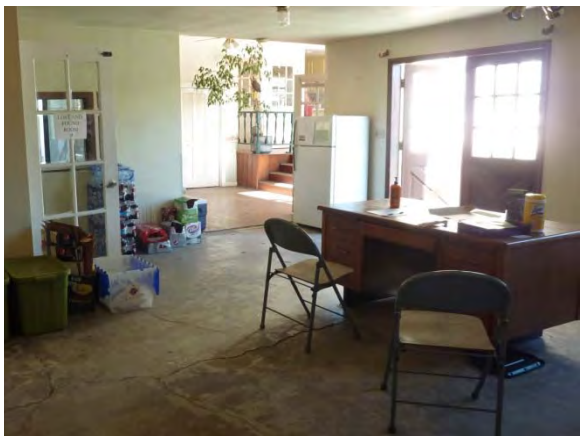


**Image 29 –Garage looking into transition space and kitchen beyond. The covered patio is to the left and the front patio is to the right.**

**Image 30 - Edge of dining room, looking into kitchen and entrance hall beyond. The basement stair is at the left.**

The current layout is as follows. The front door enters into a front hallway. To the right of the hallway is a bedroom, which was originally the living room and contains a fireplace and built in shelves on the north wall. To the left is the kitchen, which is open to the dining area to the south. The entrance hall opens up to the main hallway which runs north to south through the house. To the west of the hallway are three bedrooms and a bathroom. The closet in the middle bedroom has been converted to a shower and a sink in a counter added at the northeast corner. The south end of the hallway opens into the dining room. The dining room is the east side of the second addition. The west side of the second addition is four steps lower and is the transition between the garage and the rest of the house. This transition space is connected to the garage with a large framed opening. The garage has a vestibule at the northwest corner. A wood burning stove is located in the southwest corner. The shed can only be entered from the exterior. The basement is accessed via a stair between the kitchen and the main hallway. The basement is unfinished and contains a freestanding shower, a two compartment sink and the pool equipment.

**Image 31 - Transition space with dining room at the right and kitchen beyond. The door on the left is to the hallway, the door on the right is to the basement.**

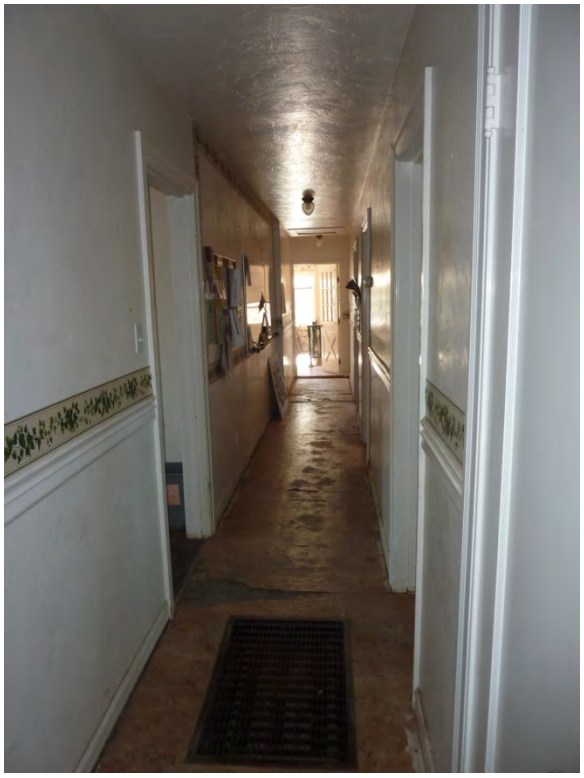


**Image 32 - Hallway looking toward the kitchen. The door at the left is to the entrance hall. The door in the right foreground is the linen closet, the next door is the bathroom and the next two doors are bedrooms.**

The interior finishes are primarily painted plaster walls and ceilings, with some gypsum board at the additions and modified areas. There is brick wall finish at the fireplace in the former living room, behind the wood burning stove in the garage and at the wall between the basement stair and the kitchen. The kitchen, transition space, and the former living room have wall paper. The bathroom has a wood wainscot. The main hallway has a wood chair rail. The kitchen and bathroom have wood cabinets with tile counters and backsplashes. The middle bedroom has plastic laminate cabinets and counters and the shower has tile floor, walls and ceiling. The former living room and the dining room have wood floors. The garage has an exposed concrete floor and the rest of the rooms have linoleum, vinyl, or vinyl tile floors.

The electrical meter is on the north wall of the house, and the panel is in the basement. The water heater is also in the basement. Some of the pool equipment is located behind the garage and some is in the basement. The house has propane gas, which is supplied from a tank. There is an in-floor heater in the main hallway and a gas stove in the former living room.

### *Character-Defining Features*

- One-story height
- Side gable roof
- Wood siding at south end
- Gabled front porch
- Chimney and fireplace at north wall

### *Existing Conditions*

In general, because it has been used and maintained by park staff, the Yellow House is in fair condition.

Structure

The original building lacks the following: effective cripple-wall bracing and anchor bolts below the floor at the exterior walls, diagonal or structural sheathing at exterior walls, and structural sheathing at the roof.

The front porch and sheathing is decaying and partially failing.

At the second addition, the cripple wall sheathing is decayed and has failed. It appears that concrete has been poured against the sheet metal flashing at along the south wall. The flashing has failed allowing water intrusion and decay of the plywood sheathing. The framing at the cripple wall is also decayed.

Exterior

*Roofing*

The condition of the roof varies from good to very poor: the asphalt shingle roofing on the former garage is in good condition; that on the west slope of the house is in fair condition, with some detached shingles; and that on the east slope of the house is in very poor condition, with curled and broken shingles and considerable leafy debris. The rooftop vents and chimneys on the garage and the west slope of the house are in fair condition, and those on the east slope are corroded, in poor condition. The gutters appear to be in fair condition, though some may be blocked by debris, and the newer galvanized downspouts drain away from the building via splash blocks. The corrugated sheet metal roof over the patio is in fair condition.

*Cladding*

The stucco finish on the house is generally in fair condition. There is one major vertical structural crack where the original house was expanded to the south. The underlying tongue and groove wood siding could be seen where the front porch had separated from the east wall of the house and appeared to be in good condition. The condition at other locations could not be observed, but there is likely some deterioration at grade, particularly along the west and north walls of the house, where planting beds abut the stucco. Stucco on the west wall of the former garage is in good condition, but that on the south wall, within the covered storage shed, is in poor condition, with extensive cracking and spalling. The wood siding at both the house and garage is in good condition, as is the brick base.

**Image 33 - Deteriorated roofing and vents**

**Image 35 - Crack in east wall at addition**

**Image 34 - Debris filled gutter with new downspout**

**Image 36 - Extensive cracking at south wall**

*Doors*

The wood doors are in fair condition. Aluminum thresholds are high and pose a trip hazard.

*Windows*

Most of the wood and aluminum windows are in fair condition. One west-facing wood window is in poor condition. Window screens are fair to poor and some are missing.

*Trim*

Wood trim at the roof, doors and windows is in fair condition. The wood louvered attic vents are in fair condition. The decorative shutters are in good condition. An awning over one door is in poor condition, with a lot of corrosion.

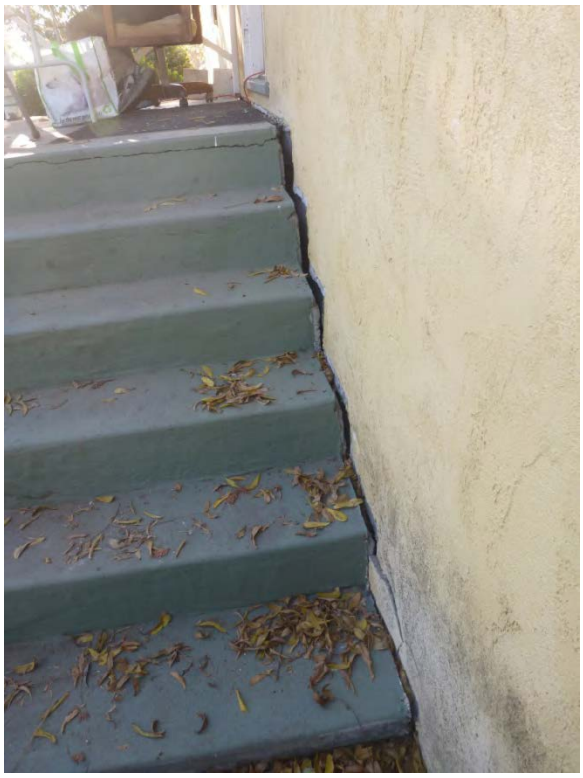


**Image 37 - Front porch stair separated from house wall**

**Image 38 - Misaligned paving at pool**

**Image 39 - Deterioration in outdoor storage shed**

*Features*

The covered front porch steps and stoop have separated from the house due to differential settlement. The stucco finish is cracked and deteriorated. The wood railing and roof support posts are in fair condition; the posts appear to be adequately supporting the porch roof; but the foundation is failing, so the overall condition should be considered very poor.

The brick chimney at the north end is in good condition, with minor cracking where it meets the stucco wall.

*Patios*

The concrete patio in front of the former garage is in fair condition. It has no control joints and, although it has a number of cracks, it remains level. The concrete steps and the brick planters surrounding the patio are in good condition.

At the rear patio, the brick planters, wood structure, including lattice, are in fair condition. The patio itself is in poor condition; portions of the concrete paving around the pool have lifted and/or cracked due to expansive soils, creating a trip hazard. The swimming pool appears to be in good condition, although its equipment was not tested.

*Outdoor Storage Shed*
This structure is in poor condition. The wood framing, various types of cladding (wood boards, plywood, wood lattice), and door are damaged and deteriorated. The concrete slab floor has extensive cracking. The corrugated fiberglass roofing is in fair condition.

Interior
*Floor*
Where carpet has been removed, the exposed linoleum is in poor condition; the underlying wood subfloor is in fair condition. The wood floor in the dining area is also in fair condition as are the wood stairs down to the lower level. Newer sheet vinyl in several rooms is in good condition. The concrete floor in the former garage is in fair condition, with several large cracks. Transitions between different types of flooring have created trip hazards.

*Walls and Ceilings*
The plaster finish throughout the house is in good condition. Wood and tile wainscots and shower surrounds are in fair to good condition.

**Image 40 - Flooring deterioration and change of level**

**Image 42 - Deteriorated window at west wall**

**Image 41 - Floor at former garage**

**Image 43 - Cabinet at kitchen sink**

*Trim*
Painted wood trim throughout the house is generally in good condition, except at the aluminum windows in the north wall, where it is deteriorated from water infiltration.

*Doors*
Wood doors and louvered closet doors are in good condition, except for wear and tear, mainly at the bottom edge.

*Features*
Wood cabinets in the kitchen, offices and bathroom are in good condition, except for water damage at the kitchen sink. Tile and laminate countertops vary from fair to good condition.

A gas range and dishwasher were removed from the kitchen.

The brick fireplace and hearth on the north wall appear to be in good condition, but the condition of the chimney is unknown.

The wood stove and brick hearth in the former garage are in good condition.

**Image 44 - Deteriorated piping in basement**

*Basement*
Condition of the exposed framing and foundation in the basement is described above. There are water stains on the concrete walls and floor. A free standing stall shower is in poor condition.

Electrical
Some components of the electrical system have been upgraded, but some original components remain. The entire system should be evaluated by a licensed engineer.

Mechanical and Plumbing

Mechanical equipment appears to be functioning adequately for the current occupancy, but should be evaluated by a licensed engineer. Elements of the plumbing piping have clearly been repaired and replaced, but much of the visible piping is corroded.

Accessibility Issues

The house is not accessible from the exterior; each entrance is reached via stairs. Once inside, the house has two levels and is generally deficient as regards accessibility and ADA compliance (path of travel, bathroom and kitchen, etc.) Required level of accessibility will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | R-3 single family residential |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 10,800 square feet |
| Actual Area | 2,837 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 3 stories |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 15 |
| Required Exits (CBC Section 1015) | 2 |
| Provided Exits | 4 |
| Other considerations | The asphalt shingle roof over the wood shingles is a non-compliant condition per CBC 1510.3, paragraph 2 |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Stabilize soils on hill behind house.
- Reinforce attachment of walls to foundation.
- Reinforce attachments of roof to walls.
- Provide a perimeter foundation drain at the back of the house.
- Provide a perimeter foundation drain at the back of the pool.
- Demolish shed at south end and remove concrete slab.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Remove asphalt and wood shingles. Install new plywood sheathing. Provide new asphalt shingle roof with gutters and downspouts.
- Add shear strength at exterior walls.
- Repair cracked plaster.
- Repair wall at grade level at chimney.
- Repair paving at back porch.
- Repair brick planters and counters at back patio.

- Assess the pool and its equipment.
- Rebuild front porch steps with concrete.
- Make minor repairs to doors and hardware.
- Make minor repairs to windows in general.
- At the north window on the west wall, replace sill and lower sash.
- Paint stucco walls and all wood elements.

*Interior*

- Install new flooring throughout house.
- Repaint walls and ceilings.
- Remove old heater and repair floor in hallway.
- Inspect fireplace flues.
- Repair kitchen cabinets.
- Replace kitchen sink.

*Systems*

- Have electrical system evaluated by a licensed contractor or engineer and upgrade as required.
- Provide new heating and air conditioning system.
- Replace water, sewer and gas pipes.

Treatments Contingent on Use

Preliminary use options for the house are visitor center, guest rental, staff housing, or office space.

- Upgrade kitchen, possibly as ADA-compliant; install new appliances.
- Completely rehabilitate bathroom, possibly as ADA-compliant.
- Install a lift between two floor levels at dining/transition space.
- Upgrade lighting.
- Widen door openings for accessibility.
- Add wall and door between house and former garage.
- Consider alterations to interior layout depending on use.

## BUILDING 6: HAY BARN/OLD STONE FLOOR BARN

**Image 45 – South wall of Hay Barn with shed on right**

**Image 46 - Hay Barn interior looking north**

### *Physical Description*

The Hay Barn was constructed in the late 1940s or early 1950s on the site of a previous barn. Located on a slightly sloping site on the east edge of the ranch complex, it is aligned with the causeway and flanked on the east and west with corrals. A slip-formed concrete silo is located at the northwest corner. The Hay Barn, as its name suggests, was originally used to store hay. It now houses some exhibits and is open to the public for tours and events. A shed runs along the east side of the barn, within the corral, and is used to shelter goats.

The rectangular barn is approximately 60 feet wide and 100 feet long, and the shed to the east is 25 feet wide and 100 feet long. The foundation is concrete piers under the wood posts and a concrete perimeter footing. The structural frame is post and beam construction. The structural members appear to have been reused as they have mortise holes. The main barn is three bays across and ten bays long. The first 15 feet of the shed (west side) is partially enclosed from the exterior and open to the main barn. The last ten feet (east side) are open to the corral.

The exterior walls are covered with 1x12 vertical wood boards spaced about ¼ to ½ inches apart. The gable roof is covered with corrugated metal; the rafter ends are exposed; and the space between the rafters and the ridge are open for ventilation.

The two primary entrances to the barn are through large pairs of sliding doors at the north and south elevations. A smaller set of sliding doors are located on the north wall, near the northwest corner. The west section of the shed is accessed through pairs of sliding doors on the south and north and the east section is accessed through large swinging doors. There are no windows in the barn, but there are three wooden vents at the north gable and one at the south gable. A 68-foot-long section of the east wall of the shed is open with no door or structural supports.

**Image 47 - Barn framing and open vent at ridge**

**Image 48 - Stone floor**

The interior floor is about a foot below the adjacent grade and is covered with light tan colored stone set in cementitous grout. Small areas of the floor are unpaved (dirt) and some areas are patched with concrete or asphalt paving. The stone paving may date to the previous barn on the site. The stone pavers extend outside the north end of the building (probably due to the difference in size between the original and rebuilt barns)

Sections of the interior walls are covered with plywood, some with painted murals. There are several stalls at the east side of the barn, which are constructed of 2x wood and plywood and appear to be recent additions.

There is electrical power and lights in the barn. Water is located near the north and south entrances. The building is not heated.

## *Character-Defining Features*

- Rectangular plan with gabled roof
- Stone floor (random rubble)
- Ventilation at roof peak, roof eaves, and upper walls
- Large sliding wood doors
- Vertical wood siding
- Wood truss roof
- Wood post and beam construction
- Alignment with Causeway Trail

## *Existing Conditions*

In general, the barn is in fair condition and its attached shed is in poor condition. The building is very dirty with considerable lichen growth on wood and metal surfaces.

Structure

There is no visible bracing or other lateral-force resisting elements along the east wall of the main barn, at the connection to the east shed. There are only a few isolated pier blocks, but no other foundation at this wall.

At the east wall of the main barn, the load-bearing posts are not continuous from the roof to the ground. A beam runs about two feet above the ground and intersects the posts. The beam is supported on stub posts, which are leaning at the south end.

The interior posts in general do not have adequate connection to their foundations. Some of the posts have shifted to the edge, or partially off of their foundations.

The existing nailed connections at the timber bracing are likely inadequate to resist lateral forces.

Exterior

*Roofing*

The corrugated metal roofing on both the barn and the shed is intact and in fair condition, with rust staining on the exterior. At the southeast corner of the barn, the roof is sagging and there is corrosion and some warping of the shed roof where it meets the barn wall. The roof drainage system is non-functional. The gutter on the west side of the barn is partially detached and filled with leafy debris. Half of the gutter at the shed is missing. Downspouts are either missing or cut off several feet above grade.

**Image 49 - Typical condition of roof**

**Image 51 - Typical repurposed and deteriorated siding**

**Image 50 - Failing roof at shed**

**Image 52 - Shed siding with wood to earth contact**

*Cladding*
The wood siding of the barn is in fair condition, considering its use as a hay barn, which required ventilation rather than a weather-tight envelope. Bottoms of boards are deteriorated due to damage from use and from water. As these were reused boards, the damage may date from earlier wood to earth contact. There are a number of split or warped boards, particularly at the east wall above the shed. The corrugated panels cladding the south wall are also in fair condition, with some missing fasteners and bent panels. The painted finish on both wood and metal is worn. The shed cladding is in poor condition. Siding is in contact with the ground and individual boards are warped, broken or missing.

*Doors*
The randomly constructed doors are in fair to poor condition. As with the wood siding, bottoms of doors are deteriorated due to damage from use and from water. The painted finish on both wood and metal is worn. The large pairs of doors at the ends of the barn are functional, with newer sliding hardware. The shed doors are very deteriorated, with damaged boards and hardware, and rest directly on grade.

*Trim*
The three wood louvered vents in the north gable and one in the south gable are in fair condition. The sill of the south gable vent is missing.

*Paving*
Concrete poured to allow access over the concrete perimeter foundation is poorly installed, poses a trip hazard, and does not provide an even slope from grade. This concrete covers the barn's stone pavers where they extend outside the north end of the building.

**Image 53 – Gable vent with missing trim**

**Image 54 – Stone and concrete paving at north entrance**

**Image 55 - Interior view showing condition of siding**

**Image 56 - Stone floor with concrete topping at south entrance**

Interior

The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Floor*

The stone floor, where it remains in place, is in fair condition. Mortar is worn or missing in some places and several sections of pavers have been removed and either left as gravel base or filled in with asphalt concrete. Asphalt and concrete used to create 'ramps' at north and south doors was poorly installed over stone pavers. These are cracked, posing a trip hazard, and do not provide an even slope from grade.

*Features*

The exposed wood structure is addressed above. The interior partitions, stalls and loft, built from new or reused lumber, are generally in good condition.

Electrical

The electrical system and lighting both need to be upgraded depending on the intended use of the building.

Accessibility Issues

The barn is not accessible from the exterior, due to its raised perimeter foundation and relation to grade. Ramps at entrances and door hardware and operation are not ADA-compliant. Once inside, the uneven stone floor does not provide an accessible path of travel. Required level of accessibility will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | U - Barn |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 8,643 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 33 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 300 square feet/occupant | 27 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 0 (The sliding doors do not meet the requirements of Section 1008 and therefore do not count as required exits. The shed has 2 exits, but they are not accessible from the main barn.) |
| Other considerations | This barn is occasionally used for assembly purposes, which would greatly increase the occupant load and required exits. |

## *Treatment Recommendations*

Basic Treatments

The basic treatment approach for the Hay Barn is to stabilize and strengthen it and halt its deterioration.

*Structure*

- Repair and improve foundation, adding new footings where required, particularly along the east wall.
- Improve all framing connections and add bracing, as required for seismic strengthening.
- Repair wall structure between barn and shed; level sagging wall at south end.
- Provide added structural support at shed.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Re-grade at shed end walls to eliminate wood to earth contact.
- Re-grade at perimeter to provide positive drainage away from building.
- Remove concrete outside north barn door, possibly remove and salvage stone pavers in this area; install paving sloped up to provide level surface at door.
- Re-secure any loose corrugated roof panels.
- Install new gutters and downspouts at west wall of barn and at shed.
- Rebuild shed end walls.
- Repair and reattach siding; replace seriously damaged boards; estimate replacement of 20%.
- Fasten loose metal siding panels.
- Repair vents at gables, including trim replacement.

- Repair barn doors, replacing damaged boards; rehabilitate or replace hardware as required for functionality.
- Replace doors at both ends of shed.
- Paint all wood elements.

*Interior*

- Remove asphalt concrete ramping at barn doors and patch stone flooring below.
- Rehabilitate damaged areas of stone flooring and mortar.
- Construct new ramps, non-destructive to stone flooring, inside both doors.

*Systems*

- Have electrical system evaluated by a licensed contractor or engineer and upgrade as required.

Treatments Contingent on Use

The preliminary recommended use for the Hay Barn is as an unconditioned, non-weatherproof exhibit and/or assembly space. Code requirements for these uses would vary based on the anticipated number of occupants.

- Add exit doors as required for new use.
- Infill area of missing stone paving at west wall.
- Provide a code-compliant path of travel through the building; this could be a raised wood walkway that would not damage the stone floor; estimated coverage for access to exhibits: 25% of floor area.
- For assembly use, construct a raised platform of size required to provide accessible seating and satisfy other code requirements, size to be determined by program.
- Reconfigure interior partitions and stalls as required for intended use.
- Upgrade electrical service and lighting, including emergency lighting, as required for new use.
- Install sprinkler system if recommended or required.

## BUILDING 7: OLD DAIRY BARN

**Image 57 – North side of Old Dairy Barn with collapsed section at east end**

**Image 58 – West entrance to Old Dairy Barn**

### *Physical Description*

The Dairy Barn was constructed in the late 1940s or early 1950s of salvaged materials. The building is located atop a hill several hundred feet southwest of the rest of the ranch complex. As its name implies it was originally used to house dairy cows. Later it was used to for sheep, but currently is unused.

The dairy barn is rectangular in plan, and measures approximately 65 feet wide and 124 feet long. The foundation is wood posts that rest on wood blocks on the ground. The structural frame is post and beam construction and some of the joints are mortise and tenon connections, while others are nailed. The barn appears to have been built in three sections. The primary section is about 40 feet wide and 100 feet long. A 24-foot-long addition extends the original gabled form toward the east. A 15-foot-wide shed covers the south side, wraps around the east side with a hipped roof at the corner and then abuts the east addition.

The west and north elevations are covered with corrugated, galvanized sheet metal. The east wall and the south side of the east addition are covered with 1x12 vertical wood boards with about ¼- to ½-inch gaps between the boards. A wooden fence approximately three feet tall defines the south side of the building. The roof is covered with corrugated, galvanized metal with an open ridge and rafter ends.

The two primary entrances are at the east and west elevations. At the west elevation, the entrance has a pair of metal gates, while the east side has a pair of wooden gates. Above the east entrance, there is a hay door high on the wall. The south addition is entered through a pair of sliding doors at the east wall.

The interior floor is primarily dirt with small areas of elevated wood floor in the south shed. There are several partial-height partitions made of vertical boards spanning between the posts.

There are currently no utilities to the Dairy Barn. There is not a maintained road to the barn, although a historic road connected it to the main road at the north.

### *Character-Defining Features*

- Rectangular plan with gabled roof
- Corrugated metal cladding
- Roof with wood rafters and purlins
- Southern addition with vertical wood cladding and hipped roof

### *Existing Conditions*

The Dairy Barn has partially collapsed on the east end. The structure is in extremely poor condition and is unsafe. Signs and safety fencing have been placed around it to block access to the building.

Structure

The building has an inadequate foundation.

The south wall has no bracing or other lateral-force resisting elements. The roof framing along the south wall is sagging and has partially failed.

The existing rafters and beams appear to be undersized for their spans. The exterior walls lack any structural sheathing. The nailed connections at the timber bracing are likely inadequate.

Exterior

The sheet metal roofing is in extremely poor condition. The sheet metal siding is also very deteriorated with some missing panels. Large sections of wood siding and trim along the open south side of the barn are rotting, broken, and/or collapsed.

**Image 59 - Collapsed east end of barn**

**Image 60 - Wood framing resting directly on grade**

**Image 61 - Failed wall at south side**

**Image 62 - Structural Damaged at south wall**

**Image 63 - Sheet Metal Roofing**

**Image 64 - Stalls inside barn**

Interior

Within the Dairy Barn, the remaining corrals and stalls are generally in fair condition.

Accessibility Issues

The barn, while at grade level, has no accessible path of travel to or within the remaining building. Required level of accessibility for a rebuilt barn will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | U - Barn |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 8,060 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 30 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 300 square feet/occupant | 32 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 1 (walls are not totally enclosed, thereby allowing exiting along the entire south side) |
| Other considerations | Current structure does not meet basic code requirements and is unsafe. If rebuilt, the new structure must meet the current building code requirements based on the proposed new use. |

## *Treatment Recommendations*

Basic Treatments

The recommended treatment approach for the Old Dairy Barn is demolition and either a) reconstruction to the same footprint, size, shape and materials as the original barn, b) construction of a new smaller barn, or c) no new construction. Prior to demolition, document the barn to HABS (Historic American Building Survey) standards.

*Structure*

- Demolish and salvage intact structural members for use in rehabilitation of existing ranch buildings or for new construction on site.

*Exterior*

- Demolish and salvage usable wood siding for use in rehabilitation of existing ranch buildings.

*Interior*

- Salvage significant barn equipment and/or features (corrals, stalls, etc.) for reinstallation in a reconstructed barn or for possible interpretive use.

## BUILDING 8: CREAMERY/ WINE STORAGE

**Image 65 – South wall of Creamery**

**Image 66 – East and north walls of Creamery**

### *Physical Description*

The Creamery building was originally constructed in the 1880s or 1890s, with a large addition to the east that dates from the 1940s or 1950s. The building is nestled into the hillside at the northwest corner of the main ranch complex. Originally used to produce and store dairy products, it was later used for wine storage.

The 30-by-49-foot, rectangular building has three sections that descend down the hill. The upper original section is 22 feet wide and 30 feet long, the middle section is 15 by 30 feet and the lower section is 12 by 30 feet. The original section has load bearing stone walls and the rest of the structure is wood framed.

Only the top of the stone wall is above ground on the west side of the building and the grade slopes down on the south side. On the north side, the grade is terraced down by a series of concrete retaining walls and slabs. The rest of the walls consist primarily of vertical boards, with horizontal boards at the north side. The roof is covered with corrugated galvanized metal. At the north gable end, in lieu of a barge board, the corrugated metal has been wrapped down over the exposed ends of the purlins.

**Image 67 - Concrete walls on north side of creamery**

**Image 68 - Interior of upper section, with wood ceiling and stone walls**

The upper section of the building is entered from the north and south through small wood plank swinging doors. The middle section is entered from the south through a pair of sliding doors and from the north through a swinging door. The lower section is entered from the east through a single sliding door. There are two small windows, covered with board awning shutters, on the west side of the building. There is a wood covered opening at the north side of the lower section.

The original stone wall separates the original building from the addition. A wood panel door, centered in the wall, allows access between the old and new section of the building. Throughout the building, the floor is made of concrete poured in 3-by-3-foot sections. The elevation of the floor from the original to the middle section drops gradually about one foot. The floor of the middle section is about three feet higher than the lower section. The exterior doors at the upper section are about two and a half feet above the floor level, and are accessed via wooded stairs without handrails. The middle and lower sections of the building are connected by a centered concrete stair. A wood railing, attached to full height framing, separates the two levels. The original section of the building has a wood ceiling, supported by wood framing. Above the ceiling is a large, inaccessible attic space. Some miscellaneous lumber construction, that may have once supported equipment, remains.

There are currently no utilities to the building. Conduit on the north and south gable ends indicates that the building once had electricity. A hose bib is located at the south elevation. There is a stone walkway along the north and east sides of the building. There are a series of concrete walls and slabs along the north side of the building of unknown use.

### *Character-Defining Features*

- Rectangular plan
- Random rubble stone walls
- Saltbox roof
- Vertical and horizontal board siding with corner boards
- Sliding doors composed of vertical boards
- Setting into hill
- Ceiling with attic space above original section

## *Existing Conditions*

The Creamery is in poor and unsound condition. Portions of the building are unsafe to enter.

Structure

The masonry walls are severely cracked and failing to the east (downhill). The building appears to have the same soil related problems as George and Vera's House (4).

The stone masonry and the concrete walls appear to have been constructed without reinforcement. This type of construction is considered hazardous in seismically-active areas.

The existing 2x4 rafters appear to be undersized for their span. The roof and exterior walls do not have any structural sheathing. The wood framing is decaying from water intrusion.

**Image 69 - Severe cracking of masonry wall**

**Image 71 - Metal Roofing, wrapped at gable end**

**Image 70 - Failed wall at northeast corner**

**Image 72 - Condition at ridge**

**Image 74 - South wall showing poor overall condition of siding and doors**

**Image 73 - Overgrown vegetation on north side**

Exterior

*Roofing*

The corrugated metal roofing is in poor condition. Some panels are bent, have missing fasteners and small holes, and rust staining on the exterior. The panels do not meet at the ridge, but there is no ridge cap covering the space between them.

*Cladding*

Both the vertical and horizontal wood siding are in very poor condition. Board ends are deteriorated; as these appear to have been reused boards, some of the damage may date from earlier wood to earth contact. The random length boards do not completely cover the ledger on top of the west stone wall. The painted finish is worn.

*Doors*

The wood doors are in very poor condition. Bottoms of doors are deteriorated due to their contact with the ground and overgrown vegetation that retains water. The painted finish is worn. The doors in the north and south stone walls are extremely deteriorated and falling off their hinges. The sliding door in the east wall is functional and the one in the south wall has newer hardware; however, both

of the doors themselves are in very poor condition. The wood shutters over windows in the west stone wall are in similar condition, with missing hinges and very deteriorated frames.

*Trim*

The Creamery's corner boards remain in place, in the same condition as the siding. The barge board is missing from the east half of the south gable end.

Interior

The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Floor*

The concrete floor of the original, west portion of the building is in fair condition. Both levels of the east portion of the building are in very poor condition, becoming extremely poor at the lower level, with settlement/heaving and large structural cracks. Conversely, the concrete stair between the two levels is in good condition.

*Features*

The exposed wood structure is addressed above. The wood ceiling appears to be in good condition, although it may not be adequately supported from above. The paneled wood door and frame in the interior stone wall is in fair condition. Wood steps at doors in the north and south stone walls are also in fair condition. The board 'railing' between levels is partially collapsed.

**Image 75 - General condition of interior**

**Image 76 - Floor slabs at mid-level of building**

**Image 77 - Condition at northeast corner.**

Accessibility Issues

There is no accessible path of travel to or within the Creamery. With no occupancy, accessibility to and inside the building would not be required.

Code Analysis

| | |
|---|---|
| Occupancy Classification | U - Barn |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 1,455 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 12 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 300 square feet/occupant | 5 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 3 |

## *Treatment Recommendations*

Basic Treatments

The recommended treatment approach for the Creamery is to stabilize it in place as a landscape element and interpret it, with no occupancy. Prior to stabilization, document the interior and exterior to HABS (Historic American Building Survey) standards.

*Structure*

- Repair structural cracks in masonry walls for structural stability and to keep animals out of building.
- Confirm that concrete site walls are structurally stable; repair as required for safety.
- Install interior structural bracing as required for seismic stabilization for an unoccupied building.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Cut back overgrown vegetation and re-grade around building to provide positive drainage away from perimeter.
- Replace corrugated metal roofing.
- Reattach loose wood siding and trim; replace severely deteriorated boards.
- Repair wood doors, replacing damaged boards; secure in place.
- Paint all wood elements.
- Provide interpretive signage nearby building.

*Interior*

- Remove any historic equipment or features for possible interpretive use elsewhere on site.

## BUILDING 9: GRANARY/MUSEUM

**Image 78 – East side of Granary with chicken coops**


**Image 79 – North end of Granary**

### *Physical Description*

It is not clear when the Granary building was constructed. It is located at the southwest corner of the ranch complex, near the pond. The site is steeply sloped toward the northeast. The Granary is west of the Tractor Barn (13) and south of John Cardoza Jr.'s House (5). There is a corral at the east and a metal canopy to the west. Originally used to house a mill that ground animal feed, the Cardoza family converted the Granary into a small museum.

The main portion of the building is approximately 60 feet long and 27 feet wide. The original building is rectangular in plan. The addition at the east side is L shaped and includes the entrance, bathroom and a long narrow storage room. A 60-foot-by-20-foot chicken shed is attached to the east side and is rotated about 10 degrees clockwise of the main building. The wood structure is resting concrete footings. The floor is elevated above the ground on a series of walls spaced about seven feet on center and running north-south. The building has load-bearing exterior walls with posts down the center and nailed trusses. There is a wood-framed porch along the west wall. On the west side of the building is a covered patio that is approximately30 feet wide and 40 feet long.

The exterior walls are clad with a variety of metal and wood siding. There is vertical metal siding at the north, east and south sides of the main building, vertical wood boards at the shed and a portion of the west wall, and horizontal wood boards at the vestibule and a portion of the west wall. The granary has a gabled roof, with a gabled dormer on the east side. The chicken coop has a shed roof. The main building and the first 12 feet of the chicken coop are covered with corrugated galvanized sheet metal. The last ten feet of the chicken coop is enclosed with chicken wire at the roof and the east wall. The roof over the patio is a separate structure than the building. The patio roof has metal posts, wood beams, open-web steel trusses, wood purlins and a metal roof.

**Image 80 - Patio on west side of building**

**Image 81 - Recessed entrance at north elevation**

The main entrance is recessed 11½ feet into the northeast corner of the building. The door is accessed by flight of stairs. The door is rail and stile with diamond-shaped glass panels. The secondary door is on the west wall and is also a rail and stile door wood door. To the right of the secondary entrance is a sliding barn door. The windows are aluminum sliders on the west and south walls. There is a large picture window flanked by operable casements at the recessed entrance. The dormer has a framed opening filled with corrugated fiberglass. There is a boarded up vent high on the south gable. The chicken coop has a small vestibule and two wood plank doors at the north side. At the south side it has two framed openings filled with chicken wire.

The main interior space is divided into two sections, separated by a partial height wood wall with a pair of sliding barn doors. The south half of the space houses exhibits; the north half appears to have been a sales area, with a counter and some food preparation equipment. It also contains a large ca. 1900 harvester.

The main electrical panel for the barns is located in the Granary. There are water and sewer connections to the building for the ¾ bath and the sink in the northwest corner.

**Image 82 - Exhibits in south portion of building**


**Image 83 - View of museum exhibit area**

### *Character-Defining Features*

- Rectangular plan
- Side gable roof with gabled dormer
- Corrugated metal cladding
- Vertical board and board and batten siding

### *Existing Conditions*

The overall condition of the Granary is fair to poor.

Structure

The building does not have sufficient lateral bracing including: adequate cripple-wall bracing below the floor at the exterior walls, diagonal or structural sheathing at the exterior walls, or structural sheathing at the roof.

The picnic area canopy roof trusses lack effective lateral bracing at their bearing points.

**Image 84 - Deteriorated structure below building**

**Image 85 - Deteriorated roof structure over picnic area**

Exterior

*Roofing*

The corrugated metal roofing, including ridge cap and flashing, is in poor condition. Some panels are bent, have missing fasteners and small holes, and heavy rust staining on the exterior. Corrosion is visible on interior surfaces as well. There is a buildup of leafy debris on the relatively flat roof over the picnic area on the west side. The gutter along the east side of the chicken coop and the drainpipe at the south end are deteriorated.

*Cladding*

Wood and metal siding on the Granary varies from poor to very poor condition. Wood boards are warped and split. The ends are deteriorated; as these appear to have been reused boards, some of the damage may date from earlier wood to earth contact. However, there is still wood to earth contact at many locations. The south end wall and chicken coop walls, in particular, are extremely deteriorated. The metal siding is corroded and damaged; at the southwest corner the siding does not cover the deteriorated framing. The painted finish is worn.

*Doors*
The two wood panel doors to the Granary are in fair condition. Board doors into the chicken coop are in poor condition.

*Windows*
Aluminum windows are in poor condition. Two gable end windows that have been in-filled with corrugated fiberglass panels (one with a nailed on screen) are also in poor condition.

**Image 86 - General condition of roofing**

**Image 87 - Roofing and trim at ridge, south end**

**Image 88 - Typical condition of wood siding and doors to chicken coop.**

**Image 89 - Typical condition of metal siding.**

**Image 90 - South Gable window with fiberglass infill.**

**Image 91 - Poorly installed window adjacent to entrance.**

*Features*
The porch along the west side is in poor condition; the non-compliant plywood ramp and deck are rotting and in contact with the ground. Wood stairs to the north entrance are in fair condition but also have direct wood to earth contact. Trim throughout the Granary is in poor condition: worn, split and rotted.

**Image 92 - Deteriorated plywood at ramp to west entrance.**

**Image 93 - Wood to earth contact at stairs to north entrance.**

Interior
The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Floor*
The wood plank floor is generally in fair condition. There is some water damage in the bathroom.

*Walls*
Wood plank walls are in good condition. Wall finishes in the bathroom are in poor condition.

*Features*
Wood railings and other features of exhibits are in good condition. Wood casework and cabinets are very dirty and in fair to poor condition. The condition of the exhibits themselves ranges from good to poor.

Electrical and Plumbing
The main electrical panel is corroded. Light fixtures inside and outside the building have been installed in a haphazard manner; exterior fixtures are corroded.

Plumbing is also a haphazard installation; steel and plastic bathroom piping is exposed in the chicken coop. Bathroom fixtures are in very poor condition.

**Image 94 - Typical electrical installation.**

**Image 95 - Deteriorated plumbing fixtures.**

Accessibility Issues

The Granary has a deteriorated, non-compliant ramp to its east entrance. Inside, the building is generally deficient as regards accessibility and ADA compliance (path of travel, bathroom, etc.) Required level of accessibility will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | A-3 museum, U- agricultural shed |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 1,640 square feet (museum),<br>1,243 square feet (shed),<br>Total:2,883 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 16 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 15 net for A, 300 square feet/occupant for U | 80 museum, 4 shed |
| Required Exits (CBC Section 1015) | 2 museum, 1 shed |
| Provided Exits | 2 museum, 1 shed |
| Other considerations | |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Make improvements to the foundation.
- Replace deteriorated framing at south end of building.
- Add necessary seismic connections, shear walls, and plywood sheathing at walls and roof of Granary and at canopy over picnic area.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Replace corrugated metal roofing, gutters and downspouts.

- Re-grade where required to provide positive drainage away from building and eliminate wood to earth contact.
- Replace metal siding on walls and dormer.
- Replace wood enclosure walls at both ends of chicken coop; including doors and framed screened openings.
- Repair wood siding and trim elsewhere on building; patch/replace boards as required: estimate replacement of 10% of siding and 20% of trim.
- Provide secure enclosure of space below building.
- Repair entrance doors, including hardware.
- Demolish entrance ramp and porch on west side; reconstruct new porch, possibly larger and with access at both ends, including a code-compliant ramp.
- Add concrete curb at bottom of north entrance stair.
- Repair chicken coop partitions and roof as required.
- Replace deteriorated aluminum windows; replace window in north gable and fiberglass paneled openings in south gable and dormer.
- Paint all wood and painted metal elements.

*Interior*

- Remove bathroom fixtures.
- Remove miscellaneous cabinets, counters and appliances.
- Retain and rehabilitate granary machinery inside building.

*Systems*

- Have electrical system evaluated by a licensed contractor or engineer.
- Remove all plumbing and heating equipment, piping, and fixtures.

Treatments Contingent on Use

The Granary, when rehabilitated, would lend itself to a number of possible uses, contingent on program needs and the Master Plan. These include Park offices, meeting/event space, or continued interpretive use.

- Install new mechanical and electrical systems.
- Consider construction of a single user accessible restroom at location of existing bathroom.
- Improve lighting; specific requirements will depend on building use.

*For office or meeting room use:*

- Remove all exhibits for possible use elsewhere on site.
- Install finished floor over existing wood subfloor.
- Insulate walls and roof and add finishes.
- Consider installation of a small kitchen at location of existing sink.
- Consider installation of air conditioning.

*For exhibit/museum use:*

- Retain or remove existing exhibits depending on interpretive program established for the site.

## BUILDING 10: LINE SHACK

**Image 96 – Front of Line Shack, facing north, leaning toward west**

### *Physical Description*

The Line Shack is currently located at the southwest corner of the ranch, near the Granary (9) and the pond. It sits slightly tilted on a gradual slope. Built in the 1890s or early 1900s, the line shack housed ranch hands. It was repeatedly moved around the ranch to keep it near the grazing cattle.

The simple gable-form structure is 12 feet wide and 16 feet long, with a shed roof over a 4-foot-deep porch. The structure is wood framed with 2x members for the floor, walls and roof. The floor structure is supported on wood skids on the long sides. The skids are elevated on wood blocks on the east side and the shed is tilted towards the west.

The exterior walls are clad with vertical wood boards tightly fit together. The main roof and porch roof are both covered with cut wood shingles. The west side of the roof is covered with a blue plastic tarp. The front porch is accessed via a center wood stair and surrounded by a wood rail attached to the wood posts.

The only entrance is through the porch to the four panel rail and stile wood door. There are three six-light fixed casement windows: one each on the west, north and south walls. The windows and door are painted at the interior, but have exposed wood at the exterior.

The interior floor is unpainted wood boards of random widths. The walls are painted a mint green.

There are currently no utilities to the building. There is some old knob and tube wiring on the exterior wall, indicating that the building once had electrical power. A wood burning stove is located in the northeast corner.

### *Character-Defining Features*

- One story height
- Gable roof

- Exposed rafter tails
- Rectangular plan
- Rustic vertical board siding
- Wood skids below floor framing
- Shed roof porch
- Wood panel door
- Multi-light wood windows
- Wood burning stove

## *Existing Conditions*

The Line Shack is unstable and leaning to the west due to subsidence along that side of the building. The wood structure sits directly on the ground.

Structure

The line shack lacks a foundation and is rests directly on the ground. It lacks diagonal sheathing or structural sheathing at the walls, and lacks structural sheathing at the roof.

**Image 97 - Tarp-clad east side of roof**

**Image 98 - Roofing and structure at west side**

Exterior

*Roofing*

The wood shingle roofing is in very poor condition. The east side has been covered by a tarp, which is now also deteriorated.

*Cladding*

The vertical, unfinished wood siding is in very poor condition. Wood boards are warped and split. Several large knot holes have been covered with wire mesh, but other, larger holes are uncovered. A bird or animal nest has been built behind the boards of the west wall.

*Door and Windows*

The wood panel door and fixed wood windows, and their trim, are in poor condition.

**Image 99 - Building set on wood skids directly on ground**

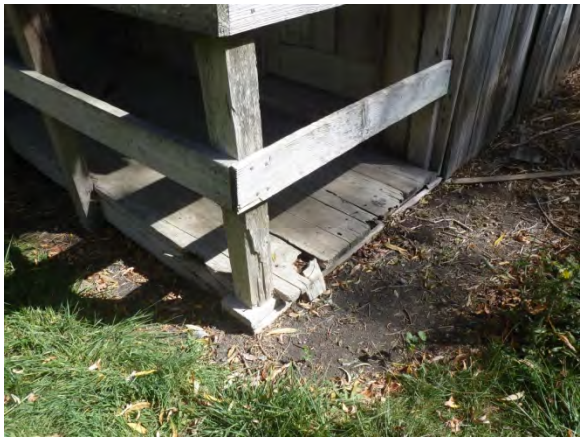


**Image 101 - Deterioration at west end of porch**

**Image 100 - Deteriorated condition of window (typical)**

*Features*

The west end of the front (north) porch has settled almost a foot. The wood decking is rotting and the entire porch is unsafe.

Interior

The interior is in fair condition, considering the building's unstable structure and unprotected exterior.

Accessibility Issues

The Line Shack is not accessible and its sloped porch and stairs are unsafe. Required level of accessibility will depend upon use: with no occupancy, accessibility would not be required.

Code Analysis

| | |
|---|---|
| Occupancy Classification | R-3 single family residential |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 9,625 square feet |
| Actual Area | 200 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 12 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 1 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 1 |
| Other considerations | |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Provide precast concrete footings under wood skids.
- Level building so that it is not leaning.
- Reconstruct porch floor.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Replace roof with new shingle roof to match original roof.
- Repair rafter ends and other rotted structural elements.
- Repair siding and replace sections that are deteriorated beyond repair.
- Reinstall chimney flue for stove for interpretive purposes, not to make functional.
- Repaint door.
- Replace window putty and repair window frames.

*Interior*

- Clean interior.
- Furnish interior as it would have been used in the field.

## BUILDING 12: OLD SHOP/WORKSHOP

**Image 102 – North wall of Old Shop**

**Image 103 –Old Shop with shed on east side**

### *Physical Description*

The workshop and attached equipment shed are located near the center of the ranch between John Cardoza, Sr.'s House (3) and the Equipment Shed (14). The late 1880s workshop is on the west side and an attached equipment storage shed is on the east. There is a steep slope of the west side of the building and an unpaved road at the top of the incline.

The workshop is 36 feet long and 16 feet wide, while the attached shed is 36 feet long and 9 feet wide. The workshop is a simple gabled form, and the shed is a single slope roof. Both the shop and the shed are balloon framed.

The shop has 7½-inch, V-grooved horizontal wood siding. The shed has a random combination of different wood siding including three inch lap siding and nine inch shiplap siding. The roof of the shop is asphalt shingles over wood shingles. The shed has corrugated galvanized sheet metal.

**Image 104 - Interior of workshop**

**Image 105 - Door hardware**

The shop has two swinging doors on the north elevation, which are accessed by wooden stairs. There are no handrails on the stairs. The shop also has a large sliding door at the south elevation. The shed has a pair of large swinging doors on the north elevation and a single swinging door on the east wall. The shop has a fixed casement window high on the gable ends (north and south). The north window is a single pane of glass, while the south window has six panes of glass. There is a fixed casement window on the south elevation of the shed, which has six lights and as unusual trim details.

The shop has a raised wood floor and the shed floor is dirt. The northwest corner of the shed is partially divided from the rest of the shed with a stud wall. The studs are covered with horizontal boards to about three feet above the floor. The area is used for chemical storage and is about 11½ feet long by 6 feet wide. This area currently is storage for chemicals. There is wood-framed shelving along the west wall of the shop and the chemical area. There are wood shelves along the east side of the chemical area, facing the main shop, and along the east wall of the shop. The shed also has some wood shelves, along the west and east walls, near the south end. The interior face of the exterior walls is partially covered with spaced horizontal boards. A table saw is mounted to the floor in the center of the shop. The shop has skipped sheathing and the underside of the wood shingles exposed at the ceiling. The shed has purlins and the metal roofing exposed.

The shop has electricity, but no water or heating.

**Image 106 - Original exterior wall within shed**

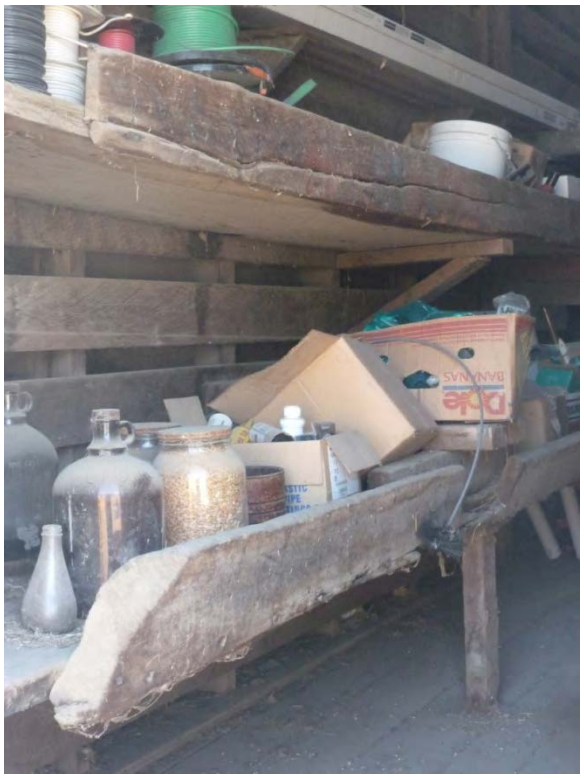


**Image 107 - Recycled wood used as shelving**

### *Character-Defining Features*

- Gable roof
- Wood corner boards and rakes
- Wood window and door surrounds
- Multi-light, wood windows near gable peak
- Doors composed of vertical wood boards
- V-groove horizontal siding
- Exposed rafters and purlins

### *Existing Conditions*

The Old Shop is in fair to poor condition. There is wood –to-earth contact around the entire perimeter and no positive drainage away from the north, west and south sides of the building. The southwest corner appears to be settling.

Structure

The Old Shop has an inadequate foundation. It lacks diagonal sheathing or structural sheathing at the walls, and lacks structural sheathing at the roof.

Exterior

*Roofing*

The asphalt shingles on the roof of the workshop are in fair condition; there are no lost shingles, but those at the ridge appear deteriorated. There is staining on the skip sheathing below the roofing, but that may pre-date the installation of the shingles. The corrugated metal roofing on the attached shed is in fair condition.

**Image 108 - Typical condition of roofing**

**Image 109 - Siding at southeast corner of shed**

**Image 110 - Deteriorated corner boards and earth to wood contact**

*Cladding*
The wood siding of the Old Shop is in poor condition. The painted finish is worn and individual boards are warped, split or missing. The siding on all sides is in contact with the ground. The south wall, in particular, has suffered from ultraviolet damage.

*Doors*
The two doors that are raised above grade are in fair condition; their wood sills are in poor condition. The doors into the shed are in very poor condition due to their contact with the ground. The large sliding door in the south wall of the workshop is in fair condition, but its lack of threshold exposes the structure below. Doors are hung and secured with miscellaneous hardware.

*Windows*
The windows are in very poor condition with broken glazing and missing putty and deteriorated frames and mullions. Neither the windows, nailed to the inside face of the wall, nor their exterior trim, fit the openings in which they are mounted.

*Features*
Wood stairs at both north entrances are in poor, hazardous condition. Wood trim is in fair to poor condition. Many boards have rotten ends; corner boards are warped and rotted at bottoms, in some cases exposing the wall structure. Paint finish is worn.

**Image 111 - Poorly fit window with Plexiglas panel**

**Image 112 - Deteriorated wood stairs directly on ground**

Interior

The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Flooring*

The board flooring in the workshop is generally in fair condition, with some deterioration at the south end wall and at the doors in the north wall.

*Walls*

The tongue and groove boards forming the wall between the workshop and the shed are in good condition.

*Features*

Wood shelving in both the workshop and the shed is in fair to poor condition. It is generally sturdy, but constructed of random lumber, some of it split or warped.

Electrical

The knob and tube wiring could present a hazard if used for power tools which are located in the workshop.

Accessibility Issues

The workshop and shed are generally deficient as regards accessibility and ADA compliance from the exterior and within the building (path of travel, bathroom, etc.). Required level of accessibility will depend upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | S-1 storage |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 13,500 square feet |
| Actual Area | 918 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 3 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 3 |
| Other considerations | Although chemicals are stored in the building, it is not categorized as a hazardous use under Section 307.1, exception 8. |
| | The asphalt shingle roof over the wood shingles is a non-compliant condition per CBC 1510.3, paragraph 2 |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Provide a continuous perimeter concrete foundation at the workshop and shed; provide concrete piers at interior posts and at exterior stairs.
- Install structural sheathing at roof and walls.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Re-grade at perimeter to eliminate wood to earth contact and to provide positive drainage away from building.
- Remove asphalt and wood shingle roofing. Install new asphalt shingle roof over plywood sheathing, with new gutters and downspouts.
- Repair metal roof as needed.
- Repair exterior siding and replace in kind where deteriorated beyond repair; estimate replacement of 25% of siding.
- Replace stairs to doors, provide landings and railings.
- Replace windows to match.
- Repair shed doors and eliminate contact with the ground.
- Paint all wood elements.

*Interior*

- Replace electrical wiring.

Treatments Contingent on Use

Preliminary recommendations include possible adaptation of the workshop for interpretive or exhibit space or for public restrooms. Either of these uses could use the shed for storage. Alternatively, the entire building could continue as storage space.

- Insulate building.
- Provide accessible entrance(s) to workshop from grade.
- Upgrade lighting.
- Install new finishes at walls, floor and ceiling.
- Install plumbing system and fixtures, including ADA-compliant facilities.
- Add heating and air conditioning system.

## BUILDING 13: TRACTOR BARN/ EQUIPMENT BARN

**Image 113 – North entrance to Tractor Barn.**

**Image 114 – Southeast corner of Tractor Barn.**

### *Physical Description*

The Tractor Barn was built between 1952 and 1953 (date in foundation says 1947) of recycled building materials at the south edge of the ranch. It is located at the intersection of Cannon Lane and Cardoza Road. The east side of the barn has a narrow fenced-in area about 12 feet wide, and a large field beyond. At the northeast corner of the barn are two small structures, one of which houses some water supply equipment. The building historically housed large tractors and farm equipment. Now, in addition to a few historic pieces of farm equipment, it is used for general storage.

Measuring 53 feet wide and 89 feet long, the tractor barn is a simple low-sloped gabled form, with no additions. It is post and beam construction with three structural bays in the east to west direction and six bays in the north to south direction. The center bay is about 20 feet wide and the side bays are about 16 feet wide. The interior posts are supported on concrete footings and the east and west walls have continuous concrete footings.

The exterior walls are clad with vertical 1x12 wood boards, spaced about 1/2 inch apart. The roof is clad with corrugated galvanized metal with open ridge and eaves.

The primary entrance to the barn is from the north through a metal gate across a large framed opening. On the opposite wall, there is a pair of large sliding doors. At the west side bay, there are pairs of hinged doors at the north and side walls. There are three unequally spaced windows along the west wall: each a fixed casement with six panes of glass. Each window is covered with thin Plexiglas at the exterior.

The floor of the barn is dirt and there are no interior partitions. The metal roof is exposed between the rafters and purlins. There are no finishes on interior of the walls.

The barn has limited power and lights. Water is located east of the main entrance.

**Image 115 - Barn interior showing framing and dirt floor**

## *Character-Defining Features*

- Rectangular plan
- Gable roof
- Walls and door composed of vertical wood boards
- Wood post and beam construction, with exposed rafters and purlins
- Multi-light, wood windows with wood surrounds

## *Existing Conditions*

The Tractor Barn is in fair to poor condition. There is no positive drainage away from the north, west and south sides of the building.

Structure

The east foundation wall is cracked and leaning. It is likely unreinforced and the supporting footing is unknown.

There are numerous decayed framing members due to water intrusion and wood-to-earth contact. One interior post has been cut off above the floor, and the other posts have inadequate connections to their foundations. One horizontal out-of-plane wall brace has failed.

The existing 2x6 rafter and 4x6 beams are undersized for their spans. The 4x6 posts are undersized for their height. The nailed connections at the timber bracing are likely inadequate to resist lateral forces. The roof and walls lack structural sheathing.

**Image 116 - Typical condition of roofing**

**Image 117 - Wood to earth contact of siding**

Exterior

*Roofing*

The corrugated metal roofing is in fair condition. The original roofing as well as the later panels, gable cap, and eave trim are in similar condition, with some missing fasteners and bent panels and trim. The original roofing has rust staining on the exterior. The lack of gutters has contributed to water damage at grade.

*Cladding*

The wood siding of the barn is in fair to poor condition. The siding at the north, west, and south walls is in contact with the ground and bottoms of boards are deteriorated due to damage from water. The painted finish is worn and individual boards are warped, split or missing.

*Doors*

The large opening at the north end has no doors. The pair of doors adjacent to this opening is hung unevenly with miscellaneous hardware. The two pairs of large doors at the south end are in very poor condition. Both are inoperable, in part due to built up soil against the bottom. The larger, sliding pair has extremely warped boards. The smaller pair of swinging doors is failing also due to inadequately sized hardware. As with the wood siding, bottoms of doors are deteriorated due to damage from water.

*Windows*

The windows are in very poor condition with broken glazing and missing putty and deteriorated frames and mullions.

*Trim*

Trim at the north entrance, windows and gable ends of roof is in fair condition. Paint finish is worn.

**Image 118 - Deteriorated doors at south end of building**

**Image 119 - Typical window with plexiglas cover**

**Image 120 - Cracked foundation at south wall**


**Image 121 - Corroded electrical components**

Interior

The wood structure and the roof and wall cladding exposed on the interior are addressed above.

Electrical

Electrical switches and some conduit are corroded and potentially unsafe; incandescent fixtures provide bare minimum illumination.

Accessibility Issues

The Tractor Barn's main entrance is on grade; however, the dirt floor is not considered compliant. The building could be made accessible, with the required level of accessibility dependent upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | S-1 storage |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 15,750 square feet |
| Actual Area | 4,673 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 20 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 16 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 1 (gate at north side) |

## *Treatment Recommendations*

Basic Treatments

The basic treatment approach for the Tractor Barn is to stabilize and strengthen it and halt its deterioration.

*Structure*

- Stabilize or remove and replace the east foundation wall.
- Replace decayed and damaged framing and add supplementary framing where required.
- Improve all framing connections and add bracing, as required for seismic strengthening.
- Install plywood sheathing at roof and walls as required for seismic strengthening.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Re-grade at perimeter eliminate wood to earth contact and to provide positive drainage away from building.
- Replace corrugated metal roofing.
- Install new gutters and downspouts at east and west walls of barn.
- Repair and reattach siding; replace seriously damaged boards; estimate replacement of 20%.
- Replace one pair of barn doors at south wall of barn, including hardware.
- Repair other barn doors, replacing damaged boards; rehabilitate or replace hardware as required for functionality.
- Repair windows or replace to match.
- Paint all wood elements.

*Interior*

- Level dirt floor and eliminate all word to earth contact.

*Systems*

- Have electrical system evaluated by a licensed contractor or engineer.

Treatments Contingent on Use

The preliminary recommended use for the Tractor Barn is unconditioned agricultural storage and maintenance.

- Upgrade electrical service and lighting as required for safe use of equipment.
- Consider adding doors to opening at north end of barn.

## BUILDING 14: STORAGE SHED/ EQUIPMENT SHED

**Image 122 – Northeast corner of Storage Shed**

**Image 123 – West wall and rusted roof of Storage Shed**

### *Physical Description*

The 1950 Storage Shed is located at the center of the Cardoza Ranch, northwest of the work yard. The Storage Shed is aligned with the Old Shed to its north. There is a steep slope of the west side of the building and an unpaved road at the top of the incline. This building was used for storage of equipment historically and is now used as the carpentry shop.

Measuring 26 feet wide and 48 feet long, the tractor barn is a simple low-sloped gabled form, with no additions. The building is balloon framed with nailed wood trusses supporting the roof. The walls rest on a continuous concrete footing.

The exterior walls are clad with vertical 1x12 wood boards, spaced about 1/2 inch apart. The roof is clad with corrugated galvanized metal with open ridge and eaves.

There are two pairs of sliding doors on the east elevation and one pair at the south. There are three equally spaced windows on the north wall and five unequally spaced windows on the west wall. All of the windows are fixed casement windows. Two of the windows on the west wall have one pane of glass and the rest have six panes each. All of the windows are covered with a thin Plexiglas at the exterior.

The Storage Shed floor is concrete. The walls have no interior finish and the ceiling is open to the exposed rafters, purlins and metal roofing.

The building has power. Water is located at the exterior, near the south door. There is no heating in the building. There is a small concrete pad in front of the northern door on the east wall.

**Image 124 - Interior currently being used as a workshop**

**Image 125 - Large sliding doors to accommodate equipment.**

## *Character-Defining Features*

- Rectangular plan
- Gable roof
- Walls and sliding doors composed of vertical wood boards
- Wood roof truss
- Multi-light, wood windows with wood surrounds
- Large sliding doors

## *Existing Conditions*

The Storage Shed is in fair to poor condition. There is wood-to-earth contact around the entire perimeter and no positive drainage away from the north, west and south sides of the building. The southwest corner appears to be settling.

Structure

The Storage Shed lacks a concrete foundation, diagonal sheathing or structural sheathing at the walls, and structural sheathing at the roof.

Exterior

*Roofing*

The corrugated metal roofing is in poor condition, with surface staining from corrosion. There is no ridge cap and some panels appear damaged at the ridge. The sheet metal chimney (no longer in use) is corroded and poorly attached to its flashing and the roof. The lack of gutters and minimal overhang of the metal roofing has contributed to deterioration of the wood trim at eaves and at the base of the wall below.

**Image 126 – Entrance to working space in Storage Shed**

**Image 128 - Typical window with Plexiglas covering; damaged trim**

**Image 127 - Deteriorated siding with wood to earth contact.**

*Cladding*

The wood siding of the Storage Shed is in poor condition. The painted finish is worn and individual boards are warped, split or missing. Although wood-to-earth contact occurs only at the northwest and southwest corners, the bottoms of siding boards are rotting throughout the building.

*Doors*

The two pairs of sliding doors are functional. The larger pair is in fair condition; the small pair in poor condition. The concrete building slab functions as a sill for both, protecting them from earth contact.

*Windows*

The windows are in poor condition with broken glazing and missing putty and deteriorated frames and mullions. Plexiglas sheets have been nailed over all of the windows to provide some weather protection.

*Wood Trim*
Barge boards and fascias are in poor condition, with some broken and missing sections. Trim at windows varies from fair to poor condition.

Interior
The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Flooring*
The concrete slab floor has a number of significant structural cracks and poses trip hazards.

Electrical
Upgrades made to the electrical system are temporary and do not meet code. The system is undersized for its current use for shop equipment.

**Image 129 - Corrugated roofing and steel beam at door**

**Image 130 - Cracked concrete slab**


**Image 131 - Miscellaneous non-compliant electrical modifications**

Accessibility Issues

The Storage Shed is built on grade; however, the entrances are not ADA-compliant. The building could be made accessible, with the required level of accessibility dependent upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | F-1 shop |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 12,750 square feet |
| Actual Area | 1,248 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 5 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 0 (The sliding doors do not meet the requirements of Section 1008 and therefore do not count as required exits.) |

## *Treatment Recommendations*

Basic Treatments

*Structure*

- Install structural sheathing at roof and walls.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Re-grade at perimeter to eliminate wood to earth contact and to provide positive drainage away from building.
- Remove and replace sheet metal roofing over new plywood sheathing. Provide gutters and downspouts.
- Repair exterior siding and trim; replace in kind where deteriorated beyond repair; estimate replacement of 25% of siding and 50% of trim.
- Replace windows to match.
- Paint all wood elements.

*Interior*

- Upgrade electrical system.
- Repair concrete floor slab.

Treatments Contingent on Use

The preliminary recommended use for the Storage Shed is for interpretive/visitor center use.

- Rehabilitate paved area at west side of building and provide an accessible entrance.
- Upgrade lighting.
- Consider insulating building, installing new finishes at walls, floor and ceiling, and add heating and air conditioning system.

## BUILDING 15: SLAUGHTERHOUSE

**Image 132 – Entrance in west wall of Slaughterhouse**

**Image 133 – East end of Slaughterhouse**

### *Physical Description*

The Slaughterhouse is located at the northeast corner of the ranch, east of the Bunkhouse. An old unmaintained road runs along the building's south side. The construction date is unknown. As its name implies, it was used for slaughtering cows and other farm animals. Now it is unused. A large blackberry bramble is engulfing the southeast corner of the building.

The 20-foot-wide, 30-foot-long slaughterhouse is a simple gable form. There appears to have been a roof attached on the east wall, perhaps a canopy or enclosed addition. The structure is wood post and beam with rafters supporting the skip sheathing. There is a continuous concrete slab poured over field stones.

The exterior walls are clad with vertical 1x12 wood boards, spaced about 1/2 inch apart. The roof is clad with corrugated galvanized metal with open ridge and eaves. The skip sheathing under the metal indicates that the roof was originally covered with wood shingles.

Large doors cover the west side of the building: a pair of hinged doors at the north side and a sliding door at the right. On the east side is a narrow, tall door with a narrow concrete ramp up to it. This door was likely used to bring in the cattle. At the east corner of the south wall, there is a low, wide door which is hinged from the top. This door may have been used to remove the carcasses. There are no windows in the slaughterhouse.

Like the other farm buildings, there are no interior wall or ceiling finishes. The floor is roughly poured concrete. At the east wall, near the south corner, the concrete slopes to the exterior and there is a gap between the wall and the foundation. This was likely to drain out the blood. At the southeast corner, there is a wood winch and tackle with a large metal hook at the end of the rope. There is a table and a couple of other pieces of equipment in the building, which relate to its historic use.

**Image 134 - Concrete drainage trough at east end of building**

**Image 135 - Winch and tackle near southeast corner**

The building currently has no utilities. A light socket mounted below a beam and wiring on the west gable show that the building once had power. No water connection was located.

## *Character-Defining Features*

- Rectangular plan
- Gable roof
- Walls and doors composed of vertical wood boards
- Corner boards
- Wood post-and-beam construction, with exposed rafters and purlins
- Concrete foundation
- Wood winch and tackle

## *Existing Conditions*

The Slaughterhouse is in poor condition. Although its roof is in good condition, the rest of the building envelope is extremely deteriorated.

Structure

The foundation is inadequate and the concrete slab, on which the building rests, is in very poor condition. The Storage Shed lacks diagonal sheathing or structural sheathing at the walls, and lacks structural sheathing at the roof. There is extensive decay of the wood framing due to water intrusion and soil contact.

Exterior

*Roofing*

The corrugated metal roofing is in generally good condition, with only one bent edge at the southwest corner. The ridge cap is also in good condition.

*Cladding*

The wood siding of the Slaughterhouse is in very poor condition. There are many warped, split or missing boards. Although the concrete slab separates the wood siding from the ground, dense plant growth around the building has contributed to the deterioration of the lower sections.

**Image 136 - General condition of roofing.**

**Image 137 - Typical condition of wood siding and vestiges of former addition east end.**

*Doors*
The sliding door in the west wall does not appear to be functional. The adjacent pair of doors is extremely deteriorated and also not functional; access to the building is gained by removing one of the door's boards. The smaller door at the opposite end is also in poor condition. The shutter low in the north wall is also in poor condition but may be operable

*Wood Trim*
All wood trim is in fair condition, with major deterioration at the bottom ends of corner boards.

*Features*
The short concrete ramp outside the east door is in poor condition.

Interior
The wood structure and the roof and wall cladding exposed on the interior are addressed above.

*Flooring*
The concrete slab floor is completely broken up in some areas and seriously cracked throughout the building.

*Features*
Remaining elements of the pulley system appear to be in fair condition.

**Image 138 - Non-functional doors at west wall.**

**Image 139 - General deteriorated condition of slab and siding.**

Accessibility Issues

There is no ADA-compliant access to or within the Slaughterhouse. The building is constructed on grade and could be made accessible, with the required level of accessibility dependent upon use.

Code Analysis

| | |
|---|---|
| Occupancy Classification | F-1 |
| Construction Type (CBC chapter 3) | VB, non-rated, combustible construction |
| Allowable area (CBC Section 503) | 12,750 square feet |
| Actual Area | 1,248 square feet |
| Allowable height ( CBC Section 504) | 40 feet, 1 story |
| Actual Height (feet/ stories) | 14 feet, 1 story |
| Occupant Load (CBC table 1004.1) Factor: 200 square feet/occupant | 5 |
| Required Exits (CBC Section 1015) | 1 |
| Provided Exits | 2 |
| Other considerations | |

## *Treatment Recommendations*

Basic Treatments

The recommended treatment approach for the Creamery is to stabilize it in place for storage use. Prior to stabilization, document the interior and exterior to HABS (Historic American Building Survey) standards.

*Structure*

- Provide continuous perimeter foundation.
- Remove and replace any deteriorated structural elements.
- Provide seismic reinforcement at exterior walls and at roof.
- Refer to Structural Assessment in the Appendix for further discussion.

*Exterior*

- Cut back overgrown vegetation and re-grade around building to provide positive drainage away from perimeter.
- Reattach loose wood siding and trim; replace severely deteriorated boards; estimate replacement of 20% of siding and trim.
- Repair wood doors, replacing damaged boards, and secure in place. Provide one operable door and safe, level access to it.
- Paint all wood elements.
- Provide interpretive signage nearby building.

*Interior*

- Remove deteriorated concrete and install new floor slab.
- Remove winch and tackle for possible interpretive use elsewhere on site.

Treatments Contingent on Use

The preliminary recommended use for the slaughterhouse is for storage.

# ADDITIONAL RECOMMENDATIONS

## RECOMMENDATIONS FOR NEW STRUCTURES OR ADDITIONS

## RECOMMENDATIONS FOR FURTHER STUDY

# APPENDICES

## BIBLIOGRAPHY

## STRUCTURAL ENGINEER'S REPORT

appendix d

# Groundwater Availability Memo

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

31 October 2012

# Memorandum

To: Steve Ehert, Sonoma County Regional Parks

From: Michael Maley, PE, PG, CHg, Mike McLeod, PG

cc: John Baas, MIG, Inc.

Subject: Progress Report
Groundwater Assessment and Well Siting Analysis for Tolay Lake Regional Park
K/J 1264014*00

Kennedy/Jenks Consultants (Kennedy/Jenks) is pleased to submit this technical memorandum providing a progress report of our groundwater assessment for Tolay Lake Regional Park. In this technical memorandum, we present a progress report that discusses the initial findings of the groundwater assessment and recommendations for siting the test well. The purpose is to provide Sonoma County Regional Park staff an opportunity to review these initial findings.

## Background

Determining the feasibility of groundwater as a water supply is critical in understanding park development options. Water is currently obtained from two springs on the property, and water from two perennial lakes on the upland (east side) part has been used for irrigation. However, springs and ponds are vulnerable to extended droughts and may not be a reliable water supply. Also, springs and ponds would require additional water treatment for use as a public drinking water supply making this option less feasible. There are no groundwater wells present on the Property. Therefore, Kennedy/Jenks recommends one test well will be drilled on Park Property to a depth of approximately 300 feet to provide subsurface information and to estimate potential well yields.

## Geology Overview

The Tolay Lake valley is an elevated valley trending generally northwest-southeast. It is bounded on the northeast by the Sonoma Mountains and on the southwest by a low line of hills that separate it from the Petaluma Valley to the west. Tolay Creek flows from northwest to southeast down the middle of the valley. Tolay Lake was formed by a natural dam across Tolay Creek that was about 14 feet higher than the lake bed. The natural dam was breached in the 1860's, but was later rebuilt to its current condition (Florsheim, 2009).

The valley is underlain by Quaternary deposits and the Petaluma Formation composed primarily of silt, clay, with scattered sand or coarse-grained layers. The hills to southwest are mainly underlain by Franciscan Formation metamorphic rock and the hills to the northeast are underlain by volcanic rocks; mainly the Sonoma Volcanics but some sources distinguish an older volcanic unit (Donnell Ranch or Tolay Volcanics) along the valley perimeter. For ease of

reference, we will refer to all the volcanic rocks as the Sonoma Volcanics in this technical memo. The distribution of these geologic formations follows the northwest-trending regional geologic structure.

The Tolay Lake basin is an elevated depression located within the Tolay Creek syncline and is bordered on the west by the northwest-trending Tolay fault and on the east by steep hills associated with the Adobe Creek anticline (Cardwell, 1958). The Rodgers Creek Fault is present in the Sonoma Mountains to the east of the Park Property. There are numerous associated faults with the Rodgers Creek Fault along the east side of the valley. Wagner and others (2002a, 2002b) show several fault contacts along the base of the hills to the east. The Tolay Fault is generally defined as the contact between the Franciscan and Petaluma Formations (DWR, 1974, 1982). Sources disagree on the precise alignment of the fault, but it is likely the Tolay Fault passes close along the foot of the hills along the southwest.

Springs are present in the valley and are larger and more numerous along the east side of the valley than on the west side. Maps and aerial photographs show several ponds and springs present in a northwest-trending alignment along the base of the hills to the east (Circuit Rider Productions Inc., 2006). The linear alignment of the ponds and springs appears to be associated with the Petaluma Formation-volcanic rock contact.

## Literature Review of Potential Aquifers

Based on the local geology, Tolay Lake Regional Park is located within a Marginal Water Availability Area, as defined by the County planning department. We have reviewed data from the California Department of Water Resources for the area (DWR, 1975, 1982), the United State Geological Survey (USGS) including reports by Cardwell (1958) and geologic maps by Blake et al (2000) and Graymer et al (2002), and geologic maps from the California Geological Survey (Wagner et al, 2002a, 2002b). Rust (1996) conducted a geotechnical investigation of the site that included some shallow borings. Below is a summary of the descriptions of the local aquifers from those reports.

The Petaluma Formation, mid-to-late Pliocene in age, consists of folded continental and shallow marine to brackish-water deposits of clay, shale, and sandstone, with lenses of friable sandstone, conglomerate and nodular limestone. Abundant clay characterizes this unit and contains about 70 percent clay, shale, and clayey or shaley beds. The Petaluma Formation can yield moderate amounts of water when a well penetrates an appreciable thickness of sand and gravel. The Petaluma Formation is noted to provide supplies of good-quality water in quantities sufficient for domestic use, although wells tapping this formation are typically greater than 150 feet deep so as to intercept enough coarser-grained units in the usually compacted and fine grained sediments. Locally, higher yield wells have been developed. A 235-foot deep well in the

Petaluma Formation about four miles northwest of Tolay Lake was reported by Cardwell (1958) to have produced 350 gallons per minute (gpm). Conditions in the Petaluma Formation are variable across the area. Depth to groundwater can vary from near the surface to over 100 feet deep. Water quality is quite variable as well.

The Sonoma Volcanics are exposed along the crest of the Sonoma Mountains on the eastern edge of the study area. The volcanic rock is considered locally significant water producer where they are composed of tuff, scoria, and volcanic sediments. However, locations where the volcanic rock is dominantly lava flows and intrusive rocks are considered to be essentially non-water-yielding unless the rocks have been highly fractured. Because of this, the Sonoma Volcanics have highly variable water-yielding characteristics depending on the site-specific characteristics.

The Franciscan complex is the oldest geologic unit in the study area (Jurassic and Cretaceous age) and are exposed along the western and southwestern edges of the study area, and east of Lakeville Highway along Tolay Creek. The complex includes highly variable amounts of shale, sandstone, chert, greenstone, and serpentinite. The Franciscan complex generally contains only limited quantities of water in fractures. Normally, consolidated rocks containing water only in fractures are not considered to have a specific yield.

## Review of Area Well Logs

Kennedy/Jenks reviewed 14 well logs provided by the Park Department (DWR, 2003) and 84 well logs from a recent request (DWR, 2012) by Kennedy/Jenks on behalf of the Park Department. The well logs included wells completed in each of the Petaluma Formation, Sonoma Volcanics and Franciscan Formation from areas near to Tolay Lake Regional Park and adjacent areas in the Petaluma and Sonoma Valleys. Some high producing wells included in the well log packages that were completed in the alluvial sediments of the Petaluma and Sonoma Valley, and do not have any relation to conditions near Tolay Lake.

There are several wells completed in the Petaluma Formation that are located along Stage Gulch Road about 1 to 3 miles north of the Park. The logs confirm that conditions in the Petaluma Formation are variable and well production is dependent upon the lithology encountered. Of eleven wells located along Stage Gulch Road and completed in the Petaluma Formation, five have low well yields of 10 gpm or less, whereas six had well yields of 15 to 40 gpm. The higher yield wells occurred on both the east and west side of the valley.

Wells completed in the Sonoma Volcanics ranged from 0 to 500 gpm. Most of the higher yield wells in the Sonoma Volcanics were located on the east flank of the Sonoma Mountains in the Sonoma Valley. Wells located further up in the Sonoma Mountains in locations more analogous

to Tolay Lake Regional Park had well yields that varied from 0 to 100 gpm. This indicates that the well yields in the volcanic rocks are also variable depending upon the lithology.

Two wells were completed in the Franciscan Formation had initial pumping rates of 15 to 50 gpm; however, they showed high drawdown over a short interval of pumping indicating that these rates are not sustainable and that the long-term pumping rate would be more in the 1 to 10 gpm range. There were two wells completed along Lakeville Highway that were dry and subsequently abandoned. These wells are open to the alluvial sediments to the west and groundwater drains from the hills towards the Petaluma Valley.

There are no groundwater wells present on Tolay Lake Regional Park. Kennedy/Jenks did review the geotechnical logs from the Rust (1996) report. One borehole TC-B4, located about 1,000 feet northeast of the existing farm buildings, is a 50-foot borehole that contained over 13 feet of sandstone. The sandstone was present from a depth of 37 feet to the bottom of the borehole, so the total sandstone thickness is unknown. This indicates that the Petaluma Formation does contain significant sandstone layers at Tolay Lake Regional Park. A deeper test well is needed to evaluate whether additional sandstone layers are present at depth. If sufficient sandstone layers are present, a Petaluma Formation well could be a viable option for Tolay Lake Regional Park.

## Well Driller's Perspective

Kennedy/Jenks discussed well drilling with Brandon Burgess (personal communication, 2012) of Weeks Drilling regarding his experience drilling water wells in the Tolay Lake area. In general, Mr. Burgess considered the Sonoma Volcanics as the more favorable potential aquifer. He noted that Weeks Drilling recently completed a well estimated at 50 gpm in the Sonoma Volcanics north of Tolay Lake Regional Park.

Mr. Burgess believes that water would be found by drilling in the Petaluma Formation, but considers the Petaluma Formation as being more uncertain as a water producer because of the high percentage of fine-grained sediments. He noted that wells completed in the Petaluma Formation have a typical depth range from 280 to 500 feet and well yields range from 5 to over 50 gpm. His experience is that one in four wells drilled in the Petaluma Formation will have well yields at the higher end of the range and that the remainder of the wells are typically near the lower end of the range.

Mr. Burgess noted that there are few wells completed in the Franciscan Formation in the Tolay Lake area, and he considers the Franciscan Formation as having the lowest potential for producing groundwater. He said that their typical procedure is to see if they encounter fractures

in the upper 40 feet; if so they'll keep drilling. If in this zone, they encounter silt, clay, and/or greenstone with few fractures, they'll abandon the hole and move elsewhere and try again.

Kennedy/Jenks also discussed drilling methods and anticipated drilling rates in the Tolay Lake area. For a well in the Sonoma Volcanics, Mr. Burgess would recommend drilling with a downhole air-hammer. If the borehole stays open, they would continue with the downhole hammer to the total depth. Downhole air-hammer methods are fast and because air is used the detection of water and flow measurements are easier. He anticipated the drill rate in the volcanic rocks using this method to be about 300 feet per day. If the borehole starts in fine material or the borehole won't stay open they will switch to mud rotary.

If drilling the Petaluma Formation, Mr. Burgess recommended drilling with mud rotary from the start. In fractured rock or the Petaluma Formation, he anticipated that the drilling rate using mud rotary would be about 150 feet per day.

Mr. Burgess said the 'rock drilling' surcharge ($12 per foot of drilling) on their budget estimate would be used if the drilling rate starts drops below 100 feet per day and that call is made in the field. Based on his experience, he doesn't anticipate that this surcharge would be necessary in the Tolay Lake area. No rock drilling surcharge would be necessary if they drill with downhole air-hammer.

## Groundwater Supply Assessment

Based on the available geology and groundwater data, the Sonoma Volcanics appear to have the highest potential for development of one or more groundwater wells especially in the hills on the eastern side of the valley. The presence of a number of springs and ponds along the eastern side of the valley further confirms that groundwater is present in this area. Area well logs indicate that the Sonoma Volcanics are a relatively consistent aquifer with well yields from 10 to over 100 gpm. The Tolay Lake Regional Park includes a large area of the volcanic rocks that should be highly fractured due the proximity the Rodgers Creek Fault and other associated mapped faults. Therefore, the Sonoma Volcanics appear to have good potential for providing a sustainable water supply for the Park.

The Petaluma Formation underlies the valley. The Petaluma Formation is primarily composed of fine-grained sediments, but can be a relatively good groundwater producer if enough sand and gravel layers are intercepted by the well. Area well logs support that the Petaluma Formation is capable of 15 to 50 gpm is sufficient sand layers are present. However, the character of the Petaluma Formation is heterogeneous and groundwater production is also highly variable. Geotechnical boreholes show that shallow sandstone layers are present. Since there are no

deep groundwater wells completed in the Petaluma Formation in Park, we are unsure what the production capacity of the Petaluma would be here without installing a test well.

The Franciscan Formation that underlies the majority of the western hills is considered a poor water-bearing unit and existing well logs indicate that wells can produce low flow rates for only a short time and with substantial drawdown. There are springs located in the hills to the west of the existing farm buildings but these appear to be small and ephemeral. Wells in the Franciscan Formation may also be more vulnerable to drought and low water conditions. Therefore, wells in the Franciscan Formation are not recommended.

## Infrastructure and Logistics Assessment

In evaluating the location of a potential water supply well, it is important to incorporate infrastructure and logistical considerations as well as the groundwater potential into the decision. Since the project is for a regional park, there are also archeological, historical and aesthetic considerations to be included. Below is a brief summary of the primary infrastructure and logistical issues present at Tolay Lake Regional Park.

The water supply to the Park is currently sourced from a spring on the east side of the valley. It is conveyed by a pipeline to a tank near the vineyard and then across Tolay Lake to a tank near the buildings. The pipeline was original infrastructure from when the site was an active farm. It may be possible to connect a new well to the tank near the vineyard and use the existing pipeline for conveyance across the valley. However, we do not currently know the condition of the existing pipeline and whether it may be required to be replaced as part of the Master Plan. If a new pipeline is required, it would present a substantial cost to construct a new pipeline across the valley.

The well would require electrical power to operate the pump and bringing in power can be expensive and power poles can be visible from a distance. Currently, electricity is available on the western side of the valley near the existing farm buildings. However, it is about one mile across the valley from the existing farm buildings. Power is not available on the property on the eastern side of the valley, but power is available on the property to the north of the Park, but is still about a half mile or more from potential well sites.

Access to the eastern side of the valley was described by Park personnel as being inaccessible during wet weather conditions, potentially from December through May. This is due to high water from Tolay Lake flooding the road across the valley and the nature of the clay-rich adobe soils. Both of these conditions can limit the ability to move equipment trucks and drill rigs across the site to both initially construct the well and to maintain the well, tank and pipeline once a well

is in operation. A viable water supply would require that the well and supporting infrastructure be accessible throughout the year in case repairs are necessary.

The California Department of Public Health requires setbacks from potential pollution sources based on the California Well Standards (DWR 1981, 1991) and the Drinking Water Source Assessment and Protection (DWSAP) Program (CDPH, 2000). Near the existing farms buildings the relevant setbacks include:

- 50 feet from any sewer line
- 100 feet from a septic tank or subsurface leachfield
- 150 feet from cesspool or seepage pit
- 100 feet from animal or fowl enclosure

Another siting criterion by CDPH is that the well must be out of the 100-year floodplain and/or above an elevation that may be subject to flooding. We would need to confirm that the well site is above the highest potential lake level so that the well would not be subject to flooding.

Based on infrastructure and access issues, the western side of the valley is preferable to the eastern side. If a viable well can be found near to the existing farm buildings, this would provide the Park Department with substantial savings in capital and maintenance costs.

## Recommendation

Kennedy/Jenks' recommendation is to use the test well to evaluate whether the Petaluma Formation near the existing farm buildings can sustain a viable groundwater supply well which would provide substantial cost savings for the Park. The available hydrogeologic data suggest a reasonable potential for a viable water supply well in the Petaluma Formation. This site is considered to be less sensitive to wet weather conditions than areas on the east side of the valley and is, therefore, logistically easier to construct this year. We would recommend a location to the south and east of the existing buildings that is sufficiently far from wastewater facilities to be protective of water quality. The fine-grained and layered character of the Petaluma Formation would also provide water quality protection from potential near-surface sources. We would construct the well with a sanitary well seal of 50 to 100 feet to further help protect water quality from near-surface sources.

If a Petaluma Formation well on the west side of the valley is found to not be viable, then the efforts should be shifted to the Sonoma Volcanics in the hills along the east side of the Park. The available information suggests that there is sufficient groundwater supply in the Sonoma

Volcanics to supply the Park. However, as noted above, there are potential infrastructure, access and logistical issues that could substantially increase the cost of this option. Kennedy/Jenks recommends that the groundwater assessment will include the eastern hills only if a well is not viable in the Petaluma Formation.

If the Petaluma Formation can provide a viable groundwater supply well for the Park, a well in the Sonoma Volcanics would not be necessary. Therefore, constructing a well in the Sonoma Volcanics should be considered only if necessary, and the timing should be postponed to allow more time to thoroughly consider the issues related to this location.

The initial recommendations of this technical memo are for discussion purposes, and Kennedy/Jenks will continue the data review. These are considered preliminary recommendations as the groundwater assessment is ongoing, but provide Regional Parks staff the opportunity to comment on these initial findings. We can set a time for a meeting or teleconference to discuss this further.

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appendix e

# Wastewater Treatment Options Memo

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

**FALL CREEK ENGINEERING, INC.**
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July 29, 2014

John Bass
Senior Environmental Planner
MIG, Inc.
800 Hearst Avenue
Berkeley, CA 94710

Subject: **Waste Disposal Options and Preliminary Wastewater System Plan**
**Tolay Lake Regional Park, Sonoma County, California**

Dear John:

Fall Creek Engineering, Inc. (FCE) is pleased to present to you this letter report describing the requirements for and a presentation of alternatives for an onsite wastewater treatment and disposal system at the Tolay Lake Regional Park (park). The park is located between the Petaluma River and the Sonoma Valley, and is in the Tolay Creek watershed, which is a sub-basin of the Sonoma Creek hydrologic area that drains to San Pablo Bay (Figures 1 and 2).[1]

The park includes 15 buildings, a seasonal lake, hiking trails, a picnic area, numerous pre-historic resource sites, and sensitive habitats, as well as rare, threatened and endangered species. The park is currently accessible to the public on weekends by permit only. The park hosts environmental education activities, offers guided tours and hosts an annual Fall Festival.[2]

As part of a two-year Master Planning process at the park, Fall Creek Engineering (FCE) has been retained to evaluate alternative wastewater improvements to accommodate expanded visitor services and facilities in the Park Center, located in the northwest portion of the park on the western shore of Tolay Lake. FCE has identified options for wastewater disposal and reuse of treated effluent. The results are summarized in this report.

The scope of work for this evaluation consisted of the following tasks:

1. Review of existing information related to the on-site wastewater system, soil and groundwater conditions, and critical resource issues.

2. Limited site evaluation to characterize soil conditions and cultural resources in the proposed redevelopment area, and improvements needing wastewater facilities.

3. Recommendation for alternative wastewater approaches, including the capacity and location of new wastewater facilities for the property and preliminary cost estimates for alternative wastewater systems

[1] Tolay Creek Riparian Enhancement Plan, November 2009, developed for Sonoma Land Trust by West Coast Watershed with assistance from Rob Evans & Associates.
[2] http://parks.sonomacounty.ca.gov/About_Us/Project_Details/Tolay_Lake_Regional_Park_Master_Plan.aspx

## 1. EXISTING SETTING AND SITE CONDITIONS

The existing wastewater treatment system on the site includes a conventional septic tank and leachfield system that has experienced intermittent problems since coming under County management. Repairs have been completed as needed to keep the system operational and serve the existing facilities and uses at the site. Water service to the site is currently provided by a spring off-site. The existing leachfield serving the property is located beneath the proposed Visitor Center Location. The existing system is not adequate to effectively manage and treat the estimated wastewater flows as the number of visitors to the park is expected to dramatically increase over the next 30 years.

Soils

The soils on the site are classified by the Natural Resources Conservation Service (NRCS) Soil Survey as predominantly Clear Lake Clay Loam and Diablo Clay. Attachment A includes a soil map of the Tolay Lake Regional Park master plan area, with regions mapped predominantly as either Clear Lake Clay Loam or Diablo Clay, and is described below:

**Clear Lake Clay Loam (CcA):** This soil consists of clay formed under poorly drained conditions and typically occupies flat basin areas. The soil is characterized as having a very shallow depth (3-5 feet) to seasonal high water table, low permeability (0.06 to 0.2 inches per hour) and high shrink-swell potential. Because of the slow infiltration rate and high groundwater table, these soils have a very high runoff potential.[3] This soil series is not well suited for subsurface wastewater disposal and are prone to clogging.

**Diablo Series (DbC, DbD, and DbE):** The Diablo series consists of well-drained clay soil occupying slopes of varying steepness (2-9 percent (DbC), 9-15 percent (DbD) and 15-30 percent (DbE) slopes). These soils also display low permeability, high shrink-swell potential and very high runoff potential. The hazard of erosion is high for these soils and increases with increasing percent slope. These soils are also not well suited for subsurface wastewater disposal and is prone to clogging.

In January 1996 a geotechnical assessment of the Tolay Lake Regional Park area was completed for the City of Santa Rosa and the U.S. Army Corps of Engineers to evaluate alternative reservoir sites and pipeline routes.[4] This study included test pits and seismic studies to evaluate soil and geologic conditions within the Tolay Lake vicinity, though the closest of the sample locations was 2,500 feet from the master plan area. The test pit logs indicate a predominance of silty clay and sandy clay soils within the top 1-5 feet, consistent with the soils encountered by FCE investigation, described below.

On May 5, 2014, FCE and a team of County employees conducted a limited site evaluation to characterize soil conditions within the Master Plan area. FCE characterized soil conditions at eight (8) soil boring locations across the site, as shown on Figure 3. The hand borings were completed using a 2" hand auger to a depth of 4 to 6 feet. Soil logs describing the borings including the type and condition of the soil encountered, are included in Attachment B. Consistent with the

[3] Hydrologic Feasibility Analysis, Kamman Hydrology and Engineering, Inc.
[4] Rust Environmental and Infrastructure, January 1996, Geotechnical Assessment of Alternative Reservoir Sites and Pipeline Routes Volume 1 – Report, Santa Rosa Subregional Long-Term Wastewater Project.

NRCS soil survey and nearby test pits sampled in 1996, the soil is predominantly clay loam and silty clay. Due to the fine grain soil texture and high swell potential, these soils are not well suited for subsurface disposal of wastewater from a conventional wastewater system using only septic tanks and leachfield disposal trenches to treat and dispose of the wastewater.

Cultural Resources

Numerous areas of prehistoric and historic value exist on the site. The wastewater collection, treatment and disposal systems will need to be carefully located and monitored during construction to minimize disturbance to nearby areas of archeological significance. A more detailed description of cultural resources in and around the park can be found in, *Tolay Lake Regional Park, Baseline Documentation, Prepared for Sonoma County Agricultural Preservation and Open Space District, Prepared by Circuit Rider Productions, Inc, June 2006.*

Environmental Resources

The proposed wastewater system improvements are proposed to be located at least 100 feet away from the perimeter of Tolay Lake and from any delineated wetland or stream on the property. Figure 4 identifies the known water features and wetlands with the required 100 foot setback. The extent of natural wetlands and required setbacks to these areas do not present a constraint on the amount of land available for wastewater treatment and disposal.

Climate data were obtained for the site vicinity from California Irrigation Management Information System (CIMIS) Station 144, which has been recording climate data in eastern Petaluma since August 25, 1999[5] and is located approximately 6.7 miles northwest of the park. Table 1 summarizes the average monthly precipitation and evapotranspiration (ETo) rates over the 15 years of record. Evapotranspiration refers to the water lost through evaporation from the soil and surface water bodies, and transpiration from plants.

Table 1. Average Park Monthly Precipitation and Evapotranspiration (ETo)

| Month | Rainfall (in) | ETo (in) |
|---|---|---|
| January | 3.03 | 1.27 |
| February | 4.20 | 1.70 |
| March | 2.93 | 3.10 |
| April | 1.48 | 4.31 |
| May | 1.01 | 5.21 |
| June | 0.41 | 6.20 |
| July | 0.10 | 6.33 |
| August | 0.03 | 5.24 |
| September | 0.03 | 4.43 |
| October | 0.95 | 3.10 |
| November | 1.64 | 1.63 |
| December | 3.82 | 1.15 |
| **Total** | **19.63** | **43.67** |

[5] http://wwwcimis.water.ca.gov/cimis/frontStationDetailData.do?stationId=144

## 2. PROPOSED SITE AND USES

The Master Plan project vision recognizes the park as sacred land with deep spiritual significance, with site features reflecting California's long and storied heritage. The Master Plan improvements would expand upon services to provide an inspirational and educational outdoor recreation destination for all ages and cultures in a thriving, ecologically rich and fully restored landscape.[6]

The Tolay Lake Master Plan site layout proposes a combination of preserving, replacing or renovating existing structures, and constructing a new Visitor Center and Native American ceremonial space. Two site improvement areas, the Equestrian Center and the Native American ceremonial space, will be served by dry wastewater facilities (i.e., pump out options), whereas the more centrally located Visitor Center, residences, park office and Granary building will be managed with a new wastewater system. The following sections estimate the wastewater flow for the planned uses at the park and describe the wastewater treatment alternatives considered. Once a well for future potable water supply for the site has been secured, separation between the proposed wastewater and water systems will need to be incorporated into the site plan, typically 10 feet setback for all water lines and 100 feet for water wells.

## 3. WASTEWATER FLOW ANALYSIS

The size and relative cost of a new wastewater treatment and disposal/reuse system are based on the flows into the system. FCE has estimated the potential flows using the master plan site layout and assumptions about future park usage assuming daily and peak visitor usage. Approximately 135,000 visitors are expected during the early spring and summer months, 30,000 visitors during winter, and 200,000 visitors during the late summer and fall. It is assumed that approximately 67% of the weekly park visitors will occur on the weekend. Table 2 summarizes the assumed seasonal and weekend peak visitors distribution. The analysis also assumes eight people will live on-site in permanent residences and four people will work in the on-site administrative facilities.

Table 2. Master Plan Prediction for Future Visitors to Tolay Regional Park[7]

| Site Use | Seasonally | Months | Monthly | Weekly | Peak per day on Weekends |
|---|---|---|---|---|---|
| *Early Spring/Summer* | 135,000 | 3 | 45,000 | 11,250 | 3,770 |
| *Winter* | 30,000 | 3 | 10,000 | 2,500 | 840 |
| *Remaining Months* | 200,000 | 6 | 33,330 | 8,330 | 2,790 |
| | | **Average** | **30,415** | **7,603** | **2,548** |

Table 3 summarizes the estimated flows from the Visitor Center, residences, park office and Granary building, based on the assumed future site use and on published per capita daily unit flows values. On an average weekend the estimated wastewater flow rate is 13,350 gallons per day with a peak weekend flow of 19,460 gallons per day.

[6] Tolay Lake Regional Park Master Plan: Public Workshop #2, January 16, 2014.
[7] J. Bass, personal communication, May 30, 2014.

Table 3. Estimated Wastewater Flow Rates from Future Park Visitors

| Wastewater Flow Rate | | | | |
|---|---|---|---|---|
| **Source** | **People** | **gallon/(person x day)** | **gallons/day** | **Refernce** |
| **Full-time Residents** | 8 | 70 | 560 | Metcalf and Eddy, 1991, Table 2-9 (pg 27), Typical value |
| **Office** | 4 | 13 | 52 | Metcalf and Eddy, 1991, Table 2-10 (pg 28), Typical |
| **Visitors** | | | | PRMD, Section 19, number 9-2-8, pg 44, estimate for picnic parks (toilet waste only), gallons per picnicker is 5 gpd. Visitor estimate based on peak weekend usage per season. |
| *Early Spring/Summer* | | | | |
| Picnic Parks (visitor/day) | 3,770 | 5 | 18,850 | |
| | | | | |
| *Winter* | | | | |
| Picnic Parks (visitor/day) | 840 | 5 | 4,200 | |
| | | | | |
| *Remaining Months* | | | | |
| Picnic Parks (visitor/day) | 2,790 | 5 | 13,950 | |
| | | | | |
| average (visitors/day) | 2,548 | 5 | 12,740 | |
| | | **Total (average)** | **13,350** | **gal/day** |
| | | **Total (peak)** | **19,460** | **gal/day** |

The total average wastewater flow rate was calculated as the sum of the flow rate from full-time residents, office and the average number of visitors. The total peak wastewater flow rate was calculated as the sum of the flow rate from full-time residents, office and visitors during the high use periods that are assumed to occur during early spring and summer months.

## 4. WASTEWATER COLLECTION SYSTEM

A new wastewater collection system will be installed to collect wastewater from the main residences, Visitor Center, offices, and the restored Granary building and convey it to a central septic tank and lift station. The wastewater collection system will be a network of gravity sewer lines and a septic tank effluent pump (STEP) system that pumps liquid to the proposed wastewater treatment system. The STEP system consists of a septic tank to retain solids and a pump system to convey liquid waste to the treatment system.

The preliminary plan proposes to install a small diameter gravity sewer system that will convey untreated wastewater to the STEP system. The STEP system will be located adjacent to the Historical Barn and Goat Corral. The STEP system will include a dual chamber septic tank to capture solids before they are pumped up to the wastewater treatment site. A small dedicated pump tank will be installed after the septic tank to house a duplex pump system. Due to the potential for high groundwater, FCE recommends installing a dual-chambered 10,000 gallon concrete or anchored fiberglass septic tank followed by a 3,000 gallon pump tank.

Figure 4 presents a preliminary layout of the proposed gravity sewer pipelines and step system. The wastewater collection system will be designed to meet the Sonoma County Public Works standards and the requirements of the Uniform Plumbing Code. The retrofitted Granary building, which will include a commercial kitchen, will have oil/water separators below the sinks and a gravity style grease trap installed as part of the collection system.

## 5. WASTEWATER TREATMENT ALTERNATIVES

Due to poor soil conditions and high groundwater conditions in the vicinity of the proposed improvements, design and construction of a conventional wastewater treatment system with a septic system and leachfields was not considered a feasible alternative without additional treatment of the wastewater. There are a variety of alternative wastewater treatment technologies that can be used to meet County and State requirements for the site. FCE has conducted an evaluation of three alternative wastewater treatment systems: (1) a packed bed textile filter system manufactured by Orenco Systems, Inc. (OSI), (2) a multi-stage trickling filter system manufactured by Acqualogic, Inc. (AQL); and (3) a combined trickling filter and constructed wetland treatment system. The evaluation describes and compares each system considering capital costs, operation and maintenance requirements, energy costs, land requirements, operator skill level, and reliability.

All three treatment systems are biological treatment systems that can produce highly treated wastewater that can be filtered, disinfected and reused for pasture irrigation or landscape irrigation for restoration projects on the property.

### Alternative #1 – OSI Advantex Packed Bed Treatment System

The Advantex textile biological filtration system, manufactured by Orenco Systems, Inc., is a widely used treatment system that can produce a high quality effluent. The system is a relatively easy system to operate and maintain, but tends to be relatively expensive compared to the other treatment alternatives.

The system treats the water using biological filters that consist of sheets of textile media packed into a fiberglass box and wastewater is intermittently sprayed over the media. Wastewater is recirculated through the textile filters at a high rate (three times a day) to keep the filter wet and improve the treatment of the water. Bacteria and other organisms colonize the textile media and treat the wastewater as it trickles across the surface of the media. This technology is referred to as pack bed fixed film treatment. Due to the relatively high density of the media, the application rate of the wastewater over the media is lower than other types of fixed film biological treatment systems, such as high rate trickling filters. As water flows through the textile filter, the organic waste is reduced, and typically the ammonia-nitrogen in the raw wastewater is converted to nitrate-nitrogen by nitrifying bacteria that grow naturally in the filters. The recycled water from the textile filters is returned to the primary/recirculation tank. The water in the primary/recirculation tank is anoxic or anaerobic (devoid of oxygen), which is the optimum condition for denitrifying bacteria which consume the nitrate-nitrogen and convert the nitrate-nitrogen to nitrogen gas, reducing the nitrogen in the wastewater.

The system consists of a large primary clarification/recirculation tank fitted with a pump system, a eight textile filters located in parallel plumbed treatment pods, and a final effluent pump tank. The sizing of the system is based on design criteria provided by the system manufacturer.

Based on the projected peak flow of 19,460 gallons per day, the Advantex System would consist of the following components:

- A 60,000 gallon primary clarifier/recirculation tank with a duplex pumping system;
- Eight (8) Advantex 100 Treatment Pods;

- A 3,000 gallon effluent pump tank and pump system; and
- A duplex manual clean disk filter system.

A process flow schematic of this system is shown in Diagram A.

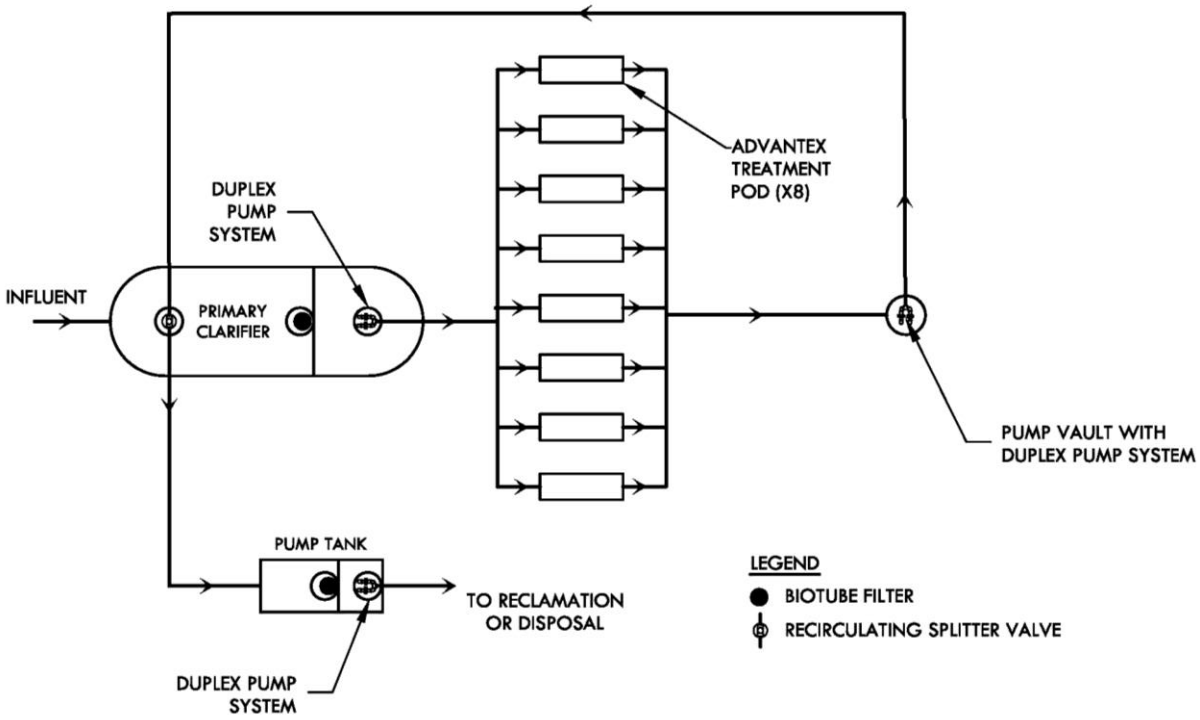


Diagram A. Typical Advantex Packed Bed Treatment System Schematic (Not to Scale)

The area required for the Advantex system is approximately 2,000 square feet.

Figure 5 shows a schematic layout of the Advantex treatment system in three potential locations within the park. One potential location is directly east of the Old Stone Floor Barn where wastewater can enter the treatment system via gravity from the collection system. A second location is near the Modern Barn and new equipment shed. The third potential location is adjacent to the Duck Pond. The Modern Barn and Duck Pond locations require additional energy for pumping collected wastewater to these higher elevations for treatment.

**Alternative #2 – Acqualogic Trickling Filter Treatment**

The Acqualogic system is similar to the Advantex system and uses a fix film biological treatment system. However, the trickling filters are designed as high rate biological treatment systems using a substantially high application rate that reduces the amount of filter area required to achieve a similar level of treatment. The multi-stage trickling filter system also recirculates the water over two or three stages of trickling filters set up in series and returning the water from the trickling filters to the primary clarifiers. Similar to the Advantex system, the AQL system uses the trickling filters to remove the organic matter from the wastewater and nitrify the ammonia-nitrogen to nitrate-nitrogen. The treated effluent is then returned to the primary clarifier to denitrify the effluent before discharge or reuse.

The trickling filter is a tank filled with engineered media that provides a substrate for organisms to grow on that treat the wastewater entering the tanks. The organisms are passively aerated and do not require a blower(s). As wastewater is sprayed over the media, the organisms absorb the nutrients in the waste (as food) and grow. Each trickling filter has a clarifier to capture biosolids that slough off the media. Each tank has a solids-return line to allow the solids to be recirculated into the beginning of the treatment system. From the clarifier, the water will either be recirculated through the trickling filter or move through the treatment system to the next stage.

The system would consist of the following components:

- A 20,000 gallon primary clarifier;
- A 3,000 gallon recirculation tank and pump system;
- A two-stage Acqualogic biofilter system (with four biofilters);
- A 3,000 gallon effluent pump tank and pumping system; and
- A duplex manual clean disk filter system.

A process flow schematic is shown in Diagram B.

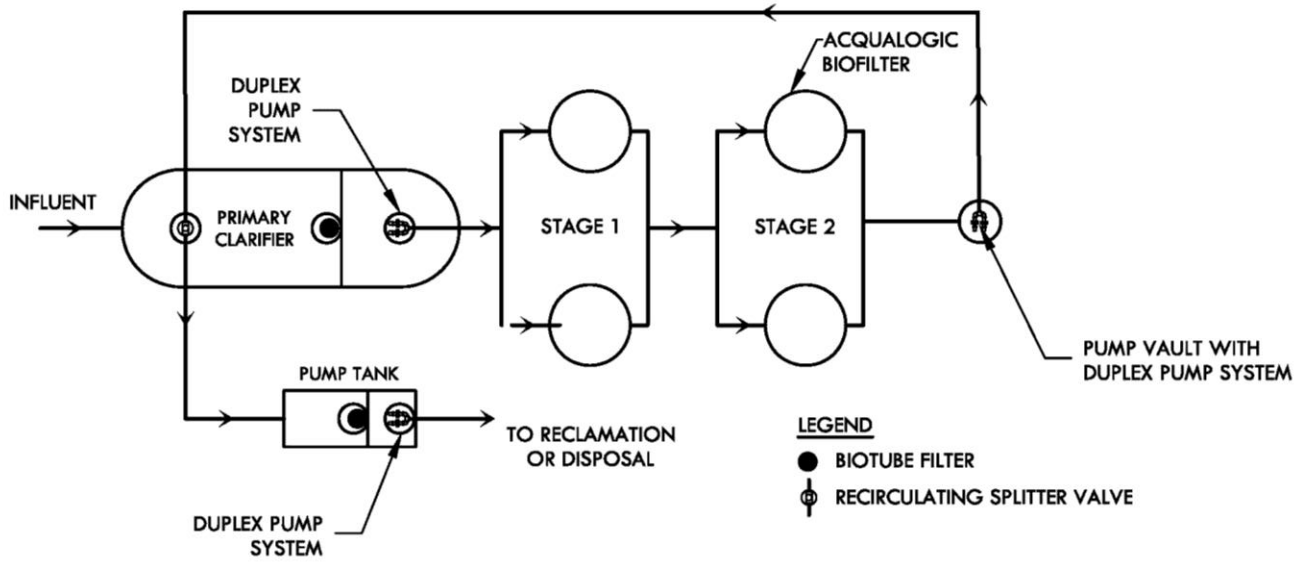


Diagram B. Typical Acqualogic Treatment System Schematic (Not to Scale)

The area required for the Acqualogic system is approximately 1,000 square feet.

Figure 5 shows three sites where this system could potentially be installed on the site.

**Alternative #3: Combined Single-Stage Trickling Filter and Natural Wastewater Treatment System**

An engineered natural treatment system (ENTS) uses naturally occurring treatment processes with few external inputs (such as energy and chemicals). These systems rely on time and complex natural biochemistry to treat water. The ENTS typically requires more land area to meet

detention time requirements. In general, an ENTS will include constructed wetland ponds that use aquatic plants and algae to assist with the treatment process. Constructed wetlands are designed and sized with multiple zones creating both anaerobic and aerobic zones to provide the complex bio-physical treatment system necessary to achieve high levels of treatment.

Treatment wetlands can provide a very high level of treatment or polishing of secondary effluent from a pretreatment system, such as a single-stage trickling filter. It is important to note that constructed wetlands systems should not be used as a primary treatment system. Wetland treatment systems can provide other ancillary benefits that are consistent with the long-term programs at Tolay Lake such as a facility for environmental education about water quality and ecological water treatment, and the creation of additional wildlife habitat.

A combined trickling filter and constructed wetland system is a wastewater treatment system that uses passive aeration, clarifier tanks, and wetlands to provide the aerobic and anaerobic environments for treatment of the wastewater. The proposed ENT system would have a single stage recirculating trickling filter, before the water enters the enhanced treatment wetlands. The trickling filter removes the majority of the Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) to reduce the organic loading to the treatment wetland. The proposed treatment wetland would consist of two three feet deep wetland ponds constructed in series.

Treatment wetlands use plants and other natural organisms to provide treatment and removal of organic matter and nitrogen from the wastewater. The wetlands have shallow and deep zones to provide free water surfaces and habitat for submerged and emergent wetland plants. Provide different zones allows for the ponds to have diverse plant life and ecology that increases the treatment efficiency of the system.

Treatment wetlands in combination with trickling filters provide very good treatment; however they require more area than either Alternatives #1 and #2. Table 8 in Section 7 provides a comparison of the land requirements for each of the alternatives. A constructed wetland that receives treated effluent from the trickling filters can achieve concentrations of 10 mg/L of BOD, 6 mg/L of TSS, and 3 mg/L of Total Nitrogen (TN). The combined treatment system would produce effluent suitable for subsurface irrigation or land disposal.

A process flow schematic for this type of treatment system is presented in Diagram C.

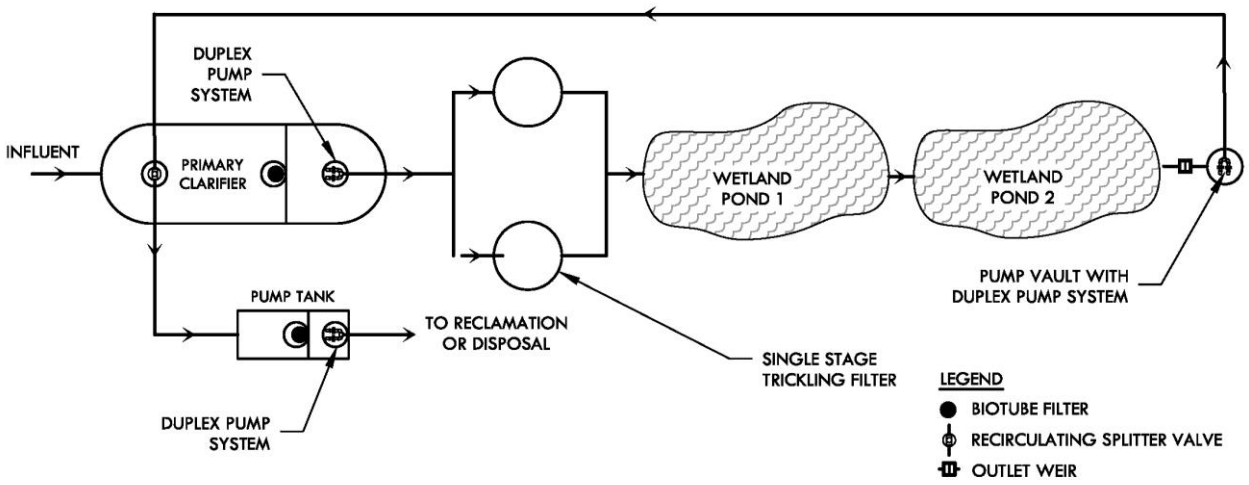


Diagram C. Typical Trickling Filter and Constructed Wetland Treatment System Schematic (Not to Scale)

Two locations have been identified within the park as potential sites to install a treatment wetland system: Duck Pond and an area northwest of the Modern Barn.

Duck Pond is an existing pond within the park that is currently accessed by cattle as a watering hole. Historical grazing activity around the pond has caused some erosion and sedimentation to occur in the pond, which has reduced the pond depth to between one and two feet. A spring on the property flows through Willow Pond to the north before continuing downstream to Duck Pond and eventually flowing into a shallow drainage ditch that connects to Tolay Lake.

If converted to a natural wastewater treatment system as shown in Figure 6, Duck Pond would be divided into two treatment ponds and a third storage pond. The treatment ponds would have both shallow (18 inch deep) and deep zones (5 feet deep) with an average depth of 3 feet. The wetland would be planted with both emergent and submergent wetland vegetation and sized to have a hydraulic residence time of over 13 days within the first two zones, with an additional 34-days of wastewater storage in the third pond area.

Considerations or issues that may constrain conversion of the Duck Pond to a treatment wetland include:

- The Duck Pond may be considered a jurisdictional wetland and if so may not be converted to a treatment wetland;

- The pond likely provides habitat for threatened or endangered species, such as the California Red Legged Frog; converting the pond to a treatment system could require mitigating loss of habitat for this special status species;

- Runoff and spring flows would need to be diverted around the pond if it is converted to a treatment wetland.

- A new wetland might be considered a new utility under the terms of the land conservation easement and if so, then may not be consistent with the existing land use provisions.

Given these issues with the Duck Pond site, it might be easier to install this alternative system in the northwest section of property near the Modern Barn. This location has sufficient area available for the single-stage trickling filter/two-pond treatment, with storage pond system, as proposed at the Duck Pond. Due to the proximity of this site to adjacent properties, additional screening with vegetation may be required to address privacy concerns.

Additional Treatment to Tertiary Treated Wastewater

Fully recycled water use in the park would require additional treatment (filtration and disinfection) in accordance with State Water Recycling Laws (Title 22). Once filtered and disinfected, the water could be available for a wide range of uses, such as irrigation, toilet flushing, fire protection and dust control. To comply with the State's water recycling laws would require additional operation and monitoring requirements that could substantially increase long-term operation and maintenance costs. For example, daily water quality testing for bacteria, which would be required, would increase the monthly service requirements by roughly $3,000 per month.

## 6. OPTIONS FOR FINAL EFFLUENT DISPOSAL AND REUSE

Based on soil conditions, FCE recommends two alternative wastewater dispersal and disposal systems at the site. The first method is the use of shallow subsurface drip dispersal system to reuse the treated wastewater for irrigation of fruit trees and ornamental landscape, and for habitat restoration projects. The second method is a land disposal system that would include setting up a dedicated spray irrigation field on pasture land that is fenced and not accessible to the public.

Figure 7 shows the proposed layout of the subsurface drip and spray irrigation areas. The subsurface drip dispersal system is shown in areas that will be landscaped and irrigated within standard setback limits from nearby streams and wetlands to assure that the project will not adversely affect surface water or groundwater quality at the site. The proposed spray irrigation system is in areas designated as pasture lands.

Additional site investigations will be required to evaluate on-site groundwater conditions and ensure adequate separation between the shallow drip dispersal system and the highest anticipated groundwater level.

In addition, careful management of the dispersal system will be required before and after rainfall events to prevent overloading or water logging the soils.

FCE has contacted California Regional Water Quality Control Board staff to assess if treated effluent could also be used for irrigation of riparian habitat areas during the spring, summer and fall. The CRWQCB indicated that this could be an appropriate reuse of this water as long as the applied water does not enter any surface water course or impact shallow groundwater resources.

Shallow Drip Dispersal System

The on-site wastewater system plan will reuse treated effluent for landscape irrigation around buildings and roads and within common landscape areas as shown on Figure 7. Based on the clay soil conditions and assuming an application rate of 0.2 gallons per day per square foot, the amount of subsurface drip disposal area required to manage 100% of the treated effluent on the site is approximately 2.23 acres (approximately 97,300 square feet).

Based on the preliminary irrigation plan, treated effluent would be applied to approximately 3 acres of dispersal area using a subsurface drip irrigation system. Table 4 presents the preliminary design calculations for the subsurface drip dispersal system.

The subsurface drip dispersal system will be installed six (6) inches below ground surface, and treated effluent would be applied during dry periods.

Table 4. Subsurface Drip Dispersal Irrigation Design Calculations

| **Shallow Drip Dispersal Calculations** | **Single Zone** | **Multiple Zones** | |
|---|---|---|---|
| Number of Zones | 1 | 5 | zone |
| Quantity of Effluent to be disposed per day | 19,460 | 19,460 | gallons |
| Hydraulic Loading Rate | 0.2 | 0.2 | gpd/sf |
| Disposal Area Required per Zone | 97,300 | 19,460 | sf |
| Spacing between wasteflow lines | 1 | 1 | ft |
| Spacing between wasteflow emitters | 1 | 1 | ft |
| Total Linear Feet of dripline | 97,300 | 19,460 | ft |

Spray Irrigation

Spray irrigation of treated wastewater is another potential disposal method in areas where public access is prohibited. Based on preliminary calculations, FCE estimates that approximately 2.1 acres is available for spray irrigation of treated wastewater. The spray field would need to be located outside of 100-foot setbacks from adjacent stream and wetland areas.

A spray irrigation system would need to be carefully managed, particularly in relation to forecasted precipitation events. An example operational limitation that could be required is withholding irrigation of the area 24-hours prior to forecast precipitation, (e.g. rainfall exceeding 0.1 inches) with irrigation resuming when soil conditions are sufficiently dry. Additional storage within the wastewater treatment system may be required to store water during prolonged (multi-day) storm events.

## 7. TECHNICAL EVALUATION OF ALTERNATIVE TREATMENT SCHEMES

A technical evaluation of each treatment system alternative was based on the following criteria:

1. Capital cost;
2. Operation and maintenance requirements; and
3. Land requirements.

Capital Costs for Treatment System Improvements

Capital costs for each alternative treatment system are compared in Table 5 based on the estimated wastewater flows. The reuse and disposal systems are assumed to be identical for each type of treatment system and are not included in this comparison.

Table 5. Capital Costs Comparison for the Treatment System Alternatives

| | **Alternative #1** | **Alternative #2** | **Alternative #3** |
|---|---|---|---|
| **Description** | **OSI Advantex Packed Bed Treatment System** | **Acqualogic Two-Stage Trickling Filter System** | **Trickling Filter & Wetland** |
| Pretreatment | $ 44,700 | $ 44,700 | $ 44,700 |
| Treatment System | $ 261,500 | $ 152,200 | $ 152,800 |
| Sales Tax | $ 26,000 | $ 16,700 | $ 16,800 |
| Shipping | $ 15,300 | $ 9,800 | $ 4,900 |
| Labor | $ 229,700 | $ 147,700 | $ 148,100 |
| Profit | $ 80,400 | $ 51,700 | $ 51,800 |
| Engineering and Permitting | $ 82,201 | $ 52,852 | $ 52,383 |
| Contingency | $ 74,000 | $ 47,600 | $ 47,100 |
| **Total Estimated Cost** | **$ 813,801** | **$ 523,252** | **$ 518,583** |

The preliminary capital cost analysis indicates that the cost of the Acqualogic two-stage treatment system and the trickling filter-constructed wetland system are very similar. The cost for the OSI Advantex treatment system is substantially higher than these two alternatives. Table 6 presents a preliminary capital cost estimate for an on-site subsurface drip dispersal and spray irrigation system.

Table 6. Preliminary Cost Estimate for On-Site Subsurface Dispersal and Spray Irrigation Systems

| **Reuse System** | **Total Cost** |
|---|---|
| Subsurface Drip Irrigation | $ 211,900 |
| Spray Irrigation | $ 66,182 |

Operation and Maintenance Requirements

Operation and maintenance (O&M) requirements are estimated by the amount of hours the operator must clean, monitor, and maintain the system on a weekly basis. All systems will have a Supervisory Control and Data Acquisition (SCADA) system that will allow the system operator to monitor the system remotely and thereby reduce the number of trips to the site. Table 7 provides a comparison of the estimated monthly and annual O&M costs for each alternative.

Table 7. Estimated Operation and Maintenance Costs

| | **Alternative #1** | **Alternative #2** | **Alternative #2** |
|---|---|---|---|
| | **OSI Advantex Packed Bed Treatment System** | **Acqualogic Two-Stage Trickling Filter System** | **Trickling Filter & Wetland** |
| Monthly O&M Cost | $ 2,000 | $ 2,000 | $ 750 |
| Annual O&M Cost | $ 24,000 | $ 24,000 | $ 9,000 |

This comparison indicates that the combined trickling filter and wetland system would require the least amount of maintenance compared to the OSI and AQL systems, which have similar O&M requirements.

Land Requirements

Table 8 presents the estimated amount of land required for each wastewater treatment system. Package plants[8] have relatively small footprints compared to the combined trickling filter and wetland treatment system.

Table 8. Land Area Requirements for Alternative Wastewater Treatment Systems

| | **Alternative #1** | **Alternative #2** | **Alternative #3** |
|---|---|---|---|
| **Land Use Requirements** | **OSI Advantex Packed Bed Treatment System** | **Acqualogic Two-Stage Trickling Filter System** | **Trickling Filter & Wetland** |
| Square Feet | 2,000 | 1,000 | 40,820 |
| Acre | 0.046 | 0.023 | 0.94 |

The combined trickling filter and wetland treatment system would require more land than either of the two package plants. However, the Duck Pond and the area behind the Modern Barn would be available to install this system.

[8] Package plants are defined by the Sonoma County PRMD in Policy No. 1-4-3 as a method of sewage treatment that uses energy and mechanical, biological, chemical or physical treatment of wastewater to reduce BOD, suspended solids, nitrogen and bacteria with a degree of complexity that requires a certified operator. Package plants also refer to any treatment unit other than a septic tank that processes more than 1,500 gallons of wastewater per day.

Energy, Operator Skill, and System Reliability

OSI and AQL treatment systems have a similar moderate energy use, whereas the treatment wetland alternative has a low energy use. All three alternatives require a relatively low level of operator skill and are reliable treatment systems.

## 8. REQUIREMENTS

The County of Sonoma and the California Regional Water Quality Control Board (RWQCB) have adopted standards for on-site wastewater systems. The following sections identify pertinent standards that apply to the siting, design, and operation of an upgraded on-site wastewater system on the property.

Sonoma County Requirements

*Sonoma County Code, Chapter 7 and 24: Regulations for Design, Construction, Repair and Operation of Non-Standard Sewage Disposal Systems (policy number 9-2-8)*

These regulations establish the rules governing non-standard sewage disposal system programs in Sonoma County. The regulations cover two basic types of non-standard systems, experimental systems and alternative systems. An experimental system is a technology that has not been used within the county but has sufficient design information and monitoring data to substantiate the design, applicability and use at the site. An alternative system is an experimental system that has been used successfully in Sonoma County.

The standards prescribe setbacks from man-made and natural features, groundwater and surface water resources, reserve area requirements, site criteria to determine the suitability of site conditions for installing a disposal system(s), and design criteria for non-standard systems.

*Sonoma County Permit and Resource Management Department Package Treatment Plant Policy and Procedure (policy number 1-4-3)*

This policy is intended to provide guidance to county staff when an application is submitted for a commercial, agricultural or industrial use that proposes use of a package sewage treatment plant for domestic sewage disposal in cases where such plants are consistent with the General Plan and is also intended to guide the environmental (CEQA) and technical review of projects.

The policy outlines the submittal requirements for a permit application (in conjunction with a discretionary permit application). The submittal must be prepared by a Registered Civil Engineer with a minimum of 5 years of experience in sewage treatment plant design. The submittal shall include a full description of the collection, treatment and disposal systems, including an evaluation of soil and groundwater conditions as well as a site-specific water balance discussion. The submittal shall include an environmental review of the package plant for CEQA compliance that assesses the potential impacts and measures required to mitigate impacts related to noise, odors, vectors, visual impacts, soil erosion, geologic hazards, potential health effects, and groundwater impacts, along with an assessment of alternative treatment schemes, size of the proposed treatment plant, aerosols, hazardous materials, sludge disposal, cumulative impacts, impacts on flood plains, biological impacts and other potential environmental factors.

*Sonoma County Site Evaluation and Percolation Test Methods (policy number 9-2-17)*

The Sonoma County PRMD has adopted procedures to provide uniform standards for review of site and soil conditions, and performing percolation testing.

California Regional Water Quality Control Board Requirements

*Water Quality Control Plan for the North Coast Region*

Primary responsibility for the protection and enhancement of water quality in California has been assigned to the State Water Resources Control Board (State Water Board) by the California legislature. The State Water Board provides state-level coordination of the water quality control program by establishing statewide policies and plans for the implementation of state and federal laws and regulations. Nine regional water quality control boards (regional water boards) adopt and implement water quality control plans (basin plans) that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems.

*Waste Discharge Requirements*

The property will be regulated by the San Francisco Bay (Region 2) Regional Water Quality Control Board (Regional Board) through their Waste Discharge to Land program. The project would be regulated under Waste Discharge Requirements and a Monitoring and Reporting Program adopted and issued by the Regional Board. The County would be required to submit a Report of Waste Discharge (RWD) for the project that provides a full description of the project, engineering calculations, design and construction plans, an operation and maintenance plan, and a copy of an approved CEQA document for the project. Once the RWD has been deemed complete by the Regional Board, Waste Discharge Requirements would be issued or the County could be allowed to operate under the recommendations of the RWD.

## 9. CONCLUSIONS

1. The future estimated number of visitors to the park represents a significant increase above existing conditions. An enhanced wastewater treatment and disposal system will be required to effectively manage this anticipated use and corresponding projected wastewater flows. The number of visitors projected to use the park would be expected to generate an average wastewater flow of 13,350 gallons per day with peak daily flows around 19,460 gallons per day.

2. Based on this preliminary analysis, FCE recommends installation of a single stage trickling filter and wetland treatment system. The system would treat and reuse wastewater via a subsurface drip irrigation dispersal and spray field irrigation system. A constructed wetland system would have the lowest capital and operation and maintenance costs compared to the other alternatives considered. A constructed wetland system would also provide benefits including additional wildlife habitat and environmental education opportunities for the park. Two potential locations for the treatment wetland have been identified: at Duck Pond and behind the Modern Barn. The Modern Barn location is currently the preferred location because of potential regulatory complications associated with the reuse of an existing water feature such as Duck Pond. For each of the three proposed treatment alternatives there is adequate space within the Park Center to accommodate the required 100 foot setback requirement from water features and wetlands.

3. During peak use the wastewater treatment system can be expected to generate low to moderate odors. Proximity to odors should be considered during the selection of a treatment location. Placement at either Duck Pond or near the Modern Barn has the benefit of being away from the main visitor area, and selection of either these locations should mitigate any potential odor issues from the treatment system.

4. Soil investigations did not find areas suitable for a conventional subsurface disposal system, such as a leachfield, although a leachfield system is currently used on-site. Additional soil testing is advised to determine if a backup leachfield system could be installed to periodic use during wet weather periods when wastewater flows are likely low but surface soils may be saturated. Further percolation tests and groundwater investigations would be needed to identify potential locations suitable for a leachfield system.

5. There is on-site area available to install shallow subsurface drip disposal systems capable of accepting up to 19,460 gpd of treated wastewater. Proposed gully restoration areas can also be served by subsurface drip disposal to assist with establishing new vegetation. Storage of treated effluent within an on-site pond would provide operational flexibility and could potentially reduce the size of the drip and spray dispersal areas by 30% to 40%, if these systems were sized for average daily flows instead of peak daily flows. It is also anticipated that wastewater production rates will be at their lowest during the

winter months when the reuse of treated effluent will need to be carefully managed with precipitation events and soil saturation.

6. The preliminary wastewater system plan assumes that large annual events, such as the Fall Festival, would be served by portable toilet facilities, not the proposed wastewater treatment system.

7. Recycled water that meets Title 22 standards is currently not considered a cost effective option at the site. However, if water supply constraints are encountered to meet anticipated future demands, recycled water could be used to offset potable water uses, such as for toilet flushing.

This concludes the evaluation of wastewater alternatives for the Tolay Lake Regional Park Master Plan. Thank you for the opportunity to assist you with this project. If you have any questions or require any additional information, please do not hesitate to contact me at (831) 426-9054.

Sincerely,

EMILY CORWIN, M.S., P.E.
Senior Associate Engineer

PETER HAASE, M.S., P.E
Principal Engineer

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# FIGURES

**ATTACHMENTS**

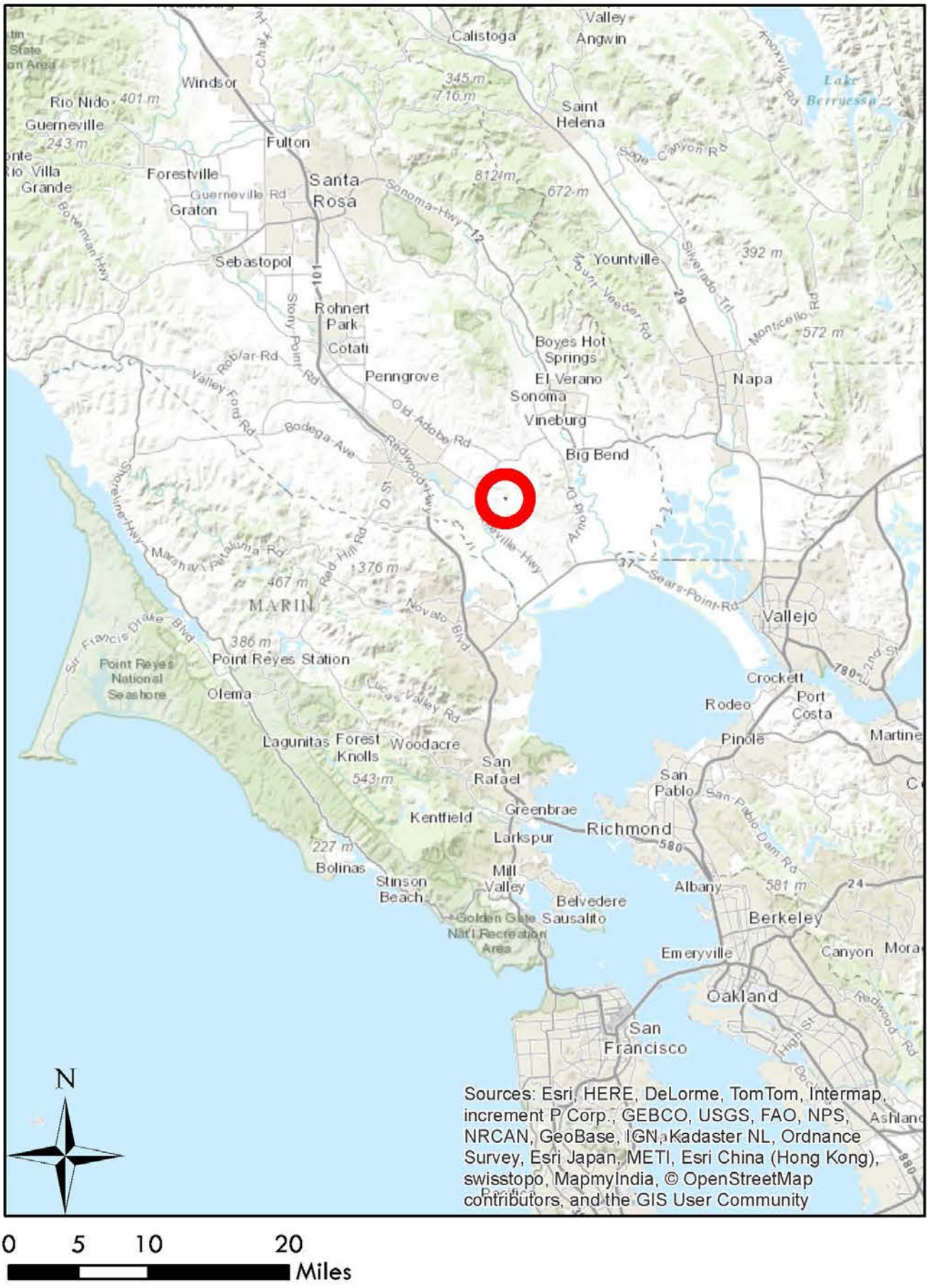



**Figure 1. Tolay Lake Regional Park Site Vicinity Map**

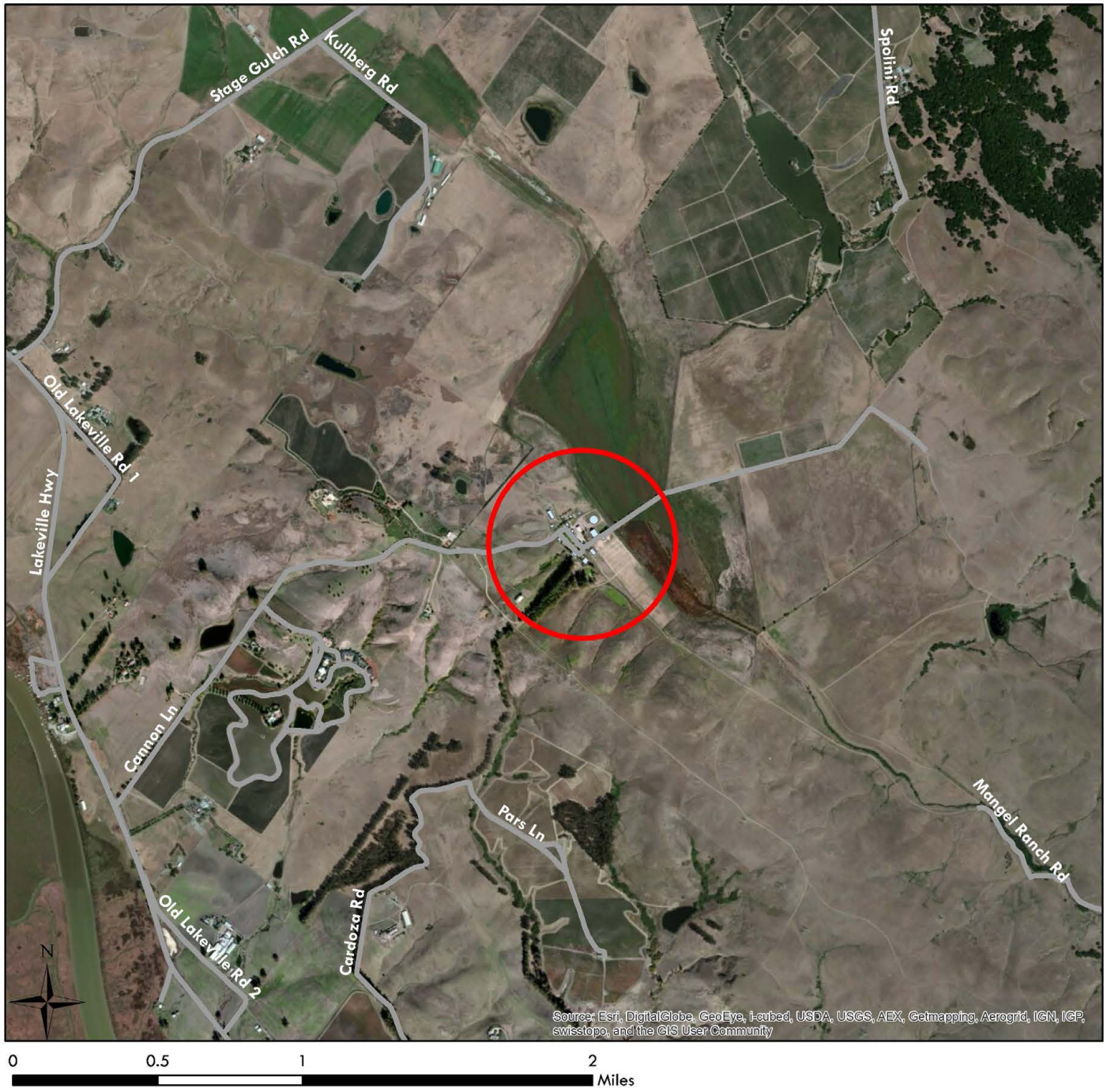



**Figure 2. Tolay Lake Regional Park Site Location Map**

# Figure 3
# Tolay Lake Regional Park
# Hand Auger
# Soil Boring
# Locations


- FCE Soil Auger Location
- Project Site
- Water Feature/Wetlands
- Grasslands & Wildflower Fields
- CULVERT
- DITCH
- FENCE
- Existing Trails
- 20' contour
- 100' contour

N

0 300 600 Feet

1 inch = 300 feet

FALL CREEK ENGINEERING

Date: 6/17/2014

# Figure 4
# Tolay Lake Regional Park
# Wastewater Treatment System
# Collection System Location


- Wastewater Collection System
- Required Setback from Environmental Resource

**Wastewater Treatment Facility**

- Dual Chamber Septic Tank (Pretreatment)
- Duplex Pump System
- Grease Trap
- Building
- Building Connected to Wastewater System
- **Project Site**
- **Water Feature and Wetlands**
- **Grasslands & Wildflower Fields**
- **Historic Cultural Resource**
- **20' contour**
- **100' contour**

N

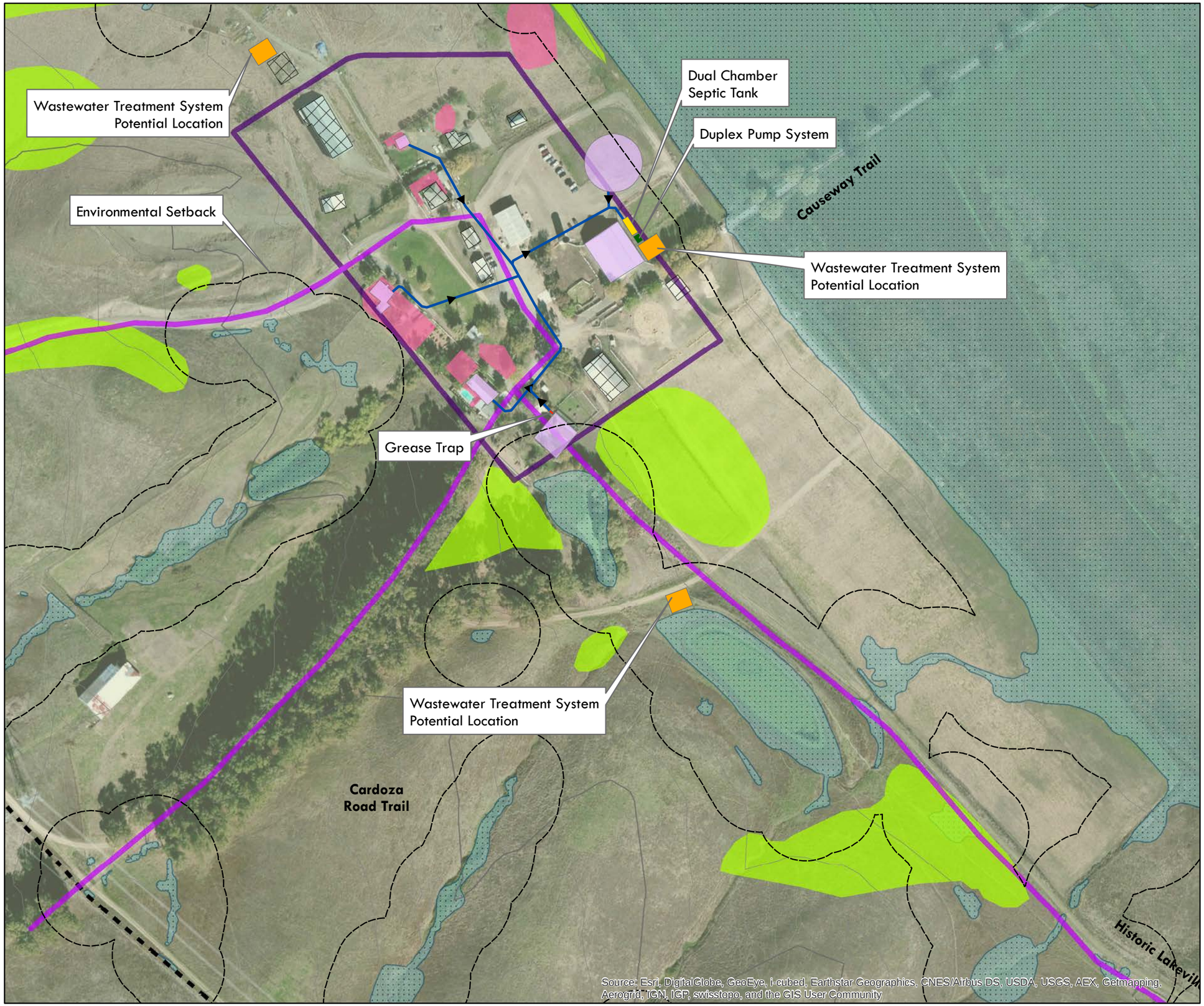
0 200 400 Feet

1 inch = 200 feet

FALL CREEK ENGINEERING

Date: 7/28/2014

# Figure 5
# Tolay Lake Regional Park
# Wastewater Treatment System
# Treatment Alternatives #1 and #2
# Package Plant Treatment System
# with Collection System Location




- Wastewater Collection System
- Required Setback from Environmental Resource

**Wastewater Treatment Facility**

- Dual Chamber Septic Tank (Pretreatment)
- Duplex Pump System
- Grease Trap
- Acqualogic or Advantex System

**Master Plan Facilities**

- Building
- Building Connected to Wastewater System
- **Project Site**
- **Water Feature and Wetlands**
- **Grasslands & Wildflower Fields**
- **Historic Cultural Resource**
- **20' contour**
- **100' contour**

0 200 400 Feet

1 inch = 202 feet

FALL CREEK ENGINEERING

Date: 6/25/2014

# Figure 6
# Tolay Lake Regional Park
# Wastewater Treatment System
# Treatment Alternative #3
# Combined Trickling Filter and Natural Wastewater Treatment System with Collection System Location

POND 1
Trickling Filter
POND 2
POND 3
Modern Barn Treatment Wetland Location
Environmental Setback
Grease Trap
Dual Chamber Septic Tank
Causeway Trail
Duplex Pump System
Trickling Filter
POND 1
POND 2
POND 3
Duck Pond Treatment Wetland Location
Cardoza Road Trail
Historic Lake

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- Wastewater Collection System
- Pipeline to Wastewater Treatment System
- Required Setback from Environmental Resource

**Wastewater Treatment Facility**

- Dual Chamber Septic Tank (Pretreatment)
- Duplex Pump System
- Grease Trap
- Treatment Wetland
- Trickling Filter

**Master Plan Facilities**

- Building
- Building Connected to Wastewater System
- **Project Site**
- **Water Feature and Wetlands**
- **Grasslands & Wildflower Fields**
- **Historic Cultural Resource**
- **20' contour**
- **100' contour**

0 200 400 Feet

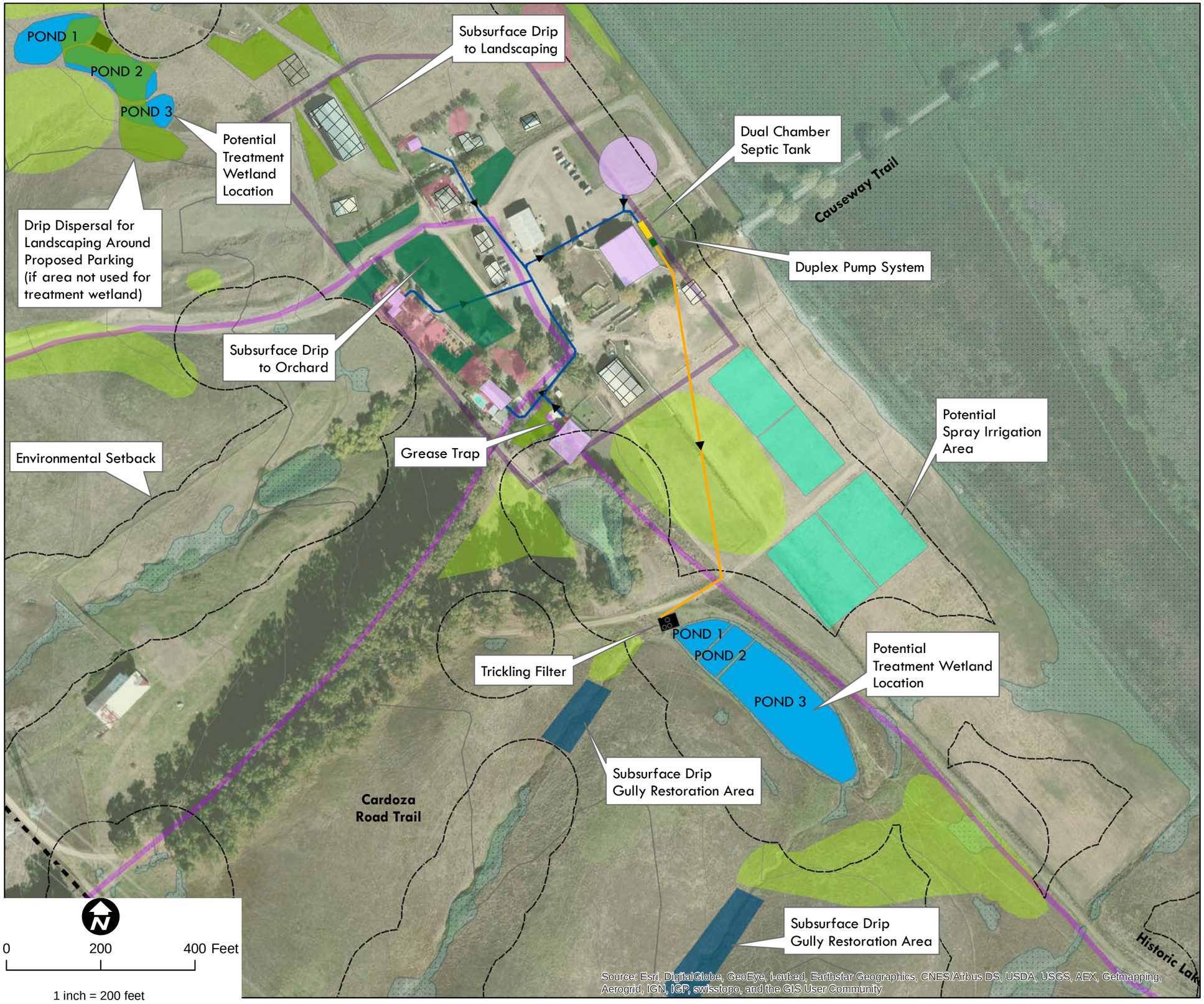
1 inch = 200 feet

FALL CREEK ENGINEERING

Date: 7/28/2014

# Figure 7
# Tolay Lake Regional Park
# Wastewater Improvement Plan

## Combined Trickling Filter and Natural Wastewater Treatment System with Collection and Disposal System Locations




0 200 400 Feet

1 inch = 200 feet

- Wastewater Collection System
- Pipeline to Wastewater Treatment System

**Wastewater Treatment Facility**

- Dual Chamber Septic Tank (Pretreatment)
- Duplex Pump System
- Grease Trap
- Treatment Wetland
- Trickling Filter

**Subsurface Drip Disposal Location**

- Landscaping
- Orchard
- Restoration Area
- Potential Spray Irrigation

**Master Plan Facilities**

- Building
- Building Connected to Wastewater System
- Required Setback from Environmental Resource
- **Project Site**
- **Water Feature and Wetlands**
- **Grasslands & Wildflower Fields**
- **Historic Cultural Resource**
- **20' contour**
- **100' contour**

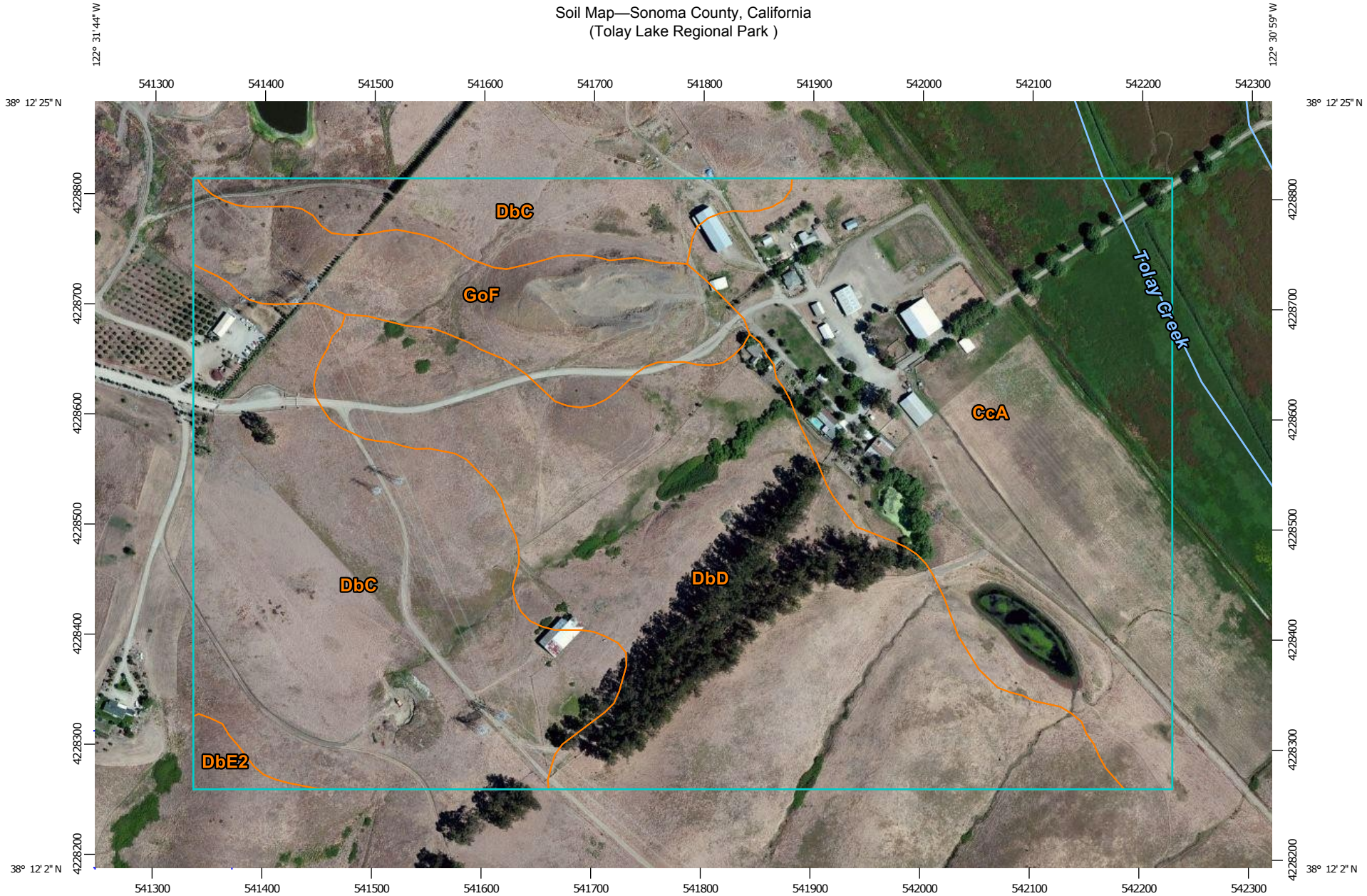
FALL CREEK ENGINEERING

Date: 7/28/2014

**ATTACHMENT A**

Natural Resources Conservation Service (NRCS) Soil Survey Map
at Tolay Lake Regional Park Master Plan Area

Soil Map—Sonoma County, California
(Tolay Lake Regional Park )




Map Scale: 1:4,910 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 6, Nov 27, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 2, 2010—Feb 17, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Sonoma County, California (CA097) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| CcA | Clear Lake clay loam, 0 to 2 percent slopes | 38.3 | 31.2% |
| DbC | Diablo clay, 2 to 9 percent slopes | 35.2 | 28.7% |
| DbD | Diablo clay, 9 to 15 percent slopes | 37.5 | 30.5% |
| DbE2 | Diablo clay, 15 to 30 percent slopes, eroded | 0.8 | 0.7% |
| GoF | Goulding-Toomes complex, 9 to 50 percent slopes | 11.1 | 9.0% |
| **Totals for Area of Interest** | | **123.0** | **100.0%** |

**ATTACHMENT B**

FCE Soil Logs

# PROJECT: BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 1 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START: 10:40 | DRILLING CONTRACTOR: FCE | DRILLING EQUIPMENT: shovel/2" augur | DATE: 5/8/14 |
| TIME STOP: 11:15 | DRILLING CREW: BEE | DRILLING METHOD: | SAMPLING METHOD: |
| TOTAL DEPTH: 6'4" | BACKFILL MATERIAL: Native Material | WATER FIRST ENCOUNTERD: NA | FINAL DEPTH TO WATER: NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CL | SILTY CLAY: very dark grey(Gley 2 3/5 PB), |
| 1 | 2" Augur | | | | | medium dense, moist |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | increasing sand content |
| 5 | | | | | SC | CLAYEY SAND: greenish grey (10YR 5/2), |
| 6 | | | | | | loose, moist |
| | | | | | | END |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 0 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT:

# BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 2 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START: 10:10 | DRILLING CONTRACTOR: FCE | DRILLING EQUIPMENT: shovel/2" augur | DATE: 5/8/14 |
| TIME STOP: 10:40 | DRILLING CREW: BEE | DRILLING METHOD: | SAMPLING METHOD: |
| TOTAL DEPTH: 6'0" | BACKFILL MATERIAL: Native Material | WATER FIRST ENCOUNTERD: NA | FINAL DEPTH TO WATER: NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| 0 | Shovel | | | | CH | CLAY LOAM: dark grey (10YR 3/1), medium dense, moist |
| 1 | 2" Augur | | | | | |
| 2 | | | | | | |
| 3 | | | | | | increasing density |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | END |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 0 | | | | | | |
| 1 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT:

# BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 3 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START: 10:00 | DRILLING CONTRACTOR: FCE | DRILLING EQUIPMENT: shovel/2" augur | DATE: 5/8/14 |
| TIME STOP: 10:55 | DRILLING CREW: EMC | DRILLING METHOD: | SAMPLING METHOD: |
| TOTAL DEPTH: 5'1" | BACKFILL MATERIAL: Native Material | WATER FIRST ENCOUNTERD: NA | FINAL DEPTH TO WATER: NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | SC | CLAYEY SAND: dark brown (4/3 7.5YR), loose, dry |
| 1 | 2" Augur | | | | | |
| 2 | | | | | | |
| | | | | | | increasing density and moisture w/iron mottling |
| 3 | | | | | CL | SILTY CLAY: grayish brown (5/4 10YR), moist, some iron deposit and gleying. |
| 4 | | | | | | |
| | | | | | | increasing sand content, some rounded |
| 5 | | | | | SC | END gravel |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT: BORING LOG

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|---|---|---|---|
| BORING NO. 4 | PROJECT NO. 21228 | LOCATION Tolay Lake | SHEET 1 OF 1 |
| TIME START 9:15 | DRILLING CONTRACTOR FCE | DRILLING EQUIPMENT shovel/2" augur | DATE 5/8/14 |
| TIME STOP 10:00 | DRILLING CREW EMC | DRILLING METHOD | SAMPLING METHOD |
| TOTAL DEPTH 6'8" | BACKFILL MATERIAL Native Material | WATER FIRST ENCOUNTERD NA | FINAL DEPTH TO WATER NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CL | SILTY CLAY: dark gray (2.5 10Y), moist, some sand, high plasticity, some sand |
| 1 | 2" Augur | | | | | |
| 2 | | | | | SC | CLAYEY SAND: yellow orange (5/3 10YR), fine sand, dry, loose |
| 3 | | | | | | |
| 4 | | | | | | loose, color lightening (4/4 5Y), some angular gravel |
| 5 | | | | | | END |
| 6 | | | | | | |
| 7 | | | | | | |
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| 9 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT:

# BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 5 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START: 12:55 | DRILLING CONTRACTOR: FCE | DRILLING EQUIPMENT: shovel/2" augur | DATE: 5/8/14 |
| TIME STOP: 1:25 | DRILLING CREW: BEE | DRILLING METHOD: | SAMPLING METHOD: |
| TOTAL DEPTH: 4'0" | BACKFILL MATERIAL: Native Material | WATER FIRST ENCOUNTERD: NA | FINAL DEPTH TO WATER: NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CH | CLAY LOAM: dark grey (10YR 4/2), dense, moist |
| 1 | 2" Augur | | | | | |
| 2 | | | | | | |
| 3 | | | | | | lighter grey color (10YR 5/1) |
| 4 | | | | | | increasing gravel |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT: BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 6 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START 12:50 | DRILLING CONTRACTOR FCE | DRILLING EQUIPMENT shovel/2" augur | DATE 5/8/14 |
| TIME STOP 1:35 | DRILLING CREW EMC | DRILLING METHOD | SAMPLING METHOD |
| TOTAL DEPTH 5'0" | BACKFILL MATERIAL Native Material | WATER FIRST ENCOUNTERD NA | FINAL DEPTH TO WATER NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CL | SILTY CLAY: dark gray (Gley 1 2.5/5G), medium dense, moist with trace angular gravel |
| 1 | 2" Augur | | | | | |
| 2 | | | | | | |
| 3 | | | | | | fine sand increasing, trace subrounded gravel |
| 4 | | | | | CH | CLAY LOAM: greenish gray (Gley 1, 5/5GY) soft, moist, trace sand, some mottling. |
| 5 | | | | | | END |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT:

# BORING LOG

| BORING NO. | PROJECT NO. | LOCATION | SHEET |
|---|---|---|---|
| 7 | 21228 | Tolay Lake | 1 OF 1 |
| TIME START: 11:10 | DRILLING CONTRACTOR: FCE | DRILLING EQUIPMENT: shovel/2" augur | DATE: 5/8/14 |
| TIME STOP: 11:50 | DRILLING CREW: EMC | DRILLING METHOD: | SAMPLING METHOD: |
| TOTAL DEPTH: 4'3" | BACKFILL MATERIAL: Native Material | WATER FIRST ENCOUNTERD: NA | FINAL DEPTH TO WATER: NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CL | SILTY CLAY: dark gray (Gley 1 2.5/10Y), dense, moist |
| 1 | 2" Augur | | | | | |
| 2 | | | | | | |
| 3 | | | | | CH | CLAY LOAM: dark gray (Gley 2 3/5PB) |
| 4 | | | | | | |
| 5 | | | | | | END |
| 6 | | | | | | |
| 7 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/14

# PROJECT: BORING LOG

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|---|---|---|---|
| BORING NO. 8 | PROJECT NO. 21228 | LOCATION Tolay Lake | SHEET 1 OF 1 |
| TIME START 11:30 | DRILLING CONTRACTOR FCE | DRILLING EQUIPMENT shovel/2"augur | DATE 5/8/14 |
| TIME STOP 12:15 | DRILLING CREW BEE | DRILLING METHOD | SAMPLING METHOD |
| TOTAL DEPTH 6-ft | BACKFILL MATERIAL Native Material | WATER FIRST ENCOUNTERD NA | FINAL DEPTH TO WATER NA |

| DEPTH BELOW SURFACE | SAMPLER TYPE | SAMPLE NO. | INCHES DRIVEN/ RECOVERED | BLOWS PER 6 IN. | USCS | LOG OF MATERIAL |
|---|---|---|---|---|---|---|
| | Shovel | | | | CH | CLAY LOAM: dark grey (Gley2, 3/5PB), moist, dense |
| 1 | 2"Augur | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | Grey mottling |
| 5 | | | | | | |
| 6 | | | | | CL | SILTY CLAY: Gley 2 3/5 PB, moist, dense |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 0 | | | | | | |
| 1 | | | | | | |
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LOGGED BY: Emily Corwin OFFICE: FCE DATE: 6/2/2014

appendix f

# Analysis of Allowable Park Uses

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# Tolay Recreation Activity Analysis Whitepaper

| Activity | Allowed Use?[1] | Compatibility with Park Vision | Level of Public Support | Neighbor concerns | Environmental impacts | Health and Safety concerns |
|---|---|---|---|---|---|---|
| Hang glide | No | No | Low (46) | Yes | Yes | Yes |
| Disc golf | Yes | No | Low (23) | Yes | Yes | Yes |
| Dogs on leash | Yes | No | High (194) | Yes | Yes | Yes |
| Dog park | No | No | Low (0) | Yes | Yes | Yes |
| Hunting | n/a- regulated by CDFW | No | Low (0) | No | Yes | Yes |
| Archery area | Yes- with Use permit | Yes | Low (4) | No | Yes | No |
| Paintball area | No | No | Low (0) | Yes | Yes | Yes |

*[1]under existing Sonoma County Code, Plans, or other regulations*

# Hang gliding

## Background

Hang gliding occurs in multiple locations in the San Francisco Bay area. It requires takeoff and landing areas, as well as staging areas. Hang gliders typically take a course and must be certified to participate in this activity. Park policies about hangliding vary. Marin County Parks and Open Space do not allow hang gliding as per policies in their Countywide Plan. In contrast, California State Parks allows hang gliders to take off from Mount Tamalpais.

## Consistency with County Code, Plans, and Regulations

Sonoma County Code appears to prohibit hang gliding. County Code chapter 20 (Parks and Recreation) Article V (Vehicles), section 20-30: "No person shall land any aircraft on or take any aircraft off any body of water or any land area in the park." An "aircraft" is defined in Article II, section 20-2(g) as any device that is used to carry a person or persons in the air.

County Code chapter 15 (Highways, Roads and Bridges) Article IV (Bridges, Dams and Other Facilities), section 15-20(b) refers specifically to hang gliding: "Except as provided herein, it shall be unlawful for any person to jump, dive or glide from a bridge or other manmade structure, including jumping, diving, and gliding using parachutes, parafoils, hang gliders or elastic cords of any type."

## Compatibility with Park Vision

Hang gliding is not consistent with the vision for Tolay Lake Regional Park. The preliminary vision for the park includes balancing cultural resource legacies with recreational uses, establishing a cutting edge interpretation oriented park and developing a thriving, ecologically functioning landscape.

Hang gliding has relatively low levels of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. However, just 46 respondents expressed an interest in hang gliding, and 1respondent expressed opposition to hang gliding.

## Environmental Impacts

Environmental impacts associated with hang gliding would include impacts related to its potential effects on sensitive wildlife in the area, including raptors. Hang gliding can induce a short term behavioral response from raptors, such as increased vocalization, escape flight (flushing), aggressive flight displays, or defense of their territory.

The addition of hang gliding to the park would require development of a launch site and landing area. The obvious area for a launch site would be located on the west side of the park where elevations are the highest. However, little to no vehicle access presently exists in this area. The addition of vehicular access for a launch site would be inconsistent with the existing natural drainages and landscapes. Construction impacts associated with an access road for hang gliding would result in noise and air quality (fugitive dust) impacts from road construction.

### Health and Safety Concerns

Hang gliding is considered a moderately dangerous activity. Should hang gliding be allowed at the Park, appropriate safety plans would need to be developed and implemented, including emergency response access to the landing area, development of an alternate landing area for emergencies, and separation of hang gliders from passive recreation users.

### Conclusion

Hang gliding is not consistent with the evaluation criteria discussed above. Hang gliding does not appear to be allowed under Sonoma County Code, and is not compatible with stakeholders' vision for the Park as a peaceful setting that emphasizes passive non-motorized recreation use, environmental education, and wildlife viewing. Moreover, the level of public support for hang gliding is relatively low. Neighbors concerns are also an issue. During the scoping process several neighbors expressed concern for the potential for visitor trespass and possible damage to their private properties.

# Disc Golf

### Background

Disc golf is a flying disc game, as well as a precision and accuracy sport, in which individual players throw a flying disc at a target. According to the Professional Disc Golf Association, "The object of the game is to traverse a course from beginning to end in the fewest number of throws of the disc. Making disc golf unique is the utilization of natural elements, using trees and shrubs as obstacles and elevation changes to make the course challenging

### Consistency with County Code, Plans, and Regulations

Sonoma County Code does not specifically prohibit disc golf. However, County Code chapter 20 (Parks and Recreation) Article IV (Use of Facilities), section 20-19 states: "No person shall drive, putt or in any other fashion, play or practice golf or use golf balls, or fly model airplanes on or over land, or operate model boats or model automobiles, or model craft of any kind or description, or other activities that endanger or disturb persons, in the park, except in areas set aside for these specific activities in accordance with rules and regulations prescribed by the park authority."

### Compatibility with Park Vision

Disc golf is not consistent with the vision for Tolay Lake Regional Park. The preliminary vision for the park includes balancing cultural resource legacies with recreational uses, encouraging community visits and interactions in a way that heals the land, and integrating agriculture, American Indian presence, and ecological aspects.

Disc golf has relatively low levels of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. However, just 35 respondents expressed an interest in disc golf, and 13 respondents expressed opposition to disc golf at the Park.

### Environmental Impacts

Environmental impacts related to disc golf at the Park would be centered on biological resources. Increased foot traffic would impact existing groundcover, leaving bare ground. Depending on the layout of the course, trees and shrubs in the area of the course could possibly be damaged from multiple disc hits, which can be especially harmful to younger trees. Additionally, gouges to bark from the discs may increase the susceptibility of trees to various insect pests and in some cases can cause death of young trees.

### Health and Safety Concerns

Major health and safety concerns related to disc golf in the park are related to the intermingling of passive recreations users (hikers, bird watching, etc.) with the active disc golf users. Disc speeds can range between 50 mph and 70 mph with distances ranging from 300 to 400 feet or more. Most disc golf courses are located within public parks and as a result, non-players are routinely found in the course environment. Serious injury could occur if non-players unknowingly cross into the path of a fast traveling disc. The presence of disc golf would require a strong presence by Park staff to ensure players were abiding by pre-established rules to protect public safety.

### Conclusion

Disc golf would not be consistent with the evaluation criteria discussed above. While the activity is not expressly prohibited under Sonoma County Code, disc golf would not be compatible with stakeholders' vision for the Park as a peaceful setting that emphasizes passive non-motorized recreation use, environmental education, and wildlife viewing. Additionally, disc golf courses require an expansive area for play (75-100-foot width fairways) and stray discs could damage valuable cultural and biological resources, as well as provide safety concerns. Moreover, the level of public support for disc golf is relatively low.

# Dogs on Leash

### Background

Dog walking is both a pastime and a profession involving the act of a person walking with a dog, typically from the dog's residence and then returning. This constitutes part of the daily exercise regime needed to keep a dog healthy but also provides exercise and companionship for the dog owner.

### Consistency with County Code, Plans, and Regulations

Sonoma County Code contains numerous ordinances related to dogs and their presence in county parks. The following sections are from County Code, Chapter 20 (Parks and Recreation), Article III (Personal Conduct):

Section 20-8 "Animals"—states "No person shall be permitted to bring, carry, entice or transport a dog, cat or other animal into the park unless such dog, cat or other animal is securely leashed on a maximum six (6) foot leash and in immediate control of a person at all times…. Dogs may be permitted to run free in areas which, from time to time, may be set aside by the park authority for the specific purpose of exercising a dog, provided, however, that the owner or keeper of the dog keeps it under control at all times and does not allow the dog to be beyond the boundaries of the area set aside.

Section 20-8 (b) states: “No person shall keep a noisy, vicious or dangerous dog or animal or one which is disturbing the other persons in the park and remain therein after the owners have been asked by the park authority to leave.”

Chapter 5 of the Sonoma County Code (Animal Regulation), Section 5-40 (a) states: Every owner of a dog over four (4) months of age shall cause such dog to be vaccinated with an approved rabies vaccine unless a veterinarian certifies that such dog should not be vaccinated for health reasons. Revaccination shall be made at such intervals of time as may be prescribed by the State Department of Health.”

## Compatibility with Park Vision

Dog walking on leash would not be consistent with the existing Park vision. The preliminary vision for the park includes balancing cultural resource legacies with recreational uses, establishing a cutting edge interpretation oriented park and developing a thriving, ecologically functioning landscape.

Dog walking has a relatively high level of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. In all, 194 respondents expressed an interest in dog walking and 33 expressed opposition to the presence of dogs, with some opposing them all together and others opposed to off leash activity.

## Environmental Impacts

Environmental impacts associated with the presence of dogs at the Park would be varied. The protection of native wildlife and their habitat (including sensitive species and their habitat, and federally or state listed, unique, or rare species) from detrimental effects of dog use, including harassment or disturbance by dogs would be important at Tolay Park. Specific environmental issues resulting from the introduction of dogs at the Park are described below.

*Wildlife.* Intensive dog use at the Park could disrupt its use by wildlife or degrade the habitat, resulting in a multitude of possible negative consequences for wildlife. Reed and Merenlender (2011) found that presence of dogs, regardless on being on or off leash, was negatively related to several canine species (bobcat, coyote and mountain lion) population indicators in a study of park and recreation areas in the SF Bay Area. Adverse effects of intensive dog use, such as chasing and flushing wildlife or disrupting nesting and foraging sites, can range from direct to less direct disturbance from physical effects such as trampling of habitat, the temporary or permanent loss of preferred habitat, and scent intrusion into predator territory. As a result of repeated disturbance, wildlife may relocate from preferred habitat to other areas to avoid harassment. Dogs or dog waste can infect wildlife and vice versa. Domestic dogs that are not vaccinated can potentially introduce diseases (distemper, parvovirus, and rabies) and transport parasites from, or transmit diseases to, wild animals or wildlife habitats.

*Vegetation and Soils.* Dogs, particularly those off leash and without adequate voice control, can affect vegetation and soils. As a result of recreational activities, vegetation can be affected by trampling indirectly through the consolidation of the soil and directly by treading upon the plants themselves. Dog waste contains nutrients and can increase the amount of nitrogen and phosphorus in the soil. Soils and vegetation can be affected by dogs through defecation and urination. The act of “marking” (scent marking with urine) could also affect vegetation by concentrating nutrients in particular areas.

*Cultural Resources.* Dogs may affect cultural resources by dog-related ground disturbance such as digging and/or trampling, which would be a contributing element to natural erosion processes on or around sensitive cultural resources. Dog urination/defecation may affect cultural resources by affecting vegetation associated with historic properties.

*Land Use.* Dog use can damage resources that cannot be easily restored. Overuse by dogs can change the character of soils, vegetation, wildlife habitat, and the species of wildlife themselves. If these resource areas are affected by intense use over a long period of time, or if natural resources are particularly vulnerable to change or damage, the impacts caused by dogs can pose challenges to restoration.

### Health and Safety Concerns

Issues related to health and safety at the Park with the inclusion of dogs would be related to encounters between visitors and park employees with unruly or aggressive dogs. Incidents can include being knocked down, intimidated, and bitten by dogs. Additionally, dog-on-dog bites and dog-on horse bites often involve visitors who could be injured during these conflicts (e.g., attempts to separate dogs, horses bolting).

### Conclusion

Dog walking is consistent with the existing preliminary vision for the Park. Dog walking is allowed under Sonoma County Code. Allowing dogs at the Park would be consistent with many of the stakeholder's vision for the Park including environmental education, cutting edge interpretation oriented park, encouraging community visits, and interactions in a way that heals the land. The level of public support for dog walking is relatively high. In order to minimize negative environmental impacts while maximizing positive visitor experience for everybody at the Park, dog walking will be permitted with the following caveats: dogs must be secured to a six-foot leash (maximum length); dog must be under owner's control at all times; dogs are only permitted on multi-use trails; dogs must be vaccinated; dog owners must pick up dog waste and dispose the waste in the proper waste bin. Depending on certain sensitive species' breeding or nesting patterns, the multi-use trail may be subject to seasonal closures for dogs.

# Dog Park

### Background

Dog parks are designed for dogs to exercise and play off-leash in a controlled environment under the supervision of their owners. Dog parks can have a number of different features, depending in part of their location, including fences, adequate drainage, benches for humans, shade for hot days, parking close to the site, water, tools to pick up and dispose of animal waste in covered trash cans, and regular maintenance and cleaning of the grounds.

### Consistency with County Code, Plans, and Regulations

The Sonoma County Code does permit dog parks in the county. Additionally, there are two dog parks located within Sonoma County parks, including Ernie Smith Community Park in El Verano and Sonoma Valley Regional Park in Glen Ellen.

### Compatibility with Park Vision

The addition of a dog park would not be compatible with the preliminary vision for the Park including the development of a thriving, ecologically functioning landscape, encouraging community visits and interactions in a way that heals the land, and development of a tribal connection to the landscape and the sacredness of the area.

The addition of a dog park has a low level of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. None of the respondents expressed specific interest in a dog park, while one respondent expressed opposition to a dog park.

### Environmental Impacts

Environmental concerns would be similar to those described above for dog walking. While impacts would be more localized than those associated with dog walking, impacts could be intensified due to the concentration of dogs into one area of the Park.

### Health and Safety Concerns

With the inclusion of a dog park, it is assumed that dogs would be limited to a specific area of the Park. A dog park would include perimeter fencing, which would reduce interaction between humans (visitors and park staff) and dogs as well as between horses and dogs. However, dog-on-dog bites and dog-on human bites could be possible in the area around the dog park location.

### Conclusion

Inclusion of a dog park within a county park is not consistent with the existing preliminary vision for the Park. Dog parks do appear to be allowed under Sonoma County Code, and have been included at least one other regional park (Sonoma Valley Regional Park). Construction of a dog park would not be consistent with many of the stakeholder's vision for the Park including environmental education, cutting edge interpretation oriented park, encouraging community visits and interactions in a way that heals the land. While the level of public support for dog walking is relatively high, there was little support for a dog park. Neighbors concerns are also and issue. A dog park is located on W. Casa Grande Road (Rocky Memorial Dog Park), southwest of Lakeville Highway.

# Hunting

### Background

Hunting is typically regulated by game, category, and area within the state, and time period. Regulations for hunting often specify a minimum caliber or muzzle energy for firearms. The use of rifles is often banned for safety reasons in areas with high population densities or limited topographic relief. Regulations may also limit or ban the use of lead in ammunition because of environmental concerns. Specific seasons for bow hunting or muzzle-loading black-powder guns are often established to limit competition with hunters using more effective weapons.

## Consistency with County Code, Plans, and Regulations

The Sonoma County Code does not permit hunting in parks. Section 20-9, Parks and Recreation, Hunting and Fishing, states:

"No person shall hunt or trap in the park. Fishing shall be confined to those water areas specifically designated by the park authority. A valid state of California fishing license shall be required and all state fish and game laws and regulations which are applicable shall apply.

(a) In the taking of invertebrates, all persons shall abide by the California sport fishing regulations according to Chapter 4, Section 27.15a and with permission of the park authority.

(b) No person shall clean fish in the park except in areas designated by the park authority.

Sec. 20-11, Parks and Recreation, Firearms, states: "No person shall carry or possess a firearm with a cartridge in any portion of the mechanism (except any federal, state, county, or municipal officer in the performance of his official duties), nor shall any person discharge across, in, or into, any portion of the park, a firearm, bow and arrow, or air or gas weapon, or any device capable of injuring or killing any person or animal, or damaging or destroying any public or private property."

Hunting seasons in California are regulated by the California Department of Fish and Wildlife. In California, there are three main categories for hunting of wildlife: Big Game: Deer, Elk, Pronghorn, and Bear, Wild Pig, Bighorn Sheep; Waterfowl: Goose, Duck, Coot, Moorhen, and Black Brant; and Upland / Small Game; Pheasant, Quail, Wild Turkey, Dove, Squirrel, and Rabbit. A valid California State Hunting License is required for hunters at all times.

The California Code of Regulations Section 4305-Animals states: "No person shall molest, hunt, disturb, injure, trap, take, net, poison, harm, or kill any kind of animal or fish, or so attempt, except that fish may be taken other than for commercial purposes in accordance with the state fishing laws and regulations, provided, however, that no person shall use or discharge a spear or bow and arrow in the state park system (except in underwater parks or on designated archery ranges). Where hunting in a state recreation area or portion thereof is permitted by regulations herein, so much of this section as is inconsistent therewith shall be deemed inapplicable, provided hunting is conducted in the manner specified."

## Compatibility with Park Vision

Hunting could be considered consistent with the vision for Tolay Lake Regional Park in that the preliminary vision for the park includes balancing cultural resource legacies with recreational uses and integrating agriculture, American Indian presence, and ecological aspects. Hunting is an activity with a long history. Hunting could be included into historical and cultural interpretations for the Park and would have relatively low impacts on the ecological resources within the park. Hunting has a relatively low level of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. However, no respondents expressed an interest in hunting and 13 respondents expressed opposition to hunting.

### Environmental Impacts

Environmental impacts associated with hunting at the Park would be low. Potential impacts would originate from hunters accidently trampling sensitive plant species in their pursuit of animal targets. Noise generated from gunfire may cause impacts to residences located in proximity to the Park.

### Health and Safety Concerns

Health and safety concerns for hunting at the Park include the safety of passive park users (hiking, walking, etc.) when hunters are present. Planning would be required to ensure separation of hunters from the general recreation public.

Hunters would be expected to follow widely adopted safety precautions that include making themselves visible to other hunters by wearing the legal amount of fluorescent orange clothing, preventing falls by wearing skid-resistant boots, and not hunting alone.

It is estimated that California issues approximately 300,000 hunting licenses per year. Yet the state averages only about 16 hunting (firearm-related) injuries per year, with two or fewer resulting in death. In these cases, the injured person is typically a member of the shooter's hunting party.

### Conclusion

Hunting is not consistent with the existing preliminary vision for the Park. Allowing hunting within the Park would not be consistent with many of the stakeholder's vision for the Park including environmental education, cutting edge interpretation oriented park, encouraging community visits and interactions in a way that heals the land. There would be serious health and safety issues that would need to be addressed if hunting was permitted at the Park. The level of public support for hunting is low. None of the respondents expressed interest in hunting, while a number of respondents opposed hunting.

# Archery Area

### Background

Historically, archery has been used for hunting and combat, while in modern times its main use is that of a recreational activity. Competitive archery (also called target archery) involves shooting arrows at a target for accuracy from a set distance or distances. This is the most popular form of competitive archery.

### Consistency with County Code, Plans, and Regulations

Sonoma County Code does not appear to prohibit archery. Article 42 of the Sonoma County Code, K Recreation and Visitor-Serving Commercial District, Section 26-42-020 states that "Shooting and archery ranges" are permitted but require a use permit.

### Compatibility with Park Vision

Archery could be considered consistent with the vision for Tolay Lake Regional Park in that the preliminary vision for the park includes balancing cultural resource legacies with recreational uses and integrating

agriculture, American Indian presence, and ecological aspects. Archery is a sport with a long history and strong cultural values. If archery were developed for children, this activity could be instructional and would have relatively low impacts on the ecological resources of the park as opposed to a more competitive archery range which would likely have more users. However, archery has relatively low levels of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. However, just 4 respondents expressed an interest in archery and 2 respondents expressed opposition to archery.

### Environmental Impacts

Environmental impacts from archery at the Park would be minimal. The activity does not require a large amount of space and would be located in a flat area of the Park. There would be little construction activity associated with development of the course. Any potential environmental damage would be from participants accidently trampling sensitive plant species.

### Health and Safety Concerns

Organized archery is considered fairly safe and as a result there would be few health or safety concerns associated with its addition to the Park. Most injuries occur to players themselves because of faulty or damaged equipment. Most archery courses enforce rules related to the handling of bows and arrow including never pointing them at other people, never shooting at an unidentified target, and never shooting an arrow straight up into the air. Most archers wear a bracer (also known as an arm-guard) to protect the inside of the bow arm from being hit by the string and prevent clothing from catching the bow string.

### Conclusion

Archery would be consistent with the evaluation criteria discussed above. Archery is an approved activity under the Sonoma County Code provided a use permit is obtained. The presence of an archery area would be compatible with stakeholders' vision for the Park as a peaceful setting that emphasizes passive non-motorized recreation use and balance cultural resource legacies with recreational uses. However, the addition of an archery area would not support the Park's vision of an ecologically thriving landscape. During the scoping process, there were no comments received opposed to an archery area.

# Paint Ball Area

(not listed in the survey responses)

### Background

Paintball is a sport in which players compete; in teams or individually, to eliminate opponents by tagging them with capsules containing water soluble dye and gelatin shell outside (referred to as paintballs) propelled from a device called a paintball marker (commonly referred to as a paintball gun). Paintballs are composed of a non-toxic, biodegradable, water soluble polymer.
Games can be played on very hard floors in indoor fields, or outdoor fields of varying sizes. A game field is scattered with natural or artificial terrain, which players use for tactical cover. Game types in paintball vary, but can include capture the flag, elimination, ammunition limits, defending or attacking a particular point or

area, or capturing objects of interest hidden in the playing area. Depending on the variant played, games can last from seconds to hours, or even days in scenario play.

### Consistency with County Code, Plans, and Regulations

Sonoma County Code does not appear to prohibit paintball. Article 42 of the Sonoma County Code, K Recreation and Visitor-Serving Commercial District, Section 26-42-020 states that "Shooting and archery ranges" are permitted but require a use permit. It is unclear whether this would include paintball facilities.

### Compatibility with Park Vision

Paintball would not be consistent with the vision for Tolay Lake Regional Park in that the preliminary vision for the park includes balancing cultural resource legacies with recreational uses and supporting a "cutting edge" interpretation oriented park. Paintball has relatively low levels of public support. More than 500 respondents completed the Tolay online survey or a hard copy version at the 2012 Fall Festival. However, no respondents expressed an interest in paintball and 1 respondent was in opposition to paintball at the Park.

### Environmental Impacts

Environmental impacts associated with the addition of a paintball park would be related to the noise generated from the use of air-powered rifles. Noise generated from paintball would impact park visitors in the general vicinity of paintball play. The air-powered riffles could also contribute to noise impacts on nearby wildlife resulting in flushing of nests from nesting birds. Impacts to sensitive plant species could occur from participants accidently trampling them during play.

### Health and Safety Concerns

Health and safety concerns related to paintball in the park would be related to the intermingling of passive recreations users (hikers, bird watching, etc.) with the more active paintball participants. Many outdoor paintball courses are located within public parks and as a result, non-players can easily wander into the paintball the course environment. Injury could occur if non-players unknowingly cross into the path of an air fired paintball. The presence of paintball would require a strong presence by Park staff to ensure players were abiding by pre-established rules to protect public safety.

### Conclusion

Paintball would not be consistent with the evaluation criteria discussed above. Paintball is an aggressive team sport that would not be conducive to the peaceful setting discussed in the preliminary vision statement for the Park. There could be serious health and safety issues associated with paintball participants coming into contact with other park users. The level of public support for paint ball is low, for none of the respondents expressed interest in paintball, while one respondent opposed paintball at the Park.

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Policy information relative to Dogs

There are two sections of the County Code in chapter 20 (Parks and Recreation) under Article III (Personal Conduct) that pertain to dogs.

Section 20-8 "Animals"--

No person shall be permitted to bring, carry, entice or transport a dog, cat or other animal into the park unless such dog, cat or other animal is securely leashed on a maximum six (6) foot leash and in immediate control of a person at all times…. Dogs may be permitted to run free in areas which, from time to time, may be set aside by the park authority for the specific purpose of exercising a dog, provided, however, that the owner or keeper of the dog keeps it under control at all times and does not allow the dog to be beyond the boundaries of the area set aside.

(a) No person shall permit a dog, cat or other pet to remain outside a tent, camper or enclosed vehicle during the night.

(b) No person shall keep a noisy, vicious or dangerous dog or animal or one which is disturbing the other persons in the park and remain therein after the owners have been asked by the park authority to leave. …

[remaining provisions deal with leaving animals in the park, having valid inoculation information, and animal feeding restrictions]

Section 20-8.5 "Dogs in parks located within the coastal zone"--

(a) There are within the county of Sonoma numerous parks, campgrounds and other recreational sites located within the county's coastal zone, as that area is defined in the Sonoma County coastal plan certified by the State Coastal Commission in December, 1980. … Recommendation 22 of this coastal plan provides that if dog predation of coastal livestock cannot be effectively controlled, dogs may be prohibited from areas directly adjacent to vulnerable grazing lands.

(b) Dogs shall be prohibited from parks, campgrounds and other recreational sites located within the coastal zone of Sonoma County whenever the decision-making body makes a finding and imposes a condition on the coastal development permit that such areas are adjacent to vulnerable grazing lands and dog predation cannot be effectively controlled, pursuant to the coastal plan of Sonoma County. This section shall not apply to seeing eye dogs used to guide a blind person, provided that such dogs shall remain under the immediate control of such blind persons.

Also, there are some individual park restrictions:

- Annadel State Park: "Dogs are not allowed on trails. Dogs are permitted on Channel Drive (a paved road) within the park. They must be on a leash no longer than 6' in length."
- Ernie Smith Community Park: "Permitted on leash no longer than 6' in length….No leash required in the dog park."
- Healdsburg Veterans Memorial Beach: "Permitted on leash no longer than 6' in length….Note: Dogs are not allowed on the beach or in the river at the park."

- Hood Mountain Regional Park & Open Space Preserve: "Please keep in mind that although leashed dogs are welcome in Regional Parks, they are not allowed on trails within Sugarloaf Ridge State Park. … Dogs are not allowed [in Hood Mountain campsites]."
- Laguna de Santa Rosa Trail: "Permitted on the multi-use trail segment on leash no longer than 6' in length."
- Ragle Ranch Regional Park: "Permitted on leash no longer than 6' in length….No leash required at the Animal Care Center Dog Park."
- Shiloh Ranch Regional Park: "No dogs allowed beyond the picnic area. Dogs in the picnic area must be kept on a 6 foot leash at all times. … Shiloh is the only Regional Park that does not allow dogs on trails, although they are welcome in the group picnic area."
- Spring Lake Regional Park: "Permitted on leash no longer than 6' in length….Dogs are allowed on the lawn around the swimming lagoon but not on the sand/beach. … Please note that leashed dogs are welcome in both Howarth and Spring Lake parks, but are not permitted in Annadel State Park."
- Taylor Mountain Regional Park and Open Space Preserve (cattle grazing area): "Dogs are perceived as predators. Cows cannot always distinguish the difference between a coyote and a dog and may become aggravated by an approaching dog off leash."

appendix g

# Technical Memorandum - Water Budget Analysis

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# Technical Memorandum - Water Budget Analysis

## Tolay Lake Restoration Alternatives

## Sonoma County, California

**Prepared For:**

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**Date:**

November 11, 2014

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## 1.0 INTRODUCTION

This Technical Memorandum serves to provide the results of a water budget analysis performed to evaluate three restoration alternatives for Tolay Lake. This memorandum provides supplemental analysis to the Tolay Lake Restoration Alternatives Memorandum by WRA dated February 3, 2014.

The primary goal of the restoration is to restore, enhance, and expand the lake at depths that are ideal for dabbling migratory birds. This includes habitat with water depths from 0" to 18" and corresponds to the shallow seasonal wetland and deeper seasonal wetland habitats used in this evaluation.

The hydrology of the system is dynamic with variables affecting the water level on any given day including topography, rainfall, upstream water use, evaporation rates, infiltration into the soil, groundwater flows, and downstream constrictions to outflow. Only some of these variables can be controlled such as topography and the rate of outflow. All restoration alternatives should consider the variability of the weather expected in Sonoma County. The water budget analysis is a tool that can translate these variables into predicted lake water levels over long periods of time. Through the evaluation of the water budget results, we can estimate the health and viability of target ecosystem habitats including shallow seasonal wetlands, deeper seasonal wetlands, seasonal emergent wetlands, and open water.

Five restoration alternatives were proposed for the project including the following:

- Alternative 1 – Lake Outlet at Elevation 215';
- Alternative 2 – Lake Outlet at Elevation 218' without a Back-berm;
- Alternative 3 - Lake Outlet at Elevation 218' with a Back-berm;
- Alternative 4 - Mid-berm Alternative;
- Alternative 5 – Lake Outlet at Elevation 215' with Enhanced Southeast Basin.

We estimated the lake size and storage volume for each of the alternatives (Table 1).

Table 1 Size and storage volume for each of the restoration alternatives.

| Alternative | Size (acres) | Storage Volume (acre-feet) |
|---|---|---|
| Alternative 1 | 71.1 | 97.7 |
| Alternative 2 | 171 | 439 |
| Alternative 3 | 150[1] | 350[1] |
| Alternative 4 | 93.3[1] | 115.5[1] |
| Alternative 5 | 93.3 | 115.5 |
| [1] approximate measurement | | |

WRA previously evaluated the first four alternatives in the *Memorandum – Tolay Lake Restoration Alternative*. In this memorandum WRA concluded that Alternatives 3 and 5 were not feasible for several reasons including the need for complex water control structures. The County selected Alternatives 1 and 2 for evaluation using the water budget in response to this information.

In the early planning stages of the project WRA developed Alternative 5 because it provided an opportunity to enhance the hydrology of the seasonal wetlands in the southeastern portion of the lake without using too much additional water. Initially this alternative was dismissed by the County because it involved grading within that Lake in an area were there may be significant archeological artifacts, and the County made a strong commitment to the Tribes to protect this resource. Since then the Tribes have indicated that they may not object to grading within the Lake if it can be shown that the area does not contain archeological artifacts. At the time that this memorandum was prepared there was an ongoing study being performed to determine if there are artifacts in this area. In response to this potential opportunity we also evaluated Alternative #5 using the water budget.

# 2.0 BACKGROUND INFORMATION

## 2.1 Effects of Water Depth and Hydrology on Wetland Habitat

The following observations and generalizations were made by WRA staff during more than twenty years designing, constructing, and monitoring the hydrology and revegetation of seasonal wetlands and emergent marshes. These observations can provide insights into the role that depth of water and frequency of inundation play in the species composition and quality of seasonal wetlands and emergent marshes. These observations can also provide criteria for evaluating alternative designs for the restoration of these types of habitats. The following describes how most wetland plant species occur within specific elevation ranges relative to the elevation of the outlet of a lake or wetland, and that wetland plant species cannot survive if they are flooded beyond a maximum depth for relatively short periods of time. In addition, species diversity and distribution is also dependent on the frequency of inundation. Inadequate inundation within seasonal wetlands can result in fewer wetland species and dominance by upland species. In addition, infrequent inundation or highly fluctuating water levels within lakes and ponds can severely limit the species that can adapt to these changing conditions. It should be noted that we are trying to describe common trends for use in developing design strategies for restoring these types of habitat and that exceptions can be found for each of the generalizations made above.

### 2.1.1 Adverse Effects of Excess Water Depth on Wetland Habitat

Most wetland plant species grow within a specific and limited range of water depths. A typical seasonal wetland species such as *Eleocharis macrostachya*, when grown under seasonal wetland conditions, thrives in water depths between 0.0' and 0.5', but is often absent from areas with depths greater than 1.0'. Along the perimeter of perennial ponds and lakes, this same species seems to be able to extend its range to water depths between 0.0' and 1.5', but is often absent from water depths greater than 2.0'. A typical emergent wetland species such as *Schoenoplectus californicus*, when grown in a perennial freshwater marsh hydrological regime typically inhabits depths between 0.0' and 3.0'. Although it can occur at depths up to 6.0', it typically has difficultly becoming established in areas were the water depth is greater than 3.0'. Often the spatial distribution of these wetland plant species is limited in areas within seasonal and emergent wetlands if the water is too deep. In general terms, species such as this can drown if they are covered with deep water for a relatively short period of time. For example, periods of deep inundation for 4 or more weeks is often enough to preclude certain species or disrupt the normal diversity and distribution of wetland species.

As we consider whether to increase the size of the lake it is important to evaluate the effect on existing wetland habitat and whether or not the increased size will create an opportunity to maintain or improve the quality of the wetlands. For example, raising the elevation of the lake outlet by more than 2 feet would drown the existing seasonal wetlands within the lake, and raising the elevation of the lake outlet more than 4 or 5 feet would drown the existing emergent wetlands within the lake. Depending on the topography of the adjacent uplands, raising the elevation of the outlet could create an opportunity to create more areas of seasonal wetlands and/or emergent wetlands but only if there is enough water to keep these new fringes wet. If there is an abundance of water than there is good chance that making the lake larger could create a larger area for quality wetlands. On the other hand, if there is a limited amount of water

than making the lake large could both destroy existing wetland habitat and provide inadequate hydrology for the new wetland areas.

### 2.1.2 Adverse Effects of Insufficient Hydrology on Wetland Habitat

Wetland hydrological regimes can be categorized as seasonal or perennial. Seasonal hydrology involves extended periods of time during the rainy season when the wetland is inundated or the soils within the wetland are saturated. The duration of inundation and soil saturation is long enough to support wetland plant species and exclude upland plant species. The quality of a seasonal wetland, in terms of wetland vegetation coverage, native plant species diversity, and absence of upland plant species, is often dependent on the frequency and duration of inundation/saturation periods. Insufficient frequency and duration often results in a decrease in the abundance and diversity of wetland plant species and an increase in the presence of upland plant species.

Perennial wetlands such as freshwater marshes can also be adversely affected by annual and seasonal fluctuations in water levels and infrequent inundation. Ponds and lakes that have fluctuating water levels from year to year usually do not have a well-developed wetland fringe. These habitats types are limited by years when these bodies of water do not fill. Wetland species can become established at a lower elevation relative to the elevation of the outlet but these plants often drown in subsequent years when the lake fills to capacity and they are covered with water depths they cannot survive.

### 2.1.3 Analysis Based on the Elevation of the Lake or Wetland Outlet

In this context we found it useful to evaluate and design wetland habitat relative to the elevation of the lake or wetland outlet. Water depths are calculated downward from elevation of the outlet as opposed to the being calculated upward from the lowest point. This type of analysis allowed us to focus on the frequency and duration of inundation in the top margins of the lake where the wetland habitat occurs. Analysis of this type was used to evaluate if there was an adequate hydro-period within the elevation ranges where seasonal and emergent wetland species are most likely to occur.

For this type of analysis the wetland habitats were mapped in accordance with depth relative to the elevation of the lake outlet. Predictions of the amount (acreage) of wetland habitat were made based on the topography of the site and the elevation ranges for each habitat type. However, sustainable wetland habitat will only occur if there is sufficient hydrology within these designated elevation ranges. In cases where there is insufficient hydrology the areas were these habitat types should occur are likely to be predominated by upland species and not develop in to high quality wetlands.

## 2.2 Wetland Habitat Types and Corresponding Water Depths

For this project we identified 4 types of wetland habitat for consideration as target types and hydrological evaluation. The four types included shallow seasonal, deeper seasonal, emergent marsh, and open water. The following table lists the four types and their corresponding target

hydrology and depth range (Table 2). The following subsections provide a description of each the deepest point in the water feature.

Table 2. Wetland types used in this analysis including the corresponding target hydrology and depth range.

| Wetland Type | Target Hydrology | Depth Range (feet) |
|---|---|---|
| Shallow Seasonal | seasonal | 0.0 to 0.5 |
| Deeper Seasonal | seasonal | 0.5 to 1.5 |
| Emergent Marsh | perennial | 1.5 to 3.0 |
| Open Water | perennial | >3.0 |

We selected these wetland habitats to evaluate based on the primary restoration goal of the project. As stated earlier in this memorandum and discussed in more detail later in this memorandum, the primary restoration goal of the project is to increase habitat for dabbling ducks. This corresponds to the shallow seasonal and deeper seasonal wetland habitats. We subdivided this range into shallow and deeper because we were not sure that there would be enough water to support deeper seasonal wetlands. We included emergent marsh habitat because this type of habitat exists, and we wanted to maintain it to some degree, and evaluate the feasibility of expanding it. We included open water habitat because this also exists to a limited extent, and we wanted find out if it would be practical to expand it.

### 2.2.1 Shallow Seasonal Wetlands

Shallow seasonal wetlands are located in areas at the fringes of Tolay Lake. They are characterized by a maximum depth of six inches of water, and they support perennial and annual grasses such as creeping spike rush (*Eleocharis macrostachya*), iris leaved rush (*Juncus xiphoides*), and wire rush (*Juncus balticus*). These species typically thrive with a relatively short period of inundation and saturated soils that occur in most years. They go dormant in the summer and they can also tolerate some short duration flooding (a few weeks) beyond a depth of 0.5'. While they can survive the occasional year without inundation, they tend to be invaded by upland weeds when the period of inundation is less than a month or only in occasional years. We recommend that the water budget should show at least 60% of years with a minimum of 4 to 6 weeks of inundation in this zone to support seasonal wetland vegetation and wildlife. The healthiest shallow seasonal wetlands that have vigorous native wetland vegetation have consistent inundation year after year, except in the severest of droughts.

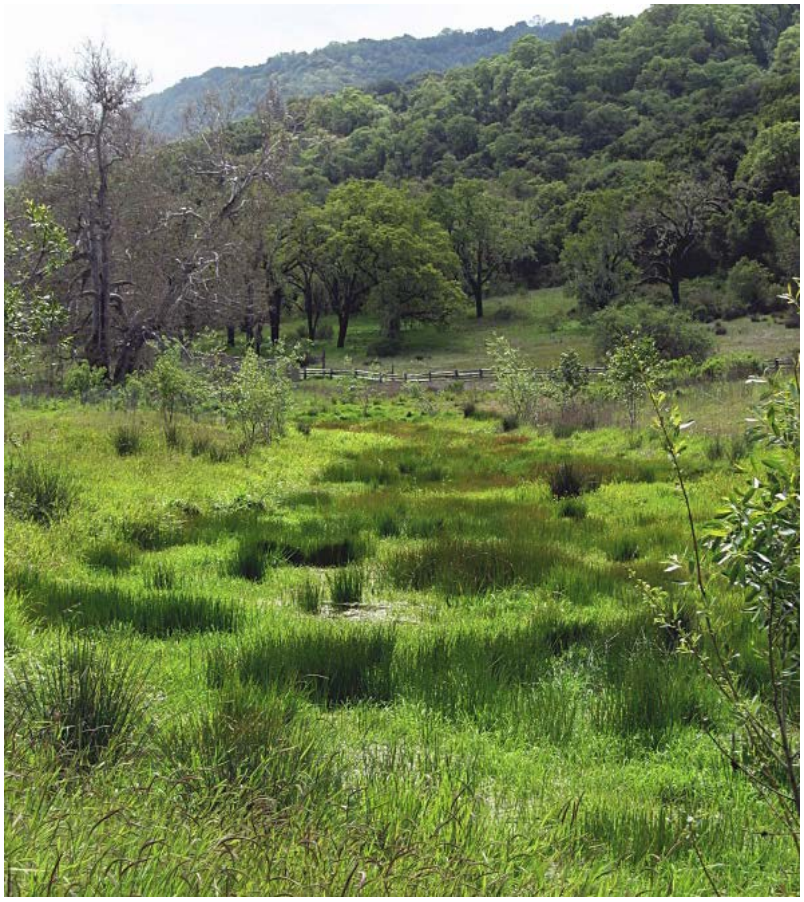

Figure 1. Photograph of shallow seasonal wetland habitat.
Typical depths are less than 0.5' relative to the lake/wetland outlet.

### 2.2.2 Deeper Seasonal Wetlands

Deeper seasonal wetlands are also located in areas at the fringes of Tolay Lake but have slightly deeper maximum water depths and thus support a different plant palette. They are characterized by a maximum depth of 18 inches of water and support some of the perennial wetland species found in the shallow seasonal wetlands as well as hardstem bulrush (*Schoenoplectus acutus*) and alkali bulrush (*Bolboschoenus maritmus*). These species and others typical of deeper seasonal wetlands typically thrive with a seasonal period of inundation and saturated soils of at least six weeks in most years. They can go dormant in the summer and they can also tolerate some short duration (a few weeks) flooding beyond a depth of 18 inches. While they can survive the occasional year without inundation, they tend to be invaded by upland weeds when the period of inundation is less than a month or only in occasional years. We recommend that the water budget should show at least 60% of years with 8 to 12 weeks of inundation in this zone to support wetland vegetation and wildlife. The healthiest deeper seasonal wetlands that have vigorous native wetland vegetation have consistent inundation year after year, except in the severest of droughts.

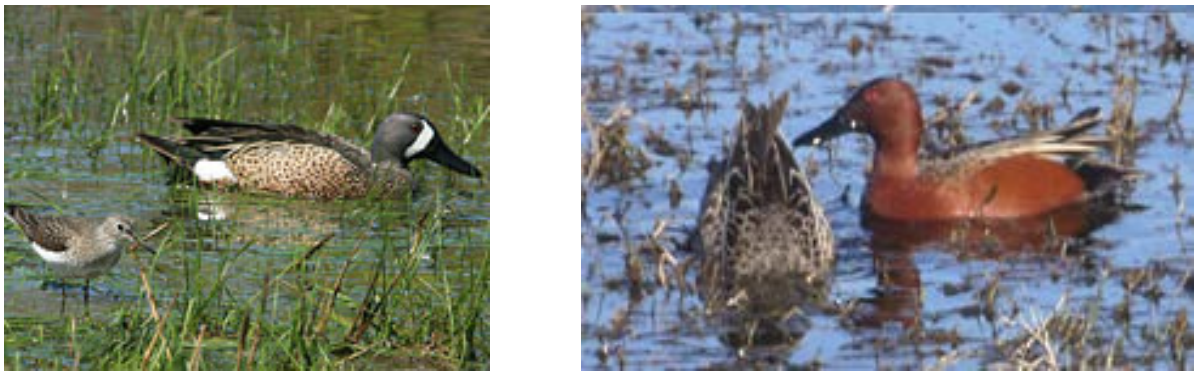

Figure 2. Photograph of deeper seasonal wetland habitat.
Typical depths range from 0.5' to 1.5' relative to the lake/wetland outlet.

### 2.2.3 Emergent Wetlands

Emergent wetlands comprise the deepest vegetated areas of Tolay Lake with maximum water depths of up to 3 feet. These areas support some of the perennial wetland species found in the shallow and deeper seasonal wetlands as well as chairmaker's bulrush (*Schoenoplectus americanus*), California bulrush (*Schoenoplectus americana*) and cattail (*Typha spp*). The hydrology associated with emergent wetlands can be either perennial or seasonal. When the hydrology is perennial the plants will grow to their maximum height and grow throughout the summer season. These species and others typical of emergent wetlands typically thrive with perennial inundation or a short (2 months or less) dry period with saturated soils in most years.

When the hydrology is seasonal the marsh will dry out in the summer and plants will stop growing and become dormant. When the hydrology is insufficient - dry periods extend beyond a few months each year - this species will often exhibit stunted growth.

For perennial hydrology we recommend that the water budget should show at least 80% of years with a minimum of 10-12 months of inundation in this zone to support emergent wetland vegetation and wildlife. For seasonal hydrology, we recommend that the water budget should show at least 60% of years with a minimum of 4 months of inundation in this zone. The healthiest emergent wetlands that have vigorous native wetland vegetation have consistent inundation

### 2.2.4 Open Water Habitat

Open water is found in areas that are too deep to support vegetation. Typically vegetation is not capable of surviving in areas that are inundated with 3 or 4 feet of water or more. Currently, only the deepest areas of Tolay Lake, within channels, are of a depth great enough to exclude all vegetation. These areas can be perennial or seasonal. A long duration of inundation during the rainy season would provide refuge for migratory birds. A summer drawdown would provide mudflats, which would potentially provide foraging habitat for resident shorebirds. We recommend that the water budget should show at least 80% of years with a minimum of 4 months of inundation in this zone to be beneficial for wildlife. This corresponds to seasonal hydrology.

Figure 3 Photograph of typical emergent marsh habitat. Water depths typically range from 1.5'to 3.0' relative to the lake/wetland outlet.

Figure 4. Photograph of typical open water habitat within a freshwater marsh. Typical depths are greater than 3'.

## 2.3 Restoration Goals

We collaborated with the County and developed restoration goals for the project The main goal of the restoration is to restore, enhance, and increase seasonal wetland habitat and habitat for shorebirds and waterfowl, with an emphasis on dabbling ducks. This main goal was based on the following biological goals that were previously developed for the project (Technical Memorandum, Tolay Lake Restoration Alternatives, WRA, Inc., Revised September, 2014).

*The main goal of the restoration is to restore, enhance, and increase seasonal wetland habitat and habitat for shorebirds, dabbling ducks, and waterfowl. This includes water deeps that range from 0.0' to 1.5' feet (shallow and deeper seasonal wetlands), which would provide foraging habitat for dappling ducks during annual migrations.*

*Goal #B1 – Enhance the frequency and duration of inundation*

- Maintain or enhance seasonal wetland hydrology within the lake
- Evaluate the feasibility of creating some perennially inundated areas within the lake

*Goal #B2 – Enhance the physical parameters of the lake if feasible and consistent with #B1.*

- Increase the frequency and duration of inundation
- Increase the area of the lake if feasible
- Increase the depth of the lake if feasible

*Goal #B5 – Enhance the habitat for migratory water fowl if feasible.*

- Shorebirds and wading birds: shallow shorelines
- Dabbling ducks: < 8" water depth; large area; diverse topography
- Waterfowl: 12"-18" water depth, large area, diverse topography

## 2.4 Previous Hydrology Feasibility Studies

### 2.4.1 Kamman Feasibility Study

A hydrology feasibility study was performed by Kamman Hydrology in 2004 (*Hydrologic Feasibility Analysis for the Tolay Lake Ranch Property, Sonoma County, California, Sonoma County Agricultural Preservation & Open Space District, Final Report, Kamman Hydrology, December, 2003*). This study used a water budget to evaluate the seasonal and annual fluctuations in water levels and storage volumes for proposed lake restoration scenarios that varied in size and storage capacity.

The study evaluated three scenarios with corresponding storage capacity of 136 acre-feet, 1100 acre-feet, and 2550 acre-feet. The 136 acre-feet scenario was assumed to represent the area of sustained ponding under existing site conditions. The 2550 acre-feet scenario represented the maximum size based downstream topography and the potential to raise the outlet elevation significantly. The 1100 acre-feet scenario represented an intermediate storage volume equal to the existing Cardoza water right application volume.

The following is a summary of the results of this study:

- there was insufficient water available to substantially increase the size of the lake;
- it is not feasible to create a significant amount of area with perennial hydrology;
- the target hydrology should be seasonal wetland.

### 2.4.2 WRA Supplemental Evaluation of the Kamman Dataset

WRA re-evaluated the Kamman dataset to get a better understanding of how the limitation of water would affect year-to-year changes in the lake size and how the limitations would affect the hydrology of wetland habitat. We re-evaluated data from the 136 acre-feet and 1100 acre-feet scenarios. Our concern was that increasing the lake size significantly would worsen the hydrology of the wetlands. We did not evaluate the 2550 acre-feet scenario because we were fairly confident, based some preliminary analysis, that we would show that the 1100 acre-feet alternative would worsen the hydrology.

We found that there is not enough water to effectively enlarge the lake and that in most years a large portion of the lake storage capacity would be underutilized. We also found that making the lake larger would have an adverse effect on the hydrology of the seasonal wetland habitat. The overall area of seasonal wetlands would not increase and, on an annual basis, the percentage of time that the wetlands would be wet would decrease. The expected effect of this change in hydrology would likely be a decrease in the coverage by wetland species, a decrease in wetland species diversity, and an increase in abundance of unwanted upland species.

#### *Effects of Limited Water on the Size of the Lake*

- On an annual basis, the lake will fill to capacity only 47% of the time. At capacity the lake would have a water surface area of 327 acres and a storage capacity of 1100 acre-feet
- On an annual basis, 37% of the time, the lake will be filled to less than 75% of its total area. During these years the lake area will be limited to 245 acres instead of 327 acres.
- On an annual basis, 18% of the time, the lake will be filled to less than 50% of its total area. During these years the lake area will be limited to 164 acres instead of 327 acres.
- On an annual basis, 14% of the time, the lake will be filled to less than 25% of its total area. During these years the lake area will be limited to 82 acres instead of 327 acres.

- On an annual basis, 41% of the time, the lake will be filled to less than 75% of its total storage volume. During these years the lake area will store 759 acre-feet instead of 1100 acre-feet.

- On an annual basis, 37% of the time, the lake will be filled to less than 50% of its total storage volume. During these years the lake area will store 506 acre-feet instead of 1100 acre-feet.

- On an annual basis, 24% of the time, the lake will be filled to less than 25% of its total storage volume. During these years the lake area will be limited to 253 acre-feet instead of 1100 acre-feet.

***Hydrology of the Wetland Habitat for the 136 acre-foot lake***

- The existing seasonal wetlands may have marginal hydrology. On an annual basis, the shallow seasonal wetlands are wet 67% of the time, the deeper seasonal wetlands areas are wet 69% of the time, and the emergent marsh areas are wet 71% of the time.

**E*ffects of Limited Water on the Wetland Habitat for the proposed larger 1100 acre-foot lake***

- The hydrology of the seasonal wetlands would worsen if the lake was enlarged from 136 acre-feet to 1100 acre-feet.

- Over a 50-year time frame, the percentage of years when the lake would fill enough to inundate the shallow seasonal wetland habitat would drop from 67% to 47%.

- Over a 50-year time frame, the percentage of years when the lake would fill enough to inundate the deeper seasonal wetland habitat would drop from 69% to 53%.

- Over a 50-year time frame, the percentage of years when the lake would fill enough to inundate the emergent marsh habitat would drop from 71% to 61%.

- If the lake was enlarged from 136 acre-feet to 1100 acre-feet than the size of the overall area of seasonal wetlands remain at about 95 acres, although the composition would shift significantly: shallow seasonal wetlands would decrease from 55 acres to 10 acres; deeper seasonal wetlands would increase from slightly from 30 to 35 acres; emergent marsh would increase from 20 to 50 acres.

## 2.5 Restoration Alternatives

### 2.5.1 Preliminary Restoration Alternatives

As mentioned earlier in the memorandum, WRA in collaboration with the County developed 4 preliminary restoration alternatives (Technical Memorandum, Tolay Lake Restoration Alternatives, WRA, Inc., Revised September, 2014) which are listed by name below. These were described and analyzed in detail in the technical memorandum referenced above.

- Alternative 1 – Lake Outlet at Elevation 215'
- Alternative 2 – Lake Outlet at Elevation 218' without a Back-berm
- Alternative 3 - Lake Outlet at Elevation 218' with a Back-berm
- Alternative 4 - Lake Outlet at Elevation 215' with a Mid-berm

### 2.5.2 Alternatives Selected for Evaluation Using a Water Budget

For this study WRA, in collaboration with the County, selected 3 restoration alternatives to evaluate using a water budget:

- Alternative 1 – Lake Outlet at Elevation 215'
- Alternative 2 – Lake Outlet at Elevation 218' without a Back-berm
- Alternative 5 – Lake Outlet at Elevation 215' with Enhanced Southeast Basin

Alternative 1 was selected because previous analysis indicated that this size wetland is in balance with the available water from the watershed and this alternative would not increase flooding on the adjacent upstream properties.

Alternative 2 was selected to find out if the watershed can support a wetland of this size and storage capacity. This alternative is likely not to be feasible because it would cause increased flooding on the adjacent upstream properties.

Alternative 5 was selected because it represents an opportunity to restored and enhance the wetlands in the southern portion of the lake without increased flooding on the adjacent upstream properties. This alternative would not increase the amount of storage water significantly and has the potential to be feasible given the limited amount of water available from the watershed. This alternative does include grading with the southern portion of Tolay Lake, which may not be desirable if there are a significant amount of archeological resources in the area.

### 2.5.3 Alternative 1 – Lake Outlet at Elevation 215'

This alternative would maintain the elevation of the lake outlet at 215' for both the northwestern and southeastern segments of the lake (see Figure 5). It would include reducing the frequency

and duration of flooding by increasing the flow capacity of the causeway culvert, eliminating the horseshoe culvert, and increasing the cross sectional area at the farm bridge. This alternative would establish a stable water elevation and reduce flooding. This alternative would have a maximum lake size and storage volume of 71.1 acres and 97.7 acre-feet respectively.

### 2.5.4 Alternative 2 – Lake Outlet at Elevation 218' without a Back-berm

This alternative would raise the elevation of the lake outlet from 215' to 218' in order to increase the potential depth and size of the lake (see Figure 6). The lake, when full, would extend onto the upstream adjacent properties. The County would have to negotiate an agreement with the adjacent property owners and gain permission to increase flooding on their property. This alternative would have a maximum lake size and storage volume of 171.53 acres and 439 acre-feet respectively.

### 2.5.5 Alternative 5 – Lake Outlet at Elevation 215' with Enhanced Southeast Basin

This alternative would maintain the elevation of the lake outlet at 215' for both the northwestern and southeastern segments of the lake. It is similar to the Alternative 1 but also includes increasing the size of the lake and enhancing the hydrology of the southeastern segment of the lake by lowering the bottom elevations in this area from 216'-217' to 214.5' (see Figure 7). This alternative would result in the establishment of a stable water elevation and high quality wetland habitat on both sides of the causeway. The southeastern segment of the lake may contain buried archaeological artifacts, which may make grading in this area undesirable. This alternative would have a maximum lake size and storage volume of 93.3 acres and 115.5 acre-feet respectively.

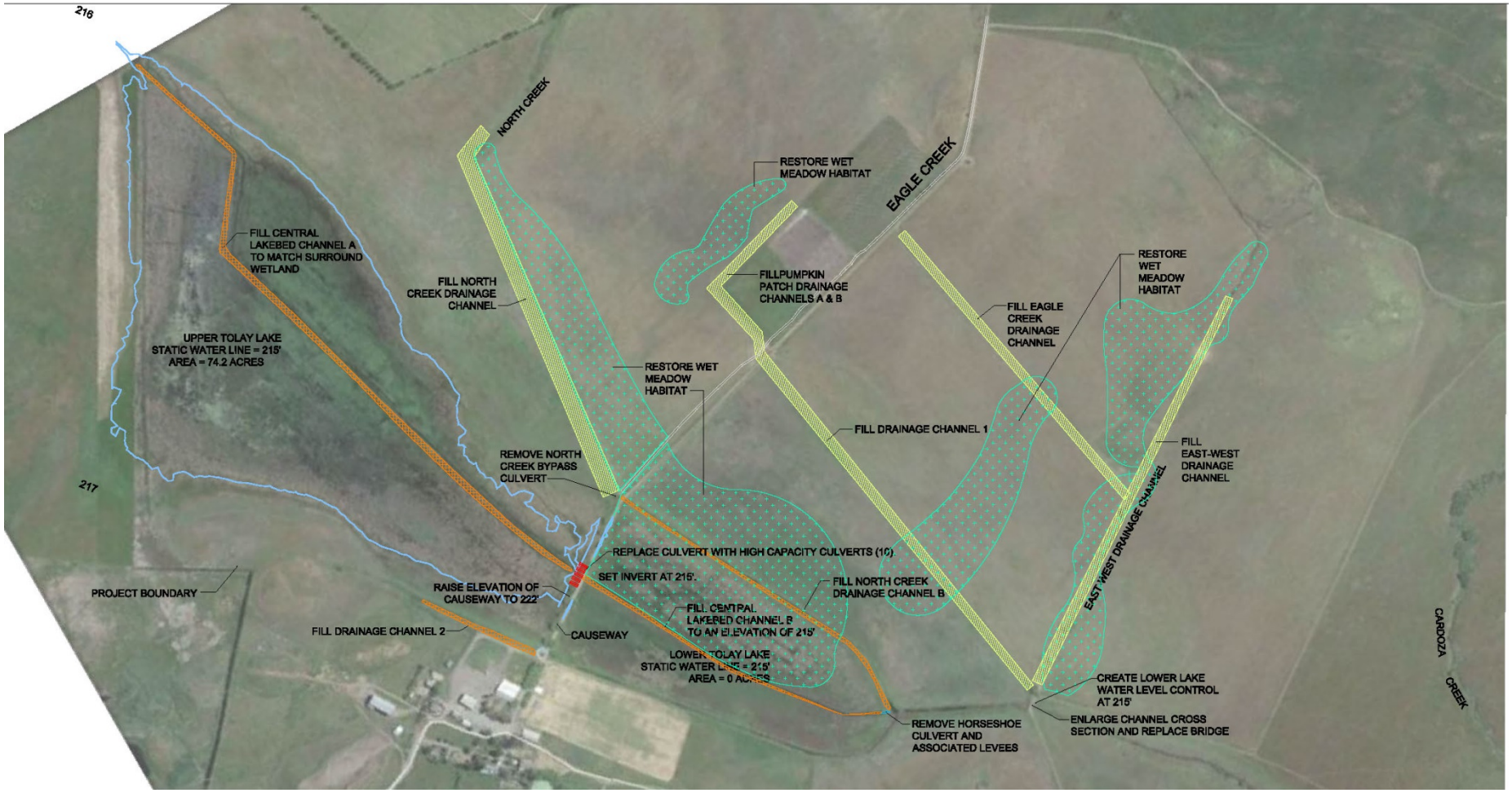


Figure 5. Conceptual design for lake restoration Alternative 1 – Lake Outlet Elevation at 215'.

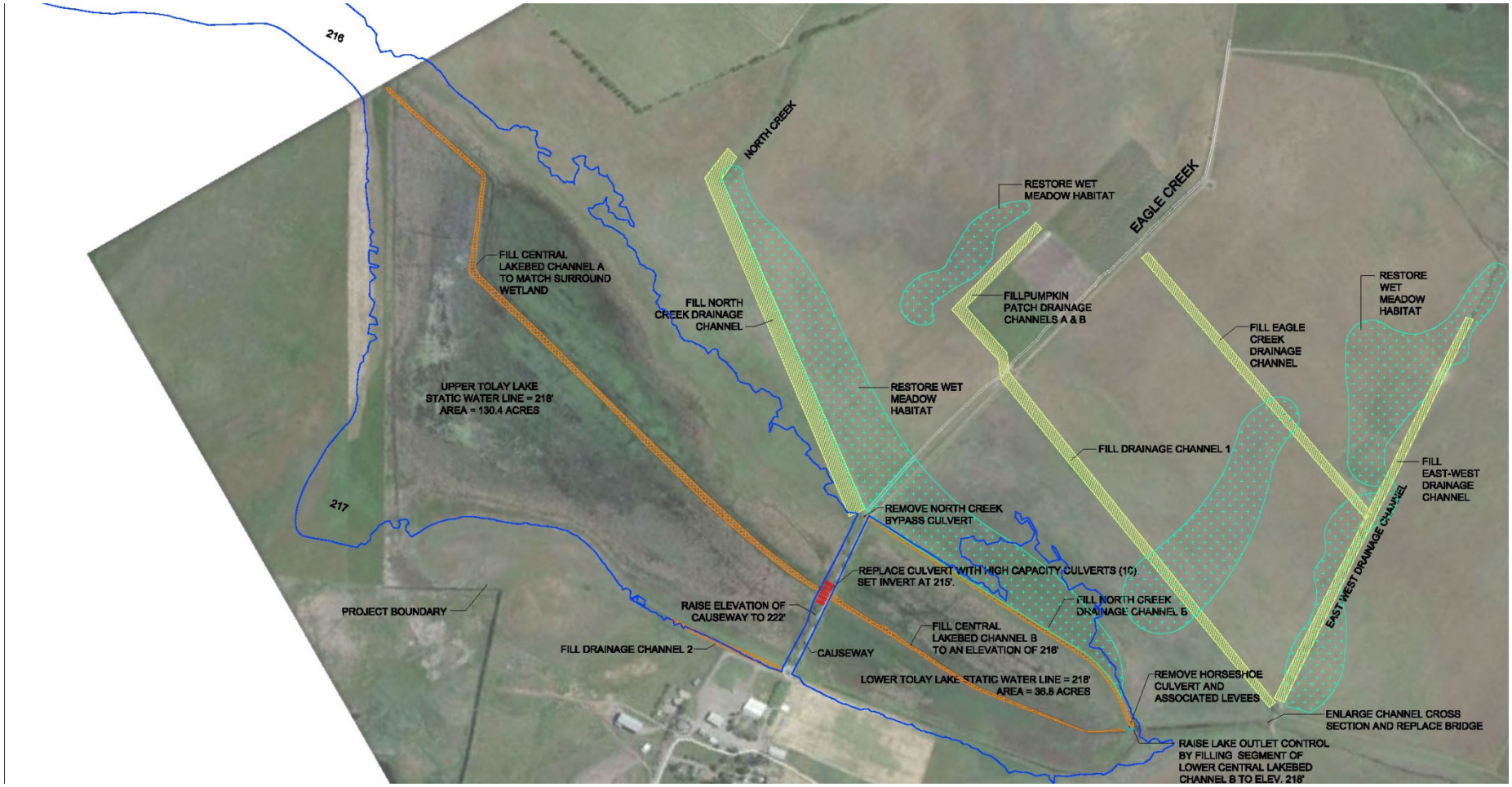


Figure 6. Conceptual design for lake restoration Alternative 2 – Lake Outlet Elevation at 218” without a Back-berm.

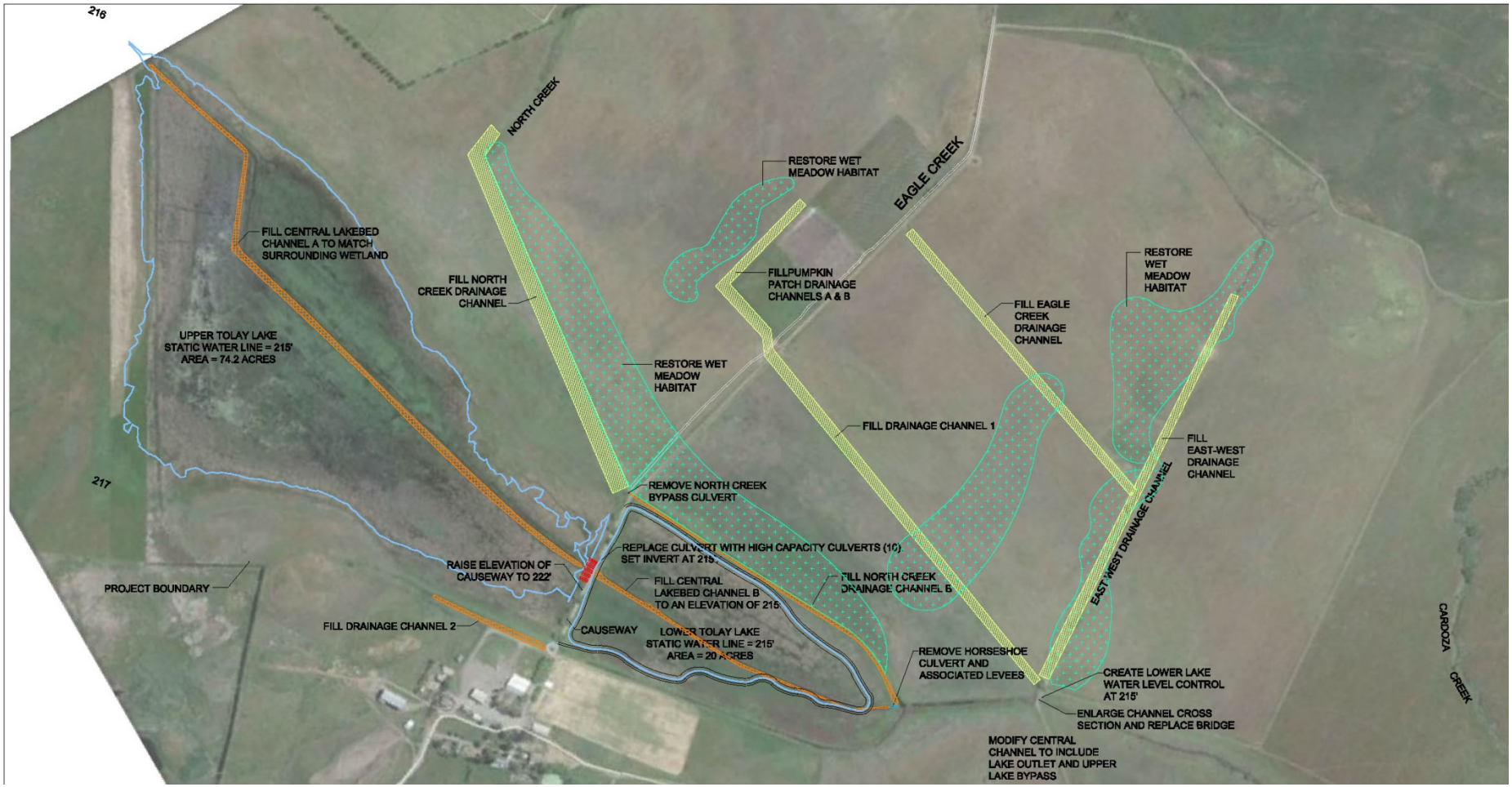


Figure 7. Conceptual design for lake restoration Alternative 5 – Lake Outlet at Elevation 215’ with Enhanced Southeast Basin.

## 3.0 WATER BUDGET METHODS

WRA developed a water budget model to evaluate the hydrology of the proposed restoration alternatives. The goal was to understand how the proposed restoration alternatives would affect the desired habitat types. This analysis included soils data collection, historic weather data collection, and water budget modelling. The following discussion provides an overview of the methods used for this analysis.

The water budget generated a daily estimate of the amount of water likely to inundate the proposed wetland with inputs of precipitation and surface inflow and outputs of outflow, infiltration, and evaporation. We based the water budget calculations on the hydrology of a wetland, which can be estimated using the following equation (Mitsch and Gosselink 1993):

Change in volume of water storage in wetland per unit time =

(Precipitation + Surface Inflow + Groundwater Inflow) –

(Surface Outflow + Groundwater Outflow + Evapotranspiration)

In preparing the water budget, we modified this equation by converting volume of water storage to depth of water by analyzing the available topographic data for the site. For the unit of time, we used a daily hydro-period. Thus, the model predicts the approximate duration of inundation in the Lake. We collected the information needed for the water budget as described below.

### 3.1 Topography

We used the topographic data set provided by the County that was generated using LiDAR. The dataset included contour lines at a 1-foot interval. The data was prepared at a time when the vegetation was low and when there was not water in the Lake. For each restoration alternative we generated a volume-to-depth dataset from the topographic data for use in the water budget.

### 3.2 Soils

Basic soil data was collected from the National Cooperative Soil Survey (NCSS 2013). According to NCSS, sixteen soil units have been mapped within the Tolay Lake watershed. Within Tolay Lake, one soil type is represented, - Clear Lake Clay Loam, 0 to 2 percent slopes. These soils consist of very deep, poorly drained soils that formed in the fine textured alluvium derived from sandstone and shale. They are extremely hard clays overlain by a clay loam surface 10 to 15 inches thick. The most limiting layer to transmit water (Ksat) is described as very low ($1.29 \times 10^{-4}$ cm/sec).

### 3.3 Precipitation and Surface Inflow

For the water inputs, daily rainfall data was taken from the nearest weather station in the county, for a twelve year period to capture variability in annual weather. The long-term annual average precipitation rate is 30.69 inches in Sonoma, California (WETS Station: Sonoma, CA8351).

Daily precipitation rates recorded at the East Petaluma, California station (CIMIS Station#144 Petaluma East) for 2002 – 2013 were collected and entered into the water budget model. Years 2005, 2006, 2010, and 2012 received average precipitation, while 2002 and 2003 were wet years (30% or more above normal), and 2003, 2004, 2007, 2008, 2009, 2011, and 2013 were dry (30% or more below normal). Variability in rainfall patterns from year to year, such as large single storms or small back-to-back storms, may produce more or less runoff in any given year. Results from the model for twelve years with different levels of rainfall are provided to show this variability. Surface runoff was determined using the Soil Conservation Service Runoff Curve Number Method (USDA 1986).

### 3.4 Evapotranspiration, Infiltration, and Outflows

For the outputs of water, daily evapotranspiration rates were also taken from the weather station for the same years as the precipitation rates. Daily evaporation rate data were taken from the East Petaluma, California station (CIMIS Station#144 Petaluma East) for 2002 – 2013 managed by the California Irrigation Management Information System, the closest station to the Project Area with evaporation data.

The infiltration rate is a value that is site specific to the Lake indicating the rate at which water is absorbed into the soil. In the previous water budget prepared by Kamman Hydrology, they used 0.0 cm/sec for the infiltration rate, surmising that the input of groundwater was equal to the output of water via infiltration. For this water budget model, we took the rate published by NCSS and reduced some inputs from groundwater. This infiltration rate is comparable to the measured in-situ infiltration rates observed within wetlands and lake habitats on similar clay soils.

Surface outflow occurs when the Lake is completely full and water flows out of the Lake via Tolay Creek. It was previously determined that there were several locations where flow within the lake drainage was constricted by undersized pipes, severely clogged pipes, or undersized channel cross sections. The project plans on retrofitting these project elements, in all of the alternatives, to reduce the frequency, duration, and magnitude of flooding of the adjacent up-stream properties. As part of this analysis we determined that the rate of outflow for the restored lake would be controlled by the outflow rate at the retrofitted channel at the farm bridge.

### 3.5 Annual Frequency of Inundation for Wetland Habitat Types

Annual frequency of inundation is the number of years that the target habitat type received adequate inundation over the study period, expressed as a percentage. We used the water budget to calculate the daily water depth for a 12-year time period for each of the restoration alternatives. As previously discussed, the water depth was measured relative to the elevation of the lake outlet. This allowed us to calculate the annual frequency of inundation for each of the target wetland habitat types: shallow seasonal wetland, deeper seasonal wetland, emergent marsh, and open water.

### 3.6 Daily Time Interval for Analysis

We evaluated the water budget on a daily time interval instead of a monthly time interval. This allowed us to make more accurate predictions of surface in-flow based on rainfall because the relationship between rainfall and surface in-flow is non-linear. Predictions of surface in-flow based on aggregated rainfall measurements, such as monthly rainfall totals, overestimate the resulting surface in-flow. Daily precipitation data was only available for the past 12 years and therefore, we had to limit our analysis to this time period. Other studies, such as Kamman's, used monthly rainfall data and evaluated the water budget over a longer period of time (50 years). We felt that the improvement of accuracy out-weighed the limitation of only 12 years of data.

### 3.7 Water Rights

The water budget included the upstream water rights in the watershed. We utilized the State database to identify the upstream water rights. Table 3 lists the water rights that were used in the water budget. For the water budget analysis, we deducted the total upstream water rights from the estimated surface inflow prior to conveying any water to the Lake. This water budget analysis did not evaluate downstream water rights.

Table 3. Water Rights Used in the Water Budget Evaluation.

| Owner | Application Number | Application Status | Permit ID | Volume | Used In Water Budget |
|---|---|---|---|---|---|
| Kullberg | A030592 | Pending | na | 35 | no |
| Kullberg | A029402 | Permitted | 20393 | 12 | yes |
| Kullberg | A029678 | Permitted | 20561 | 37 | yes |
| Martinelli | A016625 | Licensed | 10471 | 9 | yes |
| Martinelli | A031022 | Pending | na | 200 | no |
| Universal Portfolio, ltd | S019753 | Claimed | na | 0 | yes |
| Universal Portfolio, ltd | A031818 | Pending | na | 124 | no |
| Oxfoot | A029166 | Permitted | 20330 | 245 | yes |

*Permitted* – Authorization to develop a water diversion and use project. The right to use water is obtained through actual use of water within the limits described in the permit.

*Licensed* – After you have received a water right permit, constructed your project, and used water, we will inspect your project. If you have used water beneficially and if you comply with all of the conditions in your permit, you will be offered a water right license. The water right license is a vested right that confirms your actual use. If you have not used all the water allowed by your permit, or if you have used water unreasonably, you will receive a license for less water than your permit allowed. You will receive a license for only that water that has been reasonably and beneficially used.

*State Div. of Land Use* - Pre-1914 appropriative water right that is undecided by the courts.

*Claimed* - Describes pre-1914 water right.

## 4.0 WATER BUDGET RESULTS

We evaluated the three restoration alternatives using the water budget that was described above. The follow section contains the results for each of the alternatives and a summary and conclusion.

### 4.1 Water Budget Results for Alternative 1 – Outlet Elevation at 215'

The results showed that this alternative supports the shallow seasonal wetland, the deeper seasonal wetland, and the emergent marsh habitat types, but has limited to no open water habitat. Figure 8 illustrates the daily surface water elevation over the 12 year analysis period and shows each target habitat elevation range. From this figure we can see that:

- Shallow seasonal wetland habitat would be inundated in only 42% of the years;
- Deeper seasonal wetland habitat would be inundated all years;
- Emergent marsh habitat would be sufficiently inundated in all years;
- There would be no open water habitat because the lake is too shallow.

We can expect that the upper margins of the shallow seasonal wetland habitat may be invaded with upland plants in times of prolonged drought but that all three of the target habitats (shallow seasonal wetland, deeper seasonal wetland, and emergent marsh) will be present and relatively well supported by the expected hydrology.

Another consideration when comparing the alternatives is the amount of habitat that can be supported in each scenario. Figure 11 below illustrates the habitat area that will be present under Alternative 1. This shows that there will be:

- 11.29 acres of shallow seasonal wetland;
- 29.77 acres of deeper seasonal wetland;
- 34.04 acres of emergent marsh;
- There is no open water habitat because the lake is too shallow;
- Total area of viable wetlands is 75.1 acres.

### 4.2 Water Budget Results for Alternative 2 – Outlet Elevation at 218' without a Back-berm

The results showed that this alternative would have less stable hydrology with reductions in the annual inundation frequencies in the shallow seasonal wetland, deeper seasonal wetland, and emergent marsh habitat types. We predicted that this would result in lower quality wetland habitat with a higher percentage of weeds. Figure 9 below illustrates the

daily surface water elevation over the 12 year analysis period and shows each target habitat elevation range. From this figure we can see that:

- Shallow seasonal wetland habitat would be inundated in only 27% of the years;
- Deeper seasonal wetland habitat would be inundated in only 29% of the years;
- Emergent marsh habitat would be inundated in 83% of the years;
- Open water habitat would be inundated in all years;
- Bare ground will be exposed in 66% of years as Tolay Lake dries down in late summer.

It is possible that the seasonal wetland habitat could shift downward; however, we feel this is unlikely because when the lake fills in 27% of years, the wetland plants would most likely be drowned in the deeper water. This scenario is most likely to result in low quality seasonal wetlands with a high percentage of non-native weeds. Open water would be present and relatively well supported by the expected hydrology; however, more bare ground will be present in most years at the end of the summer.

Figure 12 below illustrates the habitat area that would be present under Alternative 2. This shows that this scenario has the potential to have:

- 26.7 acres of shallow seasonal wetland habitat (although the hydrology does not support it);
- 32.4 acres of deeper seasonal wetland habitat (although the hydrology does not support it);
- 48.62 acres of emergent marsh;
- 63.81 acres of open water habitat (or bare ground in some summers);
- Total area of viable wetlands is 112.43 acres;

### 4.3 Water Budget Results – Alternative 5, Outlet at 215' with Enhanced South Basin

The results showed that this alternative has almost exactly the same water surface elevation as the existing conditions; however, this alternative substantially increases the acreage of the deeper seasonal wetland by approximately 17 acres. In addition, there would be sufficient hydrology to support shallow seasonal wetland, deeper seasonal wetland, and emergent marsh habitats. Figure 10 below illustrates the daily surface water elevation over the 12 year analysis period and shows each target habitat elevation range. From this figure we can see that:

- Shallow seasonal wetland habitat would be inundated 42% of the years;
- Deeper seasonal wetland habitat would be inundated all years;

- Emergent marsh habitat would be sufficiently inundated in all years;
- There would be no open water habitat because the lake is too shallow.

We can expect that the upper margins of the seasonal shallow zone may be invaded with upland plants in times of drought but that all three of the target habitats wouldl be present and relatively well supported by the expected hydrology of Tolay Lake with a static water line at elevation 215.

Another consideration when comparing the alternatives is the amount of habitat that can be supported in each scenario. Figure 13 below illustrates the habitat area that would be present under Alternative 5. Alternative 5, while it has nearly the same hydrology as Alternative 1, supports more area of seasonal wetland habitat. Alternative 5 would have the following acres of habitat:

- 11.86 acres of shallow seasonal wetland;
- 47.4 acres of deeper seasonal wetland;
- 34.03 acres of emergent marsh;
- There is no open water habitat because the lake is too shallow;
- Total area of viable wetlands is 93.29 acres

### 4.4 Summary and Conclusions

We compared the restoration alternatives based on the results of the water budget (Table 4). For each restoration alternative we provided the maximum acreage and maximum storage volume. We also provided an estimate of the annual frequency of inundation for each of the target habitat types: shallow seasonal, deeper seasonal; emergent marsh; open water.

It should be noted that all of the alternatives included that same improvements to the water control features of the site. In a previous study we determined that several of these were too small, clogged, or no longer functioning. Improving these water control features would reduce the duration, magnitude and frequency of flooding of the upstream properties without significantly changing the size or storage volume of the lake.

Alternative 1 represents current size and storage capacity of the lake. The hydrology for the shallow seasonal wetland was predicted to be marginal (annual frequency of inundation of 42%) and our field survey indicated that the shallow wetland fringes include non-native wetland species and a larger then desirable amount of upland species. These results indicated that the hydrology of the lake would likely remain predominantly seasonal and that there is not really any opportunity to make a perennial lake.

Alternative 2 allowed us to evaluate if there is enough water to substantial increase the size and storage volume of the lake. The results indicated that increasing the size and storage volume of the lake would likely decrease the annual inundation frequency in the shallow seasonal wetland, deeper seasonal wetland, and emergent wetland habitat types. This would likely decrease the abundance and diversity of wetland plant species and increase the abundance of non-native wetland plant species and upland plant species in these areas. When full this lake would

extend onto the upstream neighbor's property and the County does not currently have permission from these landowners to increase flooding. These results are consistent with the results from evaluating the Kamman dataset.

Alternative 5 allowed us to explore enlarging the seasonal wetlands and enhancing the hydrology of the southeast section of the lake without substantially increasing the amount of required water. This would create the opportunity to enhance the wetland habitat and maintaining sufficient hydrology. In addition, the storage volume only increases from 97.7 to 115.5 acre feet. The County may be able to enhance the wetlands without needing to increase their water rights by a significant amount.

We recommend that the County consider Alternative 5 because it provides an opportunity to increase the size of the lake slightly and enhance the hydrology of the southeast portion of the lake. This alternative involves excavating the southeast portion of the lake by approximately 1 to 2 feet. There is a potential that this area contains archeology resources, and the County should work with the Tribes to determine if these resource as present and make sure that this level of ground disturbance is acceptable to the Tribes.

There are limitations to using a water budget to evaluate the restoration alternatives. The water budget does not predict dynamic flood levels under different storm scenarios. It also should not be used to design the size of water control features such as the size of culverts or cross sectional requirements for open channel conveyances. In addition the water budget is limited by the quality of data input and assumptions. It should be noted that the water budget analysis is sensitive to the soil infiltration rate. We were careful to select a soil infiltration rate that represents site conditions. In this context the water budget should be used to guide the selection of project alternatives based on the project goals and results.

We have not yet evaluated potential effects that modifying the lake may have on downstream habitat or downstream water rights.

Table 4. Results of the Water Budget Evaluation for Three Restoration Alternatives.

| Restoration Alternative | Storage Volume (acre-feet) | Area (acres) | Percent Year with Inundation (%) | Potential Adverse Impact on Existing Habitat | Potential Insufficient Hydrology on Proposed New Habitat |
|---|---|---|---|---|---|
| **Lake Outlet at Elevation 215'** | **97.7** | **71.1** | | | |
| Shallow Seasonal Wetland | | 11.3 | 42% | none | none |
| Deeper Seasonal Wetland | | 29.8 | 100% | none | none |
| Emergent marsh | | 34.0 | 100% | none | none |
| Open Water | | none | Not applicable | Not applicable | Not applicable |
| **Lake Outlet at Elevation at 218'** | **439** | **171.5** | | | |
| Shallow Seasonal Wetland | | 26.7 | 27% | yes-relocated | yes |
| Deeper Seasonal Wetland | | 32.40 | 29% | yes-relocated | yes |
| Emergent marsh | | 48.62 | 82% | yes-relocated | yes |
| Open Water | | 63.81 | 100% | no | no |
| **Lake Outlet at Elevation 215' with Enhanced South Basin** | **115.5** | **93.3** | | | |
| Shallow Seasonal Wetland | | 11.9 | 42% | none | none |
| Deeper Seasonal Wetland | | 47.4 | 100% | none | none |
| Emergent marsh | | 34.0 | 100% | none | none |
| Open Water | | none | Not applicable | Not applicable | Not applicable |

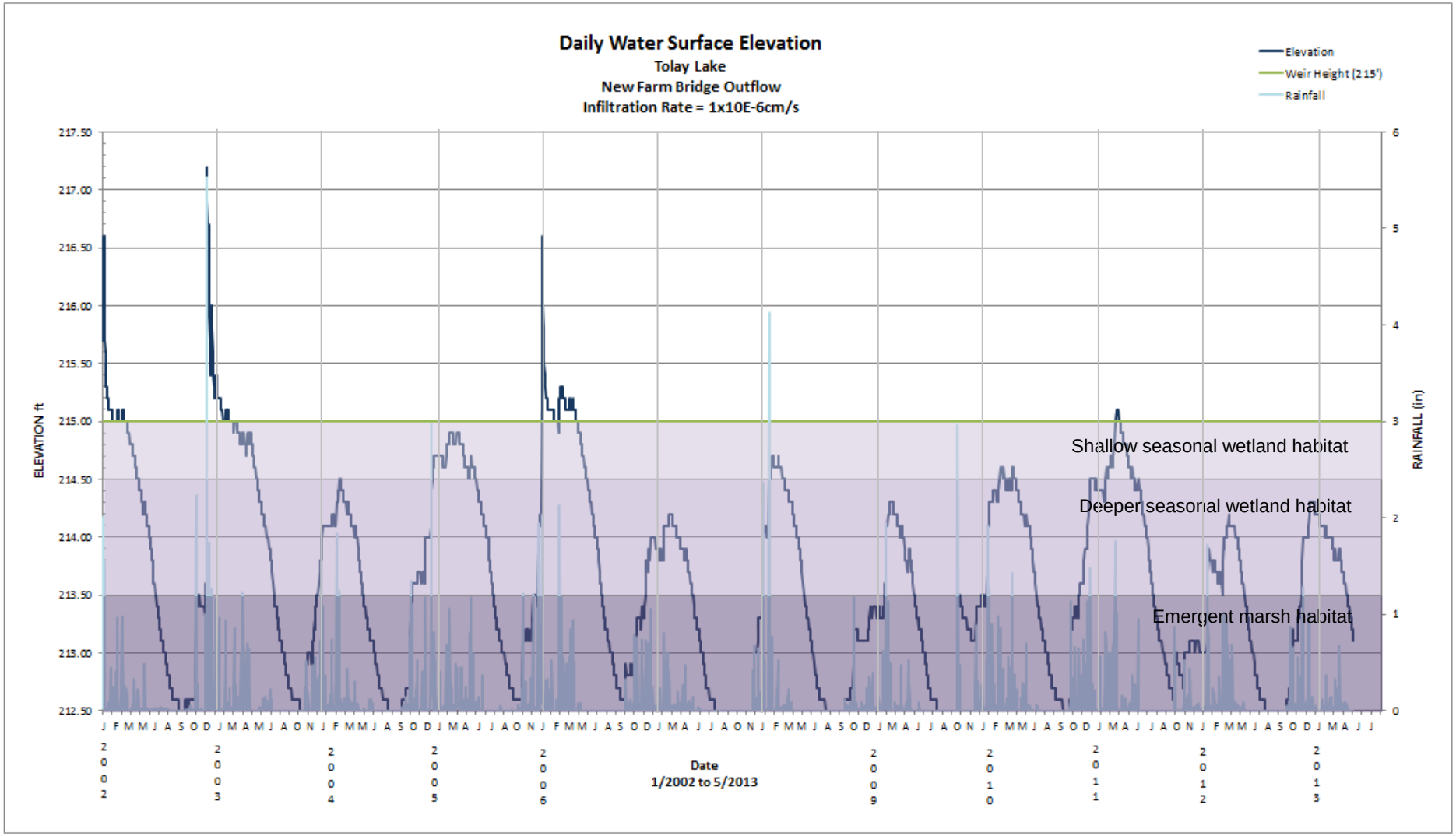


Figure 8. Daily Water Surface Elevation and Habitat for Restoration Alternative 1 – Lake Outlet at Elevation 215'.

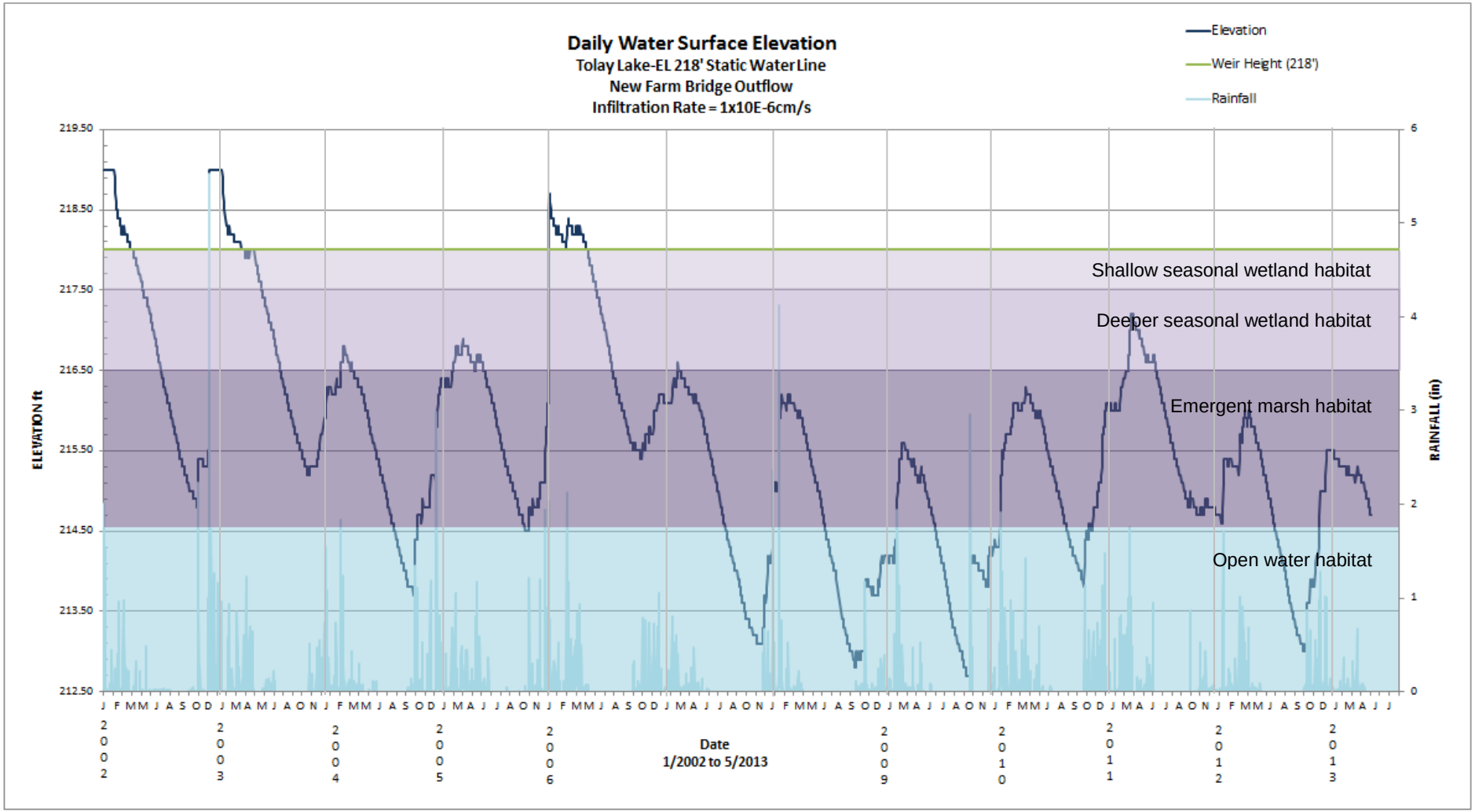


Figure 9. 12-year Daily Water Surface Elevation and Habitat for Restoration Alternative 2 – Lake Outlet at Elevation 218'

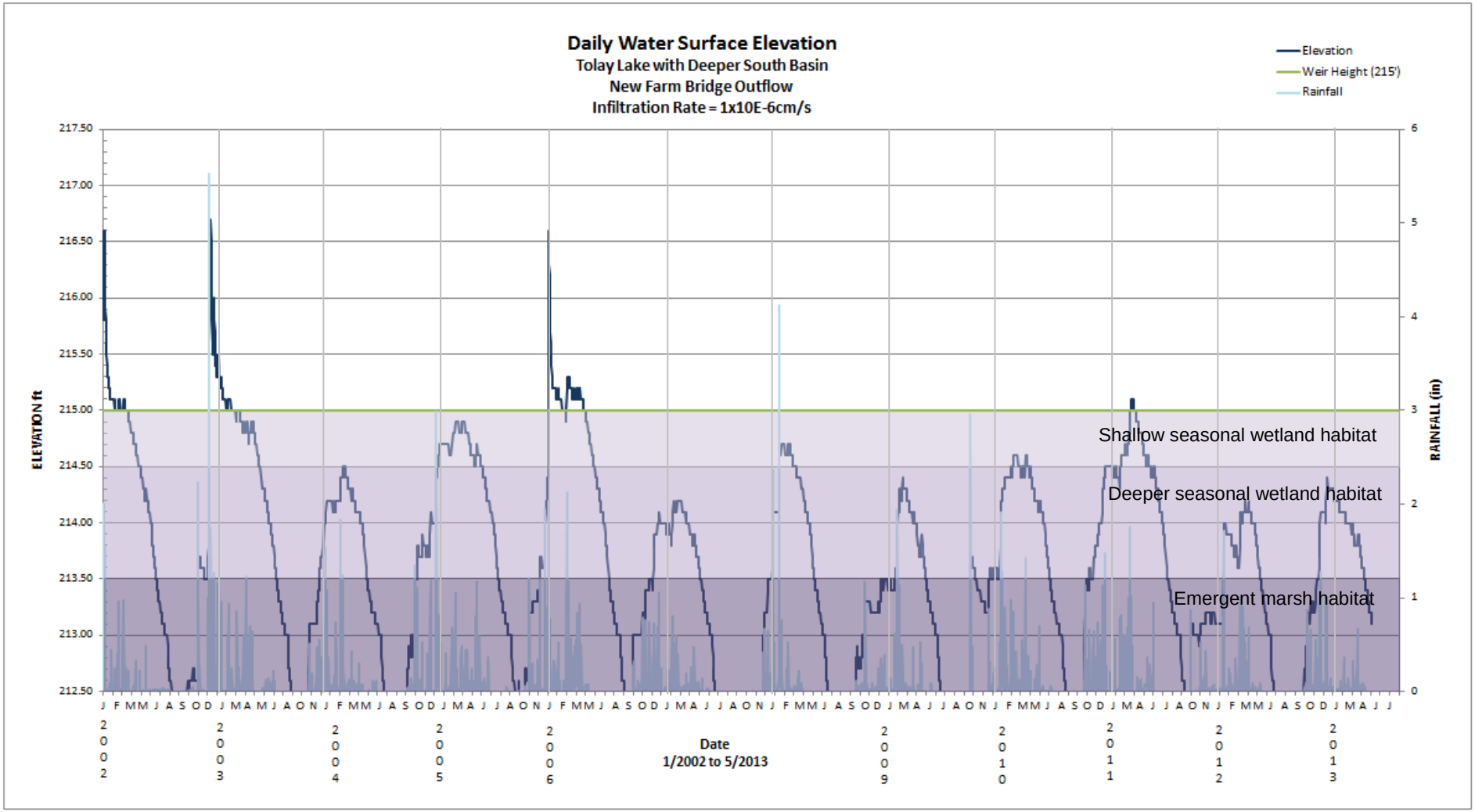


Figure 10. 12-year Daily Water Surface Elevation and Habitat for Restoration Alternative 5 – Lake Outlet Elevation at 215' with Enhancement of the South Basin


Figure 11. Areas of Inundation for Target Habitats for Restoration Alternative 1 – Lake Outlet Elevation at 215’

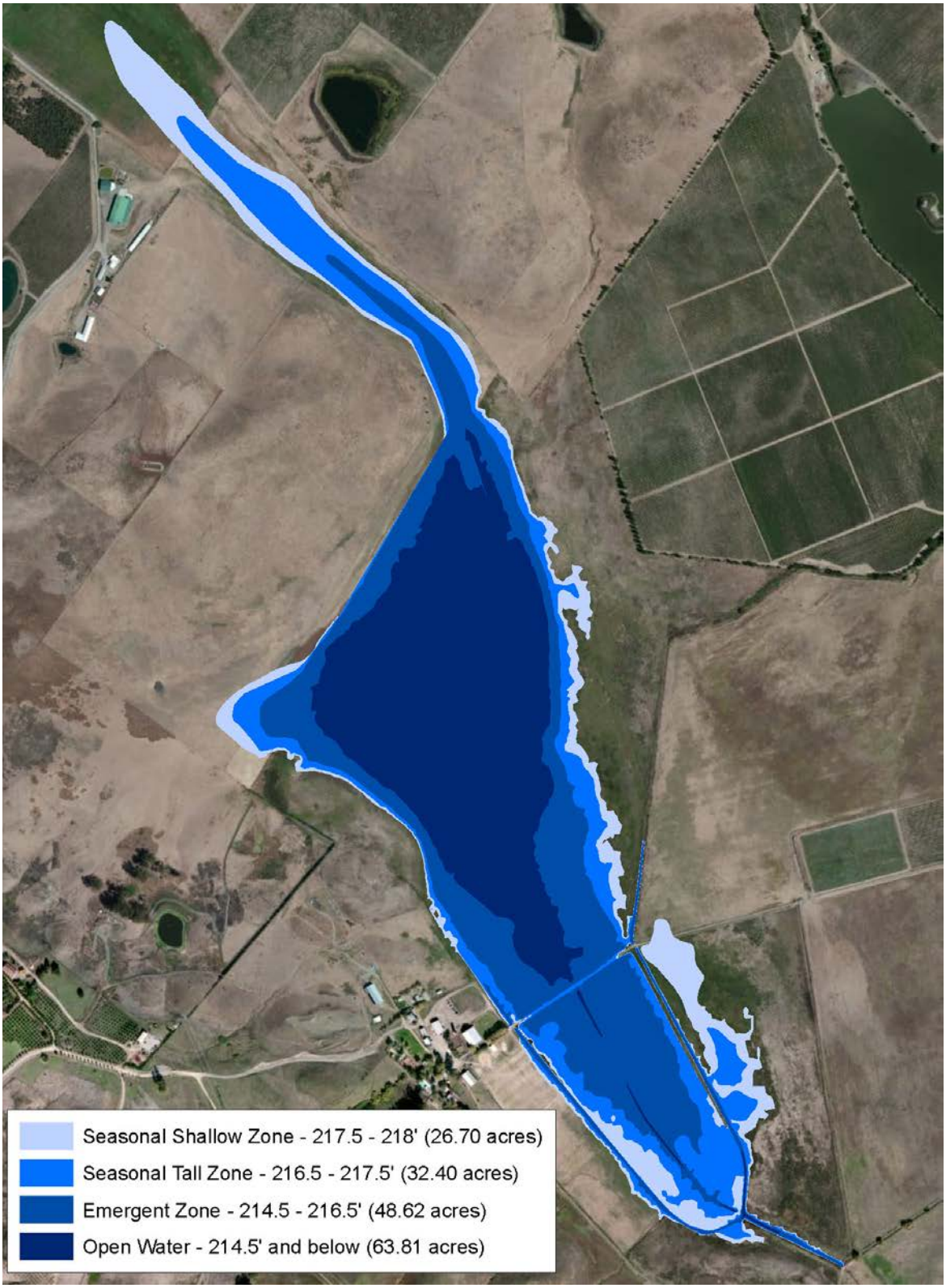


Figure 12. Areas of Inundation for Target Habitats for Restoration Alternative 2 – Lake Outlet Elevation at 218’ without a Back-berm.

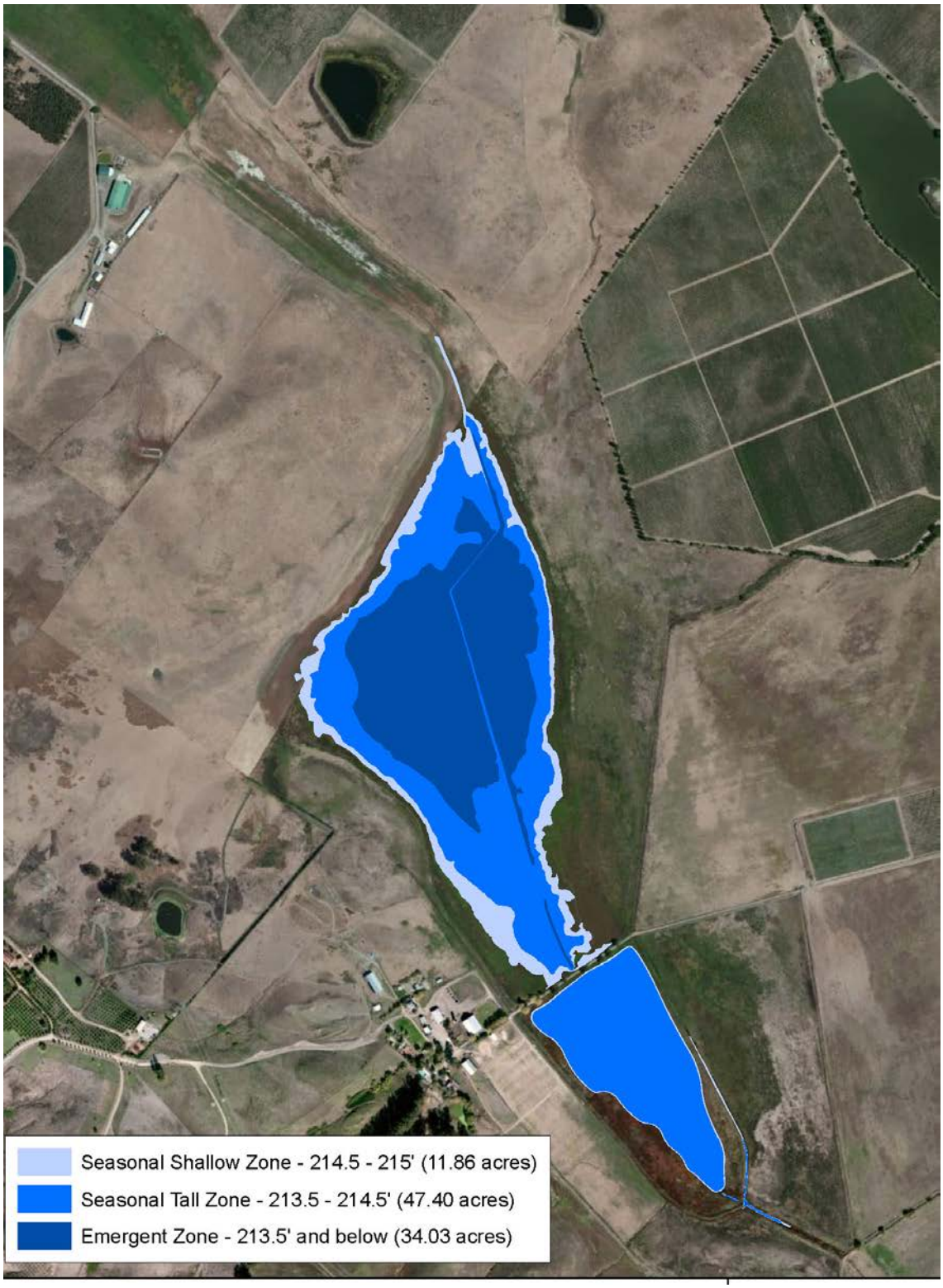


Figure 13. Areas of Inundation for Target Habitats for Restoration Alternative 5 – Lake Outlet Elevation at 215' with Enhanced Southeast Basin.

## 5.0 REFERENCES


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# Appendix - Water Budget Analysis Data

## Tolay Lake Restoration Alternatives

## Sonoma County, California

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## 1.0 INTRODUCTION

This Appendix serves to provide additional input data and results of a water budget analysis performed to evaluate three restoration alternatives for Tolay Lake, as described in the Technical memorandum dated November 11, 2014. Data presented here are a subset of the complete data set which can be provided upon request.

Table 1. Water Rights Used in the Water Budget Evaluation.

| Owner | Application Number | Application Status | Permit ID | Volume | Used In Water Budget |
|---|---|---|---|---|---|
| Kullberg | A030592 | Pending | na | 35 | no |
| Kullberg | A029402 | Permitted | 20393 | 12 | yes |
| Kullberg | A029678 | Permitted | 20561 | 37 | yes |
| Martinelli | A016625 | Licensed | 10471 | 9 | yes |
| Martinelli | A031022 | Pending | na | 200 | no |
| Universal Portfolio, ltd | S019753 | Claimed | na | 0 | yes |
| Universal Portfolio, ltd | A031818 | Pending | na | 124 | no |
| Oxfoot | A029166 | Permitted | 20330 | 245 | yes |

*Permitted* – Authorization to develop a water diversion and use project. The right to use water is obtained through actual use of water within the limits described in the permit.

*Licensed* – After you have received a water right permit, constructed your project, and used water, we will inspect your project. If you have used water beneficially and if you comply with all of the conditions in your permit, you will be offered a water right license. The water right license is a vested right that confirms your actual use. If you have not used all the water allowed by your permit, or if you have used water unreasonably, you will receive a license for less water than your permit allowed. You will receive a license for only that water that has been reasonably and beneficially used.

*State Div. of Land Use* - Pre-1914 appropriative water right that is undecided by the courts.

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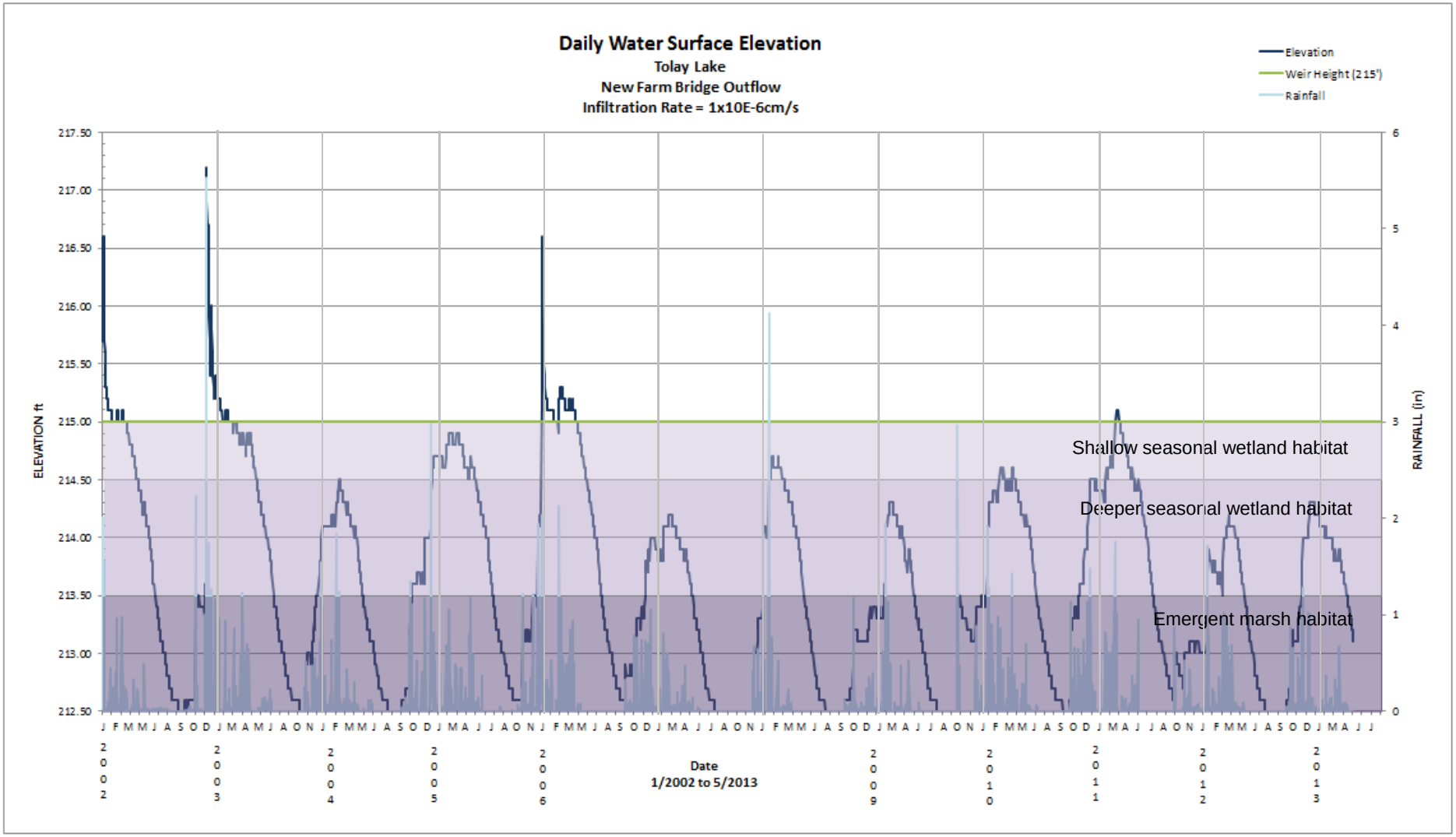


Figure 1. Daily Water Surface Elevation and Habitat for Restoration Alternative 1 – Lake Outlet at Elevation 215'.

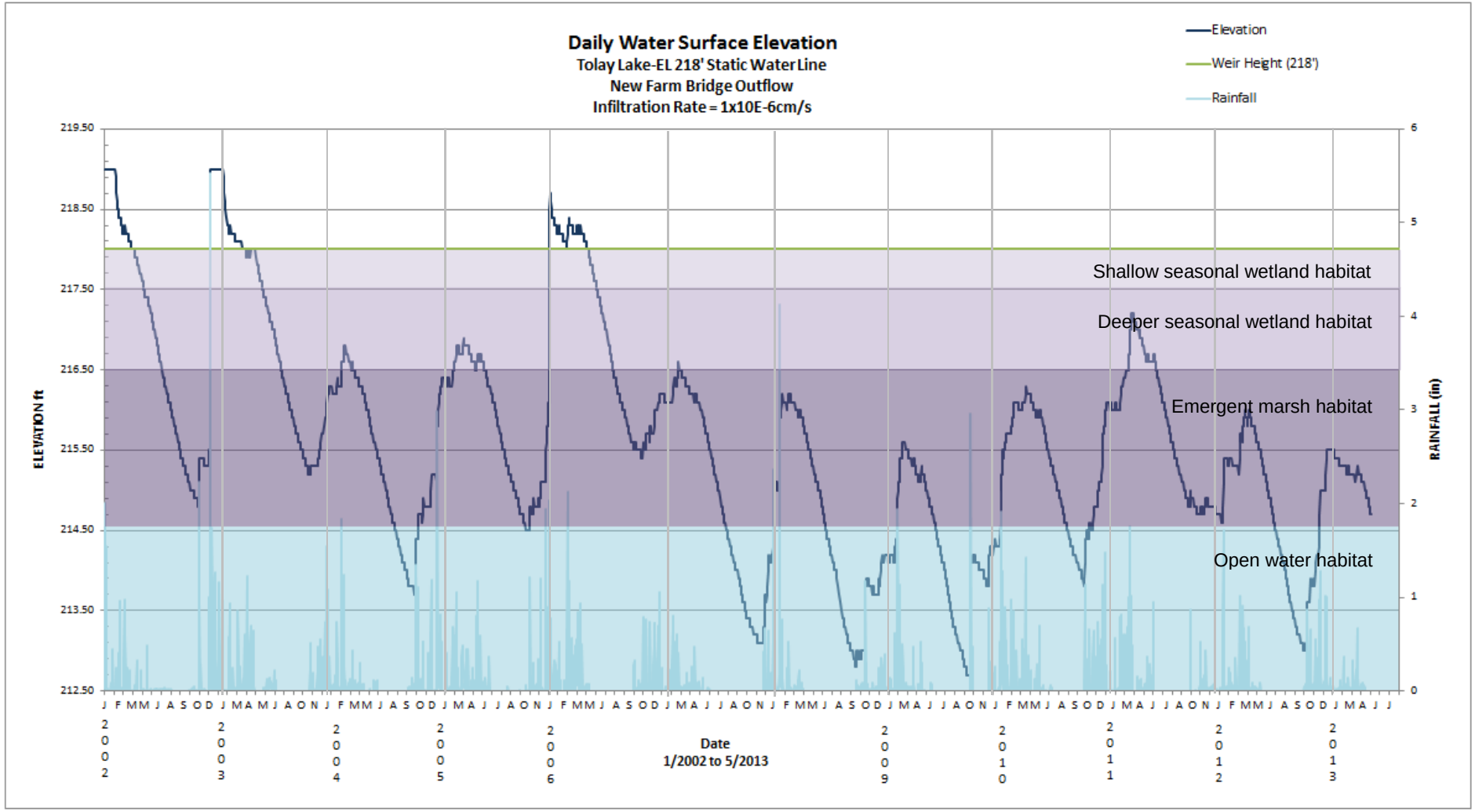


Figure 2. 12-year Daily Water Surface Elevation and Habitat for Restoration Alternative 2 – Lake Outlet at Elevation 218'

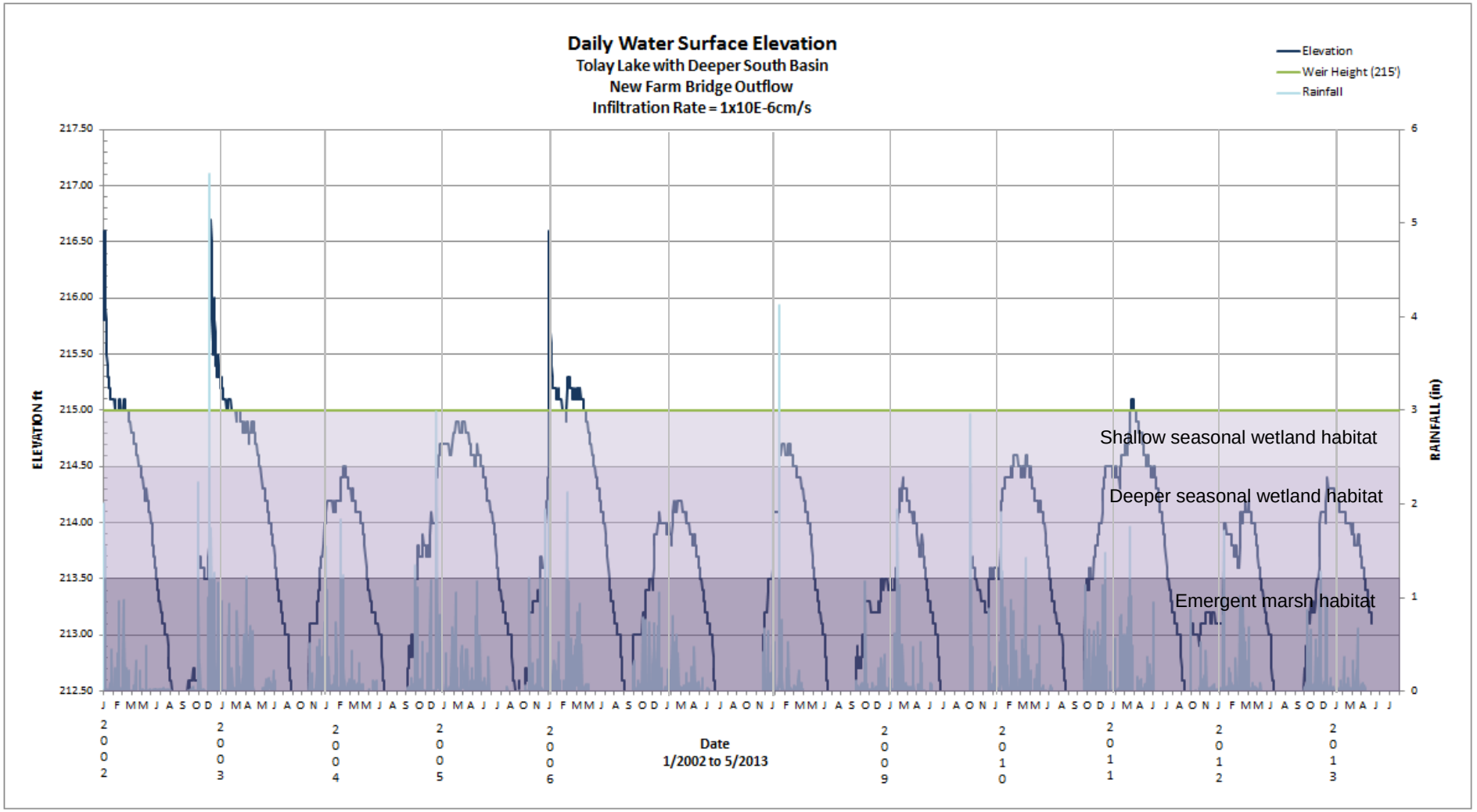


Figure 3. 12-year Daily Water Surface Elevation and Habitat for Restoration Alternative 5 – Lake Outlet Elevation at 215' with Enhancement of the South Basin

appendix h

# Tolay Lake Conceptual Ecological Model for Restoration goals

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TOLAY LAKE REGIONAL PARK
Master Plan Project

## Lake Restoration Alternatives

ALTERNATIVE 1 – LAKE OUTLET AT ELEVATION 215 FEET.

Alternative 1 was evaluated because previous analysis indicated that this wetland size is in balance with the available water from the watershed and this alternative would not increase flooding on the adjacent upstream properties.

This alternative would maintain the elevation of the lake outlet at 215 feet for both the northwestern and southeastern segments of the lake. It would include reducing the frequency and duration of flooding by increasing the flow capacity of the causeway culvert, eliminating the horseshoe culvert, and increasing the cross-sectional area at the farm bridge. This alternative would establish a stable water elevation and reduce flooding. This alternative would have a maximum lake size and storage volume of 71.1 acres and 97.7 acre-feet, respectively.

ALTERNATIVE 2 – LAKE OUTLET AT ELEVATION 218 FEET WITHOUT A BACK-BERM.

Alternative 2 was evaluated to find out if the watershed can support a wetland of this size and storage capacity. This alternative is likely not to be feasible because it would cause increased flooding on the adjacent upstream properties.

This alternative would raise the elevation of the lake outlet from 215 feet to 218 feet to increase the potential depth and size of the lake. The lake, when full, would extend onto the upstream adjacent properties. The County would have to negotiate an agreement with the adjacent property owners and gain permission to increase flooding on their property. This alternative would have a maximum lake size and storage volume of 171.53 acres and 439 acre-feet respectively.

ALTERNATIVE 5 – LAKE OUTLET AT ELEVATION 215 FEET WITH ENHANCED SOUTHEAST BASIN.

Alternative 5 was evaluated because it represents an opportunity to restore and enhance the wetlands in the southern portion of the lake without increased flooding on the adjacent upstream properties. This alternative would not increase the amount of storage water significantly and has the potential to be feasible given the limited amount of water available from the watershed. This alternative does include grading within the southern portion of Tolay Lake, which may not be desirable if there are a significant amount of archeological resources in the area.

This alternative would maintain the elevation of the lake outlet at 215 feet for both the northwestern and southeastern segments of the lake. It is like Alternative 1 but includes increasing the size of the lake and enhancing the hydrology of the southeastern segment of the lake by lowering the bottom elevations in this area from 216 feet-217 feet to 214.5 feet. This alternative would result in the establishment of a stable water elevation and high quality wetland habitat on both sides of the causeway. The southeastern segment of the lake may contain buried archaeological artifacts, which may make grading in this area undesirable. This alternative would have a maximum lake size and storage volume of 93.3 acres and 115.5 acre-feet respectively.

## Water Budget Analysis

The *Water Budget Analysis* incorporated site specific information regarding water rights, topography, soils, precipitation, inflow, outflow, and evapotranspiration (WRA 2014). In addition, the report

calculated the resulting size and annual frequency of inundation (the percentage of years with adequate inundation) of each of the target wetland habitat types (shallow seasonal wetland, deeper seasonal wetland, emergent marsh, and open water) for each restoration alternative. See Table 5-5 for a comparison of terms used throughout this chapter.

The following table compares the nomenclature used to classify the historic and target wetland habitat types within these documents to the standard *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., December 1979). The nomenclature is ordered from the outer lake fringe to the inner lake bed.

Table 1 Comparison of Wetland Habitat Nomenclature

| Baye Habitat Nomenclature | WRA Habitat Nomenclature | Cowardin Habitat Nomenclature |
|---|---|---|
| Vernal pool | N/A | Palustrine Emergent Persistent Temporarily Flooded (PEM1A) |
| Vernal (Seasonal) marsh wetlands | Shallow Seasonal Wetlands, Deeper Seasonal Wetlands | Palustrine Emergent Persistent Seasonally Flooded, Seasonally Flooded / Saturated (PEM1C, PEM1E) |
| Perennial emergent freshwater marsh | Emergent Marsh | Palustrine Emergent Persistent Semi-permanently Flooded (PEM1F) |
| Submerged aquatic vegetation beds (SAV), Floating aquatic vegetation (FAV) | Open Water | Aquatic Bed Rooted Vascular/Floating Vascular/Palustrine Emergent Persistent Permanently Flooded (AB3,4/PEM1H) |

WATER BUDGET RESULTS FOR ALTERNATIVE 1 – OUTLET ELEVATION AT 215 FEET

The analysis showed that this alternative could support shallow seasonal wetland, deeper seasonal wetland, and emergent marsh habitat types, but would have limited to no open water habitat. Results of this evaluation, based on 50 years of water records, are summarized in Table 5-6 (which includes all three lake restoration alternatives). For daily water surface elevation data, see Appendix F, “Technical Memorandum – Water Budget Analysis, Tolay Lake Restoration Alternatives”; WRA, November 11, 2014. Table 5-6 indicates that:

- Shallow seasonal wetland habitat would be inundated in 42% of the years;
- Deeper seasonal wetland habitat would be inundated all years;
- Emergent marsh habitat would be sufficiently inundated in all years;
- There would be no open water habitat because the lake is too shallow.

The upper margins of the shallow seasonal wetland habitat may be invaded with upland plants in times of prolonged drought but that all three of the target habitats (shallow seasonal wetland, deeper seasonal wetland, and emergent marsh) will be present and relatively well supported by the expected hydrology.

Another consideration when comparing the alternatives is the amount of habitat that can be supported in each scenario. Figure 5-13 illustrates the habitat area that will be present under Alternative 1. This shows that there will be:

- 11.29 acres of shallow seasonal wetland;
- 29.77 acres of deeper seasonal wetland;
- 34.04 acres of emergent marsh;
- There is no open water habitat because the lake is too shallow;
- Total area of viable wetlands is 75.1 acres.

WATER BUDGET RESULTS FOR ALTERNATIVE 2 – OUTLET ELEVATION AT 218 FEET WITHOUT A BACK-BERM

The analysis showed that this alternative would have less stable hydrology with reductions in the annual inundation frequencies in the shallow seasonal wetland, deeper seasonal wetland, and emergent marsh habitat types, which could result in lower quality wetland habitat and a higher percentage of weeds. Table 5-6 indicates that:

Shallow seasonal wetland habitat would be inundated in 27% of the years;

- Deeper seasonal wetland habitat would be inundated in 29% of the years;
- Emergent marsh habitat would be inundated in 83% of the years;
- Open water habitat would be inundated in all years;
- Bare ground will be exposed in 66% of years as Tolay Lake dries down in late summer.

It is possible that the seasonal wetland habitat could shift downward; however, this is unlikely because when the lake fills in 27% of years, the wetland plants would most likely be drowned in the deeper water. This scenario is most likely to result in low quality seasonal wetlands with a high percentage of non-native weeds. Open water would be present and relatively well supported by the expected hydrology; however, more bare ground will be present in most years at the end of the summer.

Figure 5-14 illustrates the habitat area that would be present under Alternative 2. This shows that this scenario has the potential to have:

- 26.7 acres of shallow seasonal wetland habitat (although the hydrology does not support it);
- 32.4 acres of deeper seasonal wetland habitat (although the hydrology does not support it);
- 48.62 acres of emergent marsh;
- 63.81 acres of open water habitat (or bare ground in some summers);
- Total area of viable wetlands is 112.43 acres;

WATER BUDGET RESULTS FOR ALTERNATIVE 5 – OUTLET ELEVATION AT 215 FEET WITH ENHANCED SOUTH BASIN

The analysis showed that this alternative has almost the same water surface elevation as the existing conditions; however, this alternative substantially increases the acreage of the deeper seasonal wetland by approximately 17 acres. In addition, there would be sufficient hydrology to support shallow seasonal wetland, deeper seasonal wetland, and emergent marsh habitats. Table 5-6 indicates that:

- Shallow seasonal wetland habitat would be inundated 42% of the years;
- Deeper seasonal wetland habitat would be inundated all years;
- Emergent marsh habitat would be sufficiently inundated in all years;

- There would be no open water habitat because the lake is too shallow.

The upper margins of the seasonal shallow zone may be invaded with upland plants in times of drought but that all three of the target habitats would be present and relatively well supported by the expected hydrology of Tolay Lake with a static water line at an elevation of 215 feet.

Another consideration when comparing the alternatives is the amount of habitat that can be supported in each scenario. Figure 5-15 illustrates the habitat area that would be present under Alternative 5. Alternative 5, while it has nearly the same hydrology as Alternative 1, supports more area of seasonal wetland habitat. Habitat acreages would be the following:

- 11.86 acres of shallow seasonal wetland;
- 47.4 acres of deeper seasonal wetland;
- 34.03 acres of emergent marsh;
- There is no open water habitat because the lake is too shallow;
- Total area of viable wetlands is 93.29 acres

| Table 2 Results of the Water Budget Evaluation for Three Restoration Alternatives | | | | | |
|---|---|---|---|---|---|
| Restoration Alternative | Storage Volume (acre-feet) | Area (acres) | Percent Year with Inundation (%) | Potential Adverse Impact on Existing Habitat | Potential Insufficient Hydrology on Proposed New Habitat |
| Lake Outlet at Elevation 215' | 97.7 | 71.1 | | | |
| Shallow Seasonal Wetland | | 11.3 | 42% | None | None |
| Deeper Seasonal Wetland | | 29.8 | 100% | None | None |
| Emergent marsh | | 34.0 | 100% | None | None |
| Open Water | | None | N/A | N/A | N/A |
| Lake Outlet at Elevation 218' | 439 | 171.5 | | | |
| Shallow Seasonal Wetland | | 26.7 | 27% | Yes - relocated | Yes |
| Deeper Seasonal Wetland | | 32.40 | 29% | Yes - relocated | Yes |
| Emergent marsh | | 48.62 | 82% | Yes - relocated | Yes |
| Open Water | | 63.81 | 100% | No | No |
| Lake Outlet at Elevation 215' w/ Enhanced South Basin | 115.5 | 93.3 | | | |
| Shallow Seasonal Wetland | | 11.9 | 42% | None | None |
| Deeper Seasonal Wetland | | 47.4 | 100% | None | None |
| Emergent marsh | | 34.0 | 100% | None | None |
| Open Water | | None | N/A | N/A | N/A |


Seasonal Shallow Zone - 214.5 - 215' (11.29 acres)
Seasonal Tall Zone - 213.5 - 214.5' (29.77 acres)
Emergent Zone - 213.5' and below (34.04 acres)

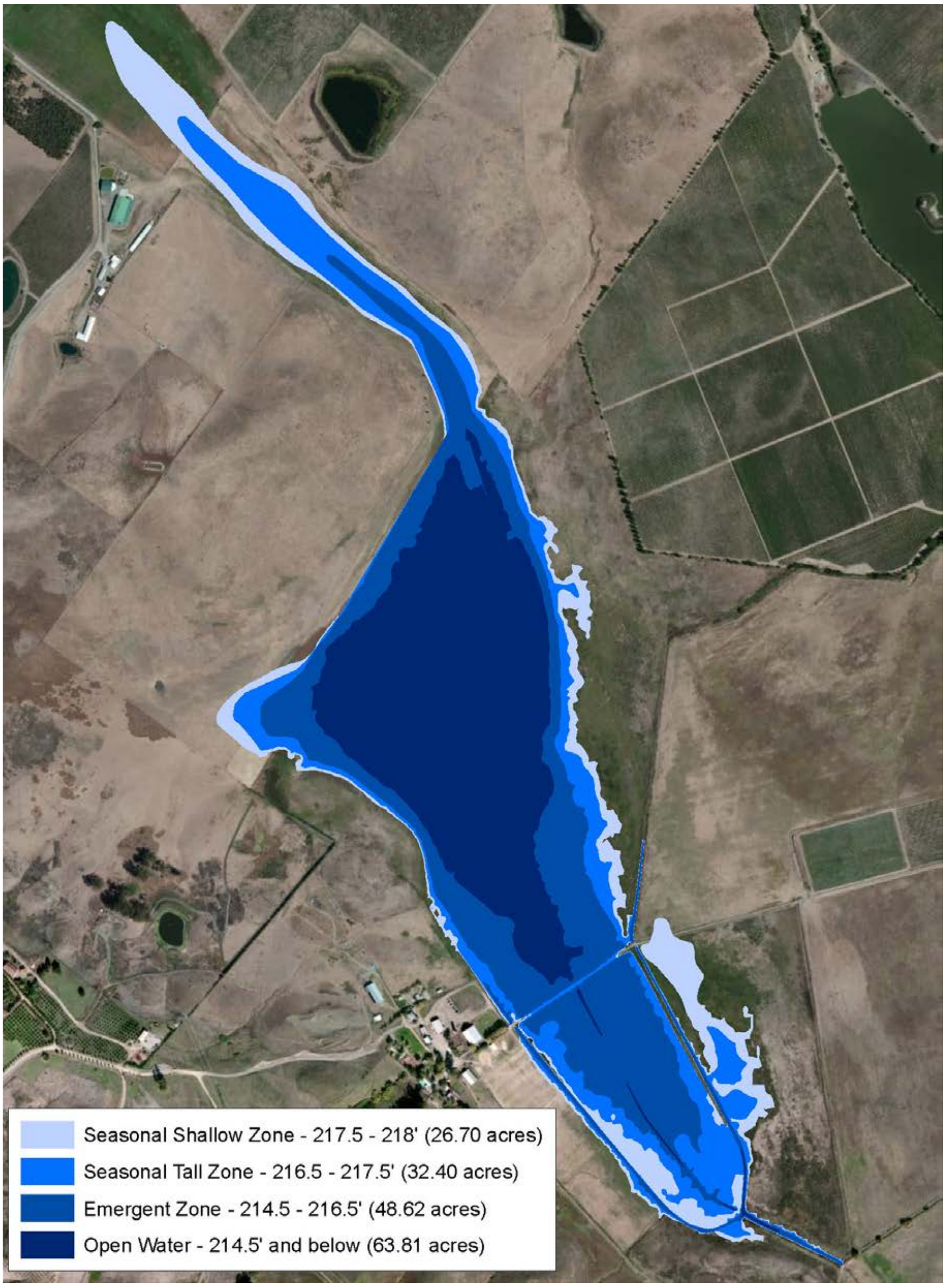




**Figure 5-14**
Target Habitats - Restoration Alternative 2

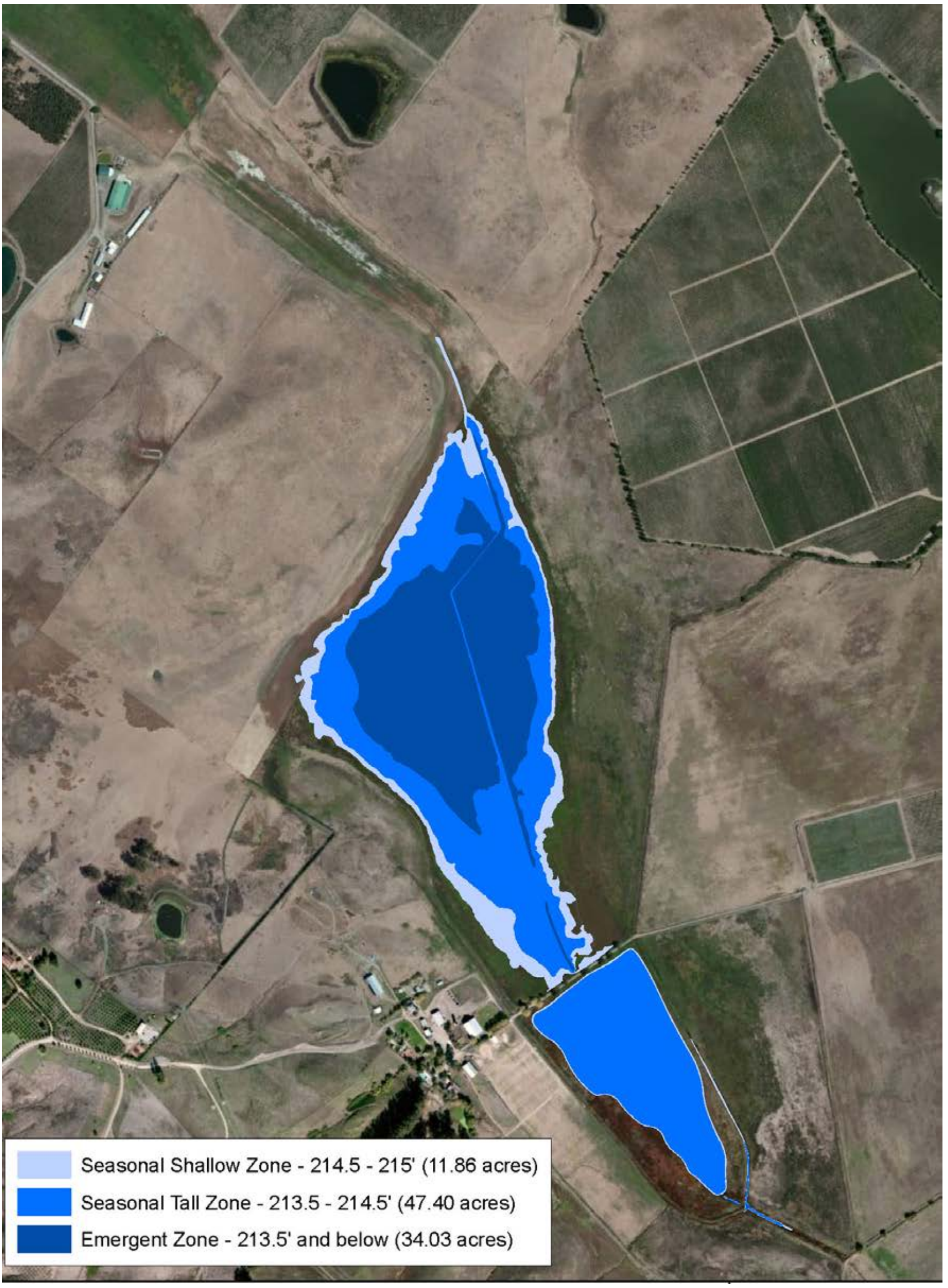




**Figure 5-15**
Target Habitats - Restoration Alternative 5

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# Draft final M E M O R A N D U M

To: John Baas **MIG, Inc.** Berkeley, California 94710 johnb@migcom.com,
Steve Ehret, Sonoma County Regional Parks Steve.Ehret@sonoma-county.org

Date: July 28, 2014

**SUBJECT**: Tolay Lake conceptual ecological model for restoration goals; synthesis of regional reference systems, hydrology, vegetation, ecosystem processes.

John, Steve:

This memorandum responds to your request for a supplementary conceptual ecosystem model for a pre-agricultural (late Holocene, Coast Miwok influenced) Tolay Lake. The scope of the memorandum includes, as discussed in our July 2 phone meeting:

- Ecosystem conceptual model – system potential & restoration goals based on regional analog reference systems
- Habitat relative values – goals
- Biological benefits, impacts, risks, opportunities
- Design alternatives – recommendations for water budget model and analysis

## 1. Wetland and seasonal lake typology: hydrology, vegetation, and terminology

The first step in establishing a valid conceptual ecosystem model for Tolay Lake is to classify it correctly within a spectrum of California wetland and aquatic ecosystem types, and distinguish it from largely artificial permanent lakes and reservoirs (impoundments mostly stocked with fish) in the region. Otherwise, unconscious concepts and goals based on basically dissimilar permanent lake ecosystems may inappropriately influence restoration goal-setting for Tolay Lake.

Tolay Lake is inherently an intermittent perennial to seasonal lake, subject to recurrent, extensive lakebed emergence (drawdown) during prolonged or severe droughts. Droughts in the Bay Area during the late Holocene lasted from decades to centuries, punctuated by extreme floods and relatively benign, moderate climates relative to the historical period (Malamud-Roam et al. 2007). Tolay Lake was very likely a naturally fishless lake because of

hydrologic isolation from fish dispersal corridors and episodic drawdown to emergent marsh during droughts. This condition would promote an amphibian and invertebrate-dominated aquatic trophic structure. The aquatic and wetland habitat/vegetation types within Tolay Lake were likely highly variable over climate cycles, including a gradient with vernal pool and vernal (seasonal) marsh wetlands, perennial emergent freshwater marsh, and submerged aquatic vegetation beds (SAV). It may have also included, at least intermittently, some floating aquatic vegetation (FAV). The nature of these aquatic ecosystems is highly fluctuating, with episodic, recurrent extremes of wetness (deeper lakes with consecutive years of wet, flooded conditions) and dryness (emergent seasonal wetlands prevalent, short-hydroperiod, shallow flooding). Hydrological extremes, and their ecological consequences (strong fluctuations in populations, community composition) are natural, and inherent features of the ecosystem, and not "pathological" or adverse conditions to mitigate with "restoration" designs for artificially enhanced stability.

The lake's shallow margins on Clear Lake clay loam flats probably included extensive vernal pool habitats. Indeed, the intermittent perennial/seasonal lake overall may be viewed in the long term as an extremely large and deep vernal pool (vernal lake) grading into to perennial lake and SAV habitat during its wettest phases -- rather than as a small or impaired permanent lake. Vernal lake habitats (Helm 1998) are similar to vernal pools, but occur in larger (>8 acre) deeper basins flooded by surface inflows in winter-spring, with emergent and dry (desiccated) soils in summer most years. Vernal lakes of the Central Valley supported foraging habitat for large populations of migratory waterfowl (Medeiros 1976). Vernal pools are distinguished by generally impermeable substrates, relatively low nutrient and sediment inflows (due to small watersheds and low gradients), high percentage annual specialist amphibious plant species and invertebrates (Keeley & Zedler 1998). Vernal pool hydrology is distinguished by summer soil desiccation phase, and normally insignificant watershed runoff (primary precipitation-driven hydrology most years. Vernal pools contrast with vernal (to seasonal) marsh, a related (and sometimes intergrading) seasonal wetland type distinguished by later emergence (drawdown) in spring to summer, emergent soils saturated to moist by summer (gradually drying to fall), and larger watersheds with significant runoff inflow. Vernal marsh vegetation consists of high percentage generalist perennial marsh species that undergo summer-dormant dieback.

At the wetter end of the spectrum, freshwater emergent marsh is characterized by permanently flooded to saturated wetlands most years, vegetated by tall emergent grass-like to broadleaf herbaceous plants. Freshwater marsh in California is generally restricted to water depths shallower than approximately 3 ft for most of the growing season. At the wettest end of the spectrum submerged aquatic vegetation (SAV) beds can occupy open water areas of variable depth (depending on water clarity), in the absence of emergent marsh. Similarly floating aquatic vegetation (FAV) can occur in sunlight exposed open freshwater water of nearly any depth, and can colonize relatively ephemeral waterbodies. SAV and FAV habitats may be permanent deepwater features, or intermittent, recolonizing during wet climate cycles after droughts have reduced freshwater marsh, or when freshwater marsh becomes excessively submerged.

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2. **Recent descriptive accounts of fluctuating hydrology of intermittent/seasonal lakes in Sonoma County: physical drivers of aquatic ecosystems**

Rubtzoff (1976) plainly described the seasonal (winter-spring) lake hydrology of two intermittent lakes in Sonoma County in relation to their wetland vegetation in the 1970s, both within historical or active agricultural settins (ranching and farming), like Tolay Lake: "Bennett Mountain Lake" (now Ledson Marsh, Annadel State Park) and Laguna Lake of Chileno Valley (Sonoma-Marin border). These are among the few semi-natural analogs of Tolay Lake, which may be used as partial reference lake ecosystems. Rubtzoff's (1976) accounts of intermittent southern Sonoma County lakes describe extensive wetland lake beds that grade from vernal pool-like summer-desiccated flats, to later-emerging, moister seasonal marsh, and core areas of perennial saturated or flooded freshwater marsh:

> Like Boggs Lake [Lake County], the entire area [of Ledson Marsh] is normally flooded in winter, but in the summer only central parts contain water, being surrounded by extensive marshy ground. Peripheral areas dry up completely, and they are the ones that exhibit a rich vernal pool flora. In some summers the entire lake dries up, but…[1974-1975].it still had much water even in late summer.

Laguna Lake's seasonal hydrology was described by Rubtzoff (1976) when it was still being drained for corn farming, which ceased in 1991 (RWQCB 2001):

> Most of the area is a winter lake over 1 mile long and ½ mile wide. In the course of the summer it dries up, exposing extensive muddy flats, but usually does not dry up completely until late summer, leaving just a strip of moist mud with a stand of tules in the middle. A more permanent lake in the southern part of the area, in Marin County, may be partly artificial. The area is under heavy agricultural use, being plowed regularly as water recedes and the exposed mud dries. Nevertheless, a vernal pool flora has time to develop before plowing….

In addition, Rubtzoff (1976) described a seasonal pond near the mouth of Tolay Creek on Yenni Ranch, on the east side of Highway 121, also supporting a zoned wetland of vernal pool vegetation grading to freshwater perennial marsh (tule, cattail, water-potato/arrowhead species).

Rubtzoff's descriptive accounts of intermittent lakes and seasonal ponds in southern Sonoma County are consistent with Kamman's (2003) characterization of the pre-agricultural hydrology of Tolay Lake. Kamman determined that the original natural sill spillway (natural dam outlet at the downstream end) of the lake, probably a bedrock feature at least in part, was 14 ft above the lowest lakebed elevation (flat fields), indicating the maximum potential depth of lake flooding in wet years prior to dam breaching for agricultural drainage in the late 19th century (Florsheim 2009).

The episodic emergence of the lakebed during droughts, and the natural disconnection of the lake from potential fish dispersal habitat, indicates that the lake was normally fishless, which indicates that the trophic structure of the lake was essentially like a large vernal pool. A large algal and detrital invertebrate grazer community (crustaceans [ostracods, copepods, cladercerans, large branchiopods], and insects, with higher species richness than permanent lakes; Simovich 1998, Helm 1998). The invertebrate-dominated lake, free from perennial poulations of aquatic predators, would likely support abundant amphibians (frogs, salamanders, newts), wading bird predators of amphibians, and waterfowl grazers of seed, submerged aquatic vegetation, and insect larvae. This inference is consistent with local vernal pool fauna observations: in the adjacent Sears Point watershed south of Tolay Creek, reconnaissance-level aquatic dip-net surveys of adjacent Sears Point sag ponds and swale pools in high rainfall winters of 2005-2006 detected rich vernal pool invertebrate communities, including seed shrimp (Ostracoda), copepods (Copepoda), water fleas (Cladocera), predaceous diving beetles (Dyticidae), water boatmen (Corixidae), chironomid larvae (Chironomidae), snails (Lymnaeidae), flat worms (Microturbellaria), and California clam shrimp (*Cyzicus californicus*) (Wetlands and Water Resources *et al.* 2005). Strong grazer-dominant food chains of seasonal fishless ponds and lakes are associated high water clarity and low abundance of algae. The introduction of fish predators of microzooplankton and invertebrate algal grazers in naturally fishless lakes, in contrast, are associated with high turbidity and abundance of microalgae and cyanobacteria (Eilers *et al.* 2007) – a fundamental principle of lake biomanipulation to improve water quality (Mehner *et al.* 2004, Kasprzak *et al.* 2004)

Kamman's (2003) caveats about the inherently variable intermittent to seasonal lake hydrology under all restoration alternatives deserve emphasis in the conceptual ecological model and restoration goals. Familiar perennial artificial lakes (reservoirs like Lake Sonoma or Lake Mendocino) are not valid models for Tolay Lake ecological goals or restoration designs:

> …a lake whose water level and area of inundation will fluctuate dramatically seasonally and between wet and dry year-types. This will lead to unique challenges in the planning and design of revegetation efforts in and around the lake. These results are also important from the context of educating stakeholders and the public of the highly dynamic lake and wetland conditions that will exist under any restoration alternative. It will be important to emphasize that many recreation activities such as boating and swimming may not be possible (or seasonally limited) due to the limited size and depth of the restored lake (Kamman 2003).

**3. Regional Tolay Lake Analogs: Descriptive Accounts of Reference Ecosystems – Intermittent Perennial/Seasonal Lake of Southern Sonoma County**

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The conceptual model for a natural, restored Tolay Lake is rooted in comparative geography of partially analogous seasonal/intermittent lakes in southern Sonoma County, which have climate, soils, and flora, as well as land use history comparable with Tolay Lake. As an array, they bracket the spectrum of potential lake hydrologic features (depth-duration curves, maximum depths, annual variability). They are reviewed here to flesh out the conceptual model, and illustrate some key ecological attributes that may be instructive for restoration goals and designs.

### Chileno Valley Laguna Lake, Sonoma/Marin County

Chileno Valley's Laguna Lake (Marin/Sonoma Counties, south of Petaluma; upper Chileno Creek watershed) is a natural intermittent lake which is now mostly perennial in its lower reaches, following cessation of agricultural drainage for corn farming that was discontinued in 1991 (RWQCB 2001). The lake is privately owned, and largely inaccessible. The deepest, downstream end of the lake (tributary to Chileno Creek) even in the extreme drought of 2014 was predominantly open shallow water and abundant submerged aquatic vegetation (SAV; small pondweed, *Potamogeton pusillus,* dominant), narrowly fringed by freshwater emergent marsh around the ordinary high water shoreline (dominants: bur-reed, *Sparganium eurycarpum*; smartweeds, *Persicaria* spp.; water-parsley, *Oenanthe sarmentosa*; hardstem tule, *Schoenoplectus acutus*). Cattle-grazed hillslope grassland and local, peripheral riparian scrub stands border the lake. The abundant native submerged pondweed vegetation and fringing perennial marsh appear to have developed in the two decades since active drainage and farming of the lakebed ceased just over two decades ago, indicating rapid succession and wetland recovery even in the absence of active restoration.

The water quality of the lower Laguna Lake is noteworthy, given its agricultural history's similarity with Tolay Lake (farmed, drained lake bed, ongoing cattle ranching in uplands). The perennial lower lake has high water clarity and abundant SAV, and absence of abundant algal mats, despite the legacy of fertilizer-intensive (high nitrogen, phosphorus) corn farming, and the continued prevalence of cattle ranching in the entire watershed (manure/urine runoff). This suggests that light and nutrient competition from SAV, denitrification in organic-rich submerged anoxic soils, and aquatic trophic structure (well-developed algal grazer community) has established and maintained relatively high water quality, despite past concerns about potential excessive ammonium (RWQCB 2001).

Wildlife data are not available for the privately owned Laguna Lake, but it evidently supports wetland and waterbird communities (wading birds, dabbling ducks, and swallow foraging above the lake), and frogs (P. Baye, pers. observ. 2014). The lake lies within the Marin core area (Walker Creek hydrologic sub-area) of the California red-legged frog recovery plan (USFWS 2002). Based on roadside shoreline sampling, the extensive small pondweed vegetation of the lower lake appears to be one of the largest, if not largest stand of the species in the Bay region, and covers almost the entire lower lake. Abundant production of small pondweed fruits, and rich aquatic invertebrate communities within submersed pondweed canopies, indicates high potential wildfowl foraging habitat, as well as potential

California red-legged frog breeding and foraging habitat. Relatively deep-water marsh edges with dense smartweed (*Persicaria*) floating mats also indicates extensive potential microhabitats favorable for bullfrogs (Cook and Jennings 2007). No floating aquatic vegetation common to the Point Reyes peninsula (*Hydrocotyle ranuncuoides*, water-pennywort, sometimes superabundant in stock ponds) appears to occur at Laguna Lake (Howell *et al.* 2007, P. Baye pers. observ.). The wetland plant species richness of Laguna Lake and its peripheral Chileno Valley wetlands is high, and includes many regionally uncommon to rare species (Howell *et al.* 2007), including intermediate form of Suisun aster (*Symphyotrichum lentum*), an arrowhead species (*Sagittaria brevirostra*), and burhead (*Echinodorus berteroi*).

Laguna Lake may represent an analog of the wetter end of the spectrum of potential Tolay Creek restoration alternatives, with low frequency of complete lakebed emergence or drying, and high frequency of consecutive years with perennial ponding. It was treated, however, as part of the "vernal pool" spectrum in a statewide classification (Keeler-Wolf et al. 1998:37). The agricultural land use and drainage history appears to be very similar to Tolay Creek, so the two decades of wetland and aquatic community succession following cessation of artificial drainage and farming provide a relevant point of reference for rates of spontaneous lake restoration.

Laguna Lake, Chileno Valley, Marin County (downstream end), July 2014. Small pondweed SAV beds occupy all water surfaces lacking ripples/wind-waves; narrow fringing freshwater marsh is mostly hardstem tule, bur-reed, cattail, water-parsley, and smartweed.

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### Ledson Marsh – Annadel State Park, Sonoma County

In addition to Rubztoff's (1976) descriptive account of Ledson Marsh with emphasis on wetland vegetation, Cook (1997) investigated habitat structure and California red-legged frog habitat of the artificially impounded seasonal marsh and pond (constructed 1930s) in interior southern Sonoma County. The 27 acre marsh/seasonal pond had a maximum water depth of approximately 1.5 m (approximately 5 ft) in the late 1990s (El Niño phase), a depth within the range of some restoration alternatives for Tolay Lake. Dominant freshwater marsh vegetation includes tule, cattail, and spikerush (*Eleocharis macrostachya*), with water-plantain (*Alisma triviale*), smartweed (*Persicaria* spp.), and Lobb's aquatic buttercup (Cook 1997). Extensive standing litter of spikerush and cattail vegetation (dead, matted shoots), were preferred sites of egg mass deposition by California red-legged frogs. The seasonal hydrology of Ledson Marsh – characterized by late summer drawdown, and only small residual areas of persistent shallow flooding or none – favored California red-legged frog reproduction over invasive non-native predator bullfrogs. This was due to the completion of larval-adult metamorphosis in one season by California red-legged frogs, and the requirement for two consecutive years of flooding for maturation of most bullfrogs larvae to adults (Cook 1997). Recurrent drawdown of the seasonal pond/lake impoundment was an important limiting factor in the size of the bullfrog population and its competitive and predator-prey interactions.

### Tolay Creek Delta margin: seasonal ponds of subsided diked nontidal baylands

The aggraded, avulsed delta of Tolay Creek has discharged into diked baylands at the historic transition zone of terrestrial delta lowlands since the El Niño (ENSO; El Niño Southern Oscillation Cycle) event of the late 1990s (P. Baye, pers. observ., unpubl. data). This has resulted in episodic deep (2-3 ft) flooding of freshwater in winter and spring, with variable drawdown to emergent mud from spring to late summer, along elevation gradients from uplands to railroad embankment/dikes. The wetlands of this complex span Clear Lake clay loam (soil series at Tolay Lake) and similar but more brackish drained Reyes series (historical tidal marsh). The wetland vegetation gradient of this Tolay Delta wetland includes alkali grassland and vernal pool flats (on hard-packed Clear Lake clay, upper elevation range with shallow flooding), wet meadow (creeping wildrye, rushes, and basket sedge on silty-clay floodplain deposits, shallow-flooded in winter), and intermittent oligohaline marsh (spikerush-lanceleaf water plantain-hardstem tule, in wet El Nino years; subject to dieback in droughts), as well as diked brackish pickleweed marsh. Rubtzoff (1976) description of seasonal pond near the mouth of Tolay Creek on Yenni Ranch (east side of Highway 121) probably corresponds with this location, or a similar past equivalent. The wetland is owned by California Department of Fish and Wildlife, and developed without active management or restoration, due to channel avulsion and sedimentation in the delta during high discharge ENSO events of 1997-98 and again in 2005-2006. This seasonal pond vegetation represents

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the wetland seed and propagule rain of the Tolay Creek watershed over a period of decades when seasonal ponding of Clear Lake clay (and similar clays) occurred to a depth of up to several feet. This wetland provides a partial and proximate analog of the shallower spring-summer emergent zones of Tolay Lake's bed. The rapid invasion of the marsh by non-native lanceleaf water-plantain (*Alisma lanceolatum*) during wet ENSO phases is noteworthy.

May 2013 – Infineon overflow parking flats, N of CDFW Tolay entry road, within the Tolay Ck Delta wetland complex. About 2 acres of *Downingia pulchella*, native vernal pool wetland wildflower with amphibious life-cycle. Co-occurs with subdominant native vernal pool associate, *Lasthenia glaberrima*. Flooded about 1 ft deep in winter from rainfall and creek overbank flows.

May 2013. *Lasthenia glaberrima*, a "wetter" species of goldfields, is abundant in seasonally flooded flats and gaps in seasonal marsh of the Tolay Creek delta. Infineon overflow parking flats, N of CDFW Tolay entry road.

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May 2013. Infineon overflow parking flats, N of CDFW Tolay entry road, within Tolay delta wetland complex. Spikerush (*Eleocharis macrostachya*) seasonal marsh spreads into algal-matted clay flats during drawdown of seasonal shallow pond, analogous with seasonal lakebed.

May 2013. Young, vigorous spikerush marsh dominates margins of seasonal shallow pond with algal mat bed exposed during drawdown in drought year. Note patchy *Downingia* at edges. Infineon overflow parking flats, west end N of CDFW Tolay entry road, within Tolay delta wetland complex.

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May 2013. CDFW Tolay seasonal marsh within delta lobes; east. Mature spikerush meadow transition to wet meadow dominated by native rushes (*Juncus balticus)* and grasses (*Elymus triticoides*) within delta floodplain.

May 2013. CDFW Tolay seasonal marsh within delta lobes; east. Wet meadow composed of native perennial grasses (*Elymus triticoides*, *E.× multiflorus*), rushes, and sedges now dominate many silty clay flats along the delta and its margins. They are taller than nonnative invasive ryegrasses (*Festuca perennis*) and are able to outcompete them here. Willows in background mark channel distributaries.

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May 2013 – CDFW Tolay/Infineon parking flats. Inconspicuous rare native peppercress, *Lepidium oxycarpum*, in alkali clay flats on Clear Lake clay loam on seasonally desiccated delta margins. Overlooked among the "weeds".

May 2013 – CDFW Tolay seasonal marsh, south. Lemmon's canary-grass (*Phalaris lemmonii*), a regionally rare annual native grass of seasonal wetland meadows, occurs in the Tolay Delta wet meadows; it formerly grew in Sears Point baylands that are being restored to tidal marsh.

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April 2005 – CDFW Tolay seasonal marsh, south end of Tolay Delta wetland complex. Wet year forms shallow seasonal lake over spikerush meadow. Note tules in depressions, background. Waterfowl use of the flooded meadow is significant due to invertebrate and seed foraging resources.

Late March, 2006 – Flooded CDFW Tolay seasonal shallow lake flats (later *Downingia* wildflower fields) from avulsed delta flooding.

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April 2005. Flooded CDFW Tolay seasonal marsh, local dominance by non-native invasive *Alisma lanceolatum.*

**Reference systems considered but rejected**

Cunningham Marsh and Pitkin Marsh in southwestern Sonoma County, and portions of the Laguna de Santa Rosa are remotely analogous with Tolay Lake, but have significant ecological differences that make them invalid as ecological models. The Laguna is connected to tributaries of the Russian River, and supports a fish community; it is also strongly perennial and supports riparian woodland and agriculture in a mixed urban/agricultural setting. Cunningham and Pitkin Marshes occur on sandy to sandy clay acidic soils (raised marine terraces with Goldridge and Blucher soils, in a matrix of woodland, forest, and riparian woodland vegetation). They have a distinct postglacial relic wetland flora that is not comparable with southeastern Sonoma County wetland flora. Permanent artificial lakes (reservoirs) stocked with predatory fish, including Lake Sonoma, Lake Mendocino, and the Mt. Tamalpais watershed impoundments, are negative, contrasting examples of lake ecosystems that fundamentally differ from the naturally intermittent to seasonal Tolay Lake ecosystem. Lakes and lagoons managed for artificially stable near-static water levels (whether low or high), such as Mountain Lake, Lake Merced, and Laguna Salada (San Francisco Peninsula) are also negative, examples of lake ecosystems contrasting with inherently dynamic seasonal lakes. The recreational and ecological attributes of these rejected, incompatible reference systems should not be reflected in Tolay Lake ecosystem restoration goals, and clarify by contrast the different ecosystem ecosystem type. This is significant because initial restoration goals for Tolay Lake emphasized larger lake area and volume and more "predictable consistent" hydrological conditions as goals. These "wetter/bigger as

better" goals are may be appropriate for some permanent lakes with naturally low variability, but not for ENSO-sensitive seasonal to intermittent fishless lakes.

## 4. Narrative Conceptual Ecosystem Model of "natural" Late Holocene Tolay Lake.

The following section is an abbreviated, summary ecological conceptual model of a pre-agricultural ("natural" in the popular sense; influenced by Coast Miwok or paleoindian burning and hunting)

### Hydrology and Water Quality

- **Alternating, unsteady state lake ecosystem driven by climate cycles and extremes**. Alternating hydrologic states, driven by long-term and short-term climate cycles (rainfall extremes; droughts, mega-floods; Malamud-Roam & *al.* 2007) would shift Tolay Lake between wet phases The lake would lack an "equilibrium", average, or steady-state ecosystem, and its dynamics between unsteady extremes would maintain a normal dynamic, disequilibrium condition of vegetation composition and structure.

- **Wetland/aquatic soil biogeochemical processes.** During wet phases, denitrification (net loss accumulated biologically available nitrogen) and carbon sequestration would be significant in anaerobic SAV bed and freshwater marsh soils. During droughts (increased frequency/duration wetland soil drainage), soil N would be nitrified and released from soil as available, elevated nutrients, and soil carbon would be released by decomposition)

- **Permanent fishless trophic structure: dominance by invertebrates and amphibians; wading birds top predators**. The naturally fishless intermittent lake would be dominated by invertebrates (crustaceans, insects) and microzooplankton grazers of algae. Suppression of algae would maintain high water clarity and water quality, and promote primary productivity through vascular plants (SAV and marsh vegetation). Absence of fish predators would promote high abundance of amphibians that can complete life-cycles in one season.

### Vegetation

- **Dynamic aquatic and wetland/aquatic vegetation types, proportions, and internal distribution**. Proportions of vernal pool, seasonal marsh, freshwater marsh, and SAV beds would fluctuate with climate cycles. SAV beds and freshwater marsh would expand rapidly during wet cycles, when perennial shallow water or soil saturation occurs for multiple consecutive years. During extreme or prolonged dry phases, freshwater marsh and SAV would die back and become displaced by seasonal marsh tolerant of summer dry/marginally moist soil, or would become reduced to

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marginal or core areas (deepest depressions or local seeps, springs) where freshwater marsh may persist during extreme droughts. SAV and freshwater marsh may potentially collapse in extreme droughts, and re-establish rapidly from seed banks or seed rain. The overall plant community diversity of Tolay Lake would depend on high-amplitude fluctuation of dominant vegetation; alternating hydrology states (predominantly perennial-saturated/flooded; predominantly seasonal, summer-dry or desiccated) driven by episodic or cyclic climate extremes would prevent any one wetland plant community from becoming dominated by species most competitive in any one hydrologic regime. Vernal pool flora in particular would depend on shallow marginal lake flats undergoing frequent desiccation in summer. The SAV vegetation would depend on deep water re-occupying lakebed areas affected by drought-dieback zones of tall emergent freshwater marsh.

- **Herbaceous vegetation dominant**. Woody riparian vegetation at lake margins would likely have been limited by frequent (annual) burning during Coast Miwok occupation, as a result of annual post-harvest (pinole) grassland management and hunting drives using fire. Frequent or recurrent burning would likely select for grass-like or forb (herbaceous) vegetation, and limit riparian scrub to small groves, and limit oak woodland to isolated mature trees. Sedge beds would likely occur in seeps of lower hillslopes bordering the lake and along some lake margins.

**Wildlife**

- **Dynamic waterfowl and wading bird habitat**. During wet phases, SAV habitat would become available for both diving ducks and dabbling ducks in deeper water areas, when SAV canopies reach the water surface and provide foraging habitat (seed, herbage, invertebrates) at all depths; dabbler habitat would not be limited by water depth when SAV canopies are extensive. In dry phases (seasonal marsh), dabblers would be excluded in freshwater tall emergent marsh, and forage primarily in more extensive short wetland vegetation during submergence in winter-spring (seasonal marsh or vernal pool flats). Principal food items for dabbling ducks would shift with climate phases: chironomid midge larvae and seed and broadleaf forbs and spikerush from seasonal marsh [dry climate phase]; pondweed turion, tuber, and seed and smartweed seed [SAV and freshwater marsh, wet climate phase]). Tricolor blackbirds may nest in tall emergent freshwater marsh, or (limited) riparian scrub such as California rose stands. Dabbling ducks may nest in sedge beds and tall continuous canopies of wet meadow fringing the lake; breeding success may be limited by available brood water in summer during dry (extreme drought) phases. Wading birds would forage at shallow submerged margins of freshwater marsh or submerged seasonal marsh, preying on high amphibian populations.

- **Dynamic herpetofauna habitat**. The naturally fishless aquatic ecosystem would support large populations of amphibians with larval stages lasting only one water-

year: Pacific chorus (tree) frog and California red-legged frog, California tiger salamander, and other salamander and newt species. Breeding habitat quality and extent would vary with the extent of shallow-submerged marsh. During wet phases with deep perennial water, western pond turtles would likely recolonize the intermittently perennial lake from channel pools in Tolay Creek.

## 5. Key predictions for Tolay restoration benefits and risks

Restoration of Tolay Lake in the modern setting (anthropogenically altered climate, biological communities, and land uses) cannot fully reassemble the pre-agricultural ecosystem structure, composition and dynamics of Tolay Lake. Restoration actions intended to have beneficial effects with respect to restoration goals may have intended consequences, some of which are foreseeable. A short list of caveats, based on predictions about alternative water management and restoration outcomes, is provided below to distinguish between two major approaches of lake restoration: maximizing the lake depth, hydroperiod to different levels while minimizing or buffering its variability ("predictable, consistent" conditions; WRA 2013); and maximizing the amplitude of natural hydrologic variability driven by climate cycles (alternating extremes of intermittent perennial lake and seasonally flooded emergent/dry lake over consecutive years).

The gist of this assessment is that attempts to manage the system to a set point or "benign" environmental conditions that avoid extremes is likely to cause long-term decline in ecosystem diversity and functions, and make the ecosystem more vulnerable to biological invasions (fish, bullfrogs) that would likely have cascading effects on biological diversity, water quality, trophic structure, vegetation and wildlife habitat quality, and management burdens.

### 5.1. Long-term marsh succession under relatively stable "predictable, consistent") managed annual flooding regimes.

Shallow (18-24") maximum winter-spring flooding

Lakebed areas subjected to relatively stable ("predictable, consistent") annual winter-spring shallow flooding to a depth of approximately 18" to 24" or more, followed by *prolonged slow emergence (drawdown) to saturated or moist soil during the summer in most years,* will likely result in *extensive dominance by relatively few competitive tall emergent freshwater marsh species such as tules, cattails, or bulrushes*, and *progressive reduction of open water areas* (submerged short wetland vegetation) over a period of 1-2 decades. Natural succession and dominance by tall emergent freshwater marsh would require artificial maintenance of shallow open water surface areas (vegetation removal) during winter-spring peak flood phases.

Lakebed areas subjected to relatively stable ("predictable, consistent") annual winter-spring shallow flooding to a depth of approximately 18" to 24", followed by with *rapid emergence (drawdown) by mid-spring and moist to dry soil conditions in midsummer* most years, will likely result in

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*extensive dominance by spikerush marsh or alkali-bulrush marsh*, with some marginal seasonal wetland areas dominated by rushes (Baltic rush, soft rush), sedges (basket sedge) or perennial creeping grasses (creeping wildrye). Spikerush marsh shoot canopies are relatively short and prone to matting, and are compatible with shallow open water surface areas during winter-spring flood phases. Alkali-bulrush marsh, in contrast, maintains persistent, tall canopies that may exclude shallow open water areas. The succession of alkali-bulrush marsh and spikerush marsh is influenced by many ecological factors other than average seasonal depth-duration flood curves and the timing of summer soil drying, and cannot be predicted by hydrology alone.

Deeper (24"-48") maximum winter-spring flooding

Lakebed areas subjected to relatively stable ("predictable, consistent") flood depths exceeding 2 ft, and less than approximately 3- 4 feet during most of the spring-summer growing season drawdown most years will likely become *progressively dominated by monotypic stands of tule or cattail*, and will permanently lose shallow open water or submersed aquatic vegetation (pondweed) habitat. (Some cattail-like species, such as bur-reed [*Sparganium eurycarpum*] may colonize the tule-cattail marsh zone, but have the same effect of displacing open water or aquatic plant habitat]. Cattail-tule marsh will persist (with declining density and height) during multi-year severe droughts if soil remains saturated to moist (not desiccated) through late summer.

Deepest (>48") maximum winter-spring flooding

Lakebed areas subjected to relatively stable ("predictable, consistent") flood depths exceeding 3-4 feet during most of the spring-summer growing season drawdown most years will likely become *progressively dominated by either mixed or monotypic stands of submerged aquatic vegetation (SAV; pondweeds and related aquatic plants) or open water surface area.* SAV will persist through multi-year severe droughts if soil is saturated to moist through late summer, and may even regenerate from seed or turions if desiccation occurs in late summer/fall, provided that emergent marsh vegetation does not displace it.

**5.2. Long-term marsh succession under highly fluctuating (unpredictable, high magnitude variability) unmanaged annual flooding regimes: ENSO-driven hydrology and ecology.** Freshwater marsh succession (cattail/tule marsh spread) would naturally be limited by both extreme deepwater conditions in wettest ENSO phases (dieback or density decline during submergence deeper than 4 ft for most of the growing season), and summer soil drying in long-term droughts. Encroachment of vernal pool flats by rush or spikerush during wet ENSO phases would also be limited by dieback during long-term droughts. Similarly, overabundance of native floating aquatic mat vegetation (water pennywort, *Hydrocotyle ranunculoides*) is limited by natural drought and marsh desiccation of the lakebed. High-amplitude hydrological variability of the lake ecosystem would maintain higher long-term plant community diversity compared with relatively stable or presumed "benign" moderate sustained near-average hydrological conditions.

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**5.3. Long-term prevalence of perennial open water and invasion risks.** Artificial perennial ponds and lakes with frequent public visitation are subject to unauthorized introduction of fish, including deliberate stocking attempts and disposal of hobby aquarist pets. For example, the recent restoration of Mountain Lake (San Francisco), a naturally nearly fishless lake (but for threespine stickleback), involved removal of decades of accumulated large carp, goldfish, exotic pet fish, and even a 5 ft long sturgeon (Jonathan Young, Presidio Trust, pers. comm. 2014). Converting a naturally intermittent/seasonal lake to a managed, artificially stabilized perennial system facilitates invasion by introduced fish, and colonization and local population growth of bullfrogs dispersing from artificial stock ponds. Both bullfrogs and non-native fish population viability at Tolay Lake would naturally be limited by episodic drawdown and pool emergence during droughts. Introduced fish populations may increase the risk of converting a perennial lake to a eutrophic or hypereutrophic aquatic system with low water quality and nuisance (or toxic) algal/cyanobacterial blooms.

5.4. **Excavation and substrate type at the lake bed; paleoecological data loss; wetland steepened gradient**. Excavation as an alternative approach to achieving deeper water areas would differ from restoration of higher water surface stands:

- Exposure of mineral clay subsoils with low organic content at the lakebed surface would likely alter biogeochemical processes fueled by accumulated soil carbon, until organic detritus accumulates to sufficient amounts through the root zone of new freshwater marsh or SAV. The primary productivity and above-ground biomass of freshwater marsh may be significantly reduced in relatively infertile (low-carbon) excavated clay basins. The natural lakebed of Tolay Lake is composed of the A horizon of Clear Lake clay loam enriched by millennia of stored soil carbon, not B or C horizons with negligible carbon content. The slowest, lagging wetland restoration variable in the oldest known wetland restoration projects (1940s-1960s tidal marsh restoration) has been the recovery of soil carbon. Excavation should not be presumed to be ecologically equivalent to restoration of (intermittent) maximum water depths.
- The deep clay sediments at the downstream end of Tolay Lake probably contain data-rich and regionally unique paleoecological data (pollen, charcoal, phytoliths, isotopic signatures, etc.) that have not been sampled. The number of inland basins preserving long records of Holocene sediments and pollen are few in this region. Tolay Lake may provide a unique and important data set for reconstruction of Holocene vegetation, climate, and human occupation history to compare with estuarine and (rare) inland pond or lake sediment cores. "Restoration" surrogate methods reliant on lakebed excavation prior to sediment core sampling may forfeit a unique and scientifically important sediment core data source.
- The excavation of a deeper pool to "restore" lake depth range without allowing higher water levels would decouple the hydrologic fluctuations of the intact lakebed and the excavated pool. The remaining unexcavated lakebed wetland flats would be

subject to less dynamic hydrology (depth range and decadal variability) than the excavated pool.

## 6. General recommendations for restoration goals, alternatives, and design elements

### Goals

- Restoration goals should be based on ecosystem dynamics and structure of an intermittent perennial/seasonal fishless lake, not a perennial lake, managed perennial pond, or recreational lake/impoundment. The intermittent lake ecosystem is more like a vernal pool-freshwater marsh gradient than a perennial deepwater lake ecosystem.
- Appropriate species-specific goals, consistent with the conceptual ecological model of the intermittent lake wetland complex and its dynamics under restored, managed conditions, could include:
    - Special-status wildlife
        - California red-legged frog (passive predictable colonization from watershed)
        - Western pond turtle (passive predictable intermittent colonization from Tolay Creek; or assisted colonization)
        - California tiger salamander (assisted colonization)
        - Tricolored blackbirds (passive unpredictable colonization)
        - Burrowing owl (passive unpredictable colonization)
    - Special-status plants
        - Baker's blennosperma (*Blennosperma bakeri*; assisted colonization; highly feasible)
        - Burke's goldfields or Contra Costa goldfields (*Lasthenia burkei, L. conjugens*, but not both; assisted colonization highly feasible)
        - Lobb's aquatic buttercup (*Ranunculus lobbii*; assisted colonization if not already present; highly feasible)
        - Sebastopol meadowfoam (*Limnanthes vinculans*; assisted colonization; highly feasible, occurs near Tolay Delta)
        - Saline clover (*Trifolium hydrophilum*; assisted colonization if not already present; highly feasible; occurs in Sears Point and baylands near Tolay Delta)
        - Suisun-Common Aster intermediates (*Symphyotrichum lentum, S. chilense*; assisted colonization highly feasible)
    - Regionally uncommon/limited distribution native wetland plants
        - *Echinodorus berteroi*
        - *Sagittaria* spp (native Marin-Sonoma)
        - *Potamogeton pusillus, P. foliosus, P. nodosus*
        - *Sparganium eurycarpum*

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**Alternatives and restoration/management design elements**

- Alternatives should emphasize restoration of hydrological variability and amplitude (dynamics at seasonal/annual and decadal time-scales), including long-term (decadal) extremes. Alternatives should not simply focus on "static" high water levels or achievement of maximum depth and duration of flooding – goals suited to perennial managed lakes. Alternatives should include all feasible options to allow maximum flooding (greatest water depths, annual hydroperiods, and episodes of consecutive years of perennial water) and extreme dry phases (drawdown, drainage, desiccation) to develop with ENSO climate cycles over the entire lakebed (wetland gradient), to the greatest extent feasible.
- Alternatives that allow greater intermittent (not perennial) maximum water surface elevations (extreme high lake level stands), but also allow for extreme, unmitigated drought-induced ecological extremes, are likely to provide the greatest degree of biological benefits in terms of biological diversity and productivity, and emulation of pre-agricultural Tolay Lake. Public education is likely to be needed to promote popular understanding and support of a highly fluctuating intermittent lake (Kamman 2003).
- Excavation should be considered a last resort as a surrogate for allowing higher maximum water levels to develop over the entire lakebed.
- Ditches should be disconnected and decommissioned (blocked; ceased to function as drainage channels), but the pools provided by disconnected, blocked ditches should be included in some alternatives, to provide small, widely distributed late-season pool or hydration habitats during drought years.
- Recolonization of Tolay Lake by California tiger salamanders, through active reintroduction/translocation, should be considered in some or all alternatives. Colonization of restored Tolay Lake by Tricolored blackbirds should be considered in some restoration alternatives.
- Restoration actions should include low-cost founder population plantings of target plant species, rather than extensive disturbance and planting, in at least some alternatives. This is indicated by the spontaneous "restoration" of Laguna Lake (Chileno Valley) over two decades. Restoration of rhizomatous species that were likely reduced or eliminated by wet-season cattle grazing and trampling, including sedge beds, should be included in some or all alternatives.
- Vegetation management actions supporting restoration may include above-ground biomass and nutrient reduction through haying (mowing + thatch, hay removal), controlled firebreak-contained burns, and dry-season grazing. Pre-restoration timed (pre-fruiting) mowing of potential nuisance species, such as cocklebur (*Xanthium strumarium*), pennyroyal (*Mentha pulegium*), or non-native Ludwigia spp. (if present) should be incorporated in all alternatives that increase water depth or hydroperiods.
- Alternative grazing plans should consider sheep grazing (avoidance of wet clay soil trampling impacts to moist wetland soils) over cattle grazing (concentration of grazing and trampling in wet clay soil). Restoration of rhizomatous sedge, rush, and

spikerush vegetation is likely to be impaired or precluded by moist-soil cattle grazing, due to rhizome and soil shearing caused by cattle trampling of wet clay soil.

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appendix i

# Biological Resources Report

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# Biological Resources Report

## Tolay Lake Regional Park
## Sonoma County, California

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# 1.0 INTRODUCTION

Located in the southern extent of the Sonoma Mountains, the Tolay Valley plays host to a diverse ecosystem and offers a unique opportunity to protect and enhance a substantial portion of the Tolay Creek watershed (Figure 1). The rich soils and diverse biologic resources of the Tolay Valley have been utilized for an array of needs from the ceremonial and resource-gathering of Native Americans to the modern farming and ranching of the Cardoza and other ranching families, and most recently for recreation and reflection of Sonoma County residents and other visitors to Tolay Lake Regional Park (Park). This document summarizes the existing biologic conditions of the Park and the Sonoma Land Trust (SLT) property with special emphasis on the sensitive and special-status resources.

## 1.1 Overview and Purpose

This Biological Resources Report (BRR) presents existing biological conditions of the Tolay Regional Park, which includes the Sonoma Land Trust property, to the south of the current Park boundaries, within a historical and regional context. This report is intended to be an ecological baseline and provide guidance for the Resource Management and Master plans. Several biologic, conservation, and restoration studies have been conducted in the Tolay Valley (LSA 2009a, LSA 2009b, LSA 2009c, Ducks Unlimited 2005, Kamman 2003, Parsons 1996). These studies form the basis of this document, with the LSA 2006-2008 studies providing the bulk of the data. The Park's existing wetlands, non-wetland waters, vegetation communities, special-status and common plant species, wildlife habitat and observed wildlife have been documented, characterized, and mapped to understand and ensure the protection of these resources during the park planning and management process for the enjoyment of future generations.

This report presents the findings and recommendations of site visits conducted by LSA between 2006 and 2008 and attendant reports, as well as site visits conducted in 2013 by WRA. To present the most recent scientific literature on California ecology, WRA has updated plant species nomenclature following the *Jepson Manual, 2nd Edition* (Baldwin et al. 2012), updated wetland indicator status for the Arid West (Lichvar 2012), and revised the vegetation community descriptions ascribed to *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009). LSA conducted separate studies of the northern and southern portions of the Tolay Lake / Tolay Creek, reporting in two documents (LSA 2009b, LSA 2009c), which have been synthesized into one cohesive document here.

## 1.2 Property Description

The Park is composed of several parcels under separate ownership, with the northern portion (Tolay Lake Regional Park) under the ownership of the Sonoma County Regional Parks (SCRP), and the southern portion (Tolay Creek Ranch) under the ownership of Sonoma Land Trust (SLT). Additionally, SLT holds an easement on undeveloped portion of the adjacent Roche Ranch Winery property to enhance the banks and riparian area of lower Tolay Creek, adjacent to the southeastern portion of the Park. Primary and public access to the Park is from Cannon Lane off Lakeville Highway in the northwest, with secondary and private access from Highway 121 in the south. The current Park headquarters is located at the former Cardoza residence in the northern portion of the Park.

### *1.2.1 Existing Conditions and Historic Land Use*

Prior to European settlement of Sonoma County, the Tolay Valley was utilized by several groups of Native Americans for settlement, resource-gathering, and ceremonial events. Following European settlement, the valley has been utilized for ranching, farming, and rural residences. The valley was part of the General Mariano Guadalupe Vallejo's Mexican land-grant, located between his Petaluma Adobe in today's City of Petaluma, and the Mission San Francisco de Solano and his private residence in today's City of Sonoma. During this period, the valley was likely grazed by cattle under the auspice of the land-grant. Since the Vallejo era, portions of the valley have been under various ownership, most recently the Cardoza family (LSA 2008). A variety of agricultural activities including grazing, potato farming, hay farming, and pumpkin farming have been conducted in the modern era (Thompson 1877, LSA 2008).

The dominant natural feature within Tolay Valley is Tolay Lake, a naturally occurring seasonal waterbody, which when unaltered, flooded up in the wet season, followed by a draw down in spring and early summer. Presumably, the lake ponded water due to being situated on heavy clay soils (Clear Lake clay soil series) with very slow permeability combined with a natural earthen dam that prevented rapid outflow. It is likely that the lake experienced pronounced interannual variation in the hydroperiod, with dryer years exposing the lakebed from complete draw down, while wetter years witnessed inundated conditions through the summer.

In an attempt to increase arable land, Tolay Lake was drained by removal of the natural earthen dam and drainage ditches dug to reroute surface flows. Stock ponds have been constructed to capture water for summer irrigation and flood control within the Tolay Valley inadvertently creating wildlife habitat. The current Park headquarters is a collection of former Cardoza family residences and farm buildings located in the northern portion of the Park. Several ranch roads traverse the Park, with Cannon Lane-Mangel Ranch Road running from Lakeville Highway to Highway 121 alongside the majority of Tolay Creek. Overhead powerlines and an associated access road run the length of the northern section of West Ridge. Currently, portions of the Park are utilized for cattle grazing with row crop agriculture centered near the Park headquarters.

### *1.2.2 Surrounding Land Uses*

The Park is in the southern extent of the Sonoma Mountains, between Petaluma Valley/Marsh and Sonoma Valley. Stage Gulch Road/Highway 116 is located to the north, Lakeville Highway to the west, Arnold Drive/Highway 121 to the east, and Highway 37 to the south. The cities of Petaluma, Sonoma, and Novato are approximately five miles northwest, northeast, and southwest, respectively, of the Park.

The Park is adjacent to vineyards to the north, northwest, and east. The property is bordered on the south by Sonoma Raceway (formerly Sears Point Raceway and Infineon Raceway), a developed professional / amateur auto racetrack. The remainder of the property is immediately surrounded by contiguous habitats, primarily open grasslands in grazing production and rural residential.

Several thousand acres of conserved lands, through ownership or easement, are adjacent to or within the immediate vicinity of the Park. The U.S. Fish and Wildlife Service (USFWS) manages

the San Pablo Bay National Wildlife Refuge which includes tidal portions of lower Tolay Creek, and the California Department of Fish and Wildlife (CDFW) manages wildlife refuges along the Petaluma River and Marsh. The Sonoma County Agricultural Preservation and Open Space District (SCAPOSD) holds ownership and/or easements over Flocchini Ranch, Sleepy Hollow Dairy, and Cougar Mountain, while SLT manages several contiguous parcels on either side of Highway 37in the Sears Point vicinity (Figure 2).

### *1.2.3 Climate and Watershed*

The Park is within a mildly seasonal Mediterranean climate, with warm-hot dry summers and cool wet winters. The average annual maximum temperatures for Petaluma[1] and Sonoma[2] are 70.4 degrees and 73.7 degrees Fahrenheit, respectively while the average annual minimum temperature is 44.9 degrees Fahrenheit. For both Petaluma and Sonoma, the warmest months are June through September, while the coolest months are December through February (WRCC 2013).

Predominantly, precipitation falls as rainfall with an annual average of 24.93 inches. Precipitation bearing weather systems are predominantly from the west and south with the majority of rain falls between November and March, with a combined average of 20.94 inches (WRCC 2013). Fog is common in the Park, with late spring and summer westerly / southerly advection fog arising from the Pacific Ocean flowing over the Marin Hills and north across San Pablo Bay in early evening and typically receding by midday. Low-lying fall and winter convection fog is common, particularly with presence of Tolay Lake. Very rarely winter precipitation falls as snow, but typically is less than one inch and does not regularly remain for a period greater than 24 hours.

The Park resides almost entirely within the Tolay Creek watershed, with the exception of the western boundary including the headwaters of several unnamed drainages in the Petaluma River watershed. The headwaters of Tolay Creek emerge north of the Park boundary, very near Highway 116 (Stage Gulch Road). Several small tributaries and one sizable tributary emerge off-site and enter lower Tolay Creek from the adjacent Roche property in the southeast. Tolay Creek enters the Sonoma Marsh complex immediately off-site to the southeast, meandering south and entering San Pablo Bay approximately six river miles from the Park boundary.

### *1.2.4 Geology and Soils*

The geology within the vicinity of the Park consists of several geologic formations, faults, landslides, and contact zones (CDC 2002a, CDC 2002a). Several faults are present throughout the Park, with the Lakeville, Roche-Cardoza, and Rogers Creek faults being the most prominent. The Lakeville and Rogers Creek faults run the length of the West Ridge and East Ridge, respectively, each periodically entering the Park. The Roche-Cardoza fault breaks from the Rogers Creek Fault, entering the southern portion of the Park (Koenig 1963, CDC 2002a, CDC 2002b).

The northern portion of the Park, including the Tolay Lake bed, is underlain primarily by Holocene basin deposits composed of fine-grained alluvium. The central-eastern portion of the Park is underlain primarily by the Donnell Ranch Volcanics composed of basalt and basaltic

[1] Weather Station: Petaluma Fire Stn 3, CA (046826), approximately six miles northwest of the Park
[2] Weather Station: Sonoma, CA (048351), approximately six miles northeast of the Park

andesite, breccia, scoria, and rhyolite flows and tuffs. The southeastern portion of the Park is underlain primarily by the Petaluma Formation composed of predominantly of lacustrine and fluvial deposits of siltstone, sandstone, shale, conglomerate, with minor inclusions of silicified tuff, chert, and limestone. The southwestern portion of the Park is underlain primarily by Jurassic period serpentinized ultramafic rock. The central-west and northwestern portion of the Park is underlain primarily by the Franciscan complex composed of sandstone, altered mafic volcanics, chert, gabbro, and schist and semischist (CDC 2002a, CDC 2002b).

The regional complex geology contributes to the formation of a diversity of soil structures, textures, chemistry, and depths contributing to the often pronounced and diverse vegetation communities within the Park. The *Soil Survey of Sonoma County* (USDA 1977) indicates the presence of 13 soil mapping units composed of seven soil series (Table 1). Table 1 summarizes the soil mapping units, including slope class, hydric rating (USDA 2012), parent material (mineral constituent of soil), soil chemistry, drainage, and notes on the ecologic characteristics. Figure 3 depicts the distribution of soil types within the planning area boundaries. The predominant soil types are Clear Lake Clay Loam, 0-2 percent slopes, and Diablo Clay, 15 to 30 percent slopes.

Generally, clay-rich soils with low slope gradients (e.g. Clear Lake clay loam) have a much higher potential to support wetland habitat than well drained, coarser textured soils, particularly on higher gradient slopes (e.g., Laniger loam). However, seep wetlands are frequently associated with a diversity of soil textures on high gradient slopes where shallow lithic contact and/or rock outcrops are present.

Vegetation communities and plant species are often closely associated with the physical characteristics of soils including parent material (i.e., serpentinite), soil chemistry (i.e., alkaline), and soil texture (i.e., clay). Therefore, the complex geology and diversity of soil types within the Park, along with microclimate conditions are directly correlated with the potential for the presence of special-status plant species and sensitive vegetation communities.

Table 1. Soil Mapping Units in Tolay Lake Regional Park (USDA 1977)

| Soil Map Unit (map code) | Slope Class | Hydric (Sonoma County) | Parent Material & Chemistry | Drainage, Runoff, &Permeability | Ecological Notes |
|---|---|---|---|---|---|
| Clear Lake clay loam (CcA) | 0-2% | Yes | Alluvium, sandstone & shale;<br>Moderately alkaline (pH 8.0) | Poorly drained;<br>Negligible to high runoff;<br>Slow to very slow permeability | May support clay associated rare plants;<br>High potential to support wetlands (clays, shrink-swell);<br>Native grasses and forbs, non-native annual grasses;<br>Low erosion potential (neutral slopes); |
| Diablo clay (DbC) | 2-9% | Yes | Residuum, sedimentary rock;<br>Moderately alkaline (pH 8.0) | Well drained;<br>Slow runoff (dry), medium to rapid (wet);<br>Slow permeability | May support clay associated rare plants;<br>May support wetlands (clay-rich and shrink-swell);<br>Annual grasses and forbs;<br>Moderate-high erosion potential (slopes) |
| Diablo clay (DbD) | 9-15% | No | | | |
| Diablo clay (DbE) | 15-30% | | | | |
| Diablo clay, eroded (DbF2) | 30-50% | | | | |
| Goulding cobbly clay loam | 5-15% | No | Residuum, tuff breccia, basalt, andesite;<br>Slightly acid (pH 6.0) | Well-somewhat excessively drained;<br>Medium-rapid runoff;<br>Moderate permeability | May support volcanic associated rare plants;<br>May support seep wetlands;<br>Oaks, scrub, grasses and forbs;<br>Moderate-high erosion potential (slopes) |
| Goulding-Toomes complex (GoF) | 9-50% | No | | | |
| Haire clay loam (HcD) | 9-15% | No | Alluvium, sedimentary rock;<br>Slightly acid (pH 6.0) | Moderately well drained;<br>Slow-rapid runoff;<br>Very slow permeability | May support sandstone associated rare plants;<br>May support seasonal wetlands (low slopes);<br>Annual grasses and forbs;<br>Low-moderate erosion potential |
| Laniger loam (LaC) | 5-9% | No | Residuum, rhyolite;<br>Medium to slightly (pH 6.0-6.5) | Well-somewhat excessively drained;<br>Medium-rapid runoff;<br>Moderate-rapid permeability | May support volcanic associated rare plants;<br>May support seep wetlands;<br>Oaks, manzanita, ceanothus, and grasses<br>Moderate-high erosion potential (slopes) |
| Laniger loam (LaD) | 9-15% | | | | |
| Laniger loam, eroded (LaE2) | 15-30% | | | | |
| Montara cobbly clay loam (MoE) | 2-30% | No | Residuum, serpentinite;<br>Moderately alkaline (pH 8.0) | Well drained;<br>Medium-high runoff;<br>Moderately slow permeability | May support serpentine associated rare plants;<br>May support seep wetlands;<br>Native grasses and forbs;<br>Low-moderate erosion potential (slopes) |
| Gullied Land | varies | No | mixed | Well drained | Unlikely to support rare plants (disturbance);<br>May support swale wetlands and non-wetland waters;<br>Non-native and ruderal plants;<br>High-extreme erosion potential |

### *1.2.5 Vegetation and Plant Species*

Moderate annual temperatures and precipitation of southern Sonoma County contribute to vegetation dominated by drought-resistant trees and shrubs, perennial native grasses, annual native forbs, and annual non-native grasses in upland positions. Generally, the Park's soils, geology, and use as rangeland contribute to open grasslands, with patches of oak-bay woodlands located in deep canyons, north-facing slopes, and along lower Tolay Creek. Additionally, clay-rich soils and watershed size contribute to the formation of extensive wetlands and non-wetland waters (e.g., Tolay Lake) in low gradient areas, as well as seep / swale complexes on higher gradient slopes. Sections 3 and 4 contain detailed discussions of each vegetation community, descriptions of the special-status plant species observed or with the potential to occur in the Park, as well as the habitat values for and the potential presence of special-status wildlife species.

## 1.3 Conservation Values

The Park parcels were purchased to protect unique cultural and historical values; as well as to protect and enhance wildlife habitat and natural areas, while providing public access. The Tolay Valley is not within the viewshed of any developed area within Sonoma County, and only the lower reach of Tolay Creek and the upper Tolay Valley are visible from public roads (Highway 121 and Stage Gulch Road, respectively). Despite its "hidden" aspect, the Park provides a unique opportunity to address conservation and recreation values of the general public.

The location and size of the Park contribute to its value for protection, enhancement, and restoration of the natural resources. Included as part of the regional preservation and restoration efforts (e.g., Dickson Ranch; Figure 2), the Park offers the opportunity to preserve almost the entirety of the Tolay Creek watershed, thereby providing land managers and restoration specialists the opportunity to affect system-wide preservation of this invaluable aquatic resource. The Park provides habitat linkages and wildlife corridors between Petaluma Marsh and the Sonoma-Napa Marshes, and Cougar Mountain and the greater Mayacama Mountains region (Merenlander et al. 2010). Additionally, its relative size and geologic, edaphic, and topographic variation provide the physical basis for a rich biodiversity of plant and wildlife species, contributing to genetic diversity and species resiliency in a regional context.

The property's close proximity to Highway 37 provides ready local access for Petaluma, Sonoma, and Novato, as well as regional access to Bay Area residents. The Park headquarters and other historical agricultural infrastructure offer a sense of place and history for park visitors, while the diverse natural resources provide aesthetic, research, and education opportunities. The management of cultural and natural resources including avoidance and minimization efforts during project activities, as well as on-going park utilization, will be addressed in the Resource Management and Master plans.

# 2.0 DATA COLLECTION METHODS

## 2.1 Background Review

Prior to site visits conducted in 2006-2008, the Soil Survey of Sonoma County, California (USDA 1977), Geologic Map of the Sears Point 7.5-minute quadrangle (CDC 2002a), Geologic Map of the Petaluma River 7.5-minute quadrangle (CDC 2002b), and aerial photographs were examined to determine if any unique geology and/or soil types that could support sensitive plant communities and/or special-status plant species (e.g. serpentine or volcanic endemics), and/or wetland and non-wetland water habitats (e.g., low permeability clays) were present in the Park.

Potential occurrence of special-status plant and wildlife species in the Park was evaluated by first determining which special-status species occur in the vicinity of the Park through literature and database searches. A search of the California Natural Diversity Database (CNDDB) focusing on the Cotati, Glen Ellen, Novato, Petaluma, Petaluma River, San Geronimo, Sears Point, and Sonoma USGS 7.5-minute quadrangles was performed prior to site visits (LSA 2009b, LSA 2009c).

Prior to site visits conducted in 2013, WRA conducted a literature and database search to update the potential occurrences of sensitive biological communities, and special-status plant and wildlife species. WRA increased the search to capture both the Petaluma River and Sears Point quadrangles, as well as the ten surrounding quadrangles (Appendix B). Additional resources reviewed by WRA to update the potential occurrence of special-status species and/or sensitive biological communities, include the current list of vegetation alliances and vegetation mapping guidelines (CDFG 2009, CDFG 2010), the Consortium of California Herbaria (CCH 2013), the Arid West supplement (Corps 2008), and *A Flora of Sonoma County* (Best et al. 1996).

## 2.2 Field Surveys

Table 2 summarizes the field studies conducted within the Park to date. LSA conducted the studies 2006-2008, supplemented by WRA site visits in 2013. Additionally Petaluma Wetlands Alliance (PWA) conducted bird counts 2006-2009. Field Survey methods are detailed in the following subsections.

Table 2. Summary of biological field studies to date at Tolay Lake Regional Park

| Field Study | Responsible Party | Date(s) | Recent Climatic Condition* |
|---|---|---|---|
| Wetland Delineation (Tolay Lake Regional Park) | LSA | 2006:<br>March 22, 23, 30<br>May 5, 8, 24<br>June 2, 5<br>July 12, 13, 16 | WY2005**: normal<br>(0.5 inch above average)<br>WY2006: normal<br>(4 inches above average) |
| Wetland Assessment (Tolay Creek Ranch) | LSA | 2008:<br>March 28<br>April 1, 5, 11<br>May 10, 16, 19, 21-23, 26-27 | WY2007: below normal<br>(13.5 inches below average)<br>WY2008: below normal<br>(13 inches below average) |
| Rare Plant Surveys& Vegetation Mapping | LSA | 2006:<br>March 22, 23, 30<br>May 5, 8, 24<br>June 2, 5<br>July 12, 13, 16<br>July 28<br>August 6, 21<br>November 5<br>2007:<br>January 19<br>2008:<br>March 28<br>April 1, 5, 11<br>May 10, 16, 19, 21-23, 26-27 | |
| Wetland Update & Vegetation Classification | WRA | 2013:<br>January 21 | Oct 2012 – Jan 2013: normal |

| Field Study | Responsible Party | Date(s) | Recent Climatic Condition* |
|---|---|---|---|
| Bird Counts | PWA | 2006:<br>April 15, 29<br>October 17, 24<br>November 6<br>December 2<br>2007:<br>January 27<br>April 7, 21<br>May 7<br>September 1, 23<br>November 3<br>December 8<br>2008:<br>February 20<br>March 15<br>April 19<br>May 24<br>June 21<br>July 19<br>September 13<br>October 5<br>November 15<br>December 14<br>2009:<br>January 2<br>February 21 | WY2006: normal<br>(4 inches above average)<br>WY2007: below normal<br>(13.5 inches below average)<br>WY2008: below normal<br>(13 inches below average)<br>Oct 2008 – Jan 2009: below |

*Recent climate conditions summarize the rainfall for the preceding season and at the time of the field survey; precipitation data from Petaluma East (CIMIS #144) and Sonoma (NCDC #8351), WETS Station from Sonoma (NCDC #8351)

**WY2005 = Water Year 2005, the water year runs from October 1 through September 30

### *2.2.1 Biological Communities*

Wetlands and Non-wetland Waters

LSA conducted a wetland delineation within the northern portion of the Park in 2006, followed by a wetland assessment in the southern portion in 2008. During both the 2006 and 2008 field visits, non-wetland waters (streams, creeks, stock ponds, etc.) were deemed potentially jurisdictional based on the presence of water, scour, shelving, debris deposits, wrack, or other indicators of flowing water and/or inundation, per Corps guidelines (Corps 2005).

During the 2008 (Tolay Creek Ranch) wetland assessment, field biologists surveyed the property mapping potential wetlands following a three-part method: (1) following vegetation and landforms; (2) tracing features on an aerial ortho-photo; and/or (3) using a GPS unit. The presence of hydrophytic vegetation and depressional topography (pools, basins, swales, etc.) were the primary superficial indicators of potential jurisdictional wetland habitats. Soils and wetland hydrology were not sampled, and no datasheets were entered.

During the 2006 wetland delineation (Tolay Lake Regional Park), field biologists sampled vegetation, soils, and hydrology in accordance with the Corps Manual (Environmental Laboratory 1987); however, these data were not reported on Corps data forms. Field biologists assigned plant species identified within the Park a wetland status according to the Corps list of plant species that occur in wetlands (Reed 1988). This wetland classification system is based on the expected frequency of occurrence in wetlands as follows:

| | | | |
|---|---|---|---|
| OBL | Obligate Wetland | Always found in wetlands | >99% frequency |
| FACW | Facultative Wetland | Usually found in wetlands | 67-99% |
| FAC | Facultative | Equal in wetland or non-wetlands | 34-66% |
| FACU | Facultative Upland | Usually found in non-wetlands | 1-33% |
| NL | Not Listed | An upland plant | <1% |

An area is considered to meet the hydrophytic vegetation criterion when more than 50 percent of the dominant species in each stratum (tree, shrub, herbs, etc.) present are in the obligate, facultative wetland, or facultative categories.

The Natural Resource Conservation Service (NRCS) defines a hydric soil as that has formed "under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (Federal Register 1994). Soils formed over long periods of time under wetland (anaerobic) conditions often possess characteristics that indicate they meet the definition of hydric soils. Hydric soils can have a hydrogen sulfide odor, low chroma matrix color, presence of redoximorphic concentrations, gleyed or depleted matrix, or high organic matter content. Field biologists sampled soils and assigned a chroma and value using a standard Munsell soil color chart (Gretag Macbeth 2000) according to the methodology provided in the Corps Manual (Environmental Laboratory 1987) to assess if hydric soil indicators were present.

The Corps jurisdictional wetland hydrology criterion is satisfied if an area is inundated or saturated for a period sufficient to create anoxic soil conditions during the growing season (a minimum of 14 consecutive days). Evidence of wetland hydrology include indicators, such as visible inundation or saturation, drift deposits, oxidized root channels, salt crusts, a shallow aquitard, or crayfish burrows. Field biologists examined sample locations for direct (e.g. saturated soils) and/or indirect (e.g. oxidized root channels) indicators to determine if wetland hydrology was present.

Upland Vegetation Communities

In 2006 and 2008, upland vegetation communities within the Park were classified based on observed dominant and characteristic species by biologists in the field (LSA 2009b, LSA 2009c), but specific documented vegetation communities from published literature (e.g., Holland 1986, Sawyer and Keeler-Wolf 1995, Barbour et al. 2007, Sawyer et al. 2009) were not ascribed.

WRA conducted a follow-up site visit in January and March 2013 to ascribe vegetation alliances currently on the CDFW *List of Vegetation Alliances* (CDFG 2010) and descriptions in *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009). However, in some cases it was necessary to identify variants of community types or to describe non-vegetated areas that are

not described in the literature. Sensitive communities were determined based on NatureServe's (2013) methodology, and are listed by CDFW (CDFG 2010).

### *2.2.2 Special-status Plant Species*

LSA botanists conducted botanical surveys over 29 days in spring 2006 through summer 2008 (Table 2). Early season surveys were conducted in the months March, April, and May, while late season surveys were conducted in the months of June, July, August, September, and October. During early season surveys, botanists traversed the entire Park with particular focus on habitats with a higher potential to support special-status plant species. For instance, botanists noted a close association between the common plant species, Fremont's star lily (*Toxicoscordion fremontii*) and the special-status plant species, fragrant fritillary (*Fritillaria liliacea*). Therefore, areas supporting Fremont's star lily received more attention than those areas without when searching for fragrant fritillary. Generally, late season surveys were composed of concentrated searches in fewer habitats supporting summer blooming species, such as pappose tarplant (*Centromadia parryi* ssp. *parryi*) and other species associated with seeps and wetlands.

All plants were identified with the dichotomous keys in *The Jepson Manual* (Hickman 1993) and *A Flora of Sonoma County* (Best et al. 1996). Additionally, plants collected in the field were identified or confirmed by comparison to images from Google Images and/or Calphotos, and pressed specimens at the UC Berkeley and Jepson herbaria. All plant species observed are included Appendix A. In January and March 2013, WRA conducted site visits recording each plant species observed, but did not perform protocol-level rare plant surveys. Plant species nomenclature was updated to follow Baldwin et al. (2012).

### *2.2.3 Special-status Wildlife Species*

LSA wildlife biologists conducted wildlife habitat assessments and wildlife reconnaissance-level surveys on March 23, May 2, June 8, and August 29, 2006, and April 1 and October 24, 2008. The surveys consisted of pedestrian wanderings recording all direct (e.g. sightings, bird song) and indirect (e.g. scat, tracks) observations, while the assessment consisted of recording habitat values on aerial photographs. Selected survey areas included representative examples of existing habitats present within the park, with specific survey areas and dates included below.

Additionally, volunteer birders have performed surveys and recorded observations from the Park. Volunteers from the PWA have conducted bird surveys in the northern parcel of the Park since April 2006. In 2009, LSA performed an analysis of the bird surveys conducted by PWA which is included as an appendix in this report. Volunteers with the Raptor Project noted raptor activity during four visits in 2007, and their results are included herein (Thiessen and Wilson 2007).

The March 23, 2006 survey focused on wintering bird use in and around Tolay Lake, as well as other aquatic features for California red-legged frog (*Rana draytonii*), western pond turtle (*Actinemys marmorata*), and other herpetofauna. Birds were surveyed from still, elevated positions northwest of Tolay Lake using binoculars and a spotting scope. Herpetofauna surveys were conducted during daylight hours, and included the aquatic features of upper Tolay Creek, Eagle Creek, Cardoza Creek, drainage ditches, Willow Pond, Duck Pond, Vista Pond and Fish Pond on East Ridge, and a stock pond on West Ridge. These surveys consisted of traversing

slowly, scanning the banks of the features with binoculars, scanning with the naked eye, and listening for frogs or turtles entering the water.

The May 2, 2006 survey focused on riparian habitat along upper Tolay Creek, Cardoza Creek below Fish Pond, and Fish Pond, as well as grassland habitats and rock outcrops in the Cardoza Creek watershed and the West Ridge.

The June 8, 2006 survey included a reexamination of riparian areas on upper Tolay Creek for passerine birds (i.e., songbirds), isolated blue gum trees on the gently sloping area west of the East Ridge for nesting raptors, and general wildlife surveys on the West Ridge and associated drainages.

The August 29, 2006 survey focused on surveying for metamorphosed California red-legged frogs within inundated aquatic features. The survey was conducted during daylight hours in portions of South Creek, upper Tolay Creek, Cardoza Creek, Vista Pond and Fish Pond, and smaller stock ponds. Additionally, an off-site stock pond to the west of the Park was surveyed remotely with binoculars.

The April 1 and October 24, 2008 surveys focused on general wildlife and were conducted in the southern parcel of the Park including lower Tolay Creek, stock ponds, and terrestrial habitats (e.g., coast live oak woodlands).

Nomenclature for amphibians and reptiles follows Crother et al. (2008), while nomenclature for mammals follows Baker et al. (2003). Nomenclature for special-status species conforms to the CNDDB (CDFW 2013a). Scientific names for species have been included parenthetically within the report despite the acceptance of English vernacular names in the American Ornithologists' Union (AOU) *Check-list of North American Birds* and supplements (AOU 2008, Parks et al 2008).

Table 3. Summary of Biological Communities at Tolay Lake Regional Park

| **Biological Community** | **Vegetation Structure &Type[1]** | **Vegetation Alliance[2]** | **Sensitive Status[3]** |
|---|---|---|---|
| Disturbed and Developed Areas | -- | -- | No Rank |
| Non-wetland Waters | -- | -- | Section 404/401 CWA; Section 1600 CFGC |
| Wetlands | Marshes and Swamps | Hardstem bulrush marshes (*Schoenoplectus acutus* Herbaceous Alliance) | CDFW Rank G5 S4; Section 404/401 CWA |
| | | Cattail marshes (*Typha angustifolia* Herbaceous Alliance) | CDFW Rank G5 S5; Section 404/401 CWA |
| | | Saltmarsh bulrush marshes (*Bolboschoenus maritimus* Herbaceous Alliance) | CDFW Rank G4 S3; Section 404/401 CWA |
| | | Salt grass flats (*Distichlis spicata* Herbaceous Alliance) | CDFW Rank G5 S4; Section 404/401 CWA |
| | | **Water smartweed marsh (*Persicaria amphibia* Provisional Herbaceous Alliance) | CDFW No Rank; Section 404/401 CWA |
| | Vernal Pools | Common spikerush marshes (*Eleocharis macrostachya* Herbaceous Alliance) | CDFW Rank G4 S4; Section 404/401 CWA |
| | | **California semaphore grass patches (*Pleuropogon californicus* Provisional Herbaceous Alliance) | CDFW No Rank; Section 404/401 CWA |
| | Meadows and Seeps | Meadow barley patches (*Hordeum brachyantherum* Herbaceous Alliance) | CDFW Rank G4 S3?; Section 404/401 CWA |
| | | **California semaphore grass patches (*Pleuropogon californicus* Provisional Herbaceous Alliance) | CDFW No Rank; Section 404/401 CWA |
| | | Pacific rush marshes (*Juncus effusus* Herbaceous Alliance) | CDFW Rank G4 S4?; Section 404/401 CWA |

| Biological Community | Vegetation Structure &Type[1] | Vegetation Alliance[2] | Sensitive Status[3] |
|---|---|---|---|
| | | Common rush marshes (*Juncus patens* Provisional Herbaceous Alliance) | CDFW Rank G4? S4?; Section 404/401 CWA |
| | | Common monkeyflower seeps (*Mimulus guttatus* Herbaceous Alliance) | CDFW Rank G4? S3?; Section 404/401 CWA |
| | | **Mixed-annual wetland forb patches (Undocumented Herbaceous Alliance) | CDFW No Rank; Section 404/401 CWA |
| Riparian Area | Riparian Woodland | Red willow thickets (*Salix laevigata* Woodland Alliance) | CDFW Rank G3 S3; Section 404/401 CWA (partial); Section 1600 CFGC |
| Woodlands and Groves | Cismontane Woodland | Coast live oak woodlands (*Quercus agrifolia* Woodland Alliance) | CDFW Rank G5 S4 |
| | | Valley oak woodlands (*Quercus lobata* Woodland Alliance) | CDFW Rank G3 S3 |
| | | California buckeye groves (*Aesculus californica* Woodland Alliance) | CDFW Rank G3 S3 |
| | | Blue gum groves (*Eucalyptus globulus* Semi-natural Woodland Stands) | No Rank |
| | Closed-cone Coniferous Forest | Monterey cypress stands (*Hesperocyparis macrocarpa* Woodland Alliance) | No Rank* |
| Rock Outcrops | Coastal Scrub | Poison oak scrubs (*Toxicodendron diversilobum* Shrubland Alliance) | G4 S4 |
| Grasslands | Valley and Foothill Grassland (native) | Purple needlegrass grasslands (*Stipa pulchra* Herbaceous Alliance) | G4 S3? |
| | | California oat grass prairies (*Danthonia californica* Herbaceous Alliance) | CDFW Rank G4 S3 |

| Biological Community | Vegetation Structure &Type[1] | Vegetation Alliance[2] | Sensitive Status[3] |
|---|---|---|---|
| | | Creeping wild rye turfs (*Elymus triticoides* Herbaceous Alliance) | CDFW Rank G4 S3 |
| | Wildflower Fields | mixed wildflower fields (Mixed native wildflowers Undocumented Herbaceous Alliance) | CDFW No Rank |
| | | Johnny jump-up wildflower fields (*Viola pedunculata* Undocumented Herbaceous Alliance) | CDFW No Rank |
| | | Cream cup wildflower fields (*Platystemon californicus* Undocumented Herbaceous Alliance) | CDFW No Rank |
| | Valley and Foothill Grassland (non-native) | Italian rye grass grasslands (*Festuca perennis* Semi-natural Herbaceous Stands) | No Rank |
| | | **Medusa head patches (*Elymus caput-medusae* undescribed Semi-natural Herbaceous Stands) | No Rank |
| | | Slender wild oat grasslands (*Avena barbata* Semi-natural Herbaceous Stands) | No Rank |
| | | Soft chess grasslands (*Bromus hordeaceus* Semi-natural Herbaceous Stands) | No Rank |
| | | Dogtail grass grasslands (*Cynosurus echinatus* Semi-natural Herbaceous Stands) | No Rank |

[1]Source: CNPS Vegetation Mapping Classification (CNPS 2013)

[2]Source: *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009)

[3]Sensitive Status based on Section 404/401 of the Clean Water Act; Section 1600 of the California Fish and Game Code; CDFW/NatureServe natural communities ranking

*Considered sensitive in native stands only highly restricted to Monterey Peninsula; community here represents planted stands not indicative of the natural vegetation community/alliance described in the literature

**Not previously described in Sawyer et al. 2009 or elsewhere

# 3.0 EXISTING HABITATS

## 3.1 Developed and Disturbed Areas

Developed and disturbed areas are not specifically addressed in the vegetation literature (Holland 1986, Barbour et al. 2007, Sawyer et al. 2009); however, these areas tend to be composed of similar disturbance-adapted, invasive plant species, and often provide habitat for native wildlife species. Within the Park, developed and disturbed habitat is present primarily in around the former Cardoza Residence (Park Headquarters) in the northwestern portion, as well as in and around roads, bridges, and other infrastructure.

### *3.1.1 Vegetation of Developed and Disturbed Areas*

Developed and disturbed areas within the park are not composed of documented vegetation alliances, but do host a suite of non-native plant species and native species are essentially absent. Several ornamental species were observed but not identified to species in and around and the Park Headquarters. Naturalized, and often invasive, plant species identified include blackwood acacia (*Acacia melanoxylon*), common fig (*Ficus carica*), mustard (*Brassica nigra*), charlock (*Sinapis arvensis*), thistles and lettuces (*Carduus pycnocephalus, Centaurea solstitialis, Silybum marianum, Lactuca saligna, L. serriola*), fennel (*Foeniculum vulgare*), bull mallow (*Malva nicaeensis*), and stork's bills (*Erodium botrys, E. cicutarium, E. moschatum*). The presence and persistence of these disturbance-adapted, invasive species poses a threat to the native habitats throughout the Park by providing a seed source that can be transported from the Park Headquarters and other disturbed areas.

### *3.1.2 Wildlife Values of Developed and Disturbed Areas*

If somewhat diminished in quality, developed and disturbed areas can offer some wildlife habitat values. Wildlife within developed areas is typically more habituated to repeated human activity, and often common in urban to suburban settings. Ornamental vegetation, buildings, and other infrastructure provide nesting and roosting sites for a variety of birds including barn owl (*Tyto alba*), California towhee (*Pipilo crissalis*), black phoebe (*Sayornis nigricans*), barn swallow (*Hirundo rustica*), house finch (*Carpodacus mexicanus*), and American goldfinch (*Cardeulis tristis*).

Western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), and gopher snake (*Pituophis catenifer*) commonly forage in around developed areas for insects and small vertebrates, while skunk (*Mephitis* sp.), raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*) will frequently occupy abandoned or lightly used barns and other out-buildings. Garden vegetables and domestic ornamentals are often an attractant for black-tailed deer (*Odocoileus hemionus columbianus*), which likely browse nocturnally and at sunset / sunset rise in the Park Headquarters area when human activity is low.

## 3.2 Non-wetland Waters

Non-wetland waters include those habitats of ephemeral to perennial flowing or sill open water with very little to no emergent vascular vegetation. These features are frequently jurisdictional under the Clean Water Act, and within the Park include Tolay Lake, creeks, and stock ponds.

Often these features are adjacent to herbaceous or woody wetland habitat (Sections 3.3 and 3.4, below), but the majority of the areas mapped as non-wetland waters within the Park generally lack vegetation cover in excess of five percent across the entire feature.

### *3.2.1 Tolay Creek and Tributaries*

Tolay Creek is the dominant drainage within the Park, extending approximately four miles from the south end of Tolay Lake in the north to Highway 121 in the south (Figure 4). Tolay Creek has been channelized through and downstream of Tolay Lake for approximately 0.3 mile, presumably to drain Tolay Lake for agriculture, and dredge spoils are located in several locations along the upper reach of Tolay Creek. The entire run of Tolay Creek below Tolay Lake is within a confined and incised channel. The upper reach is approximately 4 to 10 feet deep, and 10 to 20 feet in width, while the lower reach is approximately 8 to 15 feet in width, with similar depths. Historic floodplain terraces are present in the lower reach. Numerous tributaries discharge into Tolay Creek from both West Ridge and East Ridge.

Flows of Tolay Creek are strongly seasonal with active, flowing water observed in late fall through spring months, but drying by summer, while the tributaries are ephemeral to intermittent with winter through spring flows. Deeper pools in the lower reach of Tolay Creek typically remain wetted year-round, and pools in several tributaries remain into summer. The substrate of the creek in the upper reach is composed of sorted sediments and muck from decomposed vegetation. Sands and silts comprise the lower velocity portions of the lower reach, and cobbles and gravels comprise the high velocity areas.

Areas of dense in-channel vegetation are located in the upper reaches of Tolay Creek where alteration to the channel has occurred, and is composed of cattail (*Typha angustifolia*) and water smartweed (*Persicaria amphibia*). The lower reach contains less in-channel vegetation made up of small patches of cattail, hardstem bulrush (*Schoenoplectus acutus*), pennyroyal (*Mentha pulegium*), watercress (*Nasturtium officinale*), water pennywort (*Hydrocotyle ranunculoides*), water plantain (*Alisma lanceolatum*), and rough cocklebur (*Xanthium strumarium*). The banks and historic floodplain terraces of the creek support intermittent riparian woodland (Section 3.4), as well as patches of Himalaya blackberry (*Rubus armeniacus*), poison hemlock (*Conium maculatum*), Baltic rush (*Juncus balticus*), mugwort (*Artemisia douglasiana*), stinging nettle (*Urtica dioica*), and horsetails (*Equisetum laevigatum, E. telmateia*).

### *3.2.2 Cardoza Creek*

Cardoza Creek is made up of two primary drainages, the Main and North forks. The Main Fork originates outside and to the east of the Park, and flows into Vista Pond where the channel has been rerouted from its original flow line into Fish Pond.The bank is deeply incised and eroding in several locations and the bed is composed of sediments of mixed size. The channel is approximately 4 to 10 feet in width, and flows appear to be intermittent throughout the winter and spring. Above Vista Pond, scattered coast live oak (*Quercus agrifolia*), California bay (*Umbellularia californica*), and California buckeye (*Aesculus californica*) trees grow along the streambank, along with poison oak (*Toxicodendron diversilobum*), California coffeeberry (*Frangula californica*), creeping snowberry (*Symphoricarpos mollis*), and bee plant (*Scrophularia californica*).

The North Fork of Cardoza Creek originates in seep wetlands adjacent to the property line and ridgeline of East Ridge, and flows directly into Fish Pond approximately 1,000 feet below the confluence with the Main Fork. The bank is frequently incised, undercut, and eroding, and the bed contains mixed sediments. The channel is approximately 3 to 8 feet in width, and flows appear to be intermittent with no flow in summer months. Above Fish Pond, a cluster California buckeye and California bay trees are located in the higher portion of the reach, but herbaceous species such as brownhead rush (*Juncus phaeocephalus*), common rush (*J. patens*), and bee plant dominate the vegetation along this fork of Cardoza Creek.

The historic Main Fork channel is currently present between the dam face of Vista Pond and Fish Pond, which flows in winter and spring months reverting to a seep wetland in summer months. Fish Pond discharges across a concrete-lined spillway creating downstream erosion and undercutting at the spillway. Automobiles, concrete block, and other detritus appear to have been intentionally placed in the channel below the spillway to reduce erosion. The channel below the spillway appears to have stabilized because it has attained a stable elevation with the downstream reach of Cardoza Creek. The historic channel emerging from the Fish Pond dam face does not exhibit wetland characteristics but does contain willow riparian habitat.

The lower reach of Cardoza Creek (below Fish Pond) flows through a natural, somewhat downcut channel for approximately 2,800 feet where the channel appears to have been altered to flow straight into Tolay Creek 1,200 feet further downstream.

### *3.2.3 North Creek – Oak Grove Fork*

The headwaters of the Oak Grove Fork of North Creek originate in the northeast portion of the Park on East Ridge as a slumped gully, then flows within a defined channel through oak woodland. Waters flow off property into a large agricultural reservoir. Flows reenter the Park from the this reservoir into man-made ditch system which runs on the east side of Tolay Lake, eventually joining Tolay Creek approximately 690 feet upstream from the Farm Bridge. In the upper reach, the channel is approximately 4 to 8 feet in width, the bank incision is generally muted from the oak woodlands, and the bed is composed of mixed sized sediment. Flows appear to be intermittent, but flowing waters were observed in August and November 2006 (LSA 2009b), an above average rainfall year for Petaluma (UC-IPM 2013, WRCC 2013).

The slumped gully headwaters support hydrophytes such as Pacific rush (*Juncus effusus*), brownhead rush, and pennyroyal. The reach underneath the oak woodland canopy does not exhibit wetland characters, but the ditches of the lower reach contain a mucky channel bottom and emergent hydrophytes such as cattail and water smartweed.

### *3.2.4 Eagle Creek*

The headwaters of Eagle Creek originate on the edge of the property line and ridgeline of East Ridge as seep wetlands. The waters flow off property between vineyards located immediately north of the Park, then are routed through man-made ditches returned to Park eventually joining Tolay Creek at the Farm Bridge. In the upper reach, the channel is approximately 2 to 6 feet in width, the bank is incised in several locations, and the bed is composed of mixed sized sediment. Flows appear to be intermittent, but standing water was observed in August 2006 (LSA 2009b). A small grove of coast live oak is present along the upper portion of the reach, and Pacific rush and brownhead rush are present along the bank periodically in-channel. In the lower reaches where Eagle Creek has been routed into man-made ditches, the channel bottom

is composed of muck from decaying vegetation, and the vegetation is predominantly a mix of weedy hydrophytes and cattail.

### *3.2.5 Ponds*

Several ponds for irrigation and livestock watering are located throughout the Park. Although these ponds were man-made, they contain functions and values similar to naturally occurring water bodies. Several of these ponds dry out by summer, functioning as seasonal wetlands with distinct vegetation communities (see Section 3.3).

Vista Pond and Fish Pond, located on East Ridge, were constructed within the Cardoza Creek watershed, and are supplied by in-channel flow, surface runoff, direct precipitation, and seasonal and perennial springs. Inundation is perennially, with a verge of wetland grasses such as western mannagrass (*Glyceria* x *occidentalis*), meadow barley (*Hordeum brachyantherum*), Mediterranean barley (*H. marinum*), Italian rye grass (*Festuca perennis*), and California semaphore grass (*Pleuropogon californicus* var. *californicus*). A patch of willow riparian is established on the west shore of Fish Pond, where Cardoza Creek enters, made up primarily of red willow (*Salix laevigata*) (see Section 3.4).

Duck and Willow ponds, located on the West Ridge adjacent to the Park Headquarters, are supplied by over a mile pipe from springs located on the northeastern portion of the Park. Overflow water flows from Willow Pond into Duck Pond, and onward into a small swale which runs into a culvert under the primary ranch road. These ponds contain a verge of common facultative grasses, similar to Fish Pond and Vista Pond, and red willows ring the western edge of Willow Pond.

A large, unnamed, seasonal pond / vernal marsh is located in the remote southeastern portion of the Park adjacent to Highway 121. The pond is supplied by an ephemeral drainage which runs underneath Highway 121 and into the Sonoma Creek Marsh. The presence of Highway 121 acts as a dam, backing waters up in winter months in this pond, but drying by early summer. Several aquatic plant species are present when ponded water is present in winter and early spring, including Lobb's buttercup (*Ranunculus lobbii*), aquatic buttercup (*R. aquatilis*), water plantain, and saltmarsh bulrush (*Bolboschoenus maritimus*). Following draw-down of winter waters, the pond becomes alkali vernal marsh habitat dominated by salt-tolerant wetland species (see Section 3.3.2).

Several small stock ponds and depressional features are scattered throughout the Park, particularly on the West Ridge. These features collect surface runoff, in-channel runoff, and direct precipitation, wetting up through the winter months, and drawing down by the summer or late spring. Vegetation is very similar to that of vernal pool (see Section 3.3.3).

### *3.2.6 Wildlife Values of Non-wetland Waters*

The year-round water availability and vegetation cover provide wildlife with important resources, particular in the dry summer months. Mammals and birds almost certainly water in the deeper pools of Tolay Creek and its tributaries, and amphibians and aquatic invertebrates may utilize the creek for breeding and foraging habitat. California red-legged frog have been observed within Tolay Creek (Parsons 1996), but were not observed during LSA's or WRA's studies (LSA 2009b, LSA 2009c). Riparian areas present along Tolay Creek and its tributaries provides cooler waters more favorable for California red-legged frog than for the invasive bullfrog (*Rana*

*catesbeianus*); however, one bullfrog was observed in 2006 on a tributary adjacent to Tolay Creek.

Numerous water birds have been observed in and around the Park's several ponds, including Canada goose, mallard, American widgeon, cinnamon teal, great egret, snowy egret, and great blue heron. Shorebirds, such as killdeer, black-necked stilt, Wilson's snipe, and greater yellowlegs utilize the ponds and their edge habitat for foraging. Similar to the pools of Tolay Creek, ponds with an extended hydroperiod provide suitable breeding habitat for Sierran tree frog (*Pseudacris sierra*), western toad (*Bufo boreas*), bullfrog, and possibly California red-legged frog. Although not observed in the ponds, these features provide suitable foraging and basking habitat for western pond turtle. Garter snakes (*Thamnophis* spp.) and southern alligator lizard are frequent visitors to ponds and other aquatic features, foraging on insects, toads, frogs, and small fish.

## 3.3 Wetlands

Wetlands and moist grasslands are those features dominated by herbaceous hydrophytic species rooted in soils that are saturated during the growing season for a period sufficient to meet hydric conditions (i.e., 14 days or greater). These features are jurisdictional under Section 404/401 of the Clean Water Act. Tolay Lake, the largest wetland / non-wetland water within the Park, is composed of several spatially and temporally distinct wetland types. In addition to Tolay Lake, the Park contains seeps, seasonal wet meadows, seasonal depressions, seasonal swales, and vernal pools containing several vegetation alliances typically dominated by native herbaceous, hydrophytic species.

The hydrology of wetlands in the Park varies from perennial or nearly perennial in marsh and seep wetlands to intermittent or seasonal in vernal pools and meadows. Hydrology, soil type, and soil/water chemistry are the strongest determinants of dominant vegetation communities and species composition within these wetlands. Secondarily, disturbance, soil/hydrologic modification, and grazing regime influence vegetation patterns within these features.

### *3.3.1 Tolay Lake*

Tolay Lake is a natural lake which has been substantially altered over the past century. To drain the lake, it is believed that the natural earthen dam was removed, Tolay Creek widened and deepened, and North Creek diverted to enter Tolay Creek below the lake. Consequently, the extent and duration of ponding has been greatly reduced, thereby altering the biological functions of the lake.

Historically, Tolay Lake is thought to have been perennial during years of high rainfall, extending to Stage Gulch Road located approximately one mile north of the Park's northern boundary (Kamman 2003, Ducks Unlimited 2005). A secondary account from 1823, reported in 1877, has the lake varying in width from approximately 420 feet to 3,300 feet, and a length of 3,300 feet (Thompson 1877), while the Petaluma Land Grant map of 1860 approximates the lake at one-quarter mile wide and two miles long (Ducks Unlimited 2005). Given the variability in these accounts and other historic maps, as well as contemporary observation, it is assumed that Tolay Lake has functioned as a vernal or semi-permanent marsh/lake through recorded history.

Currently, Tolay Lake is a large, shallow basin segmented into agricultural checks divided by drainage ditches. The lake becomes inundated in the winter months, remaining through the

early spring. The Cardoza family traditionally pumped water from the lake in April through May for their farming operation, with some lower, unconnected areas of the lakebed retaining inundation later in the season. Parsons (1996) indicates that two acre-feet of water are present in Tolay Creek during normal to wet years, and one acre-foot of water during dry years. LSA observed water within Tolay Creek in August 2006, an above average water year, despite an observed dried lakebed.

Clearly delineating ponded areas (non-wetland waters) from vegetated areas (wetlands) is difficult due to the extensive, historic alteration of the lake and annual variation in rainfall and consequent vegetation patterns. The outermost extent of the lake was delineated by LSA in 2006 based on a "slight break in the slope of the formerly cultivated field" which may indicate the historic shoreline on the eastern side of the Tolay Lake (LSA 2009b).

The vegetation within Tolay Lake varies spatially, seasonally, and annually, largely depending on amount of rainfall and topographic position. Generally, soils within the upper margin of Tolay Lake are saturated throughout the wet season drying out in early summer, and inundation is only present in above normal water years. The lower margin experiences saturation throughout the majority of the year to year-round, and is frequently inundated. The lakebed experiences experiences frequent and repeated inundation within the wet season, which may remain into the dry season depending on volume and timing of rainfall. As a result, a shift from meadow to freshwater marsh habitat is evident between the upper lake margin, the lower margin, and the lakebed, effectively dividing the lake into approximately three vegetation alliances: meadow barley patches, water smartweed marsh, and mixed-annual wetland forb patches.

Meadow barley patches (*Hordeum brachyantherum* Herbaceous Alliance). CDFW Rank G4 S3?; Section 404/401 Waters (Sensitive): Meadow barley patches have been documented from the Coast Ranges, Sierra Nevada Foothills and Eastside, and Modoc Plateau (Holland 1986, Sawyer et al. 2009). These patches are located upslope of the lower lake margin and contain a mix of spring blooming hydrophytes and summer blooming upland species. Early in the spring, meadow barley, Mediterranean barley, spiny-fruit buttercup (*Ranunculus muricatus*), curly dock (*Rumex pulcher*), dominate the upper lake margin, followed by the emergence of black mustard, charlock, bristly ox-tongue (*Helminthotheca echioides*), and field bindweed (*Convolvulus arvensis*).These patches intergrade with mixed-annual wetland forb patches downslope toward Tolay Lake, and upland grasslands upslope from Tolay Lake.

Mixed-annual wetland forb patches (Undocumented Herbaceous Alliance). CDFW No Rank; Section 404/401 Waters (Sensitive): Mixed-annual wetland forb patches have not been previously documented in the vegetation literature (Holland 1986, Barbour et al. 2007, Sawyer et al. 2009); however, the distinct change in vegetation assemblage between the upper lake margin and lakebed merits inclusion as a distinct vegetation alliance. This area of Tolay Lake is dominated by species which emerge earlier in the spring as waters begin to recede and soils begin to dry, such as slender popcorn flower (*Plagiobothrys stipitatus*), purslane speedwell (*Veronica peregrina* ssp. *xalapensis*), starwort (*Callitriche* sp.), hyssop loosestrife (*Lythrum hyssopifolia*), and common monkeyflower (*Mimulus guttatus*). These emerge earlier in the spring as waters begin to recede and soils begin to dry.

Water smartweed marsh (*Persicaria amphibia* Undocumented Herbaceous Alliance). CDFW No Rank; Section 404/401 Waters (Sensitive): Water smartweed marshes have not been previously documented in the vegetation literature (Holland 1986, Barbour et al. 2007, Sawyer et al. 2009); however, the prevalence of water smartweed on the lakebed of Tolay Lake merits

inclusion as a distinct vegetation alliance. Downstream of the causeway of Tolay Lake, water smartweed forms a near complete monoculture. Upstream of the causeway, it is a dominant species, with substantial cover of other semi-aquatic species including water plantain in the spring through summer. As the water draws down, late spring and summer blooming species emerge such as Fuller's teasel (*Dipsacus fullonum*), mayweed (*Anthemis cotula*), heliotrope (*Heliotropium curassavicum* var. *oculatum*), swamp pricklegrass (*Crypsis schoenoides*), red ammannia (*Ammannia coccinea*), fat hen (*Atriplex prostrata*), smooth willowherb (*Epilobium campestre*), devil's claw (*Proboscidea lutea*), velvet-leaf (*Abutilon theophrasti*), and common purslane (*Portulaca oleracea*).

### *3.3.2 Vegetation of Marshes and Swamps*

Marshes are typically located in estuaries, deltas, floodplains, broad alluvial valleys, and large depressions where low velocity surface water collects, creating saturated soil conditions for a majority of the year. These systems can range from freshwater to saline, and are often subject to tidal action. Within the Park, marsh habitat is associated with Tolay Lake, the fringes of ponds, and agricultural ditches in the Tolay Valley. Vegetation alliances documented within marsh habitats in the Park include hardstem bulrush marsh, cattail marsh, saltmarsh bulrush marsh, and salt grass flats; however, due to frequent intergradation between these alliances, alliance-level mapping was not performed.

Hardstem bulrush marshes (*Schoenoplectus acutus* Herbaceous Alliance). CDFW Rank G5 S4; Section 404/401 Waters (Sensitive): Hardstem bulrush marshes are known from the Central Valley, Modoc Plateau, the Bay Area, and coastal marshes (Holland 1986, Sawyer et al. 2009). These marshes dominate the agricultural ditches in Tolay Valley and the fringe of ponds, and intergrade with cattail marshes. The dominant species is the emergent graminoid, hardstem bulrush, but includes substantial cover of chairmaker's bulrush (*Schoenoplectus americanus*), cattail, water smartweed, and water plantain.

Cattail marshes (*Typha angustifolia* Herbaceous Alliance). CDFW Rank G5 S4; Section 404/401 Waters (Sensitive): Cattail marshes have been documented throughout California except at the highest elevations (Holland 1986, Sawyer et al. 2009). Similar to hardstem bulrush marshes, this vegetation alliance is located in agricultural ditches and ringing ponds. Dominated by the cosmopolitan hydrophyte cattail, this alliance contains substantial cover of hardstem bulrush, chairmaker's bulrush, water pennywort, water smartweed, and water plantain.

Saltmarsh bulrush marshes (*Bolboschoenus maritimus* Herbaceous Alliance). CDFW Rank G5 S4; Section 404/401 Waters (Sensitive): Saltmarsh bulrush marshes are known from the Bay Area, Humboldt Bay, and the South Coast (Holland 1986, Sawyer et al. 2009). Within the Park, saltmarsh bulrush marsh is located in the deeper portions and channel of the large seasonal pond adjacent to Highway 121, which emerges as spring waters draw down. The dominant species is saltmarsh bulrush, with subdominant and characteristic cover of water plantain, water buttercup, and Lobb's buttercup.

Salt grass flats (*Distichlis spicata* Herbaceous Alliance). CDFW Rank G5 S4; Section 404/401 Waters (Sensitive): Salt grass flats are extensively distributed in moderate to high saline environments throughout the Central Valley, Eastside Sierra, Modoc Plateau, Deserts, and coastal regions of California (Holland 1986, Sawyer et al. 2009). Salt grass flats are located in the large seasonal pond adjacent to Highway 121, and contain a mix of saline tolerant wetland species such as alkali heath (*Frankenia salina*), heliotrope, alkali mallow (*Malvella leprosa*),

rabbit's-foot grass (*Polypogon monspeliensis*), Mediterranean barley, brass buttons (*Cotula coronopifolia*), narrowleaf bird's-foot trefoil (*Lotus tenuis*), coyote thistle (*Eryngium* sp.), smooth goldfields (*Lasthenia glaberrima*), and curly dock (*Rumex crispus*).

### *3.3.3 Vegetation of Vernal Pools and Stock Ponds*

Vernal pools are unique seasonal wetlands located on flat to hillock terrain in concave depressions. These habitats are underlain by restrictive soils, typically either fine textured Vertic clays or medium grained substrate overlying a shallow hardpan. Watersheds vary in size from very localized to extensive in large vernal pool complexes. Vernal pools can range in pH with alkali vernal pools common in the Great Valley, Delta, and San Francisco Baylands. Although not naturally occurring in the Park, several wetlands function similar to vernal pools and host a similar suite of plant species; therefore, they are referred to vernal pools. Within the Park, these features are associated with or located in stock ponds and in-channel depressions of ephemeral and intermittent tributary streams, and on the top of West Ridge. Vernal pools were characterized as such primarily by their observed vegetation assemblage as containing a dominance or prevalence of characteristic vernal pool species. Vegetation alliances within vernal pool and stock pond fringe habitats in the Park include common spikerush wetland (Sawyer et al. 2009); however, the species assemblages are often quite rich and shift annually with climatic variation, and distinct alliance-level characterization can be difficult to determine.

Common spikerush wetland (*Eleocharis macrostachya* Herbaceous Alliance). CDFW Rank G4 S4; Section 404/401 Waters (Sensitive): Common spikerush wetlands are known throughout California, particularly in the Central Valley, Sierra Nevada Foothills, and Coast Ranges (Holland 1986, Sawyer et al. 2009). Common spikerush wetlands were observed on the drying margins of stock ponds and within the intermittent and ephemeral drainages on the East and West ridges. Observed species include common spikerush (*Eleocharis macrostachya*), armed coyote thistle (*Eryngium armatum*), Lobb's aquatic buttercup, aquatic buttercup, common yellow monkey flower, flowering quillwort (*Triglochin scilloides*), water chickweed (*Montia fontana*), California semaphore grass, rabbit's-foot grass, Mediterranean barley, brownhead rush Pacific rush, and common rush.

### *3.3.4 Vegetation of Meadows and Seeps*

Meadows or moist grasslands are typically located on flat to very slightly concave alluvial floodplains, terraces, and valley bottoms. These habitats are often underlain by fine textured soils which hold saturation into late spring or summer thereby supporting wetland grasses and forbs, but extensive surface ponding of water is uncommon or very short lived. These systems are overwhelmingly freshwater and soil pH is often neutral to alkaline. They are associated with upper margins of Tolay Lake (see Section 3.3.1), the large seasonal pond adjacent to Highway 121, and scattered locales in Tolay Valley.

Seeps are associated with springs and typically located on hillsides, often as headwaters to defined wetland swales and streams. These habitats are typically underlain by mixed textured sediments with substantial cobble and gravel, and/or associated with rock outcrops. Saturated conditions are strongly seasonal to year-round, and surface ponding may be present, particularly in areas were ungulates graze heavily or which have been developed. These systems are freshwater and pH varies with soil type.

Vegetation alliances within meadow and seep habitats in the Park include Pacific rush meadows, common rush meadows, common monkeyflower seeps, and California semaphore grass meadows (Sawyer et al. 2009). Due to their frequently relatively small size and indistinct boundaries between these vegetation alliances, they were not mapped to alliance level.

Pacific rush meadows (*Juncus effusus* Herbaceous Alliance). CDFG Rank G4 S3; Section 404/401 Waters (Sensitive): Pacific rush meadows are known from the Bay Area, Delta Area, and Sierra Nevada Foothills. (Sawyer et al. 2009). This community is dominated by Pacific rush, a perennial cespitose or tussocked graminoid closely associated with fine grained soils and extended saturation, and are scattered throughout the Park in low gradient positions and in small patches adjacent to hillside seeps. Associated species include hydrophytes including common rush, brownhead rush, meadow barley, creeping wild rye (*Elymus triticoides*), common monkeyflower, purslane speedwell, and rabbit's-foot grass.

Common rushmeadows (*Juncus patens* Provisional Herbaceous Alliance). CDFG Rank G4 S3; Section 404/401 Waters (Sensitive): Common rush meadows are considered a provisional alliance requiring further investigation by vegetation ecologists (Sawyer et al. 2009); however, several areas in low gradient positions and adjacent to hillside seeps support a characteristic to dominant presence of common rush. Associated species include hydrophytes including Pacific rush, California semaphore grass, tall fescue (*Festuca arundinacea*), meadow barley, and Mediterranean barley, and Italian rye grass.

California semaphore grass meadows (*Pleuropogon californicus* Provisional (Undescribed) Herbaceous Alliance). CDFW No Rank; Section 404/401 Waters(Sensitive): California semaphore grass wetlands are known throughout the Central Valley and North Coast Ranges of California (Holland 1986, Sawyer et al. 2009). Wetlands dominated by California semaphore grass are located in similar positions as common spikerush wetlands, as well as broad meadow-like wetlands within Tolay Valley. Other dominant or characteristic species in wetter areas include meadow barley, brownhead rush, and creeping wild rye, while drier portions support facultative species such as Mediterranean barley, Italian rye grass, and California oat grass (*Danthonia californica*).

Common monkeyflower seeps (*Mimulus guttatus* Herbaceous Alliance). CDFG Rank G4 S3; Section 404/401 Waters (Sensitive): Common monkeyflower seeps have been documented from the Klamath and Cascade Ranges, Sierra Nevada Foothills, Interior Coast Ranges, and Modoc Plateau (Sawyer et al. 2009); however, small patches of this alliance are relatively frequent in seep and spring areas throughout the Coast Ranges (Calflora 2013, Baldwin et al. 2012). This vegetation alliance is located adjacent to hillside seeps where strongly seasonal flows support several obligate and facultative wetland species including brass buttons, Jersey cudweed (*Pseudognaphalium luteoalbum*), slender popcorn flower, watercress, water pygmyweed (*Crassula aquatica*), rushes, and purslane speedwell.

### *3.3.5 Wildlife Values of Tolay Lake and Other Wetlands*

Tolay Lake

Tolay Lake provides an important year-round or nearly year-round water source for a variety of wildlife, from large mammals to migratory birds. Black-tailed deer, raccoon, long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), and Virginia opossum are likely to water in

and around the lake. There is no recent reported evidence of beaver (*Castor canadensis*) or river otter (*Lontra canadensis*) from Tolay Valley.

Tolay Lake is recognized as an important wintering area for migratory waterfowl (Steve Ehret pers. comm., LSA 2009b). The spatial extent and relatively shallow depth of the lake attracts ducks and other waterbirds, while the extensive vegetation provides important forage for over-wintering waterfowl. LSA (2009b) and PWA have identified eleven duck species, eight of which are dabblers, and include gadwall (*Anas strepara*), American widgeon (*Anas americana*), mallard (*Anas platyrhynchos*), cinnamon teal (*Anas cyanopera*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), green-winged teal (*Anas cracca*), canvasback (*Aythya valisineria*), greater scaup (*Aythya marila*), bufflehead (*Bucephala albeola*), and ruddy duck (*Oxyura jamaicensis*). Other birds observed in and around Tolay Lake associated water bodies include Canada goose (*Branta canadensis*), pied-billed grebe (*Podilymbus podiceps*), double-crested cormorant (*Phalacrocorax auritus*), American coot (*Fulica americana*), and Caspian tern (*Hydroprogne caspia*).

The shallow water and productive vegetation provide forage and cover for wading birds such as great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egrettia thula*), which forage along the lake edge. Egret rookeries have been observed in blue gum groves along Lakeville Highway and downtown Petaluma, which may utilize Tolay Lake among other waterbodies in southern Sonoma County. The shallower margins of the lake likely provide foraging habitat for wintering and migrating shorebirds such as killdeer (*Charadrius vociferous*), greater yellowlegs (*Tringa melanoleuca*), least sandpiper (*Calidris minutilla*), western sandpiper (*Calidris mauri*), and long-billed dowitcher (*Limnodromus scolopaceus*).

The importance of Tolay Lake as habitat for invertebrates has not been investigated, but the seasonal drawdown of the lake likely reduces macro-invertebrate diversity. Insect hatches are likely in spring and early summer, providing important forage resources for bats, swallows, and other insectivores. The lake provides suitable breeding habitat in most years for western toads and Sierran tree frogs, and California red-legged frog in protected areas when waters remain into early summer. Although American bullfrogs utilize the lake for forage and cover, breeding is unlikely due to the depth and seasonal drawdown.

Other Wetlands

Wildlife values for other wetlands are similar to those as Tolay Lake (above) and upland grasslands (Section 3.6). Many of the Park's wetlands provide water resources into late summer when water availability is at a minimum. Birds, mammals, and reptiles are expected to frequent wetlands for watering, and the associated dense vegetation provides cover. Shrews (*Sorex* spp.) and other small mammals are likely to utilize seep wetland habitat for foraging and cover, while birds such as killdeer, great egret, and Wilson's snipe (*Gallinago delicata*) are more likely to forage in wet areas than drier portions of grasslands and wildflower fields.

The wetlands within the Park provide suitable breeding, foraging, and dispersal habitat for a variety of amphibians and reptiles. Wetlands with an extended spring hydroperiod provide breeding habitat for Sierran tree frog and western toad, while connected streams and creeks provide a dispersal pathway and adjacent uplands provide estivation sites. Suitable breeding habitat for American bullfrog and California red-legged frog is present within several of the larger seasonal wetlands, vernal pools, and stock ponds. Garter snakes forage in and around meadows, seeps, and vernal pools where their prey resources, such as toads, frogs,

salamanders, and small fish, are plentiful. Southern alligator lizard and western fence lizard are frequently, though not exclusively, observed in and around wetland resources foraging, sheltering, and thermoregulating in the warmer periods of the year.

## 3.4 Riparian Areas

Riparian areas are broadly defined as vegetation assemblages associated with streams or other water bodies, predominantly composed of woody species, which is dependent upon the hydrology of the associated water body (CDFG 1994). Located throughout California, these systems provide numerous benefits to the associated water body including nutrient input, water cooling, bank stabilization, and flood control, as well as essential wildlife habitat. Within the Park, riparian areas are composed primarily of one vegetation alliance, red willow thickets, but scattered coast live oak woodlands in the upper reaches of ephemeral and intermittent streams function as riparian areas as well.

### *3.4.1 Vegetation of Riparian Woodland*

Red willow thickets (*Salix laevigata* Woodland Alliance). CDFW Rank G3 S3; (portions) Section 404/401; Section 1600 CFGC (Sensitive): Red willow thickets have been documented in reaches of the Desert, and cismontane California with the exception of the North Coast (Sawyer et al. 2009). The overstory of this community varies in height and crown, but is generally greater than 15 feet tall and wider than 30 feet. The canopy is dominated by several willow species (*Salix* spp.), with some individuals exceeding DBH of 12 inches. Larger, mature trees are located on the top of bank of Tolay Creek, Cardoza Creek, and other streams, with saplings often colonizing the lower banks and channel bottoms.

The canopy is dominated by a mix of red willow, arroyo willow (*Salix lasiolepis*), yellow willow (*S. lasiandra*), and sandbar willow (*S. exigua*), with occasional Fremont cottonwood (*Populus fremontii*), coast live oak, valley oak (*Quercus lobata*), and California buckeye. The understory is made up of scattered upright snowberry, California blackberry (*Rubus ursinus*), Himalaya blackberry, California rose (*Rosa californica*), and mugwort. Shrubs and perennial herbs of the understory are relatively scattered or absent due largely to a nearly closed canopy and/or extensive grazing.

### *3.4.2 Wildlife Values of Riparian Areas*

Riparian areas are recognized as important habitat for wildlife through the provision of cover, migration, foraging, nesting, breeding, and watering (Faber 2003), and are essential for many bird species in California (RHJV 2004). Neither LSA nor PWA observed riparian obligate passerines despite the relatively well developed riparian habitat along Tolay and Cardoza creeks (LSA 2009b). Red-winged blackbirds and song sparrows were the two most abundant birds observed within the Tolay Creek watershed, along with single to few observations of warbling vireo, orange-crowned warbler, Wilson's warblers, yellow warblers, and willow flycatcher; however, breeding of these latter species was not confirmed, which may have been migrants (LSA 2009b). Other birds that are assumed to use or were observed using riparian areas within the Park include mourning dove, Anna's hummingbird, downy woodpecker, northern flicker, black phoebe, tree swallow, bushtit, Bewick's wren, ruby-crowned kinglet (winter), hermit thrush (winter), American robin, yellow-rumped warbler (winter), spotted towhee,

California towhee, white-crowned sparrow (winter), golden-crowned sparrow (winter), and house finch.

In addition to utilization by numerous bird species, riparian canopy provides cover for migration for large mammals, and shading and cooling of stream waters for aquatic species. Direct observations of deer and coyote (*Canis latrans*) have been made in and around riparian areas along Tolay Creek, as well as raccoon tracks on the banks of Tolay Creek. Additional mammal species that are likely to frequent or utilize riparian habitat include common gray fox (*Urocyon cinereoargenteus*) and Virginia opossum.

## 3.5 Woodlands and Groves

Cismontane woodland is broadly defined as vegetation communities typically dominated by broadleaf trees with relatively open canopies located west of the Sierra Nevada crest, while closed-cone coniferous forests are stands of dense, typically even-aged, fire dependent coniferous species often associated with nutrient deficient soils (Holland 1986, CNPS 2013). These vegetation communities have been described in further taxonomic detail to the vegetation alliance level, which in the Park, includes coast live oak woodland, valley oak woodland, California bay woodland, blue gum groves, and Monterey cypress groves (Sawyer et al. 2009) (Figure 5).

Woodlands and groves are largely confined to north-facing slopes, deep stream canyons, along lower Tolay Creek, and adjacent to the Park Headquarters. Although termed "forest" in the literature (Holland 1986, Sawyer et al. 2009), the Monterey cypress dominated area may more appropriately be deemed a grove as the dominant species, Monterey cypress (*Hesperocyparis macrocarpa*) does not naturally occur in Sonoma County, and the extent of this community is limited to a few acres or less.

### *3.5.1 Vegetation of Cismontane Woodlands*

Coast live oak woodlands (*Quercus agrifolia* Woodland Alliance). CDFW Rank G5 S4 (Sensitive): Coast live oak woodlands are known throughout coastal California on a variety of substrates, topography, and microclimates (Sawyer et al. 2009). The overstory of this vegetation community dominated by coast live oak with subdominant California bay and scattered individuals of California buckeye located along lower Tolay Creek and the lower margins of tributary streams. Higher on slopes, these woodlands contain scattered individuals of Pacific madrone (*Arbutus menziesii*) and California black oak (*Quercus kelloggii*).Many coast live oak trees exceed four feet in diameter at breast height (DBH; 4.5 feet above ground), and approach 30 feet in height. LSA suggested that equivalent sized trees from Olompali State Historic Park, approximately four miles west, were less than 70 years old (LSA 2009c).

The understory of coast live oak woodlands in the northern areas of the Park tended to be dominated by herbaceous species with very little shrub cover, while those in the southern portions contained a higher proportion of shrubs. Additionally, a cursory observation of oak saplings/seedlings suggests a higher rate of regeneration in the south. This difference may be attributable to different grazing intensities in the two areas and/or the reduced accessibility of southern woodlands due steeper slopes and more extensive stands. Shrub species include upright snowberry, poison oak, California coffeeberry, and California rose. Herbaceous cover is dominated by miner's lettuce (*Claytonia perfoliata*), common bedstraw (*Galium aparine*), Pacific

sanicle (*Sanicula crassicaulis*), hedge nettle (*Stachys ajugoides*), Dutchman's pipe (*Aristolochia californica*), and white baby blue eyes (*Nemophila heterophylla*).

Valley oak woodlands (*Quercus lobata* Woodland Alliance). CDFW Rank G3 S3 (Sensitive): Much reduced from their original extent, valley oak woodlands are located in throughout the Central Valley, valleys in the Coast Ranges, and the Transverse Range where deep clay soils have accumulated (Holland 1996, Barbour et al. 2007, Sawyer et al. 2009). Located on the lower reach of Tolay Creek, this woodland or savannah is dominated by valley oak. Leaf shape suggest that many of these oaks may be hybrids between Oregon white oak (*Quercus garryana*) and valley oak, both within white oak subgenus (*Lepidobalanus*) (West Coast Watershed 2009). Individuals reach an estimated height of 40 to 50 feet, and have a DBH between two and four feet. Mistletoe (*Phoradendron serotinum*) is frequent within the crown, as are cavities from broken and dropped limbs.

Occasional tree and shrub associates include coast live oak, willows (*Salix* spp.), California rose, and coyote brush (*Baccharis pilularis*), but the understory is dominated by non-native annual grasses, horehound (*Marrubium vulgare*), and dwarf nettle (*Urtica urens*). Very little regeneration was observed within this community, but exclusion fencing and plantings (oak seedlings and willow poles) have been installed in coordination between SLT and Point Reyes Bird Observatory's (PRBO) Students and Teachers Restoring a Watershed (STRAW) project.

California buckeye woodlands (*Aesculus californica* Woodland Alliance). CDFW Rank G3 S3 (Sensitive): Isolated California buckeye woodlands are common throughout coastal California and the Sierra Nevada Foothills (Sawyer et al. 2009). Confined to several small rock outcrops, the overstory of this woodland composed solely of California buckeye. Individual trees are of average size with DBH of up to two feet, and heights less than 20 feet. Mistletoe (*Phoradendron* spp.) is prevalent in the crown, but limb loss appears minimal.

The understory is composed of large rocks, thin soils, and herbaceous species. The only shrub is low-growing poison oak, while the herb layer is dominated by weedy species including dwarf nettle, Italian thistle, and yellow star thistle.

Blue gum groves (*Eucalyptus globulus* Semi-natural Woodland Stands). CDFW No Rank (Not Sensitive): Blue gum groves are common in southern and western Sonoma County where trees were planted for shelterbelts and woodlots (Holland 1996, Sawyer et al. 2009). The Park contains several groves of planted blue gum (*Eucalyptus globulus*), with the largest located immediately west of the Park Headquarters. Trees are relatively large with heights reaching an estimated 50 to 70 feet, and DBH of four to six feet. Blue gum trees are prone to windthrow/windsnap causing a large accumulation of limbs and downed trees as well as shredded bark in lower limbs and bole forks.

The overstory of this community is dominated by a single species, blue gum, and the understory contains no shrubs and few herbs due to heavy leaf/bark litter, a dense nearly complete overstory canopy, and possibly allelopathic effect. Scattered herbs include dogtail grass (*Cynosurus echinatus*), ripgut brome (*Bromus diandrus*), and yellow bedstraw (*Galium murale*).

### *3.5.2 Vegetation of Closed-cone Coniferous Forest*

Monterey cypress groves (*Hesperocyparis macrocarpa* Semi-natural Woodland Stands). CDFW No Rank (in planted/escaped stands) (Not Sensitive): Native Monterey cypress groves are known only from relict stands on the Monterey Peninsula, but have been planted widely throughout coastal California (Holland 1986, Sawyer et al. 2009). One small grove of Monterey cypress is present along the banks of lower Tolay Creek, which may be indicative of an old homestead. Trees are large with an estimated height of 40 feet and DBH of two to 3 feet. The overstory is dominated by a single species, Monterey cypress. The understory is relatively sparse due to a dense nearly closed canopy, but includes dogtail grass, Italian thistle, miner's lettuce, and hedge nettle.

### *3.5.3 Wildlife Values of Woodlands and Groves*

Woodlands and groves throughout California provide species-rich wildlife habitat, primarily due the production of acorns and other fruits, as well as the provision of cover, nesting, and sheltered rearing areas (CalPIF 2002). Acorns are exceptionally nutritious and frequently prodigious, providing feed for numerous species of birds, and are grazed upon by black-tailed deer, western gray squirrels (*Sciurus griseus*), and feral pig (*Sus scrofa*) among other species. Feral pigs have been infrequently observed near the Park, but no recent observations of pigs within the Park have been recorded. Mature trees and snags provide potential roost sites for bat species known to occur in the region, including Yuma myotis (*Myotis yumanensis*), little brown myotis (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and pallid bat (*Antrozous pallidus*); however, none have been positively identified (LSA 2009b, LSA 2009c). Additionally, long-tailed weasel, and striped skunk are closely, but not exclusively, associated with woodlands and groves.

Herpetofauna shelter within woodlands and groves for thermo-regulation during warm periods, because evaporative pressure is reduced beneath the shaded canopy (Block and Morrison 1998). Leaf litter, downed branches, and rock outcrops provide cover and forage habitat for herpetofauna. Salamander species typically observed in California woodlands include slender salamander (*Batrachoseps attenuatus*) and arboreal salamander (*Aneides lugubris*), and common reptiles expected to inhabit or utilize woodlands and groves include the western skink (*Plestiodon skiltonianus*), southern alligator lizard (*Elgaria multicaranata*), ring-necked snake (*Diadophis punctatus*), and sharp tailed snake (*Contia tenuis*).

Dozens of birds are closely associated with and dependent upon oak woodlands. A reciprocal relationship exists between western scrub-jay and Steller's jay and oak trees which provide high quality forage in exchange for dispersal. Large trees, including oaks, provide cover and nest sites for both cup-nesting and cavity-nesting birds, and frequently utilized as cache sites by acorn woodpeckers (CalPIF 2002), and several species appear to utilized the Park's oak woodlands solely including band-tailed pigeon, Stellar's jay, oak titmouse, brown creeper, winter wren, and spotted towhee (LSA 2008b). Raptors, such as red-tailed and red-shouldered hawks, typically construct nests in large trees. In March 2006, LSA observed a pair of red-tailed hawks in courtship above an oak woodland, (LSA 2009b), and nesting behavior was observed at the Park headquarters eucalyptus grove; however, specific nest sites were not documented. Golden eagles have been observed within and around the Park (Steve Ehret pers. comm.), and may utilize large oak or blue gum trees in midslope positions for nesting, although there have been no confirmed golden eagle nests within the Park.

Grassland areas hosting high densities of wildflowers support butterflies, flies, bees, and other invertebrate pollinators. Opler's longhorn moth (*Adella oplerella*) are dependent upon cream cups (*Platystemon californicus*), which are present sporadically throughout the grasslands of the Park, with particularly dense patches in areas underlain by serpentine substrate in the southwestern portion. The larvae of silverspot butterflies or fritillaries (*Speyeria callippe*) are completely dependent upon Johnny jump-ups (*Viola pedunculata*), while the adults nectar on a variety of flowers, especially thistles and mints (*Mentha pulegium, M. arvensis, Monardella* spp.) (Shapiro and Manolis 2007).

## 3.6 Upland Grasslands and Wildflower Fields

The dominant vegetation type within the Park, valley and foothill grasses, are distinguished here from meadows by their species composition, soil texture and moisture regime, and landscape position (Figure 5). The majority of valley and foothill grassland habitat is dominated by non-native annual Mediterranean grasses introduced to California in 19th century; however, stands of remnant native grasslands and wildflowers are located throughout the Park. The once extensive native grasslands and wildflower fields diminished rapidly in California with the overgrazing by sheep and cattle followed by severe drought in the 19th century, and it is estimated that 10 percent of these habitats remain (McNaughton 1968, Jackson 1985). Consequently, native grasslands and wildflower fields frequently are considered sensitive biological resources by CDFW (CDFG 2009).

### *3.6.1 Vegetation of Valley and Foothill Grasslands (Native)*

Purple needlegrass grassland (*Stipa pulchra* Herbaceous Alliance). CDFW Rank G4 S3? (Sensitive): Purple needlegrass grasslands are known throughout the Coast Ranges, South Coast, western Transverse Range, and the Sierra Nevada Foothills (Holland 1986, Sawyer et al. 2009). These grasslands are often dominated by a suite of non-native grasses, but purple needlegrass (*Stipa pulchra*) composes ten percent or greater relative cover within these stands (Sawyer et al. 2009). Within the Park these grasslands are overwhelmingly located on slopes underlain by shallow, well-drained soils, on both west- and east-facing aspects. Additionally, extensive purple needlegrass grasslands are present on serpentine substrate in the remote southwest portion of the Park. The serpentine and shallow, non-serpentine soils may allow for purple needlegrass and other native species to compete with non-native grasses, which generally require more nitrogen than these soil types offer (Harrison 1999).

Although not completely devoid of non-native annual grasses, purple needlegrass grasslands contain relatively high densities of the native perennial grasses including purple needlegrass, foothill needlegrass (*Stipa lepida*), blue wild rye (*Elymus glaucus*), California onion grass (*Melica californica*), and California oat grass. Native forbs are typically more prevalent within these grasslands than non-native grasslands (see below), and include miniature lupine (*Lupinus bicolor*), sky lupine (*L. nanus*), and yellow and hayfield tarweeds (*Hemizonia congesta* ssp. *lutescens, H. c.* ssp. *luzulifolia*).

California oat grass prairie (*Danthonia californica* Herbaceous Alliance). CDFG Rank G4 S3 (Sensitive): California oat grass prairies are known from coastal sites in Northern and Central California, the Coast Ranges, Sierra Nevada Foothills (Holland 1986, Sawyer et al. 2009). In the Park, this community is located sporadically in Tolay Valley on clay-rich soils where it intergrades with rush wetlands (Pacific rush meadow, common rush meadow), and on coarser

textured soils of slopes where it intergrades with purple needlegrass grassland and non-native grassland habitats.

California oat grass prairies/grasslands in the lower parts of Tolay Valley are dominated by California oat grass, with a mix of meadow barley, creeping wild rye, sedges (*Carex* sp.), and rushes (*Juncus* sp.). These areas exhibit many of the same elements as meadows/moist grasslands; however, soils and or wetland hydrology were not observed and are therefore considered upland grasslands. Those areas dominated by California oat grass on hillsides contain a greater mix of upland species including purple needlegrass, foothill needlegrass, and non-native grasses.

Creeping wild rye turfs (*Elymus triticoides* Herbaceous Alliance). CDFG Rank G4 S3 (Sensitive): Creeping wild rye turfs are known from the South Coast, Humboldt Bay, the Bay Area, and Central Valley (Holland 1986, Sawyer et al. 2009). Similar to California oat grass prairie, these turfs intergrade with upland grasslands and meadows/moist grasslands, within the same topographic positions. These turfs contain a very similar suite of associated grasses as California oat grass prairies, but often are nearly a monotypic stand of creeping wild rye.

### *3.6.2 Vegetation of Wildflower Fields*

Wildlflower fields (Undocumented Herbaceous Alliances). CDFW No Rank (Not Sensitive): Mixed wildflower fields are known throughout Coastal California, the Great Valley, and Sierra Nevada Foothills, and attempts to document several specific vegetation alliances are currently underway (Holland 1986, Barbour et al. 2007, Sawyer et al. 2009). These communities are located on slopes and ridgelines, and are typically situated on shallow soils and/or soils derived from serpentine thereby limiting the competition with non-native annual grasses, and allowing for a persistent year-to-year swatch of native wildflowers. Wildflower fields within the Park are closely associated and often intergrade with purple needlegrass grassland. Three wildflower field alliances were identified within the Park, cream cup wildflower fields, Johnny jump-up wildflower fields, and mixed wildflowered fields.

As with purple needlegrass grassland, these fields contain non-native annual grasses including wild oats (*Avena* spp.), bromes (*Bromus* spp.), and barleys (*Hordeum* spp.), but the characteristic presence of native perennial and annual forbs which bloom throughout the spring and into summer, distinguish this community from native and non-native grasslands. Native perennial forbs include Johnny jump-up, California poppy (*Eschscholzia californica*), Fremont's star lily, blue-eyed grass (*Sisyrinchium bellum*), hog fennel (*Lomatium utriculatum*), and sanicles (*Sanicula bipinnata, S. bipinnatifida*). Spring annuals include miniature lupine, sky lupine, cream cups, soft blow wives (*Achyrachaena mollis*), California goldfields (*Lasthenia californica*), rusty popcornflower (*Plagiobothrys nothofulvus*), coastal tidytips (*Layia platyglossa*), Johnny-tuck (*Triphysaria eriantha* ssp. *eriantha*), owl's-clovers (*Castilleja densiflora, C. exserta*), and a variety of clovers (*Trifolium* spp.). Often overlooked, the late spring and summer blooms of annual forbs includes yellow and white hayfield tarweeds, coast tarweed (*Madia sativa*), Monterey centaury (*Zeltnera muehlenbergii*), California dwarf flax (*Hesperolinon californicum*), winecup clarkia (*Clarkia purpurea* ssp. *quadrivulnaris*), and bluehead gilia (*Gilia capitata* ssp. *capitata*).

### *3.6.3 Vegetation of Valley and Foothill Grasslands (Non-native)*

Non-native grasslands (Several Herbaceous Alliances). CDFW No Rank: Non-native grasslands are known throughout cismontane California on nearly all soil types and all topographic positions (Holland 1986, Sawyer et al. 2009). In the 19th Century, following severe drought and overgrazing, grasses from the Mediterranean region came to dominate existing native grasslands. Complete removal of woody cover in woodlands, savannahs, and scrublands can also result in a predominance of non-native annual grasslands, and historically was conducted to increase pasture and grazing lands. These grasslands are typically dominated by annual grasses, but can exhibit annual shifts in species dominance as well as can be dominated by non-native annual forbs in drought years. Because of the complex spatial and annual variability, classifying and mapping these grasslands at a given location typically only represents that year's dominant species, and therefore specific vegetation alliance are listed here, but detailed descriptions are not given (Table 3).

Non-native grassland is by far the most prevalent community within the Park, and is composed of several annual grasses including Medusa head (*Elymus caput-medusae*), wild oats, bromes, little rattlesnake grass (*Briza minor*), dogtail grass, Italian rye grass, and barleys. Non-native perennial grasses are present within these grasslands, often forming monotypic stands, and include common velvet grass (*Holcus lanatus*), dallis grass (*Paspalum dilatatum*), harding grass (*Phalaris aquatica*), and hood canary grass (*P. paradoxa*).

During drought years, non-native grasslands can exhibit a higher coverage of native and non-native forbs, including lupines, filarees, geraniums (*Geranium dissectum, G. molle*), spring vetch (*Vicia sativa*), shepherd's needle (*Scandix pectin-veneris*), and clovers (*Trifolium dubium, T. hirtum, T. subterraneum*) (Knopps and Barthell 1996). Additionally, in areas with repeated disturbance or excessive grazing, very weedy species can come to dominate these grasslands, reducing forage production and wildlife values. Aggressive invasive non-native forbs and grasses include Medusa head, black mustard, radishes (*Raphanus raphanistrum, R. sativum*), charlock, star thistles (*Centaurea calcitrapa, C. solstitialis*), milk thistle (*Silybum marianum*), rough cat's-ears (*Hypochaeris radicata*), and bristly ox-tongue.

Native forbs persist within these grasslands, but do not form substantial stands or cover. Typically, these natives are hearty perennial species, particularly geophytes that can compete with the rapid growth of non-native annual grasses in the winter and spring, and include California poppy, Ithuriel's spear (*Triteleia laxa*), soap plant (*Chlorogalum pomeridianum* var. *pomeridianum*), California checkerbloom (*Sidalcea malviflora* ssp. *laciniata*), Fremont's star lily, blue-eyed grass, Johnny jump-up, and hillside morning glory (*Calystegia subacaulis* ssp. *subacaulis*).

### *3.6.4 Wildlife Values of Upland Grasslands and Wildflower Fields*

Grasslands dominate the landscape of the Park, and therefore provide the largest, contiguous habitat for wildlife. Dozens of common bird species forage in grasslands and several may ground nest including western meadowlark. Grasshopper sparrows and horned larks may breed in and around the grasslands of Park based on behavior observed by LSA (2009b, 2009c). These species are more restricted in their distribution than many common grassland bird species and therefore their presence suggest relatively high quality grassland habitat of varying structure. Raptors forage over grasslands for small mammals, birds, and insects. Observed or assumed present raptor species within the Park include red-tailed hawk, northern

harrier, white-tailed kite, American kestrel, great horned owl, and barn owl. Other local bird species closely associated with grasslands include turkey vulture, loggerhead shrike, western kingbird, Say's phoebe, American crow, Savannah sparrow, and red-winged blackbird. A fairly recent introduction to California, wild turkeys typically utilize meadows and grasslands adjacent to woodlands for foraging and courtship.

Carnivorous mammals such as coyote and bobcat (*Lynx rufus*) forage widely in grasslands for small mammals and herpetofauna. Black-tailed deer and black-tailed jackrabbit (*Lepus californicus*) forage throughout every type of grassland, sheltering in adjacent woodlands or rock outcrops, and California ground squirrels (*Spermophilus beecheyi*) create extensive burrow networks which are utilized by reptiles, amphibians, insects, arachnids, and mollusks. Other small mammals such as deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californica*), Botta's pocket gopher (*Thomomys bottae*), and western harvest mouse (*Reithrodontomys megalotis*) are assumed present within the grasslands of the Park.

Black-tailed jackrabbit, California ground squirrel (*Spermophilis beecheyi*), and other small mammals constitute major prey species for raptors, coyotes, foxes, and bobcat. LSA (2009b, 2009c) did not observe excessive numbers of California ground squirrel (*Spermophilis beecheyi*) despite plentiful habitat; however, Jenette Cardoza, the former owner of the Cardoza Ranch, has observed natural fluctuations in their population numbers (Steve Ehret pers. comm.). The paucity of numbers observed by LSA may suggest a natural population trough from predation or other factors.

Common reptiles typically found in grasslands in this region include western fence lizards, Northern Pacific rattlesnake (*Crotalus oreganus oreganus*), common garter snake (*Thamnophis sirtalis*), gopher snakes, and northern American racers (*Coluber constrictor*). Grassland areas adjacent to seasonal wetlands in this area could also support northern Sierran tree frog and western toad.

## 3.7 Rock Outcrops

Rock outcrops can consist of boulder fields overlying and interspersed with shallow soils as well as large emerging rocks from shallow to deep soil. Organic debris combines with mineral soil in rock fissures to provide a rooting matrix for many shrubs and native forbs. Natural rock outcrops are located throughout the Park, particularly on the West Ridge, as well as historic rock walls, which function similarly to rock outcrops, on the East Ridge (Figure 5). These features often provide cover and nesting habitat for wildlife and host a rich flora. While several large rock outcrops are located in coast live oak woodlands and California buckeye woodlands, poison oak scrub is predominant vegetation alliance associated with these features within the Park, particularly when located in a larger grassland mosaic.

### *3.7.1 Vegetation of Rock Outcrops (Coastal Scrub)*

Poison oak scrubs (*Toxicodendron diversilobum* Shrubland Alliance). CDFW Rank G4 S4: Poison oak scrubs are located throughout cismontane California in the Coast Ranges, Sierra Foothills, and western Transverse Range (Holland 1986, Sawyer et al. 2009). Although not uniquely associated with rock outcrops, these scrubs are often closely associated with exposed sandstone and chert outcrops, as well as rock walls in coastal Sonoma and Marin counties. The dominant shrub species is poison oak, but scattered individuals of sticky monkey (*Mimulus aurantiacus*), upright snowberry (*Symphoricarpos albus*), California rose, California coffeeberry

are located throughout this community. The herbaceous layer is generally richer than surrounding habitats, and composed of fiddleneck (*Amsinckia menziesii, A. intermedia*), shooting stars (*Dodecatheon hendersonii*), California polypody (*Polypodium californicum*), California maidenhair fern (*Adiantum jordanii*), coffee fern (*Pellaea andromedifolia*), gold back fern (*Pentagramma triangularis*), winecup clarkia, woodland star (*Lithophragma affine*), phacelia (*Phacelia* sp.), wild cucumber (*Marah fabacea*), soap plant, and Dutchman's pipe.

### *3.7.2 Wildlife Values of Rock Outcrops*

A variety of fossorial mammals and bird species have been observed utilizing rock outcrops. The prominent function offered by these features, particularly in surrounding grassland habitat, provides perches for lookout and calling. The fissures within the rock and friable soil are common densities for California ground squirrels (*Spermophilis beechyi*), and burrowing owls (*Athene cunicularia*) have been observed in and around rock outcrops. Western fence lizards (*Scleroporus occidentalis*) are a ubiquitous siting in and around rock outcrops where they can take shelter and thermo-regulate in shaded fissures during warm temperatures, and capture radiant heat in cooler temperatures.

Predators such as coyote and bobcat often stalk fossorial mammal prey in and around rock outcrops, and mountain lion (*Puma concolor*) may use larger, shrubby or wooded outcrops within the Park to ambush prey.

The generally dense wildflower displays in and around rock outcrops provide nectaring and larval host support for a variety of butterflies and moths, and the presence of Dutchman's pipe in more shaded positions around coast live oak woodlands, presumably provides larval food for the pipevine swallowtail (*Battus philenor*).

## 4.0 SPECIAL-STATUS SPECIES

### 4.1 Special-status Species Definition

Special-status species include those plants and wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA). These acts afford protection to both listed species and species proposed for listing. In addition, CDFW Species of Special Concern, which are species that face extirpation in California if current population and habitat trends continue, USFWS Birds of Conservation Concern, and CDFG special-status invertebrates are all considered special-status species. Although CDFG Species of Special Concern generally have no special legal status, they are given special consideration under the California Environmental Quality Act (CEQA). In addition to regulations for special-status species, most birds in the United States, including non-status species, are protected by the Migratory Bird Treaty Act of 1918. Under this legislation, destroying active nests, eggs, and young is illegal.

Plant species included within the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (Inventory) with California Rare Plant Rank (Rank) of 1 and 2 are also considered special-status plant species and must be considered under CEQA. Very few Rank 3 or Rank 4 plants meet the definitions of Section 1901 Chapter 10 of the Native Plant Protection

Act or Sections 2062 and 2067 of the CDFG Code that outlines the California Endangered Species Act. However, CNPS and CDFW strongly recommend that these species be fully considered during the preparation of environmental documentation relating to CEQA, and have therefore been included here. Additionally, regionally significant plants and/or plants with particular wildlife values are those species that otherwise do not have formal legal protection, but may be considered sensitive by local agencies or organizations. While no formal list exists on the Milo Baker CNPS Chapter, Sonoma County planning documents, or other organizations, regionally significant plant species and plants with specific wildlife values were assessed based on herbarium records from Harvard (2013), the Consortium of California Herbaria (CCH 2013), and Sonoma State Herbarium as partially transcribed in *A Flora of Sonoma County* (Best et al. 1996). Section 6 describes the regulatory context of special-status species in greater detail.

## 4.2 Special-status Plant Species

Initially, it was determined that 34 special-status plant species have the potential to occur within the park (LSA 2009b, LSA 2009c). Following site visits, this number was revised to 33 species, with the site lacking suitable habitat for the remaining species. The number and list of species returned from the initial (2006) database queries were not previously reported. The updated database query returned 73 special-status plant species within the 12 quadrangle search area (CDFW 2013a, CNPS 2013, USFWS 2013). An updated assessment of all 73 special-status plant species is included in Appendix B. The species initially evaluated, and/or with the potential to occur, and/or were observed during the 2006-2008 surveys are detailed below. Locations of all special-status plant species observed in the Park to-date are included in Figure 6.

### *4.2.1 Special-status Plant Species Observed within the Park*

LSA documented three special-status plant species, fragrant fritillary, Lobb's aquatic buttercup, and marsh death zigadene (*Toxicoscordion fontanum*). Initially, Marin western flax (*Hesperolinon congestum*) was reported from the southeast portion of the Park; however, closer examination at the Jepson herbarium resulted in a revised identification to the common species, California western flax. Additionally, Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*) may have been observed by LSA within the Park, but this species is very difficult to distinguish from the more common, Kellogg's yampah (*Perideridia kelloggii*), and positive identification was not confirmed.

Fragrant fritillary (*Fritillaria liliacea*). CNPS Rank 1B. High Potential (Present): Fragrant fritillary is a low-growing, bulbiferous perennial forb in the lily family (Liliaceae) that blooms from February to April. It typically occurs in open, grassy areas in valley and foothill grassland, coastal scrub, and coastal prairie habitat at elevations ranging from 10 to 1345 feet (CDFW 2013a, CNPS 2013). Soil survey data at known locations suggest that this species is typically located on moderately acidic (pH 5.8) to neutral (pH 6.7) clay loams to clays derived from volcanics or serpentine (CDFW 2013a, CSRL 2013). This species has a serpentine affinity rank of weak indicator (1.8) (Safford et al. 2005). Observed associated species include soap plant, coyote brush, purple needlegrass, California oat grass, large flowered star tulip (*Calochortus uniflorus*), California buttercup (*Ranunculus californicus*), sun cups (*Taraxia ovata*), shooting stars, needleleaf pincushion plant (*Navarretia intertexta*), one-sided bluegrass (*Poa secunda*), and Greene's popcornflower (*Plagiobothrys greenei*) (CDFW 2013a).

Fragrant fritillary is documented from 38 USGS 7.5-minute quadrangles in Alameda, Contra Costa, Marin, Monterey, San Benito, Santa Clara, San Francisco, San Mateo, Solano, and Sonoma counties (CNPS 2013). There are ten CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and six CCH (2013) records from Sonoma County. Fragrant fritillary was assessed to have a high potential to occur in the Park due the presence of clay substrate derived from serpentine soils and the relative location of documented occurrences. In 2006 and 2008, hundreds of individuals were observed in two populations on northeast-facing slope underlain by Diablo clay in the northwest portion of the Park (Figure 6).

Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*). CNPS Rank 4. Moderate Potential (Possibly Present): Gairdner's yampah is a perennial forb in the carrot family (Apiaceae) that blooms from June to October. It typically occurs in vernally mesic areas within broadleaf upland forest, chaparral, coastal prairie, valley and foothill grassland, and vernal pool habitat at elevations ranging from 0 to 1985 feet (CNPS 2013, Baldwin et al. 2012). This species is a facultative (FAC) plant (Lichvar 2012), and is known from vernal pool habitat in some regions of California, but is generalist in others (Keeler-Wolf et al. 1998). Observed associated species are not reported in the literature.

Gairdner's yampah has been documented from eight USGS 7.5-minute quadrangles, but is known from Contra Costa, Kern, Los Angeles, Marin, Mendocino, Monterey, Napa, Orange, San Benito, Santa Clara, Santa Cruz, Santa Clara, San Diego, San Luis Obispo, San Mateo, Solano, and Sonoma counties (CNPS 2013). There are no CNDDB (CDFW 2013a) records from the greater vicinity of the Park, and 24 CCH (2013) records from Sonoma County. Gairdner's yampah was assessed to have a moderate potential to occur within the Park due the presence of mesic grassland and seasonal wetland habitat. This species is very difficult to distinguish from the more common, Kellogg's yampah (*Perideridia kelloggii*), and positive identification was not confirmed.

Lobb's aquatic buttercup (*Ranunculus lobbii*). CNPS Rank 4. High Potential (Present): Lobb's aquatic buttercup is annual aquatic forb in the buttercup family (Ranunculaceae) that blooms from February to May. It typically occurs in vernally wet areas within cismontane woodland, North Coast coniferous forest, valley and foothill grassland, and vernal pool habitat at elevations ranging from 45 to 1530 feet (CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is known from vernal pool habitat in some regions of California, but is generalist in others (Keeler-Wolf et al. 1998). Observed associated species include mosquito fern (*Azolla filiculoides*), western mannagrass, pale spike-rush, iris-leaf rush (*Juncus xiphioides*), common monkeyflower, calico flowers (*Downingia* spp.), perennial rye grass, meadow barley, and Mediterranean barley (personal observation 2010, 2011, 2012).

Lobb's aquatic buttercup is known from nine USGS 7.5-minute quadrangles in Alameda, Contra Costa, Marin, Mendocino, Napa, Santa Cruz, San Mateo, Solano, and Sonoma counties (CNPS 2013). There are no CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and 18 CCH (2011) records from Sonoma County. Lobb's aquatic buttercup was assessed to have a high potential to occur within the Park due to the presence of seasonal wetland habitat and stock ponds, and the presence of the associated species. In 2006-2008, Lobb's aquatic buttercup was observed in vernal pools, seasonal depressions at hillside slumps, and stock ponds on the western ridgeline of the Park, and the large seasonal pond adjacent to Highway 121 (Figure 6).

Marsh zigadene (*Toxicoscordion fontanum*). CNPS Rank 4. High Potential (Present): Marsh zigadene is a bulbiferous perennial forb in the false-helleborine family (Melanthiaceae) that blooms from April to July. It typically occurs in vernally mesic areas underlain by clay substrate derived from serpentine in chaparral, cismontane woodland, lower montane coniferous forest, meadow and seep, and marsh and swamp habitat at elevations ranging from 45 to 3250 feet (CNPS 2013, CDFW 2013a). This species is an obligate (OBL) wetland plant (Lichvar 2012), and has a serpentine affinity rank of broad endemic/strong indicator (3.8) (Safford et al. 2005). Observed associated species include non-native annual grasses (e.g., soft chess, Mediterranean barley, Italian rye grass, meadow barley, western mannagrass, California oat grass, and fragrant fritillary (personal observation 2011).

Marsh zigadene is known from Lake, Marin, Mendocino, Monterey, Napa, San Benito, Santa Cruz, San Luis Obispo, San Mateo, and Sonoma counties, but is only documented from three USGS 7.5-minute quadrangles (CNPS 2013). There are no CNDDB (CDFW 2013a) records from the greater vicinity of the Park, and no CCH (2013) records from Sonoma County. Marsh zigadene was assessed to have a high potential to occur within the Park due to the presence of serpentine seep habitat. A few marsh zigadene individuals were observed along a tributary to Tolay Creek in the southeast portion of the Park (Figure 6).

### *4.2.2 Special-status Plant Species with the Potential to Occur in the Park, but not Observed*

Twenty-nine special-status plant species have the potential to occur in the park, but were not observed during surveys and site visits conducted in 2006, 2007, 2008, and 2013. Although these species were not observed, they should be considered to have the potential to occur as the surveys, though extensive, were not protocol-level and recent colonization is possible.

Franciscan onion (*Allium peninsulare* var. *franciscanum*). CNPS Rank 1B. Moderate Potential: Franciscan onion is a perennial forb in the lily family (Liliaceae) that blooms from May to June. It typically occurs on dry hillsides underlain by clay substrate, often derived from serpentine, in cismontane woodland and valley and foothill grassland habitat at elevations ranging from 165 to 975 feet (CDFW 2013a, CNPS 2013). This species has a serpentine affinity rank of weak indicator (1.8) (Safford et al. 2005). Observed associated species include California bay, California buckeye, coast live oak, leather oak (*Quercus durata*), and purple needlegrass (CDFW 2013a).

Franciscan onion is known from ten USGS 7.5-minute quadrangles in Mendocino, Santa Clara, San Mateo, and Sonoma counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and five CCH (2013) records from Sonoma County. Franciscan onion has a moderate potential to occur within the Park due to the presence of serpentine substrate, and associated species; however, this species was not observed during plant surveys in 2006, 2007, and 2008.

Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*). Federal Endangered, CNPS Rank 1B. Moderate Potential: Sonoma alopecurus is a perennial herb in the grass family (Poaceae) that blooms from May to July. It typically occurs in wet areas in freshwater marsh and riparian habitat at elevations ranging from 15 to 1200 feet (CDFW 2013a). Soil survey data at known locations in Sonoma County suggest that this species is typically located on moderately strongly acid (pH 5.0) to neutral (pH 6.7) loams, often mixed with larger textures derived from sandstone or other sedimentary rock (CDFW 2013a, CSRL 2012). This species is an obligate (OBL) wetland plant (Lichvar 2012), with no vernal pool indicator status (Keeler-Wolf et al. 1998).

Observed associated species include rushes (*Juncus* spp.), sedges (*Carex* spp.), rabbit's-foot grass, water pepper (*Piperia hydropiperoides*), western mannagrass, water parsley (*Oenanthe sarmentosa*), and false manna grass (*Torreyochloa pallida*) (CDFW 2013a).

Sonoma alopecurus is known from eight USGS 7.5-minute quadrangles in Marin and Sonoma counties (CNPS 2013). There is one CNDDB (CDFW 2013a) record in the greater vicinity of the Park, and six CCH (2013) records from Sonoma County. Sonoma alopecurus has a moderate potential to occur within the Park due to the presence of perennial wetland habitat, and some associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Napa false indigo (*Amorpha californica* var. *napensis*). CNPS Rank 1B. Moderate Potential: Napa false indigo is a small deciduous tree in the pea family (Fabaceae) that blooms from April to July, with identifiable vegetative structures remaining into early fall. It typically occurs on north-facing aspects in openings in broadleaf upland forest, chaparral, and cismontane woodland habitat at elevations ranging from 395 to 6560 feet (CDFW 2013a, CNPS 2013). Soil survey data at known locations in Sonoma County suggest that this species is typically located on moderately acid (pH 5.6) to neutral (pH 6.7) loams, often mixed with larger textures derived from a variety of orogeny (CDFW 2013a, CSRL 2012). Observed associated species include California bay, black oak, coast live oak, Douglas fir (*Pseudotsuga menziesii*), tanoak (*Notholithocarpus densiflorus*), Pacific madrone, California hazelnut (*Corylus cornuta* var. *californica*), ocean spray (*Holodiscus discolor*), poison oak, wood fern (*Dryopteris arguta*), bracken fern (*Pteridium aquilinum*), wood rose (*Rosa gymnocarpa*), and rein orchid (*Piperia transversa*) (CDFW 2013a).

Napa false indigo is known from 21 USGS 7.5-minute quadrangles in Marin, Monterey, Napa, and Sonoma Counties (CNPS 2013). There are nine CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and eight CCH (2013) records from Sonoma County. Napa false indigo has a moderate potential to occur in the Park due to the presence of shaded woodland with associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Bent-flowered fiddleneck (*Amsinckia lunaris*). CNPS Rank 1B. Moderate Potential: Bent-flowered fiddleneck is an annual forb in the forget-me-not family (Boraginaceae) that blooms from March to June. It typically occurs in open areas within cismontane woodland, valley and foothill grassland, and coastal bluff scrub habitat often underlain by clay substrate at elevations ranging from 10 to 1625 feet (CDFW 2013a, CNPS 2013, Hickman 1993). Observed associated species include coast live oak, blue oak (*Quercus douglasii*), California juniper (*Juniperus californicus*), buck brush (*Ceanothus cuneatus*), poison oak, miniature lupine, foothill lotus (*Acmispon brachycarpus*), calf lotus (*A. wrangelianus*), fringe pod (*Thysanocarpus curvipes*), q-tips (*Micropus californicus*), cream cups, slender tarweed (*Madia gracilis*), common yarrow (*Achillea millefolium*), goldenback fern, one-sided bluegrass, woolly sunflower (*Eriophyllum lanatum*), and slender wild oat (*Avena barbata*) (CDFW 2013a).

Bent-flowered fiddleneck is known from 35 USGS 7.5-minute quadrangles in Alameda, Contra Costa, Colusa, Lake, Marin, Napa, San Benito, Santa Clara, Santa Cruz, San Mateo, and Yolo counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and one CCH (2013) record from Sonoma County. Bent-flowered fiddleneck has a moderate potential to occur within the Park due the presence of open woodland and grassland

habitat with associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Alkali milk-vetch (*Astragalus tener* var. *tener*). CNPS Rank 1B. Moderate Potential: Alkali milk-vetch is an annual herb in the pea family (Fabaceae) that blooms from March to June. It typically occurs on low ground in alkali flats and flooded lands in alkali playa, valley and foothill grassland, and vernal pool habitat at elevations ranging from 0 to 200 feet (CDFW 2013a, CNPS 2013). This species is a facultative wetland (FACW) plant (Lichvar 2012), and is regularly known from vernal pool habitat, but may occur in other wetland habitat types (Keeler-Wolf et al. 1998). Observed associated species include docks, rough cocklebur, spiny cocklebur, bird's-foot trefoil (*Lotus corniculatus*), Mediterranean barley, Italian rye grass, harvest brodiaea (*Brodiaea elegans*), slender popcornflower, woolly marbles (*Psilocarphus tenellus*), salt grass (*Distichlis spicata*), mousetail (*Myosurus minimus*), and alkali heath (CDFW 2013a).

Alkali milk-vetch is known from 35 USGS 7.5-minute quadrangles in Alameda, Contra Costa, Merced, Monterey, Napa, San Benito, Santa Clara, San Francisco, San Joaquin, Solano, Sonoma, Stanislaus, and Yolo counties (CNPS 2013). There are three CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and one CCH (2013) record from Sonoma County. Alkali milk-vetch has a moderate potential to occur within the Park due to the presence of seasonal wetland habitat with some associated species; however, this species is closely associated with vernal pools with high pH, and it was not observed during plant surveys conducted during 2006, 2007, and 2008.

Sonoma sunshine (*Blennosperma bakeri*). Federal Endangered, State Endangered, CNPS Rank 1B. Moderate Potential: Sonoma sunshine is an annual herb in the sunflower family (Asteraceae) that blooms from March to May. It typically occurs on heavy clay soils in vernally wet areas in vernal pool, and valley and foothill grassland habitat (CDFW 2013a, CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include California semaphore grass, bractless hedge hyssop (*Gratiola ebracteata*), Douglas' mesamint (*Pogogyne douglasii*), calico flowers, slender popcornflower, goldfields, common monkeyflower, lady's-thumb (*Persicaria maculosa*), tidy tips, white hyacinth (*Triteleia hyacinthina*), meadowfoams (*Limnanthes* spp.), and non-native annual grasses (CDFW 2013a).

This species is known from seven USGS 7.5-minute quadrangles in Sonoma County (CNPS 2013). There are eight CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and 30 CCH (2013) records from Sonoma County. Sonoma sunshine has a moderate potential to occur within the park due the presence of seasonal wetland habitat with some associated species; however, this species is closely associated with vernal pools on the Santa Rosa Plain and Valley of the Moon, and it was not observed during plant surveys conducted during 2006, 2007, and 2008.

Round-leaved filaree (*California macrophylla*). CNPS Rank 1B. Moderate Potential: Round-leaved filaree is an annual forb in the geranium family (Geraniaceae) that blooms from March to May. It typically occurs on clay to loamy clay substrates in cismontane woodland, and valley and foothill grassland habitat at elevations ranging from 50 to 3900 feet (CDFW 2013a, CNPS 2013). Observed associated species include coast live oak, shiny pepperweed (*Lepidium nitidum*), blue dicks (*Dichelostemma capitatum*), fiddleneck, tomcat clover (*Trifolium willdenovii*),

showy madia (*Madia radiata*), one-sided bluegrass, and wild parsley (*Apiastrum angustifolium*) (CDFW 2013a).

Round-leaved filaree is known from 126 USGS 7.5-minute quadrangles in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Lassen, Los Angeles, Merced, Monterey, Napa, Riverside, Santa Barbara, San Benito, Santa Clara, San Diego, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, Stanislaus, Tehama, Tulare, and Yolo counties (CNPS 2013). There is one CNDDB (CDFW 2013a) within the greater vicinity of the Park, and two CCH (2013) records from Sonoma County. Round-leaved filaree has a moderate potential to occur within the Park due to the presence of clay-rich soils and grassland with some associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*). Federal Endangered, State Threatened, CNPS Rank 1B. Moderate Potential: Tiburon paintbrush is a hemiparasitic perennial forb in the broomrape family (Orobanchaceae) that blooms from April to June. It typically occurs in dry slopes on rocky serpentine substrate in valley and foothill grassland habitat at elevations ranging from 195 to 1300 feet (CDFW 2013a, CNPS 2013, Hickman 1993). This species has a serpentine affinity rank of strict endemic (6.1) (Safford et al. 2005). Observed associated species include soap plant, long-tubed iris (*Iris macrosiphon*), California onion grass, Torrey's onion grass (*Melica torreyana*), hayfield tarweed, woolly sunflower, musk brush (*Ceanothus jepsonii*), Marin dwarf flax, and Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*) (CDFW 2013a).

Tiburon paintbrush is known from five USGS 7.5-minute quadrangles in Marin, Napa, and Santa Clara counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and no CCH (2013) records in Sonoma County. Tiburon paintbrush has a moderate potential to occur within the Park due to the presence of serpentine grassland with some associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Pappose tarplant (*Centromadia parryi* ssp. *parryi*). CNPS Rank 1B. Moderate Potential: Pappose tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from May to November. It typically occurs in vernally mesic, often alkaline areas in coastal prairie, meadow, seep, coastal salt marsh, and valley and foothill grassland habitat at elevations ranging from 5 to 1380 feet (CDFW 2013a, CNPS 2013). This species is a facultative wetland (FACW) plant (Lichvar 2012), and is a vernal pool generalist (Keeler-Wolf et al. 1998). Observed associated species include bristly ox-tongue, wild radish, foxtail fescue (*Festuca myuros*), willow leaf dock (*Rumex salicifolius*), toad rush (*Juncus bufonius*), Italian rye grass, Mediterranean barley, salt grass, alkali heath, perennial pepperweed (*Lepidium latifolium*), yellow star thistle, alkali mallow (*Malvella leprosa*), and alkali weed (*Cressa truxillensis*) (CDFW 2013a).

Pappose tarplant is known from 17 USGS 7.5-minute quadrangles in Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, and Sonoma counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Parks, and three CCH (2013) records from Sonoma County. Pappose tarplant has a moderate potential to occur within the Park due to the presence of grassland habitat with many associated species; however, this species is typically

located in an alkali grassland-coastal brackish marsh ecotone, and was not observed during plant surveys conducted in 2006, 2007, and 2008.

Dwarf downingia (*Downingia pusilla*). CNPS Rank 2. Moderate Potential: Dwarf Downingia is an annual herb in the harebell family (Campanulaceae) that blooms from March to May. It typically occurs on mesic sites of vernal lake and pool margins in valley and foothill grassland, and vernal pool habitat at elevations ranging from 0 to 1460 feet (CDFW 2013a, CNPS 2013, Baldwin et al. 2012). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is regularly known from vernal pool habitat, but may occur in other wetland habitat types (Keeler-Wolf et al. 1998). Observed associated species include spotted throat calico flower (*Downingia concolor*), California oat grass, Lobb's buttercup, coyote thistle (*Eryngium aristulatum*), dodder (*Cuscuta* spp.), tricolor monkeyflower (*Mimulus tricolor*), bractless hedge hyssop, Douglas' mesamint, California semaphore grass, meadowfoams, and non-native annual grasses (CDFW 2013a).

Dwarf downingia is known from 42 USGS 7.5-minute quadrangles in Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba Counties, and is known from the continent of South America (CNPS 2013). There are six CNDDB (CDFW 2013a) records within the greater vicinity of the Park, and 16 CCH (2013) records from Sonoma County. Dwarf downingia has a moderate potential to occur in the Park due the presence of seasonal wetland habitat with associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*). CNPS Rank 1B. Moderate Potential: Tiburon buckwheat is an annual forb in the buckwheat family (Polygonaceae) that blooms from May to September. It typically occurs in chaparral, valley and foothill grassland, cismontane woodland, and coastal prairie habitat at elevations ranging from 0 to 2275 feet (CDFW 2013a, CNPS 2013). Soil survey data at known locations suggest that this species is typically located on very slightly acidic to neutral (pH 6.7 to pH 7.2) unweathered bedrock to stony clay loams derived from serpentine (CDFW 2013a, CSRL 2013). This species has a serpentine affinity rank of strict endemic (6.2) (Safford et al. 2005). Observed associated species include purple needlegrass, squirrel tail (*Elymus elymoides*), California onion grass, blue-eyed grass, California poppy, woolly lessingia (*Lessingia hololeuca*), and ocean spray (CDFW 2013a).

Tiburon buckwheat is known from eight USGS 7.5-minute quadrangles in Alameda, Contra Costa, Marin, and Sonoma counties (CNPS 2013). There are four CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and one CCH (2013) record from Sonoma County. Tiburon buckwheat has a moderate potential to occur in the Park due to the presence of serpentine grassland and outcrops with associated species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

White hayfield tarplant (*Hemizonia congesta* ssp. *congesta*). CNPS Rank 1B. High Potential: White hayfiedl tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from April to November. It typically occurs in grassy areas and fallow fields in coastal scrub, and valley and foothill grassland at elevations ranging from 65 to 1840 feet (CDFW 2013a, CNPS 2013). This species has a serpentine affinity rank of weak indicator / indifferent (1.3) (Safford et al. 2005). Observed associated species include coast live oak, white hyacinth, Italian rye grass, little rattlesnake grass, pennyroyal, and spiny-fruited buttercup (CDFW 2013a).

White hayfield tarplant is known from 23 USGS 7.5-minute quadrangles in Marin, Mendocino, San Francisco, San Mateo, and Sonoma counties (CNPS 2013). There are seven CNDDB (CDFW 2013a) records in the greater vicinity of the Park, 71 CCH (2013) records from Sonoma County. White hayfield tarplant has a high potential to occur in the Park due to the presence of grassland habitat, and the presence of documented occurrences within the local vicinity; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Marin western flax (*Hesperolinon congestum*). Federal Threatened, State Threatened, CNPS Rank 1B. Moderate Potential: Marin western flax is an annual forb in the flax family (Linaceae) that germinates in early spring, blooms from April to July, and senesces by mid-summer. It typically occurs in serpentine grassland, scrub, or barrens in chaparral and valley and foothill grassland habitat at elevations ranging from 15 to 1205 feet (CDFW 2013a, CNPS 2013). This species has a serpentine affinity rank of strict endemic (6.1) (Safford et al. 2005). Observed associated species include leather oak, chamise (*Adenostoma fasciculatum*), Mt. Tamalpais manzanita (*Arctostaphylos montana* ssp. *montana*), wicker stem buckwheat (*Eriogonum vimineum*), Tiburon buckwheat, pitted onion (*Allium lacunosum*), farewell to spring (*Clarkia amoena*), yellow mariposa lily (*Calochortus luteus*), hairy gumweed (*Grindelia hirsutula*), rancheria clover (*Trifolium albopurpureum*), sandwort (*Minuartia douglasii*), small-flower western flax (*Hesperolinon micranthum*), Marin county navarretia (*Navarretia rosulata*), purple needlegrass, California onion grass, and Torrey's onion grass (CDFW 2013a).

Marin western flax is known from ten USGS 7.5-minute quadrangles in Marin, San Francisco and San Mateo counties (CNPS 2013). There are five CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and no CCH (2013) records from Sonoma County. Marin western flax was reported from the southeast portion of the Park; however, closer examination at the Jepson herbarium resulted in a revised identification to the common species, California western flax. Although California western flax does not have a federal, state, or CNPS listing, the discovery of this species within the Park is no less significant. This discovery is only the second documented case of California western flax from Sonoma County, both of which are on serpentine substrates (CCH 2013, Best et al. 1996).

Burke's goldfields (*Lasthenia burkei*). Federal Endangered, State Endangered, CNPS Rank 1B. Moderate Potential: Burke's goldfields are annual herbs in the sunflower family (Asteraceae) that bloom from April to June. They typically occur in mesic portions of pools and swales in meadow, seep, and vernal pool habitat at elevations ranging from 45 to 1970 feet (CDFW 2013a, CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include Italian rye grass, Mediterranean barley, California semaphore grass, California oat grass, meadowfoams, goldfields, and rushes (CDFW 2013a).

Burke's goldfields are known from twelve USGS 7.5-minute quadrangles in Lake, Mendocino, Napa, and Sonoma Counties (CNPS 2013). There is one CNDDB (CDFW 2013a) record in the greater vicinity of the Park, and 25 CCH (2013) records from Sonoma County. Burke's goldfields have a moderate potential to occur in the Park due to the presence of seasonal wetland habitat with some associated plant species; however, this species is closely associated with valley bottom vernal pools, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Contra Costa goldfields (*Lasthenia conjugens*). Federal Endangered, CNPS Rank 1B. Moderate Potential: Contra Costa goldfields are annual herbs in the sunflower family (Asteraceae) that bloom from March to June. They typically occur in vernally saturated areas in pools, depressions, and swales of open grassy areas in valley and foothill grassland, vernal pool, and cismontane woodland habitat at elevations ranging from 0 to 470 feet (CDFW 2013a, CNPS 2013). This species is a facultative wetland (FACW) plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include Italian rye grass, Mediterranean barley, woolly marbles (*Psilocarphus* spp.), slender popcornflower, legenere (*Legenere limosa*), smooth goldfields, yellow rayed goldfields (*Lasthenia glabrata*), California semaphore grass, calico flowers, and brass buttons (CDFW 2013a).

Contra Costa goldfields are known from 24 USGS 7.5-minute quadrangles in Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma Counties (CNPS 2013). There are four CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and one CCH (2013) record from Sonoma County. Contra Costa goldfields have a moderate potential to occur in the Park due to the presence of seasonal wetland habitat with some associated plant species; however, this species is closely associated with alkali valley bottom vernal pools, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Legenere (*Legenere limosa*). CNPS Rank 1B. Moderate Potential: Legenere is an annual forb in the harebell family (Campanulaceae) that blooms from April to June. It typically occurs in the lower portions of vernal pool habitat at elevations ranging from 0 to 2890 feet (CDFW 2013a, CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include needle spikerush (*Eleocharis acicularis*), water chickweed, goldfields (*Lasthenia* spp.), meadowfoams, and non-native annual grasses (CDFW 2013a).

Legenere is known from 33 USGS 7.5-minute quadrangles in Alameda, Lake, Napa, Placer, Sacramento, Santa Clara, Shasta, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba Counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and no CCH (2013) records from Sonoma County. Legenere has a moderate potential to occur in the Park due to the presence of seasonal wetland habitat with some associated plant species; however, this species is closely associated with valley bottom vernal pools, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Bristly Leptosiphon (*Leptosiphon acicularis*). CNPS Rank 4. Moderate Potential: Bristly leptosiphon is an annual forb in the phlox family (Polemoniaceae) that blooms from April to July. It typically occurs in chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland habitat at elevations ranging from 175 to 4875 feet (CNPS 2013). Observed associated species include bird's-eyes (*Gilia tricolor*), true babystars (*Leptosiphon bicolor*), redstem filaree (*Erodium cicutarium*), purple needlegrass, European hair grass (*Aira caryophyllea*), foothill lotus, Spanish lotus (*Acmispon americanus*), and miniature lupine (personal observation 2012).

Bristly leptosiphon is known from nine USGS 7.5-minute quadrangles in Alameda, Butte, Contra Costa, Fresno, Humboldt, Lake, Marin, Mendocino, Napa, Santa Clara, San Mateo, and Sonoma counties (CNPS 2013). There are no CNDDB (CDFW 2013a) records within the greater vicinity of the Park, and seven CCH (2013) records from Sonoma County. Bristly

Leptosiphon has a moderate potential to occur within the Park dur to the presence of associated species and vegetation communities; however, this species is typically associated with hillside "shoulders" with very shallow soils, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Jepson's Leptosiphon (*Leptosiphon jepsonii*). CNPS Rank 1B. Moderate Potential: Jepson's Leptosiphon is an annual herb in the phlox family (Polemoniaceae) that blooms from March to May. It typically occurs in open to partially shaded areas on volcanic or serpentine substrate in chaparral and cismontane woodland habitat at elevations ranging from 325 to 1640 feet (CDFW 2013a, CNPS 2013). Observed associated species include California bay, coast live oak, chamise, toyon (*Heteromeles arbutifolia*), purple needlegrass, California oat grass, and non-native annual grasses (CDFW 2013a, personal observation 2010, 2012).

Jepson's Leptosiphon is known from 18 USGS 7.5-minute quadrangles Lake, Napa, and Sonoma counties (CNPS 2013). There are two CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and five CCH (2013) records from Sonoma County. Jepson's Leptosiphon has a moderate potential to occur in the Park due to the presence of associated species and vegetation communities; however, this species is closely associated with rocky volcanic substrate located on chaparral fringes, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Woolly-headed Lessingia (*Lessingia hololeuca*). CNPS Rank 4. Moderate Potential: Woolly-headed lessingia is an annual herb in the sunflower family (Asteraceae) that blooms June to October. It typically occurs on clay often derived from serpentine in broadleaf upland forest, coastal scrub, lower montane coniferous forest, and valley and foothill grassland at elevations ranging from 45 to 1000 feet (CNPS 2013). Observed associated species include Italian rye grass, ripgut brome, soft chess, California poppy, dwarf plantain, cream cups, onion (*Allium* spp.), and common muilla (*Muilla maritima*) (personal observation 2009).

This species is known from 27 USGS 7.5-minute quadrangles in Alameda, Marin, Monterey, Napa, Santa Clara, San Mateo, Solano, Sonoma, and Yolo Counties (CNPS 2013). There are no CNDDB records for this species, and eight CCH (2013) records from Sonoma County. Woolly-headed Lessingia has a moderate potential to occur within the Park due to the presence of some associated plant species and serpentine substrate; however, it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Sebastopol meadowfoam (*Limnanthes vinculans*). Federal Endangered, State Endangered, CNPS Rank 1B. Moderate Potential: Sebastopol meadowfoam is an annual herb in the meadowfoam family (Limnanthaceae) that blooms from April to May. It typically occurs on poorly drained clay or sandy soils in swales, depressions, and pools of marshy areas of valley oak savanna, mesic meadow, vernal pool, and valley and foothill grassland habitat at elevations ranging from 45 to 1000 feet (CDFW 2013a, CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include California semaphore grass, goldfields, blennosperma species (*Blennosperma* spp.), Lobb's buttercup, Douglas's mesamint, California oat grass, Italian rye grass, Mediterranean barley, pennyroyal, popcornflowers (*Plagiobothrys* spp.), spikerushes (*Eleocharis* spp.), and quillwort (CDFW 2013a).

Sebastopol meadowfoam is known from nine USGS 7.5-minute quadrangles in Napa and Sonoma Counties (CNPS 2013). There are five CNDDB (CDFW 2013a) records in the greater

vicinity of the Park, and 23 CCH (2013) records from Sonoma County. Sebastopol meadowfoam has a moderate potential to occur in the Park due to the presence of seasonal wetland habitat with some associated plant species; however, this species is closely associated with valley bottom vernal pools, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Mt. Diablo cottonweed (*Micropus amphibolus*). CNPS Rank 3. Moderate Potential: Mt. Diablo cottonweed is an annual herb in the sunflower family (Asteraceae) that blooms from March to May. It typically occurs on thin, rocky substrates in broadleaf upland forest, chaparral, cismontane woodland, and valley and foothill grassland habitat at elevations ranging from 145 to 2710 feet (CNPS 2013). Observed associated species include filarees (*Erodium* spp.), annual fescues (*Festuca* spp.), owl's clovers, California goldfields, and annual lupines (personal observation 2010).

This species is known from 32 USGS 7.5-minute quadrangles in Alameda, Contra Costa, Colusa, Lake, Marin, Monterey, Napa, Santa Barbara, Santa Clara, Santa Cruz, San Joaquin, San Luis Obispo, Solano, and Sonoma Counties (CNPS 2013). There are no CNDDB records for this species, and six CCH (2013) records from Sonoma County. Mt. Diablo cottonweed has a moderate potential to occur in the Park due to the presence of associated plant species and vegetation communities; however, this species is typically located on thin sandstone substrates, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Marsh microseris (*Microseris paludosa*). CNPS Rank 1B. Moderate Potential: Marsh microseris is a perennial herb in the sunflower family (Asteraceae) that blooms from April to June, sometimes into July. It typically occurs in closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland habitat at elevations ranging from 15 to 985 feet (CDFW 2013a, CNPS 2013). Observed associated species include coast live oak, coyote brush, English plantain (*Plantago lanceolata*), blue-eyed grass, bracken fern, rough cat's ear, common velvet grass, little rattlesnake grass, and Douglas iris (*Iris douglasiana*) (CDFW 2013a).

Marsh microseris is known from 24 USGS 7.5-minute quadrangles in Marin, Mendocino, Monterey, San Benito, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma counties (CNPS 2013). There is one CNDDB (CDFW 2013a) record in the greater vicinity of the Park, and four CCH (2013) records from Sonoma County. Marsh microseris has a moderate potential to occur in the Park due to the presence of grassland habitat with some associated plant species; however this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*). CNPS Rank 1B. Moderate Potential: Baker's navarretia is an annual herb in the phlox family (Polemoniaceae) that blooms from April to June. It typically occurs in vernally wet areas underlain by adobe and/or alkaline substrates in cismontane woodland, meadow, seep, vernal pool, valley and foothill grassland, and lower montane coniferous forest habitat at elevations ranging from 15 to 5710 feet (CDFW 2013a, CNPS 2013). This species is an obligate (OBL) wetland plant (Lichvar 2012), and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include pillwort (*Pilularia americana*), Douglas' mesamint, tricolor monkeyflower, pennyroyal, calico flowers, California semaphore grass, Lobb's buttercup, and non-native annual grasses (CDFW 2013a).

Baker's navarretia is known from 26 UGSG 7.5-minute quadrangles in Colusa, Glenn, Lake, Marin, Mendocino, Napa, Solano, Sonoma, Sutter, Tehama, and Yolo Counties (CNPS 2013). There is one CNDDB (CDFW 2013a) record in the greater vicinity of the Park, and 15 CCH (2013) records from Sonoma County. Baker's navarretia has a moderate potential to occur in the Park due to the presence of seasonal wetland habitat with some associated plant species; however, this species is closely associated with valley bottom vernal pools, and it was not observed during plant surveys conducted in 2006, 2007, and 2008.

Petaluma popcornflower (*Plagiobothrys mollis* var. *vestitus*). CNPS Rank 1A. Moderate Potential: Petaluma popcornflower is a perennial forb in the forget-me-not family (Boraginaceae) that blooms from June to July. This presumed extinct species is assumed to have located in wet areas on the margins of valley and foothill grassland and coastal salt marsh habitat at elevations ranging from 30 to 165 feet (CDFW 2013a, CNPS 2013). This species is a facultative wetland (FACW) plant (Lichvar 2012). Observed associated species are not reported in the literature.

Petaluma popcornflower is known from one USGS 7.5-minute quadrangle in Sonoma County (CNPS 2013). There is one CNDDB (CDFW 2012) record within the greater vicinity of the Park, and no CCH (2013) records from Sonoma County, or elsewhere. Petaluma popcornflower has a moderate potential to occur in the Park due to the presence of grassland-wetland ecotone, and very little is known about this species; however, it was not observed during plant surveys conducted in 2006, 2007, and 2008.

North Coast semaphore grass (*Pleuropogon hooverianus*) State Threatened, CNPS Rank 1B. Moderate Potential: North Coast semaphore grass is a perennial herb in the grass family (Poaceae) that blooms from April to June. It typically occurs in shady, wet grassy areas in broadleaf upland forest, meadow, seep, and North Coast coniferous forest habitat at elevations ranging from 30 to 2205 feet (CDFW 2013a, CNPS 2013). Soil survey data at known locations suggest that this species is typically located on strongly to slightly acid (pH 5.5 to pH 6.1) gravelly to sandy loams derived from a variety of orogeny (CDFW 2013a, CSRL 2013). This species is a facultative wetland (FACW) plant (Lichvar 2012), and is restricted to vernal pool habitat in some regions of California, but is a generalist in other regions (Keeler-Wolf et al. 1998). Observed associated species include coast live oak, California bay, rushes, California blackberry, dense sedge (*Carex densa*), field sedge (*Carex praegracilis*), and harding grass (CDFW 2013a).

North Coast semaphore grass is known from eleven USGS 7.5-minute quadrangles in Marin, Mendocino, and Sonoma counties (CNPS 2013). There are four CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and ten CCH (2013) records from Sonoma County. North Coast semaphore grass has a moderate potential to occur due to the presence of mesic areas in oak-bay woodlands with some associated plant species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*). CNPS Rank 1B. Moderate Potential: Point Reyes checkerbloom is a perennial, rhizomatous forb in the mallow family (Malvaceae) that blooms from April to September. It typically occurs in freshwater marshes and swamps near the coast at elevations ranging from 10 to 245 feet (CNPS 2013, CDFW 2013a). This species is an obligate (OBL) wetland plant (Lichvar 2012). Observed associated species include sedges, rushes, panicled bulrush (*Scirpus microcarpus*), water parsley, American speedwell (*Veronica americana*), common monkeyflower, musk monkeyflower (*Mimulus*

*moschatus*), golden-eyed grass (*Sisyrinchium californicum*), Pacific silverweed (*Potentilla anserina* ssp. *pacifica*), Douglas iris, swamp harebell (*Campanula californica*), California blackberry, and common velvet grass (CDFW 2013a).

Point Reyes checkerbloom is known from ten USGS 7.5-minute quadrangles in Marin, Mendocino, and Sonoma counties (CNPS 2013). There is one CNDDB (2013) record within the greater vicinity of the Park, and nine CCH (2013) records from Sonoma County. Point Reyes checkerbloom has a moderate potential to occur within the Park due to the presence of perennial wetland habitat with some associated plant species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Showy rancheria clover (*Trifolium amoenum*). Federal Endangered, CNPS Rank 1B. Moderate Potential: Showy rancheria clover is an annual forb in the pea family (Fabaceae) that blooms from April to June. It typically occurs on open, sunny sites, in swales, on roadsides, and cliffs sometimes underlain by serpentine substrate in valley and foothill grassland and coastal bluff scrub habitat at elevations ranging from 15 to 1365 feet. This species is a facultative wetland (FACW) plant (Lichvar 2012), and has a serpentine affinity rank of weak indicator (1.3) (Safford et al. 2005). Observed associated species include slender wild oat, bromes, annual fescues, Italian rye grass, California oat grass, California brome (*Bromus carinatus*), meadow barley, Italian thistle, and pale flax (*Linum bienne*).

Showy Rancheria clover is known from 16 USGS 7.5-minute quadrangles in Marin, Napa, Santa Clara, Solano, and Sonoma counties (CNPS 2013). There are five CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and ten CCH (2013) records from Sonoma County. Showy Rancheria clover has a moderate potential to occur in the Park due to the presence of serpentine grassland habitat with some associate species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

Saline clover (*Trifolium hydrophilum*) CNPS Rank 1B. High Potential: Saline clover is an annual herb in the pea family (Fabaceae) that blooms from April to June. It typically occurs in mesic, alkali sites in marsh, swamp, valley and foothill grassland, and vernal pool habitat at elevations ranging from 0 to 1495 feet (CDFW 2013a, CNPS 2013). This species is a facultative (FAC) plant (Lichvar 2012), and is a vernal pool generalist (Keeler-Wolf et al. 1998). Observed associated species include California semaphore grass, salt grass, Italian rye grass, brass buttons, calico flowers, Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), hyssop loosestrife, toad rush, California oat grass, purslane speedwell, meadow barley, clovers (*Trifolium microdon*, *T. wormskioldii*, *T. fucatum*), and sand spurry (*Spergularia macrotheca*) (CDFW 2013a).

Saline clover is known from 22 USGS 7.5-minute quadrangles in Alameda, Colusa, Monterey, Napa, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Solano, and Sonoma Counties (CNPS 2013). There are three CNDDB (CDFW 2013a) records in the greater vicinity of the Park, and two CCH (2013) records in Sonoma County. Saline clover has a high potential to occur in the Park due to the presence of seasonal wetland habitat with many associated plant species, and the relative location of the nearest documented occurrence; however, this species was not observed during plant surveys in 2006, 2007, and 2008.

Oval-leaf Viburnum (*Viburnum ellipticum*). CNPS Rank 2. Moderate Potential: Oval-leaf viburnum is a shrub in the honeysuckle family (Caprifoliaceae) that blooms from May to June, with identifiable vegetative characteristics remaining intact into fall. It typically occurs in

chaparral, cismontane woodland, and lower montane coniferous forest habitat at elevations ranging from 695 to 4550 feet (CDFW 2013a, CNPS 2013). Observed associated species include Pacific madrone, blue oak, Oregon white oak, California black oak, interior live oak (*Quercus wislizenii*), California bay, sticky manzanita (*Arctostaphylos viscida*), poison oak, choke cherry (*Prunus virginiana*), mock orange (*Philadelphus lewisii*), and thimbleberry (*Rubus parviflorus*) (CDFW 2013a).

Oval-leaf viburnum is known from 30 USGS 7.5-minute quadrangles in Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Mendocino, Napa, Placer, Shasta, Sonoma, and Tehama counties, and is known from the states of Oregon and Washington (CNPS 2013). There is one CNDDB (CDFW 2013a) record within the greater vicinity of the Park, and three CCH (2013) records from Sonoma County. Oval-leaf viburnum has a moderate potential to occur in the Park due to the presence of shaded woodland sites with some associated plant species; however, this species was not observed during plant surveys conducted in 2006, 2007, and 2008.

### *4.2.3 Plant Species with Regional Significance or Habitat Value Observed within the Park*

Three plant species within the Park have regional significance or habitat value (Appendix A). These plants are either uncommon or rare in Sonoma County despite being common elsewhere, or offer specific habitat requirements for special-status wildlife species. Generally, these species are at the edge of their range or occur in unique habitats such as serpentine.

Cream cups (*Platystemon californicus*). No Rank – Opler's longhorn moth larval host plant. High Potential (Present): Cream cup is an annual forb in the poppy family (Papaveraceae) that blooms from February to May (Baldwin et al. 2012). It typically occurs on a variety of substrate, including volcanics and serpentine, in valley and foothill grassland, as well as open woodlands, chaparral, and coastal scrub habitat at elevations ranging from 0 to 3000 feet (Baldwin et al. 2012, Calflora 2013, WRA observations). This species has a serpentine affinity rank of weak indicator (1.7) (Safford et al. 2005). Observed associated species include California poppy, bluehead gilia, bird's-eye gilia, owl's clovers, tidy tips, goldfields, lupines, needlegrasses, small fescue (*Festuca microstachys*), Idaho fescue (*Festuca idahoensis*), California onion grass, and a suite of non-native annual grasses (WRA observations).

Cream cup is not documented in the CNPS Inventory or CNDDB. It is relatively common in grasslands in Sonoma, Marin, and Napa counties, with 28, 33, and 22 CCH (2013) records documented from these counties, respectively. Although cream cup does not have a federal or state listing or other formal conservation designation, it is believed to be the sole source of Opler's longhorn moth larval food, and therefore should be considered sensitive within the Park. Several substantial colonies of cream cups were mapped within the Park (Figure 5).

Johnny jump-up (*Viola pedunculata*). No Rank – Silverspot larval and nectar host plant. High Potential (Present): Johnny jump-up is a perennial forb in the violet family (Violaceae) that blooms from February to April (Baldwin et al. 2012). It typically occurs on a variety of well-drained substrates located on hillsides and ridgelines in full sun within valley and foothill grassland, and open cismontane woodland and chaparral habitat at elevations ranging from 0 to 5000 feet (Baldwin et al. 2012). Observed associated species include oaks, needlegrasses, checkerblooms (*Sidalcea* spp.), lupines, blue-eyed grass, blue dicks, California poppy, purple sanicle, and a suite of non-native annual grasses (WRA observations).

Johnny jump-up is not documented in the CNPS Inventory or CNDDB; however, it is relatively common in grasslands in Sonoma, Marin, and Napa counties, with nine, 10, and eight CCH (2013) records documented from these counties, respectively. Although Johnny jump-up does not have a federal or state listing or other formal conservation designation, it is likely the larval and nectar host for an unnamed silverspot butterfly known from Cougar Mountain, and therefore should be considered sensitive within the Park. Several substantial colonies of Johnny jump-up were mapped within the Park (Figure 5).

California western flax (*Hesperolinon californicum*). No Rank – Regionally Significant. High Potential (Present): California western flax is an annual forb in the flax family (Linaceae) that blooms from May through June. It typically occurs on serpentine substrate in valley and foothill grassland, chaparral, and cismontane woodland at elevations ranging between 0 to 2000 feet (Baldwin et al. 2012, CCH 2013). This species has a serpentine affinity rank of strong indicator (2.8) (Safford et al. 2005). Observed associated species include bluehead gilia, needlegrasses (*Stipa* spp.), California onion grass, Torrey's onion grass, June grass (*Koeleria californica*), Idaho fescue, and small fescue (*Festuca microstachya*) (personal observation 2011).

California western flax is not documented in the CNPS Inventory or CNDDB, but collections have been recorded from Alameda, Butte, Colusa, Contra Costa, Fresno, Lake, Marin, Merced, Napa, Placer, Sacramento, San Joaquin, San Mateo, Solano, Sonoma, Stanislaus, Sutter, Tehama, and Yolo counties (CCH 2013). The core population of this species is in Napa, Lake, and Colusa counties, which is the center of diversity for the genus *Hesperolinon* (O'Donnell 2010). Because the Park contains one of only two documented occurrences from Sonoma County (CCH 2013), this species is considered regionally sensitive. A substantial population of this species was mapped inadvertently as Marin western flax in the southwest portion of the Park within serpentine grasslands (Figure 5).

## 4.3 Special-Status Wildlife Species

### *4.3.1 Invertebrates*

Opler's longhorn moth (*Adella oplerella*). No Status (Special Animals List). High Potential (Present): Opler's longhorn moth was a federal species of concern that was considered but rejected for listing as an endanged species in 1994, and is currently on the Special Animals List (CDFG 2011). The moth is endemic to grasslands where its larval food plant, cream cups, grows. Descriptions of the life history and early stages of this moth are incomplete, but it is known that the moth completes the active portions of its life cycle during the winter-spring wet season (Powell 1969). Eggs are deposited directly into the unopened flowers of the host plant, and larvae emerge after they have consumed the developing seeds. The larvae may enter diapause during the summer and re-emerge after the winter rains to continue feeding until they are large enough to pupate. The adult host plant is not known, though it appears that the adults may feed on the nectar of cream cups, and other native herbaceous species.

In recent years, Opler's longhorn moth has been recorded from sites extending along the west side of San Francisco Bay, the inner Coast Ranges, and Alameda, Marin, Sonoma, Santa Cruz, and Santa Clara counties (A. Launer, pers. comm., 1997, J. Powell, pers. comm., 1997 in USFWS 1998b). The moth was previously thought to only occur in areas of serpentine soil where its exclusive host plant is often found in prodigious numbers, but it has been observed in non-serpentine areas where thin soils support a high density of native species, including cream cups. Therefore, it may be more accurate to associate the moth with low fertility soils that

support a sufficient density of host plants. Within the Park, one individual was observed in native grassland habitat underlain by serpentine substrate in the southwest. The presence of cream cup colonies and recorded observations of Opler's longhorn moth suggest that the Park offers high quality habitat for this species.

Blennosperma vernal pool andrenid bee (*Andrena blennospermatis*). No Status (Special Animals List). Moderate Potential: Blennosperma bee has no federal or state listing, but is included on the Special Animals List (CDFG 2011). This bee is a specialist pollinator of common blennosperma (*Blennosperma nanum* var. *nanum*) and Sonoma sunshine (*B. bakeri*). Bees nest in upland areas, such as mima mounds, near vernal pools and seasonal wetland complexes where blennosperma is prevalent. The CNDDB contains records from Sonoma, Lake, Solano, Colusa, Sacramento, Placer, San Joaquin, and Tehama counties, including records from the Valley of the Moon and Santa Rosa Plain (CDFW 2013a).

LSA noted that although being present, blennosperma numbers may have been lower than normal due to drier than average conditions at the time of surveys (LSA 2009c). Should the populations of blennosperma be more robust than observed and blennosperma bee capable of dormancy during unfavorable years, this species may be present within the Park. The bee is most likely to be in the vicinity of the serpentine habitat where blennosperma individuals were documented by both LSA and WRA.

Zerene silverspot butterfly subspecies (*Speyeria zerene*). No Status (Special Animals List). High Potential: An unnamed subspecies of Zerene silverspot butterfly has been documented from the Cougar Mountain property located immediately south of the Park. Currently, this subspecies has not been formally described in the taxonomic literature, and therefore has no official legal protection. However, this subspecies appears to be highly restricted to the Cougar Mountain area, and therefore, following formal description is likely to receive protective status. Other silverspot butterfly larva host on native violets (*Viola adunca, V. pedunculata*), and it is assumed the unnamed subspecies documented from Cougar Mountain does so as well. Due to the relative location of documented occurrences of this subspecies of silverspot butterfly and the presence of large Johnny jump-up colonies on the East and West ridges, this subspecies has a high potential to occur in the Park.

Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*). No Status (Special Animals List). Moderate Potential: Ricksecker's water scavenger beetle does not have federal or state listing, but is included on the Special Animal List (CDFG 2011). Very little is known about the life history and ecology of this species, but adults and larvae of other species within this genus are aquatic, and adults are capable of flight (NatureServe 2013). This beetle is known from small ponds and vernal pools, where larvae are predacious and remain on shoreline vegetation. Documented occurrences are from the Bay Area and Central Valley, including specimens from Sonoma, Marin, San Mateo, Solano, Contra Costa, Alameda, Sacramento, and Placer counties (CDFW 2013a, ESSIG 2013). The nearest documented occurrence is from June 1969 on Sonoma Mountain, approximately 10 miles north of the Park (CDFW 2013a). The presence of stock ponds and vernal pool-like wetlands, as well as very little documentation regarding distribution and ecology, suggest that this species has a moderate potential to occur in the Park.

California linderiella (*Linderiella occidentalis*). No Status (Special Animals List). High Potential (Present): California linderiella does not have federal or state listing, but is on the Special Animals List (CDFG 2011). This fairy shrimp has been documented from 39 locations in the Central Valley and Coast Ranges, and is the mostly widely distributed of the fairy shrimp (Eng et

al. 1990, Erickson and Belk 1999). Completely aquatic, California linderiella are known from vernal pools, playas, and other seasonally inundated areas with open water. Water may be clear to slightly turbid, and must remain inundated for a minimum of 31 days to allow for reproduction. Pool size varies widely from several square feet to several acres. Vegetation in their habitat is typically sparse to moderately dense, and excessive emergent vegetation diminishes the quality of habitat (Helm 1998, Erickson and Belk 1999).

California linderiella motility is by means of beating motions that pass along their swimming legs in a wave-like motion from head to tail. California linderiella life cycle is completed in one season, with breeding females carrying their eggs in a brood sac on their abdomen, which are either dropped to the pool bottom or carried until the female dies and sinks (Federal Register 1994). Eggs or cysts are resistant to heat, cold, and prolonged dry periods, and several years of breeding may comprise the soil of occupied vernal pools, forming the cyst bank (Donald 1983). California linderiella forage on algae, rotifers, bacteria, and small bits of organic matter (Pennak 1989). This species was observed within Tolay Lake, and is expected to occur there and in other aquatic habitat within the Park (Sam Bacchini pers. comm. from LSA 2009b).

### *4.3.2 Amphibians and Reptiles*

California red-legged frog (*Rana draytonii*). Federal Threatened, CDFW Species of Special Concern. High Potential (Present): California Red-legged Frog was listed as Federally Threatened May 23, 1996 (61 FR 25813-25833). Critical Habitat for CRLF was designated on March 17, 2010 (75 FR 12815 12959). A Recovery Plan for CRLF was published by the USFWS on May 28, 2002. The Park falls within the Petaluma Creek-Sonoma Creek Core Recovery Area. There are four Primary Constituent Elements (PCEs) that are considered to be essential for the conservation or survival of this species. The PCEs for California red-legged frog include: (1) aquatic breeding habitat; (2) non-breeding aquatic habitat; (3) upland habitat; and (4) dispersal habitat (USFWS 2006).

Aquatic breeding habitat consists of low-gradient fresh water bodies including natural and manmade (e.g., stock) ponds and pools in perennial streams, marshes, lagoons, and dune ponds with still or slow-moving water, and dense shrubby riparian vegetation (Hayes and Jennings 1986, Jennings 1988, Jennings and Hayes 1994). Aquatic breeding habitat must hold water for a minimum of 20 weeks in most years to allow for egg, larvae, and tadpole development (USFWS 2006). Aquatic non-breeding habitat may or may not hold water long enough for this species to hatch and complete its aquatic life cycle, but it provides shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frog. These waterbodies include plunge pools within intermittent creeks, seeps, quiet water refugia during high water flows, and springs of sufficient flow to withstand the summer dry period. California red-legged frog can use large cracks in the bottom of dried ponds as refugia to maintain moisture and avoid heat and solar exposure (Alvarez 2004).

Upland habitats (e.g., grasslands, woodlands) provide shelter, forage, and cover, and include areas within 200 to 300 feet. Upland habitat can include structural features such as boulders, rocks and organic debris (e.g., downed trees, logs), as well as small mammal burrows and moist leaf litter (USFWS 2006). Dispersal habitat includes accessible upland or riparian habitats between occupied locations within 0.7 mile of each other that allow for movement between these sites, but dispersal of up to 1.8 miles has been documented (USFWS 2002, Fellers and Kleeman 2007). Moderate to high density urban or industrial developments, large reservoirs and heavily traveled roads without bridges or culverts are considered barriers to dispersal

(USFWS 2006). Short-distance dispersal movements are generally straight-line movements, and dispersal typically occurs at night during wet weather (Bulger et al. 2003, USFWS 2002, Bulger et al. 2003, Fellers and Kleeman 2007). California red-legged frogs tend to remain very close to a water source during dry weather; however, overland dispersal may occur in response to receding water (USFWS 2002).

Foothill yellow-legged frog (*Rana boylii*) CDFW Species of Special Concern. Moderate Potential: This species is typically located in forested and woodland habitats, occurring in shaded, shallow streams and riffles with a rocky substrate. Egg masses are attached to the rock substrate, and at least some cobble-sized stones are necessary. Tadpoles require at least 15 weeks to metamorphose into juvenile form. Foothill yellow-legged frog does not estivate and is rarely found far from a source of permanent water. Historically, this species was known to occur in most Pacific drainages from Oregon to Los Angeles (Jennings and Hayes 1994). Populations have declined due to siltation and the introduction of American bullfrogs and exotic fish. Tolay Creek and its tributaries contain suitable breeding, foraging, and dispersal habitat for foothill yellow-legged frog; however, this species was not observed during site visits in 2006-2008.

Western pond turtle (*Actinemys marmorata*). CDFW Species of Special Concern. High Potential: Western pond turtle is the only freshwater aquatic turtle native to most of California, associated with rivers, creeks, lakes, and ponds throughout much of the state. Typical aquatic habitat features stagnant or low gradient water, aquatic vegetation, and aerial basking sites such as logs, rocks, and mud-banks. Adult females excavate nests in riparian and upland areas in the spring or early summer. Nest sites are generally located on sunlit slopes, and require friable soil that is sufficiently dry to promote successful egg development (Holland 1994). The young generally hatch and overwinter in the nest (Jennings and Hayes 1994, Reese and Welsh 1997). At least under some ecological conditions, pond turtles may regularly utilize terrestrial habitats (Reese and Welsh 1997). While some populations are active principally in the spring and aestivate during the rest of the year, turtles along the southern California coast may be active year-round (Jennings and Hayes 1994). Western pond turtle is a dietary generalist, subsisting principally on invertebrates as well as plant material and carrion.

LSA did not observe western pond turtles during site investigations in 2006-2008; however, anecdotal observations and the relatively high quality habitat on-site suggest that this species has a high potential to occur within the Park.

### *4.3.3 Birds*

White-tailed kite (*Elanus leucurus*). CDFW Fully Protected Species. High Potential (Present): White-tailed kite is resident in a variety of open habitats, including agricultural areas, grasslands, scrub and open chaparral habitats, meadows, and emergent wetlands throughout the lower elevations of California. Nests are constructed mostly of twigs and placed in small to large trees, often at habitat edges or in isolated groves (Dunk 1995). This species preys upon a variety of small mammals and other vertebrates. The Park provides open habitats for foraging and suitable trees for nesting, as well as contiguous high-quality foraging habitat adjacent to the Park. White-tailed kites have been observed by LSA foraging within the Park. Although no nesting location has been documented to date, suitable nesting habitat is present within the Park.

Golden eagle (*Aquila chrysaetos*). CDFW Fully Protected Species, USFWS Bird of Conservation Concern. High Potential (Present): A fully protected species, golden eagle is largely resident in open and semi-open areas from sea level to 11,500 feet elevation. Occupied habitats include shrublands, grasslands, desert, mixed woodlands, and coniferous forests. This species is usually found in mountainous areas, but it may also nest in wetland, riparian, and estuarine habitats at lower elevations (Kochert et al. 2002). Golden eagles typically build or maintain multiple nests prior to selecting one nest for a given year; however, they do exhibit strict site fidelity, often moving nesting locations between years, and may not nest each year (Peeters and Peeters 2005). Nests are large and typically built on cliff ledges or in large, relatively isolated trees; therefore, many of the blue gum and possibly larger coast live oak trees in the Park provide potential nesting locations.

Golden eagles forage over wide areas, most frequently above open canopied shrub or woodland, or grassland habitat, and feed primarily on ground squirrels, rabbits, large birds, and carrion. The Park's expansive grassland habitat is optimal for foraging, and the mix of riparian, woodland, and minor shrub elements provide cover for many of the prey animals of the golden eagle.

Golden eagles have been repeatedly observed in and immediately adjacent to the Park (Steve Ehret pers. comm. in LSA 2009b, PWA 2009), and the Tolay Lake area is thought to host five active golden eagle nests (Janet Thiessen pers. comm. in LSA 2009b), likely lending to the frequent observations. The East Ridge has the highest frequency of observations, and due to its relatively isolated location and the presence of coast live oak woodland with sizable trees, it is thought that nesting is most likely here, though perhaps outside of the Park. According to Peeters and Peeters (2005), the optimal nesting location is at the midslope position of north- and east-facing ridges gaining maximum protection from strong winds, and there have been no observations of nests on ridgelines. Although golden eagles have been observed soaring, foraging, and perching over the site by Steve Ehret, LSA, and others (Steve Ehret pers. comm. in LSA 2009b), and the Park provides suitable nesting habitat, no nesting has been observed on-site.

Burrowing owl (*Athene cunicularia*). CDFW Species of Special Concern. High Potential (Present): Burrowing owl is a state protected species, but does not have any federal listing. These birds prefer short grass grasslands with burrow networks, and frequently with boulder fields or rock outcrops. Burrows of small mammals, such as ground squirrels, are utilized for year-round shelter and nesting, and are frequently modified by these owls. Constructed burrows are readily occupied by burrowing owls, and have been constructed for habitat enhancement and mitigation in several sites in California.

Burrowing owls have been observed within the grasslands of the Park, particularly in areas of burrow activity and rock outcrops (Steve Ehret pers. comm. in LSA 2009b). Single individuals have been repeatedly observed at rock outcrops and boulder fields in winter and spring, though infrequently in summer, suggesting dispersing juveniles or over-wintering birds. Breeding burrowing owls have not been observed in Sonoma County since 1987, and breeding colonies are considered extirpated from the county (Burridge 1995).

Short-eared owl (*Asio flammeus*), CDFW Species of Special Concern, High Potential (Present): Short-eared owl is a state protected species, but does not have any federal listing. These owls are ground-nesting, and therefore require tall herbaceous vegetation to conceal their nests. Typically located in grasslands and emergent wetlands (Holt and Leasure 1993), within

California short-eared owls are concentrated on the Modoc Plateau, Great Basin, western Sacramento Valley, and southern Coast Ranges, with isolated populations around the state (Shuford and Gardali 2008).

A short-eared owl was observed within grassland habitat on the West Ridge on November 18, 2005 (Jake Newell, pers. comm.). Short-eared owls do not typically breed in Sonoma or Marin counties, but fledged young have been observed in Point Reyes National Seashore and Annadel State Park in 1979 (Shuford and Gardali 2008). The Park provides suitable foraging and overwintering habitat, but regular nesting is unlikely due to the presence of grazing and very limited observations of breeding in the North Bay.

Grasshopper sparrow (*Ammodramus savannarum*). CDFW Species of Special Concern. High Potential (Present): A second priority species of special concern (Unitt 2008), grasshopper sparrow generally prefers moderately open grasslands and prairies with patchy bare ground. They select different components of vegetation depending on grassland ecosystem. This sparrow typically avoids grasslands with extensive shrub cover, although some level of shrub cover is important for birds in western regions (Vickery 1996).

Grasshopper sparrows are ground nesting birds, creating cupped nests domed with overhanging grasses and a side entrance, which are very rarely located in tall grasses of grasslands. Eggs are usually lain in early to mid-June and hatch within 14 days. Both males and females provide care to the young, and second broods are common. This species primarily feeds on insects (Vickery 1996). Suitable foraging and breeding habitat for this species is widely present, where open shrubs and grasslands with bare ground create a habitat mosaic, and therefore specific observations are not indicated on Figure 5.

Tricolored blackbird (*Agelaius tricolor*), CDFW Species of Special Concern, USFWS Bird of Conservation Concern. High Potential: The tricolored blackbird is a locally common resident in the Central Valley and along coastal California. This species breeds adjacent to freshwater, preferably in emergent wetlands with tall, dense cattails (*Typha* spp.) or tules (*Schoenoplectus* spp.), thickets of willow (*Salix* spp.), blackberry and/or tall herbs, as well as flooded agricultural fields with dense vegetation (Shuford and Gardali 2008). Insects are the primary food source. This species is highly colonial; nesting habitat must be large enough to support a minimum of 30 pairs, and colonies are commonly substantially larger, ranging from 100 to tens of thousands of individuals. Several confirmed and probable breeding locations have been observed in southern Sonoma County (Burridge 1995). Tricolored blackbirds have been observed within the Park (PWA 2009), and it has a high potential to nest within the Park due to observations within the Park, relative to the location of documented nesting observations in southern Sonoma County and the presence of emergent freshwater marsh vegetation.

Nesting birds (various spp.). MBTA, CFGC. High Potential (Present): Despite no federal or state listing, all native birds are protected either by the Migratory Bird Treaty Act (MBTA) or the California Fish and Game Code (CFGC). The MBTA protects active nests of all birds including migratory species. Upland game and waterfowl birds are allowed to be taken, but strict seasons have been developed around the life cycle of these birds. Breeding bird season may vary dependent upon species, site condition, annual weather and legal agreement (e.g., mitigation plans), but generally runs from February 1 to August 31 in a given year. Red-tailed hawk and western meadowlark have been observed nesting on site by LSA (LSA 2009b), and several other species undoubtedly nest each year within the Park's boundaries.

### *4.3.4 Mammals*

American badger (*Taxidea taxus*). CDFW Species of Special Concern. Moderate Potential: The American badger is a semifossorial mammal in the weasel family (Mustelidae). Macrohabitat includes dry, open forests and woodlands, open scrub, and grasslands. Microhabitat conditions require loose friable soils for burrow creation and foraging potential. Badgers are typically solitary, nocturnal, and construct burrows for refuge during daylight hours. Badger burrows are usually elliptical, with only one entrance, and are located in areas with plentiful prey sources. The primary prey is composed of ground squirrels and pocket gophers, which are typically pursued by digging into their burrows (Jameson and Peeters 2004). Alternative prey resources include mice, rats, reptiles, amphibians, and bird eggs. Young are born in the spring and independent by the end of summer.

Badgers have very large home ranges, depending on available habitat. Males can forage across a range of approximately one square mile to 25 square miles in patchier habitat, while females can range from one-half square mile to 15 square miles (Messick and Hornocker 1981, Newhouse and Kinley 2000). However, in general, densities are one badger per square mile in occupied, prime habitat (Long 1973). Badgers have not been recorded in the Park or immediate vicinity, but suitable habitat is present on hillsides (i.e., East and West ridges) away from heavy clay soils, soil disturbance, and frequent human visitation in Tolay Valley. Several large holes have been observed in the Park that may have been constructed by American badger (Steve Ehret pers. comm.).

Townsend's big-eared bat (*Corynorhinus townsendii townsendii*). CDFW Species of Special Concern, WBWG High Priority Species. Moderate Potential: This species ranges throughout western North America, from British Columbia to the central Mexico. It is typically associated with caves, but also found in man-made structures, including mines and buildings (CDFW 2013a). While many bats wedge themselves into tight cracks and crevices, big-eared bats hang from walls and ceilings in the open. Males roost singly during the spring and summer months while females aggregate in the spring at maternity roosts to give birth. Females roost with their young until late summer or early fall, until young become independent and can fly and forage on their own. Hibernation roosts tend to be made up of small aggregations of individuals in central and southern California (Pierson and Rainey 1998). Although there are no documented roost sites within the Park or its immediate vicinity, the presence of old farm buildings offers the potential for suitable roost sites. Townsend big-eared bats roosting elsewhere in the area may forage over the Park at night.

Pallid bat (*Antrozous pallidus*).CDFW Species of Special Concern, WBWG High Priority Species. Moderate Potential: Pallid bats are distributed from southern British Columbia and Montana to central Mexico, and east to Texas, Oklahoma, and Kansas. This species occurs in a number of habitats ranging from rocky arid deserts to grasslands, and into higher-elevation coniferous forests. Pallid bats are most abundant in the arid Sonoran life zones below 6,000 feet, but have been found up to 10,000 feet in the Sierra Nevada. They often roost in colonies of between 20 and several hundred individuals. Roosts are typically in cliffs, rock crevices, tree hollows, mines, caves, and a variety of man-made structures, including vacant and occupied buildings, bridges, and bird boxes (Jameson and Peeters 2004). Tree roosting has been documented in large conifer snags (e.g., ponderosa pine [*Pinus ponderosa*]), inside basal hollows of giant sequoias (*Sequoiadendron giganteum*), and within bole cavities in oak (*Quercus* spp.) trees. They have also been reported roosting in stacks of burlap sacks and

stone piles. Pallid bats are primarily insectivorous, feeding on large prey that is taken on the ground, or sometimes in flight (Texas Parks and Wildlife 1997). Prey items include arthropods such as scorpions, ground crickets, and cicadas (WBWG 2013). Pallid bats have a moderate potential to occur due to the presence of several documented roost sites in the general vicinity of the Park (CDFW 2013a) and the presence of suitable roosting habitat (e.g., old farm buildings) within the Park.

# 5.0 ECOLOGICAL PROCESSES

Understanding the ecological processes across the Park and how the Park fits within a wider mosaic of open space lands is essential for proper management of the Park's resources. Disturbance regimes, including natural and man-induced, interplay with the nutrient and hydrologic cycles which support intact, native vegetation and wildlife habitat. Species movement across landscapes provides genetic diversity and colonization / recolonization of native species. The fragmentation of landscape can alter the rate, distance, and direction of species dispersal, and contribute to invasion by undesirable plant and wildlife species which can have deleterious effects on water quality, the nutrient cycle, native vegetation, fire hazard, and wildlife species.

## 5.1 Disturbance Regimes

### *5.1.1 Grazing*

Livestock grazing has occurred in California since the early 18$^{th}$ century, with introduction of cattle to the North Bay in the Mexican Colonial Era. Cattle and wild horses likely grazed throughout the current Park boundary during Vallejo's tenure of the land. Records from the Rancho Petaluma suggest that 15,000 cattle were present across the Rancho in 1841 (Silliman 2004), but this is likely an underestimate of the total grazing pressure when accounting for feral livestock, wild horses, elk, and deer (LSA 2009a). Between 1857 and 1943, successive owners of the current Park raised dairy cattle, beef cattle, sheep, and horses, as well as farmed row crops, grains, silage, and vineyards. It was during this period that intense and prolonged drought contributed to decline in native prairies and type conversion to the non-native annual grasslands present today (Heady 1988, Jackson 1985, Bartolome et al. 2007). However, pollen evidence suggests that invasive species may have slightly preceded European expansion (Mensing and Byrne 1998).

In 1943, the Cardoza family purchased the Tolay Lake property, where they raised silage, row crops, dairy cattle, beef cattle, and sheep. At the time of the property transfer from the Cardoza family to Sonoma County, in 2005, a cow-calf operation was the sole livestock enterprise on the ranch. Conversations with the Cardoza family (LSA 2009a) ascertained that the former Cardoza holding (northern portion of the Park) supported between 150 and 250 cow-calf pairs, depending upon whether the lakebed was grazed. Currently, Glen Mohring of H & L Mohring Ranch holds the grazing lease for the northern and southern portions of the Park with SCRP and SLT, respectively.

Despite the complex interactions between grazing and natural biota, some beneficial and deleterious effects from grazing are well understood and measurable. Primarily, grazing affects vegetation through direct herbivory, trampling, changes in the nutrient cycle, soil and hydrologic

disturbance through compaction and erosion (Bush 2006). These effects favor plants adapted to or tolerant of disturbance, which are often non-native annual grasses and invasive species. Additionally, shrubs, saplings, and even large trees can be browsed or impacted from "loafing" thereby reducing regeneration of woodlands and shrublands and contributing to type conversion (Bartolome et al. 2007). Sensitive habitats including riparian areas, wetlands, and plant species with a high susceptibility to direct herbivory can quickly be negatively impacted (Fleischner 1994, Painter 1995, Belsky et al. 1999). A history of grazing may be contributing to stream bank incision, headcuts, reduced shrub understory, browsed tree limbs, among other effects.

When managed properly, livestock have several beneficial effects, including thatch reduction, floral diversity, fire suppression, and wildlife habitat maintenance. Non-native annual grasslands develop excessive thatch accumulation that can inhibit seed germination of other species and increase fire hazard (Kyser et al. 2007). Properly timed grazing can promote native plant species growth through reduced competition for space and nutrients, thatch reduction, and a long term reduction of non-native species in the seed bank (D'Antonio et al. 2001, Hayes and Holl 2003, Huntsinger et al. 2007). In turn, native wildlife dependent upon specific plants gain benefits, and perhaps continued survival, through grazing, such as the Bay checkerspot butterfly and Callippe silverspot butterfly whose host plants can readily become out-competed by non-native grasses (Weiss 1999, Weiss et al. 2007). The deleterious and beneficial effects of grazing on wildlife are well documented, if, sometimes, little understood; however, grazing is an effective tool for wildlife and vegetation management when adaptive management principles guide the grazing regime and monitoring results are used to adjust practices as needed.

### *5.1.2 Fire*

Much of California's vegetation has evolved with fire as a major component of its disturbance and renewal process. Wet winters and springs with relatively mild temperatures allow for rapid plant growth, while warm to hot, relatively moistureless summers dry senescent vegetation, particularly of annual species, thereby creating conditions conducive to late season wildfire. Several notable species in California are aided by fire in their successful reproduction (e.g., giant sequoia, Bishop pine), and fire has contributed to vegetation patchiness and, thus, floral diversity. Additionally, fire has been used as a tool to intentionally manipulate vegetation by reducing cover or increasing visibility and ease of movement, providing favored wildlife habitat, and increasing abundance of food plants (e.g., geophytes).

Frequency of wildfires set by Native Americans in California is not well understood; however, the intensity of fires appears to have been such to create type conversion from shrubland and woodland to open savannah and grassland (Keely 2001, Anderson 2005). Evidence from fire scars on coast redwoods in Annadel State Park suggests that intentional fires were set, recurrently at 6 to 23 years, and were of low intensity (Finney and Martin 1992). Type conversion from fires started by Native Americans may be most evident on the coastal prairie of California where shrubs and conifers were removed by fire and cutting, a practice which European settlers replicated to maintain extensive rangelands (Keely 2001).

Type conversion from woody dominated communities to those dominated by favored herbs set the stage for the invasion by Eurasian annual grasses and forbs. The most prevalent non-native grasses of California are overwhelmingly annual and from the Mediterranean, and, in their place of origin, are adapted to disturbance (Jackson 1985). However, these species are not particularly fire-adapted, and fire has been utilized to control and reverse the spread of aggressive annual invasive species with varying success. Burning of yellow star thistle has

yielded some success in control of this species (DiTomaso 1999), but it has been shown to return without repeated treatments (Kyser and DiTomaso 2002). Burning of Medusa head has proven somewhat effective, but specific timing, intensity, and repeated treatments are essential to achieve a reduction in this species (Rice and Smith 2008).

In general, fire is an effective tool for land management when applied in conjunction with other management techniques (e.g., grazing, soil grubbing). Additionally, public health and safety concerns surround the use of prescribed burns. Controlled burning would likely be most effective when applied with other treatments and conducted away from Park Headquarters, neighboring residences, and public roads (i.e., Highway 121). Similar to grazing, fire can be a cost effective management technique over broad areas where herbicide, mechanical removal, and other treatments for invasive species are impracticable.

### 5.2 Hydrologic Cycle and Geomorphology

All ecosystems are dependent upon reliable water availability. Because the Park resides within a strongly seasonal, Mediterranean climate, the summer months are very dry, with precipitation virtually absent for up to six months. Conversely, November through March can see an excessive amount of rainfall, with streams and creeks repeatedly swelling to bank-full during the winter's cyclonic storms. Therefore, areas that can capture the winter rainfall and store it through the summer months are important and, often delicate, resources for the wildlife and plant life of a given area. The wetlands of the Park function as natural reservoirs which soak up the winter rains, which are slowly discharged during the spring into summer.

Although wetlands can slow surface and subsurface flows of water as well as nutrient and sediment migration, intact surrounding upland habitats (e.g. grasslands, woodlands) serve to intercept and infiltrate water migrating towards wetland and water features. Intact soils with healthy, perennial vegetation can attenuate overland sheet flow and reduce erosion, even in upland systems. When these areas become denuded or overwrought with ephemeral annual vegetation, the first winter rains can deliver large sediment and nutrient pulses into aquatic features. Multi-canopied habitats with undisturbed leaf litter and downed woody debris protect the soil surface from erosion, add material for absorption, and disperse sheet flow more slowly during and following heavy storm events. A reduction in leaf litter and/or shrub layer, particularly on steep slopes, can increase overland sheet flows and sediment loading. Likewise, native perennial grasses have much deeper root systems than annual species, creating pathways for water infiltration to deeper areas in the soil profile.

Water capture and storage maintains seeps and springs throughout the Park, prolonging the growing season for nearby plants and providing water resources for wildlife. Grazing animals utilize seeps and springs in the summer months to graze on green vegetation and access water supplies. Heavy grazing can create rilling, channelization, and incision within these areas, providing conduits for water to shed more rapidly, as well as compact soils reducing infiltration and absorption. Likewise, roads, trails, and paths can alter overland flows by concentrating surface waters and increasing the velocity of flows.

Portions of the Park have severe hydrologic modifications, particularly Tolay Lake. A history of stock pond creation and drainage of the lakebed has increased the velocity of flows within downstream channels contributing to down-cutting, head-cutting, and incision. Head-cuts and incision migrate uphill providing a pathway for invasive species (e.g. Himalayan blackberry), reducing native vegetation communities (e.g. purple needlegrass grassland), and altering the

subsurface hydrology of wetlands (e.g. seep/spring wetlands) often located at the head of ephemeral and intermittent streams. Incision within these can compromise the wetland's ability to store water later into the season, thereby reducing important resources for wildlife and vegetation dependent upon surface or near-surface waters. Additionally, the ability of wetlands to slow surface water also slows sediment migration, when these damaged, these systems can increase soil migration and sediment loads in the downstream watershed.

## 5.3 Species Interactions and Habitat Connectivity

### *5.3.1 Natural Regeneration of Native Plant Species*

Regeneration of native species within California is of major interest to land managers. The preservation of intact vegetation communities dominated by native species tends to provide greater soil stability, higher water quality, and wildlife habitat. Understanding how the habitats of the Park have changed through time and what they may look like is important for the guidance of successful management and restoration activities. The restoration and preservation of native grasslands has received much attention from researchers and land managers concerned with water quality, soil retention, forage and range quality, biodiversity, and carbon sequestration.

Native grassland habitats in California are among the state's most threatened habitats (Noss et al. 1995), and an estimated 90 percent of native perennial grasslands have been lost to development, agriculture, or type conversion since the mid-19$^{th}$ century (Dell et al. 2007). Additionally, approximately 90 percent of the species listed in the CNPS Electronic Inventory of Rare and Endangered Plants are closely associated with grassland habitats in California (CNPS 2013, Skinner and Pavlik 1994). Upland grasslands are the dominant habitats within the Park, and the presence of intact or relatively healthy native grasslands is encouraging for preservation and restoration. The decline in native grasslands is typically linked to overgrazing and extreme drought in the late 19$^{th}$ century, when non-native annual grasses came to dominate the herbaceous communities of California. However, much research has demonstrated the positive effects of well-managed grazing, particularly in coordination with fire or other means, to maintain and enhance native grassland habitats.Similar to native grasslands, oak woodlands throughout California have received much research attention, particularly concerning regeneration. Within California, over 330 species of birds, mammals, reptiles, and amphibians depend upon oak woodlands (Barrett 1980), including up to 40 percent of the terrestrial mammal species documented in California, and over 5,000 insect species (Pavlik et al. 1991). Within the Park, oak woodland is second only to grasslands in terms of cover among terrestrial vegetation communities. Because oak woodlands maintain soil and water quality, and they have an extremely high biodiversity, a noticeable lack of regeneration in oak woodlands is a major concern.

Oak are wind-pollinated and generally require cross-pollination with other individual trees to develop viable acorns. Depending on conditions and species, acorns can take several seasons to mature, in which time numerous insects can predate on them while still on the tree. Once mature, acorns fall to woodland floor, where they become an important food resource to deer, feral pigs, squirrels, insects, birds, and historically humans. Those acorns that are not consumed, may germinate and remain small seedlings whereupon their short stature and nutritious leaves and twigs provide browse for deer and livestock. Seedlings can remain under the parent tree for years before light and space open allowing for a "release" on the young trees.

Oak regeneration within the Park has not been formally investigated, but casual observations of coast live oak seedlings, particularly at the dripline of adult trees, is encouraging. Far fewer oak seedlings are present in open grasslands, presumably due to distance from source, competition from herbaceous plants, and grazing and browsing by deer and livestock. Annual grass soil moisture use differs from native perennial grasses, which may be contributing to the decline in oak regeneration (Gordon et al. 1989). Studies at Annadel State Park found that oak seedlings within perennial grasslands (i.e., native) were more plentiful and more robust than those observed within annual grasslands (i.e., non-native) (Barnhart et al. 1991), possibly due to differing soil moisture regimes or presence of beneficial mycorrhizae. Distance from source may be contributing to fewer oak seedlings as well, as studies from blue oak woodlands suggest that habitat fragmentation and fewer trees may provide less opportunity for successful pollination (Knapp et al. 2001, Sork et al. 2002).

It is possible that healthy, intact, native perennial grasslands provide an opportunity for oak woodland establishment and preservation. Additionally, it is almost certain that the preservation of large, adult and nursery trees on-site is fundamental to the maintenance of oak seedlings. Therefore, the preservation, enhancement, and restoration of native perennial grasslands as well as the Park's oak woodlands are beneficial to both community types, and the wildlife, water quality, and soil integrity the depend upon them.

### *5.3.2 Maintenance of Habitat Diversity*

Habitat includes both the biotic and abiotic conditions necessary to support the suite of plant and wildlife species that occupy and utilize a given location. Climate (macro- and micro-), soil type (texture, parent material, permeability, pH), geomorphology (chemistry, depth to bedrock), and topography (e.g., shape, slope, and aspect) are the dominant abiotic factors to drive the diversity and complexity of habitat types. Increased structural complexity and vegetation diversity within a habitat may provide more niches for species, both numbers of individuals within a given species and different types of species. Although few species occupy only one habitat type, evidence or direct observation within a given habitat type can be reliably determined based on the presence of a species constituent elements (e.g., soil texture, presence of slack water). Increased habitat and structural diversity as a mosaic across a landscape, therefore, provides a greater opportunity for a given species to occupy and survive within a given location, such as the Park.

Therefore, the presence of several habitat types (e.g., grasslands, woodlands, wetlands) within the Park increases the likelihood of plant and wildlife diversity, and the maintenance of that habitat diversity increases the chances for those species to perpetuate. For instance, as noted above, native perennial grasslands may provide the opportunity for oak seedlings to establish and reproduce. Differing stand densities and heights of grasslands provide different niches for small mammals and ground-nesting birds, which in turn provide prey sources for larger mammals (e.g., coyote, fox) and raptors (e.g., hawk, owl). The presence of snags, singular trees, and fences provides perches for raptors from which they can hunt, or provides observation posts for California quail while the others within the covey forage seed. Structural diversity within woodlands and riparian areas, provides more niches for nesting birds, amphibians, and mammals which depend on resources that are provided from these different layers (e.g., food sources in the lower and middle stories, nesting and observation resources from the upper canopy). Preservation and enhancement of a rich habitat mosaic, as well as in-

habitat diversity (plant species, structure) provides a richer species diversity and healthier individuals within that species.

### *5.3.3 Species Dispersal and Habitat Fragmentation*

Species dispersal refers to the successful migration of an individual organism from its source or existing population to a new, favorable location where it can successfully establish and reproduce (Fahrig 2003). Generally, plant species dispersal is via seed through one or more mechanisms. Seeds can be carried on the wind or water, with adaptive or specialized structures to aid in their movement. Fleshy or nutty fruits may provide nutrition to an animal predator who later distributes elsewhere viable seed through fecal deposits, or seed can be carried in hand or fur by humans or animals, intentionally or unintentionally, to new locations. In addition to seed dispersal, vegetative propagules can break from a parent plant and be carried to a new location to establish new populations or comingle with existing populations. Wildlife species are generally more mobile than plants. While some species lack the ability of long-range self-motility, most are capable of dispersing across the landscape to seek out new habitats, higher quality habitats, and/or breeding partners.

In addition to escaping unfavorable conditions and finding more favorable locales, species dispersal can create genetic mixing. Out-crossing among two or more populations can provide new individuals with robust, well-adapted traits at a broader scale, and ensure continued species survival. However, dispersal barriers can limit the ability of organisms from successfully reaching other individuals or locations that otherwise would be hospitable to that organism. Barriers can be natural such as rivers, oceans, mountain ranges, or artificial such as highways, developed lands, or denuded landscapes (i.e., habitat fragmentation).

Habitat fragmentation refers to the intentional or unintentional division or separation of habitats such that barriers to species dispersal have been created (Fahrig 2003). Fragmentation of extensive, contiguous, and/or diverse habitats into smaller patches can influence species diversity, persistence, and genetic exchange, particularly for smaller, less mobile species. Some species are seemingly less affected by habitat fragmentation (e.g., birds), while other are particularly sensitive to habitat fragmentation (e.g., plants). Habitat fragmentation reduces space for species occupation, and increases a species exposure to disease, predation, incidental harm (e.g., vehicular accidents), etc. Additionally, habitat fragmentation increases the area to edge ratio of remnant habitat patches, which can have provide conduits for disturbance invasive plant species, and diminish the quality of native species diversity. The preservation of intact, native habitats and a rich mosaic of habitat types within the Park provide the opportunity for the continued presence of plant and wildlife species. The Park is located at or very near the intersection of several differing habitat types (e.g., coastal brackish marsh, upland grasslands, oak woodlands), and the Tolay properties acquisitions of nearly an entire watershed, offer the opportunity to preserve, research, and enhance the intersection of these habitats and provide core, unfragmented habitat for many species.

### *5.3.4 Invasive Plant Species*

Invasive plant infestations can have a profound negative impact on native vegetation communities, alteration of wildlife patterns and breeding, increased fire hazard and frequency, increased sedimentation and erosion, reduced livestock forage capacity, and other threats to healthy ecosystems. Invasive species are typically non-native in origin and out-compete locally native plant species through several advantages. Non-native species often are resistant to or

have no local predators, and frequently reproduce through prodigious seed set or vegetative propagules; therefore, invasive species can reproduce rapidly with very few biotic stressors to curb population growth. Additionally, because these species are frequently adapted to disturbance, roadways, trails, and other human activity can act as a conduit for continued dispersal.

Invasive plant species were mapped during the 2006-2008 surveys, and additional data were collected in 2013 (Figure 7). Fifty-eight plant species considered invasive or that have been assessed by Cal-IPC (2006) have been observed within the Park over several surveys and site visits (Table 4). Additionally, two plants that were not identified to the species level, tamarisk (*Tamarix* sp.) and water primrose (*Ludwigia* sp.), have a high probability of being species that are considered invasive. WRA evaluated invasive species ranked as "assessed" and "limited" and determined that only two, bristly ox-tongue and curly dock, appeared to pose a substantial future threat to certain habitats or species within the Park. All four invasive species with a rank "high" and seven of the 29 species ranked "moderate" were determined to pose a current or future threat to substantially alter the native habitat or management regime within the Park, and are therefore discussed here. Figure 7 illustrates locations of dense infestations of invasive plant species mapped by LSA in 2006-2008; however, due to the ubiquitous, diffuse, and/or intermittent distributions of several species, as well as shifting populations / distributions, mapping results should not be considered static.

In general, non-native grasses (e.g., soft chess) constitute their own vegetation alliances or are characteristic species within other vegetation alliances and are nearly impossible to eradicate; therefore, these species are not addressed as potential threats to the existing habitats and species within the Park. Additionally, these species, although competitive with native grasses and forbs, often provide habitat for native wildlife and valuable forage for livestock which are a potentially vital component of overall management of the Park. Those species of the highest concern for specific management goals and biological resources within the Park are summarized in Table 4 and are discussed below.

Blue gum (*Eucalyptus globulus*). Cal-IPC: Moderate: Blue gum is an evergreen tree in the myrtle family (Myrtaceae) that blooms from October through March, and sets seed in winter through summer. Blue gum was introduced from Australia for fuel wood, shelterbelts, and ornamentals, and is known throughout the Coast Ranges and South Coast (Baldwin et al. 2012, CCH 2013). This evergreen tree reproduces primarily through seed, but copsed trees can stump sprout. Although blue gum is often considered a hazard tree from a tendency for wind fall and fire, and the probably alleolapathic character precludes understory vegetation, it does provide nesting and cover habitat for native birds and other wildlife. The primary recommended control method is mechanical removal, herbicide application to cut stumps, followed by herbicide application or mechanical removal of saplings and seedlings.

Tamarisk (*Tamarix* sp.). Cal-IPC: unknown (possibly High): Tamarisk is an evergreen tree or shrub in the tamarisk family (Tamaricaceae) that typically bloom in spring and set seed in summer. Most tamarisk species are introduced ornamentals from Eurasia and Africa, and are known throughout California. Although the tamarisk present in the Park was not identified to the species, it is most likely small-flower tamarisk (*T. parviflora*), a relatively common escapee in the North Bay and drier margins of the North Coast Range. Primarily tamarisk species are threat to vegetation and reduce forage available, through alteration of soil pH and a lowered water table. The deep roots of these species bring water and salts from the water table. However, tamarisk

can provide cover and nesting habitat for native birds. The recommended control method is mechanical removal, application of herbicide treatment to the cut stump, and follow-up herbicide application to saplings and/or stump sprouts (Cal-IPC 2006).

Table 4. Invasive plant species threat evaluation in the Park

| Species | Threat | | | | |
|---|---|---|---|---|---|
| | Erosion | Vegetation | Fire | Wildlife | Grazing |
| blue gum | none | moderate-high | High | low | moderate-high |
| tamarisk | none-low | moderate-high | moderate-high | low-moderate | moderate |
| Himalayan blackberry | none-low | high | moderate-high | none-low | moderate |
| black mustard | moderate | moderate-high | Moderate | low-moderate | moderate-high |
| Italian thistle | moderate | moderate | Moderate | low-moderate | moderate-high |
| purple star thistle | moderate | moderate | Moderate | low | high |
| yellow star thistle | moderate-high | moderate-high | Moderate | low | high |
| poison hemlock | low | high | Moderate | low-moderate | high |
| Fuller's teasel | none-low | moderate | low-moderate | low | moderate |
| Medusa head | moderate | moderate-high | moderate-high | low | high |
| fennel | none-low | high | moderate-high | low-moderate | moderate-high |
| bristly ox-tongue | none-low | moderate | Low | low-moderate | moderate |
| water primrose | none | high | None | moderate-high | none |
| harding grass | none-low | high | moderate-high | low-moderate | low |
| curly dock | none-low | moderate | Low | low | moderate |

(LSA 2009b, LSA 2009c)

Himalayan blackberry (*Rubus armeniacus*). Cal-IPC: High: Himalayan blackberry is an evergreen shrub/vine in the rose family (Rosaceae) that blooms from March to June, and sets seed into early fall. It is originally native to Eurasia, but is known throughout cismontane California at elevations below 5000 feet (CCH 2013, Baldwin et al. 2012, Cal-IPC 2006), and is considered a facultative-upland species (Lichvar 2012). Himalayan blackberry primarily reproduces through rhizomes, but can be transported by seed, and therefore can invade disturbed areas, wetlands, and shady areas rapidly and displace native species (CCH 2013, Cal-IPC 2006). However, Himalayan blackberry can provide shade for streams and nesting, foraging, and shelter habitat for birds and small mammals.

Black mustard (*Brassic nigra*). Cal-IPC: Moderate: Black mustard is an annual forb in the mustard family (Brassicaceae) that blooms from April to July. It is a native Europe, but is now known widely throughout North America including all of cismontane California (Baldwin et al. 2012, CCH 2013). It reproduces solely through seed which are prodigiously set in spring through summer. Because the tall stalks of (3 to 6 feet) black mustard often forms extensive, monotypic stands and is tolerant of soil disturbance and nutrient-poor soils, this species can rapidly overtop and out-compete native forbs and grasses, particularly in disturbed areas.

Recommended control methods include weed whipping, herbicide application, and/or grazing (Cal-IPC 2006).

Italian thistle (*Carduus pycnocephalus*). Cal-IPC: Moderate: Italian thistle is an annual forb in the sunflower family (Asteraceae) that blooms from February through July, and seed set concurrently. It is native to the Mediterranean, and is known throughout coastal California and the northern Sierra Nevada Foothills (Baldwin et al. 2012, CCH 2013). It reproduces solely by seed, and can out-compete native herbaceous species due to its relative unpalatability, tolerance of light shade and full sun, prodigious seed set, and often monotypic stand forming character. Recommended control includes weed whipping and herbicide application (Cal-IPC 2006).

Purple star thistle (*Centaurea calcitrapa*). Cal-IPC: Moderate: Purple star thistle is an annual to perennial forb in the sunflower family (Asteraceae) that blooms from July through October, and sets seed in late summer through early winter. It is native to southern Europe, and is known from the Bay Area, South Coast, and Central Valley (Baldwin et al. 2012, CCH 2013). Because this species is unpalatable to livestock, and often toxic to horses, it can rapidly invade grasslands and open disturbed areas, particularly in areas with compacted soils and heavy grazing (Cal-IPC 2006, Baldwin et al. 2012). Recommended control methods include weed whipping, herbicide application, and grubbing to destroy the deep, strong tap root which can over-winter (Cal-IPC 2006).

Yellow star thistle (*Centaurea solstitialis*). Cal-IPC: High: Yellow star thistle is an annual forb in the sunflower family (Asteraceae) that blooms from May to October, and sets seed summer through fall. It is originally native to southern Europe, but is known throughout California except the high Sierra Nevada below 4500 feet (CCH 2013, Baldwin et al. 2012, Cal-IPC 2006). Yellow star thistle reproduces through seed in late summer to early winter. Because this species is unpalatable to livestock, and often toxic to horses, it can rapidly invade grasslands and open disturbed areas, particularly in areas with compacted soils and heavy grazing (Cal-IPC 2006, Baldwin et al. 2012). Recommended control methods include weed whipping prior to seed set but during flower when individuals have spent the majority of their energy. For large infestations, altered grazing regime accompanied by mechanical removal and herbicide applications may be necessary (Bossard et al. 2000).

Poison hemlock (*Conium maculatum*). Cal-IPC: Moderate: Poison hemlock is a perennial forb in the carrot family (Apiaceae) that blooms from April to June, and sets seed throughout late spring and summer. It is originally native to Eurasia and North Africa, and is known throughout cismontane California and the Great Basin below 5000 feet elevation (Baldwin et al. 2012, Calflora 2013, CCH 2013). Poison hemlock reproduces through seed in summer, which is prodigious and spread by wildlife, wind, water, and humans. This species is lethally toxic to humans, wildlife, and livestock when ingested, and can rapidly invade wetland and mesic upland habitats (Cal-IPC 2006). It poses a moderate threat to wetland and riparian habitat as stands can be monotypic, as well as its toxicity to wildlife. Recommended control methods include hand and mechanical removal, including rooting structures prior to seed set, for smaller populations (Bossard et al. 2000).

Fuller's teasel (*Dipsacus fullonum*). Cal-IPC: Moderate: Fuller's teasel is a perennial forb in the teasel family (Dipsacaceae) that blooms from June to August, and set seed through summer. It is originally native to Europe, and is known throughout the Coast Ranges, South Coast, Modoc Plateau, and northern Sierra Nevada Foothills (Baldwin et al. 2012, CCH 2013). Fuller's teasel

reproduces solely from seed, which is distributed by wind and livestock, primarily in summer into fall. Because this species is unpalatable to livestock, tolerant to soil disturbance, and mesic soil moisture regime, this species poses a substantial threat seasonal wetland and perennial marsh (fringe) habitat. Recommended control methods include weed whipping and grubbing of rosettes in early spring, with follow-up herbicide treatment for greater efficacy (Cal-IPC 2006).

Medusa head (*Elymus caput-medusae*). Cal-IPC: High: Medusa head is an annual graminoid in the grass family (Poaceae) that blooms from April to July, and sets seed in summer. It is originally native to Eurasia, but is known from the Coast Ranges, Klamath Ranges, Central Valley, Modoc Plateau, northern Great Basin, and Transverse Ranges below 7000 feet (Baldwin et al. 2012). Medusa head reproduces through a prodigious annual seed set throughout summer, and can rapidly invade grasslands, pastures, and meadows (Cal-IPC 2006). This species is a threat to the forage potential of the Park as it is not palatable throughout most of the year and does not provide as much nutrition as other grasses and forbs to grazing livestock. Because, grazing livestock has been, and will likely continue to be, a primary component of the Park, consideration of management through fire or other means may be warranted (Bossard et al. 2000, Marty 2007, Reiner et al. 2007).

Fennel (*Foeniculum vulgare*). Cal-IPC: High: Fennel is a perennial forb in the carrot family (Apiaceae) that blooms from May to September, and sets seed from August through October. It is originally native to the Mediterranean, and is known from throughout cismontane California below 5200 feet elevation (CCH 2013, Baldwin et al. 2012, Cal-IPC 2006). Fennel reproduces through seed in late summer and early fall, and seeds are spread by flowing water, wildlife, and humans. Because this species is relatively unpalatable to livestock, the seeds are moderately long-lived, and there is a prodigious seed-set well adapted to disturbed soils, it can rapidly invade roadsides and other harsh substrates forming near monotypic stands (Cal-IPC 2006). Recommended control methods for small infestations include hand removal including full removal of all rooting structures, followed by repeated removals and possible herbicide application. For large infestations, hand or mechanical removal in coordination with herbicide applications may be necessary (Bossard et al. 2000).

Bristly ox-tongue (*Helminthotheca echioides*). Cal-IPC: Limited: Bristly ox-tongue is an annual to perennial forb in the sunflower family (Asteraceae) that blooms from June through December, and sets seed concurrently. It is native to Europe, and is known throughout coastal California and the Central Valley (Baldwin et al. 2012, CCH 2013). It reproduces solely from seed, and can rapidly invade disturbed areas and can tolerate mesic soil moisture regimes. Recommended control methods include weed whipping and grubbing of rosettes in early spring, with follow-up herbicide treatment for greater efficacy (Cal-IPC 2006).

Water primrose (*Ludwigia* sp.). Cal-IPC: unknown (possibly High): Water primrose is a perennial aquatic forb in the evening primrose family (Onagraceae) that blooms from March through December, and sets seed concurrently. Although water primrose was not identified to species, it is likely that it is six petal water primrose (*Ludwigia hexapetala*), a native to California, but an extremely aggressive invasive species. Water primrose can reproduce by seeds, but likely reproduces through rhizomatous growth and broken nodes that root in new locations. Its rapid growth can quickly out-compete native emergent marsh and aquatic species, as well as diminish open water habitat for amphibians (California red-legged frog) and reptiles (e.g. western pond turtle), and decomposing matter can exacerbate eutrophication of ponds and lakes. Recommended control methods include complete draw-down of water in controlled

waterbodies (e.g. stock ponds), herbicide application combined with mechanical removal to reduce eutrophication.

Harding grass (*Phalaris aquatica*). Cal-IPC: Moderate: Harding grass is a perennial graminoid in the grass family (Poaceae) that blooms from February through March, and sets seed through spring. It reproduces through seed and short rhizomes, forming monotypic tussock stands. It is native to the Mediterranean, and has been introduced throughout California as post-fire erosion control and livestock forage. The monotypic and tall growth form precludes shorter native grasses and forbs, and the excessive thatch buildup can increase fire hazard, particularly when adjacent to shrub and woodland communities. Recommended controls include repeated mowing early in the growing season, repeated burns, grazing, and/or herbicide treatment (Cal-IPC 2006).

Curly dock (*Rumex crispus*). Cal-IPC: Limited: Curly dock is a perennial forb in the buckwheat family (Polygonaceae) that blooms and sets seed year-round. It is native to Eurasia, but has a worldwide distribution and is known throughout California (Baldwin et al. 2012, CCH 2013). Curly dock reproduces by seed and can rapidly invade areas with a mesic soil moisture regime. Recommended control methods include weed whipping, soil grubbing, and herbicide application (Cal-IPC 2006).

### *5.3.5 Invasive Wildlife Species*

Similar to invasive plant species, non-native wildlife can alter native wildlife behavior, over-browse native vegetation, provide pathways for invasive plants, share communicable diseases with native fauna, and compromise agricultural enterprises. Several non-native wildlife species have been documented within or have a high potential to occur in the Park. Although California red-legged frog and American bullfrog co-occur and have breeding cycles separated by up to ten weeks (Cook and Jennings 2007), predation by American bullfrogs has been documented (Cook and Jennings 2001, Wilcox 2011). Several of the stock ponds support suitable breeding habitat for both of these amphibians, and therefore, American bullfrog could pose a considerable localized threat to the existing or established populations of California red-legged frog. Wild turkeys are present within the Park; however, it is unclear if this species has deleterious effects on oak regeneration and small invertebrates. Studies from Annadel State Park suggest that the diet of wild turkey is predominantly non-native plants supplemented by insects and small vertebrates (Barrett and Kucera 2005), and wild turkeys have very little overlap with California quail (Lau 2006). Of greater concern may be feral pigs which are frequent migratory residents in the Sonoma Mountains. Feral pigs cause excessive damage to soil through rooting and wallowing, increasing erosion and providing a pathway for invasive species. Invasive brooms (*Genista* spp., *Cytisus* spp.), and other soil disturbance adapted invasive plant species may spread more rapidly and form dense thickets precluding native vegetation where feral pigs frequent (Sheppard and Hosking 1998, personal observation 2010). Currently, no broom species have been reported from the Park, and continued exclusion of these species will rely on proper management of human visitation as well as non-native wildlife, such as feral pigs.

## 5.4 Nutrient Cycling

Nutrient cycling supports the existence of biota throughout the world, and understanding the delicate relationship of nutrient cycling within a given site is important for successful land management. There are seventeen essential nutrients to support plant life, with oxygen,

carbon, nitrogen, phosphorus, and potassium being the primary macronutrients. Oxygen and carbon are absorbed from the atmosphere; nitrogen, phosphorus, and potassium are taken up from the soil. Soil bacteria fix nitrogen in a soluble form that plants take up and re-deposit through fecal deposits, which are then washed into the soil and find their way into the water cycle. Eventually bacteria returns nitrogen to the atmosphere.

Local vegetation communities and plant species have evolved or adapted to the balance of nutrient availability within a given site. Therefore, alterations to the availability of nutrients can severely disrupt the ability of some species to survive, yet allow others, particularly non-native species, to readily invade. For instance, the increase in soluble nitrogen from automobile exhaust may be a primary cause of increased invasion by non-native grasses into serpentine grasslands, an otherwise restrictive environment for plants not adapted to this nitrogen deficient soil type (Weiss 2006). Additionally, nutrient loads, particularly phosphates, are responsible for harmful algal blooms that deoxygenate waterbodies resulting in fish kills.

Within the Park, livestock grazing, the historic use of fertilizers, and relative location of major transportation corridors (e.g., Lakeville Highway, Highway 37) are likely the primary sources of human-induced effects on the local nutrient cycle. Livestock graze across a broad range, taking up nitrogen and other macronutrients which form their vegetative diet, and deposit them in localized fecal deposits. Frequently, in areas where livestock are penned or “loaf” (e.g., tree lines, troughs) concentrated nutrient loads are evident in the presence of dense stands of invasive species such as milk thistle and Italian thistle, although repeated soil disturbance is certainly a considerable contribution to this highly localized phenomenon. Probably the most significant threats from nutrient cycling alterations are in the waterbodies and serpentine areas of the Park, where increased inputs of nitrogen and phosphates can alter the local vegetation communities, threaten sensitive species, and contribute to eutrophication. Therefore, grazing management and considerations on fertilizer use within the Park should account for these potential alterations.

## 6.0 MANAGEMENT CONSIDERATIONS

The overall goals for the management of Tolay Lake Regional Park include the maintenance and enhancement of the biological resources and the abiotic factors contributing their integrity. At the same time, these goals are balanced with other Park goals including the protection of valuable cultural and historical resources, public access, and educational and recreational opportunities. The provision of public access and other human visitation to the Park will likely require infrastructure improvements and installation, and its continued and periodic maintenance. Therefore, in order to protect the biological resources of the Park, the development of a resource management plan is essential to provide a framework and guidance for proposed improvements and their future upkeep. The following sections summarize those areas within the Park that may require further study, consideration, and/or management during and following the initial phase of the Park opening.

## 6.1 Habitat Enhancement and Conservation

*Non-wetland Waters and Wetlands*

Numerous wildlife species depend upon the wetlands, stock ponds, Tolay Lake, and Tolay Creek within the Park. Additionally, native plant species diversity is frequently relatively high within these habitats. Therefore, these habitats should be managed and, where feasible, enhanced to ensure the continued viability of high quality plant and wildlife habitat. The following management options should be considered in the resource management plan for non-wetland waters and wetlands within the Park:

- Preliminary jurisdictional determination of wetland and non-wetland boundaries in areas with specific planned impacts (e.g., trails, Park infrastructure);
- Where feasible, avoidance of wetland and non-wetland habitats for trail implementation;
- Development of restoration guidelines of Tolay Lake and Tolay Creek;
- Enhancement, and/or restoration of existing degraded seeps, meadows, and vernal pool/stock ponds;
- Through a grazing management plant, monitoring of grazing effects and the exclusion of cattle, either seasonally or year-round, as necessary;
    - Development of wildlife-friendly alternative water resources for grazing animals away from wetlands and other sensitive habitats;
- Minimization of sediment migration and nutrient delivery through trail alignment, grazing exclusion, etc.
- Development and maintenance of buffers for trail locations and other Park infrastructure;
- Seasonal access restrictions and appropriate spanning structures (e.g., bridges, boardwalks), and;
- Monitoring and management of invasive weed and aquatic wildlife species infestations, as appropriate.

*Riparian Areas*

Riparian areas offer several benefits to native plants, wildlife, and water quality including but not limited to buffering nutrient loading, sediment migration, shading, cover, and water cooling. Riparian areas should be managed, and where feasible, enhanced to provide continued habitat for native species and improved water quality. The following management potions should be considered in the resource management plan for riparian areas within the Park:

- Where feasible, avoidance of trail alignments through or adjacent to riparian areas;
- Minimization of human visitation to areas of natural native tree and shrub regeneration and possible exclusion of grazing from these areas;
- Propagation and planting of native trees and shrubs from local populations through cuttings and seed collection;
- Restoration of native understory species with an emphasis on natural successional patterns;
- Removal of existing high priority invasive plant species (e.g., Himalayan blackberry);
- Through a grazing management plant, monitoring of grazing effects and the exclusion of cattle, either seasonally or year-round, as necessary;
    - Development of wildlife-friendly alternative water resources for grazing animals away from wetlands and other sensitive habitats;

- Minimization of sediment migration and nutrient delivery through appropriate trail alignment, grazing exclusion, etc.
- Development and maintenance of buffers for trail locations and other Park infrastructure;
- Seasonal access restrictions and appropriate spanning structures (e.g., bridges, boardwalks), and;
- Minimization of fragmentation of existing riparian woodlands/scrubs.

*Woodlands and Groves*

Oak and California buckeye woodlands provide some of the richest plant and wildlife habitat within the Park. Blue gum and Monterey cypress groves offer nesting habitat for birds, but may diminish native floristic diversity. Therefore, these features may require differing management regimes to maintain and enhance native plant community diversity, while providing essential wildlife habitat. The following management options should be considered in the resource management plan for woodlands and groves fields within the Park:

- Where feasible, avoidance of tree cutting for trail alignment;
- Minimization of human visitation to areas of natural native tree and shrub regeneration and possible exclusion of grazing from these areas;
- Propagation and planting of native trees and shrubs from local populations through cuttings and seed collection;
- Restoration of native understory species where the understory is currently dominated by non-native species;
- Development and implementation of a grazing plan with monitoring requirements;
- Monitoring, containment, and/or removal of existing sudden oak death areas;
- Monitoring and removal of invasive plant species infestations during and following trail construction and other Park improvement projects; stewardship programs to remove existing invasive plant infestations;
- Minimization of fragmentation of existing oak and California buckeye woodlands.

*Upland Grasslands and Wildflower Fields*

Grassland and wildflower field habitats should be managed to maintain and enhance the presence of native plant species and their community structure, upon which many wildlife species depend. The following management options should be considered in the resource management plan for upland grassland and wildflower fields within the Park:

- Where feasible, avoidance of trail alignment in the areas of highest floral diversity;
- Minimization of human visitation through planned trail alignment and information materials (i.e., signage, pamphlets);
- Decommission and rehabilitation of non-vital access roads and social trails;
- Development and implementation of a grazing plan with monitoring requirements;
- Seeding / planting of locally collected native plant species, possibly including special-status plant species (e.g., fragrant fritillary) and important larval species (e.g., Johnny jump-up);
- Monitoring and removal of invasive plant species infestations during and following trail construction and other Park improvement projects; stewardship programs to remove existing invasive plant infestations.

*Rock Outcrops*

Rock outcrops offer a refuge for several native plant species that have been extirpated from surrounding grasslands, and provides cover wildlife species. The following management options should be considered in the resource management plan for rock outcrops as well as stone walls within the Park:

- Where feasible, avoidance and minimization of trail alignment through rock outcrops;
- Development and implementation of a grazing plan.

*Special-status Species*

Several special-status plant and wildlife species have been documented within the Park or have the potential to exist within the Park. These species should be protected and, where feasible, their habitat enhanced. The following management options should be considered in the resource management plan for special-status species within the Park:

- Avoidance of documented populations including appropriate buffered area (e.g., fragrant fritillary) or high quality habitats (e.g., Johnny jump-up colonies);
- Educational resources for park visitors about special-status species and their importance to the local ecosystem;
- Possible propagation of special-status plant species and reintroduction to existing high quality unoccupied habitat within the Park;
- Scheduled monitoring of plant populations with thresholds for management actions;
- Enhancement or restoration of existing habitats for special-status species (e.g., pond creation for California red-legged frog; invasive plant species abatement).

*Invasive Species*

Aggressive infestations of non-native, invasive species can reduce native species reproduction, increase fire and other hazards, alter hydrologic and ecologic functions, among other threats to healthy functioning native systems. Therefore, the following management options should be considered in the resource management plan for invasive species within the Park:

<u>Invasive Plant Species</u>:

- Minimization of ground disturbance activities
- Mitigation measures, such native species seeding and weed abatement, for areas where ground disturbance is unavoidable;
- Use of weed free straw for erosion control; weed free forage for supplemental feeding of livestock;
- Educational resources for park visitors and employees about invasive plant species;
- Localized native species propagules and seeds for restoration, erosion control, revegetation, etc.;
- Prevention program of introduction and reintroduction of invasive species.

<u>Invasive Wildlife Species</u>:

- Develop site-specific bullfrog eradication or control methods;

- Develop site-specific methods and/or studies for assessing potential wild turkey impacts;
- Develop site-specific methods should feral pigs become introduced to the Park.

### 6.2 Preferred Habitats for Park Development and Sensitive Habitat Avoidance

The Park is composed of several unique and otherwise sensitive habitats, including though not limited to oak woodlands, serpentine grassland, and Tolay Lake. To develop park infrastructure and provide public access, the following considerations for the placement of access, trails, fences, etc. that minimize the deleterious effects to the Park's sensitive biological resources, with preference for Park infrastructure and heaviest visitation in the Park's more common or ubiquitous habitats, should be included in the resource management plan:

- Consideration of trail and infrastructure location and installation to encourage passive recreation;
- Implement a visitor educational program to inform about the sensitive habitats and species within the Park;
- Trails could be preferentially located in more ubiquitous, less sensitive habitats such as non-native annual grasslands, while extremely sensitive habitats such as wetlands may be avoided or impacts to such, minimized;
- Habitats could be evaluated for their level of sensitivity, and the trail system designed accordingly (e.g. heavy use in grasslands, light use in woodlands, very light/seasonal use in wetlands);
- Consider placing seasonal restrictions on certain trails to minimize or prevent erosion, invasive species spread, etc.;
- Avoidance of extremely sensitive habitats/species and development of appropriate buffers;
- Where feasible, incorporation of existing livestock and social trails, and ranch roads as part of the trail system;
- Parking, picnic areas, and other larger infrastructural improvements should be located in existing developed areas (i.e., existing Park Headquarters / Cardoza residence).

### 6.3 Minimization of Erosion, Hydrologic Alteration, and Nutrient Loading

Intentional and significant hydrologic modifications were historically conducted within the Park, particularly through the draining of Tolay Lake, the creation of stock ponds, and channelization of agricultural ditches. Unintended hydrologic alteration has likely resulted from these modifications as well as the long history of grazing where compacted soils and channelized drainages have allowed water to move more quickly in overland sheet flow and lowered water table. Channelization and compacted soils have increased erosion throughout the watershed, which provide opportunities for invasive plant species, increase sediment loads in Tolay Creek, etc. Therefore, the following options should be considered in the resource management plan to conserve hydrologic and geomorphic integrity of the Park:

- Mapping and monitoring of headcuts and incision near wetlands;
- Monitor road and trail channel crossings;
- Trail and access road design to prevent or minimize erosion, flow concentration, and lower velocity of overland sheet flow;
- Development / refinement of grazing management to reduce soil compaction, trampling, and visitation to wetlands;

- Livestock exclusion from wetlands and other aquatic features;
- Inter-annual / inter-decadal movement of water troughs and other livestock infrastructure to “rest” and rehabilitate areas of livestock concentration;
- Seasonal trail and road restrictions to prevent or minimize sediment migration, erosion, etc.

### 6.4 Data Gaps

Several in-depth studies have been conducted to date regarding the biological resources within the Park; however, additional, site specific surveys may be necessary depending on exact infrastructural designs. The following information may be necessary:

- Section 404/401 jurisdictional determination of wetlands and non-wetland waters at proposed infrastructural improvements / installations to determine the precise extent of jurisdictional features.
- Updated protocol-level rare plant surveys along proposed trail corridors and other Park infrastructure to ensure the avoidance of special-status plant species.
- Breeding bird and bat roost surveys should include trees, shrubs, or existing structures be slated for removal.
- Species-specific wildlife surveys along proposed trail corridors and other Park infrastructure to ensure the avoidance of special-status plant species.

### 6.5 Adaptation to Climate Change

It is universally accepted throughout the scientific community that climate change is being exacerbated by human activity. Probable effects of climate change include increased heat waves, drought, and more intense storms (Pew 2013). Modeling for California suggests that climate change effects will decrease Sierran and Cascadian snowpacks, cause a rise in sea level, increase the duration and intensity of heat waves, increase critically dry years (annual drought), and increase wildfires (Karl et al. 2009, Luers et al. 2006). Rises in ocean temperature may affect fog and precipitation, but is unclear if precipitation will increase, decrease, or remain overall the same but with changes in timing. Additionally, changes in species distribution and phenology have been repeatedly reported throughout the world (Malcolm and Pitelka 2000, Walther et al. 2002). It is uncertain how climate change will impact Sonoma County’s vegetation communities, wildlife species, hydrologic cycle, nutrient cycle, and other elements of the ecosystem. Therefore it is important for land managers to plan for conservation benefits that will provide habitats with the resiliency to buffer the effects of climate change uncertainty. The Park confers several benefits to the region and resident plant and wildlife species that may allow them to adjust to climate change. Land management of the Park should consider these beneficial elements and provide enhancement for them.

- The Park provides connectivity for plant and wildlife species through latitudinal (north-south) and elevational gradients;
- Maintenance and enhancement of functional vegetation groups to provide resiliency in individual species;
    - Maintenance and enhancement of native floral diversity and seedbed which increase the opportunity for species adaptation to changing climate;
    - Invasive species control and monitoring to effectively reduce or prevent type conversion;

- Wetlands and non-wetland waters provide valuable water storage during drier periods, and attenuate runoff and sediment transport during wetter periods;
- Wetlands, non-wetland waters, and riparian areas provide aquatic and cooling refugia to species for thermo-regulating.

Due to the uncertainty of climate change, developing monitoring and management strategies to measure and evaluate changes within the Park will provide land managers with the ability to respond effectively. Adaptive management encourages the continual incorporation of the most recent research and strategies for land management, and the general principles of adaptive management should be incorporated into the resource management plan.

## 6.6 Regulatory Jurisdictions and Policies

Several federal, state, and local agencies, through regulation and guidance, attempt to protect sensitive biological resources. The following sections explain the regulatory context guiding the protection of biological resources in Sonoma County and the State of California, including applicable federal and state laws and regulations that helped guide field investigations.

### *6.6.1 Environmental Quality Acts*

California Environmental Quality Act (CEQA)

Projects that are funded, administered, or requiring a permit from a state or local agency must comply with the California Environmental Quality Act. Projects are defined as discretionary actions that have the potential to have a physical impact on the environment, including but not limited to, biological resources. Essentially a disclosure law, CEQA is intended to disclose to the public proposed and approved projects with environmental impacts, inform municipalities/agencies and the public about potential impacts of proposed projects on environmental quality, identify avoidance and minimization measures of those impacts, and address alternatives to the project or project design to avoid impacts or detail mitigation measures to reduce the levels of impact from the proposed project.

National Environmental Policy Act (NEPA)

Similar to CEQA, projects that are funded, administered, or permitted by a federal agency require review under the National Environmental Policy Act (NEPA). NEPA requires federal agencies to consider environmental impacts from project undertaken or permitted by said agency, and provide reasonable alternatives to the project or mitigation.

### *6.6.2 Federal Regulations*

Clean Water Act (CWA) & Rivers and Harbors Act

Section 404 of the Clean Water Act (CWA) gives the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) regulatory and permitting authority regarding discharge of dredged or fill material into “navigable waters of the United States”. Section 502(7) of the CWA defines navigable waters as “waters of the United States, including territorial seas.” Section 328 of Chapter 33 in the Code of Federal Regulations defines the term “waters of the United States” as it applies to the jurisdictional limits of the authority of the Corps under the CWA. A summary of this definition of “waters of the U.S.” in 33 CFR 328.3 includes

(1) waters used for commerce; (2) interstate waters and wetlands; (3) "other waters" such as intrastate lakes, rivers, streams, and wetlands; (4) impoundments of waters; (5) tributaries to the above waters; (6) territorial seas; and (7) wetlands adjacent to waters. Therefore, for purposes of the determining Corps jurisdiction under the CWA, "navigable waters" as defined in the Clean Water Act are the same as "waters of the U.S." defined in the Code of Federal Regulations above.

The limits of Corps jurisdiction under Section 404 as given in 33 CFR Section 328.4 are: (a) *Territorial seas:* three nautical miles in a seaward direction from the baseline; (b) *Tidal waters of the U.S.:* high tide line or to the limit of adjacent non-tidal waters; (c) *Non-tidal waters of the U.S.:* ordinary high water mark or to the limit of adjacent wetlands; (d) *Wetlands:* to the limit of the wetland.

The Corps of Engineers also has jurisdiction over "navigable waters" under Section 10 of the Rivers and Harbors Act of 1899. Section 10 of this Act applies to tidal areas below Mean High Water (MHW) and includes tidal areas currently subject to tidal influence, as well as historical tidal areas behind levees that both historically and presently reside at or below MHW. "Navigable waters of the U.S.", as defined in 33 CFR Part 329, are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. The act prohibits any unauthorized action that obstructs the "navigable capacity of any waters of the United States." These actions can include building of structures; excavation, fill; alterations and modifications to navigable waters (33 USC 403). A determination of navigability, once made, applies laterally over the entire surface of the waterbody and is not extinguished by later actions or events which impede or destroy navigable capacity. The upper limit of navigable water is at the point along its length where the character of the river changes from navigable to non-navigable, such as at a major fall or rapids. Since the upper limit of navigability of waterways under Section 10 jurisdiction is sometimes difficult to discern, determinations of navigability under Section 10 are often made by the Corps and kept on file, independent of submitted permit applications or delineations.

Federal Endangered Species Act (ESA)

The Federal Endangered Species Act (ESA) protects listed species from harm or "take," broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Any such activity can be defined as a "take" even if it is unintentional or accidental. The USFWS has jurisdiction over federal threatened and endangered plant and wildlife species.

An endangered species is defined as a species "in danger of extinction within the foreseeable future throughout all or a significant portion of its range," while a threatened species is defined as a species "likely to become an endangered species" (USFWS 2013). A candidate species is defined as one which the USFWS has "sufficient information on biological vulnerability and threat(s) to support an issuance of a proposed rule to list but issuance of the proposed rule is precluded" (USFWS 2013). Endangered and threatened species are protected under the ESA, while candidate species are generally not afforded protection.

Under Section 7 of the ESA, federal agencies involved in permitting that may or will result in the take of federal listed species are required to consult with the USFWS prior to issuance of the permit. If the action in question does not involve another federal permit, under Section 10 of the

ESA, direct consultation with the USFWS is necessary for the issuance of a take permit. Certain activities regarding endangered and threatened plants are regulated under Section 9 of the ESA. The removal, intentional or malicious damage, or intentional destruction of federal listed plant species are prohibited under the ESA.

Migratory Bird Treaty Act (MBTA)

The federal Migratory Bird Treaty Act (MBTA) of 1918 prohibits the take, killing, selling, purchasing, and any attempt thereof of migratory birds, or parts of migratory birds, or their eggs and/or nests. Under the MBTA, "take" is defined as "to pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill, unless the context otherwise requires." Most birds native to North America, migratory or otherwise, are protected by the MBTA. Several non-native species, such as European starling and house sparrow, are not protected under the MBTA. Permission to take birds protected under the MBTA, but otherwise not protected under other legal provisions (e.g., ESA), is subject to review and approval by the USFWS.

### *6.6.3 State Regulations*

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act of 1969 established the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCB) in the State of California. The SWRCB and RWQCB regulate activities in waters of the State which include "Waters of the U.S." "Waters of the State" are defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state."

The RWQCB regulates discharges of fill and dredged material that require a Section 404 permit from the Corps under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act through the State Water Quality Certification Program. State Water Quality Certification is necessary for projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact "Waters of the State." In order for a Section 404 permit to be valid, Section 401 of the CWA requires a Water Quality Certification or waiver to be obtained. The Water Quality Certification (or waiver) is issued if the RWQCB assesses that permitted activities will not violate water quality standards individually or cumulatively over the term of the action. Water Quality Certification must be consistent with the requirements of the Federal CWA, the California Environmental Quality Act, the California Endangered Species Act, and the Porter-Cologne Act.

If a proposed project or portion of a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to "Waters of the State," the RWQCB has the option to regulate the dredge and fill activity under its state authority in the form of Waste Discharge Requirements or Certification of Waste Discharge Requirements. In these cases a Water Quality Certification is not necessary under Section 401 of the CWA because federal jurisdiction does not apply.

California Endangered Species Act (CESA)

Functionally very similar to the ESA, the California Endangered Species Act (CESA) is intended to provide additional protection to endangered and threatened species within the State of California. State listed species include endangered, threatened, and candidate species, the

latter of which is afforded protection under the CESA. Under the auspice of the CDFW, the CESA does not supersede the federal ESA, but works in conjunction with it.

Under proposed project impacts, state-listed species require an "incidental take" permit under Section 2081 of the California Fish and Game Code (CFGC), but only if (1) the take is incidental under an otherwise lawful activity; (2) impacts are minimized and fully mitigated; (3) mitigation is proportional and capable of successful implementation; and (4) adequate funding is provided to implement required minimization and mitigation measures including monitoring compliance.

California Fish and Game Code (CFGC)

Under Sections 1600-1616 of the California Fish and Game Code (CFGC), streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by CDFW. Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term "stream", which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life…[including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation" (14 CCR 1.72). In addition, the term "stream" can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). "Riparian" is defined as "on, or pertaining to, the banks of a stream." Riparian vegetation is defined as "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

In addition to the protection of lakes, streams, and riparian areas, the CDFW designates certain wildlife species as "fully protected" under several sections of the CFGC. Bird species are protected under Section 3511, mammals under Section 4700, herpetofauna under Section 5050, and fishes under Section 5515. It is unlawful to take or possess fully protected species at any time, and permission to do so is generally never granted by the CDFW.

### *6.6.4 Other Guidance and Considerations*

State Species of Special Concern, Special Animal Lists, and Special Plant Lists

The CDFW maintains several lists composing the Species of Special Concern (Jennings and Hayes 1994, Shuford and Gardali 2008, Williams 1986). Generally, species of special concern are those species the CDFW considers to have a particularly restricted distribution, associated with declining or sensitive habitats, or have experienced noticeable population declines. Regardless of legal status (e.g., federal / state threatened), these species are inventoried in the CNDDB, and may be considered under CEQA or other state permitting action during proposed project implementation.

In addition to the Species of Special Concern, the CDFW maintains a Special Animals List (CDFG 2011) and Special Plants List (CDFW 2013b). The species on these lists are considered by the CDFW to be of the greatest conservation need and are typically special-status species with other state or federal protection. These species are either listed or candidates for listing under the ESA or CESA, species that meet the criteria for listing, species

that are state Species of Special Concern, taxa that are biologically rare, very restricted in distribution or their habitat requirements, declining throughout their range, have a vulnerable stage in their life cycle that warrants monitoring, or taxa that are on the periphery of their range and are threatened with their extirpation in California. Generally, these species are protected under federal and/or state laws, and are considered under CEQA.

Sensitive Biological Communities and California Native Plant Society Ranks

Sensitive biological communities include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in its CNDDB (CDFG 2013a). Sensitive plant communities are also identified by CDFW (CDFG 2003, CDFG 2007, CDFG 2009), and CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2013) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or USFWS must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G). Specific habitats may also be identified as sensitive in city or county general plans or ordinances.

Plant species included within the CNPS Inventory of Rare and Endangered Plants (CNPS 2013) with California Rare Plant Rank (Rank) of 1 and 2 are also considered special-status plant species and must be considered under CEQA. Very few Rank 3 or Rank 4 plants meet the definitions of Section 1901 Chapter 10 of the Native Plant Protection Act or Sections 2062 and 2067 of the CFGC that outlines the California Endangered Species Act. However, CNPS and CDFW strongly recommend that these species be fully considered during the preparation of environmental documentation relating to CEQA. This may be particularly appropriate for the type locality of Rank 3 and 4 plants, for populations at the periphery of a species range, or in areas where the taxon is especially uncommon, or has sustained heavy losses, or from populations exhibiting unusual morphology, or occurring on unusual substrates.

A CNPS Rank 1A plant is a species, subspecies, or variety that is considered to be extinct. A Rank 1B plant is considered rare, threatened, or endangered in California and elsewhere. A Rank 2 plant is considered rare, threatened, or endangered in California but is more common elsewhere. A Rank 3 plant is potentially endangered but additional information on taxonomy, rarity, and endangerment is needed. A Rank 4 plant has a limited distribution but is presently not endangered.

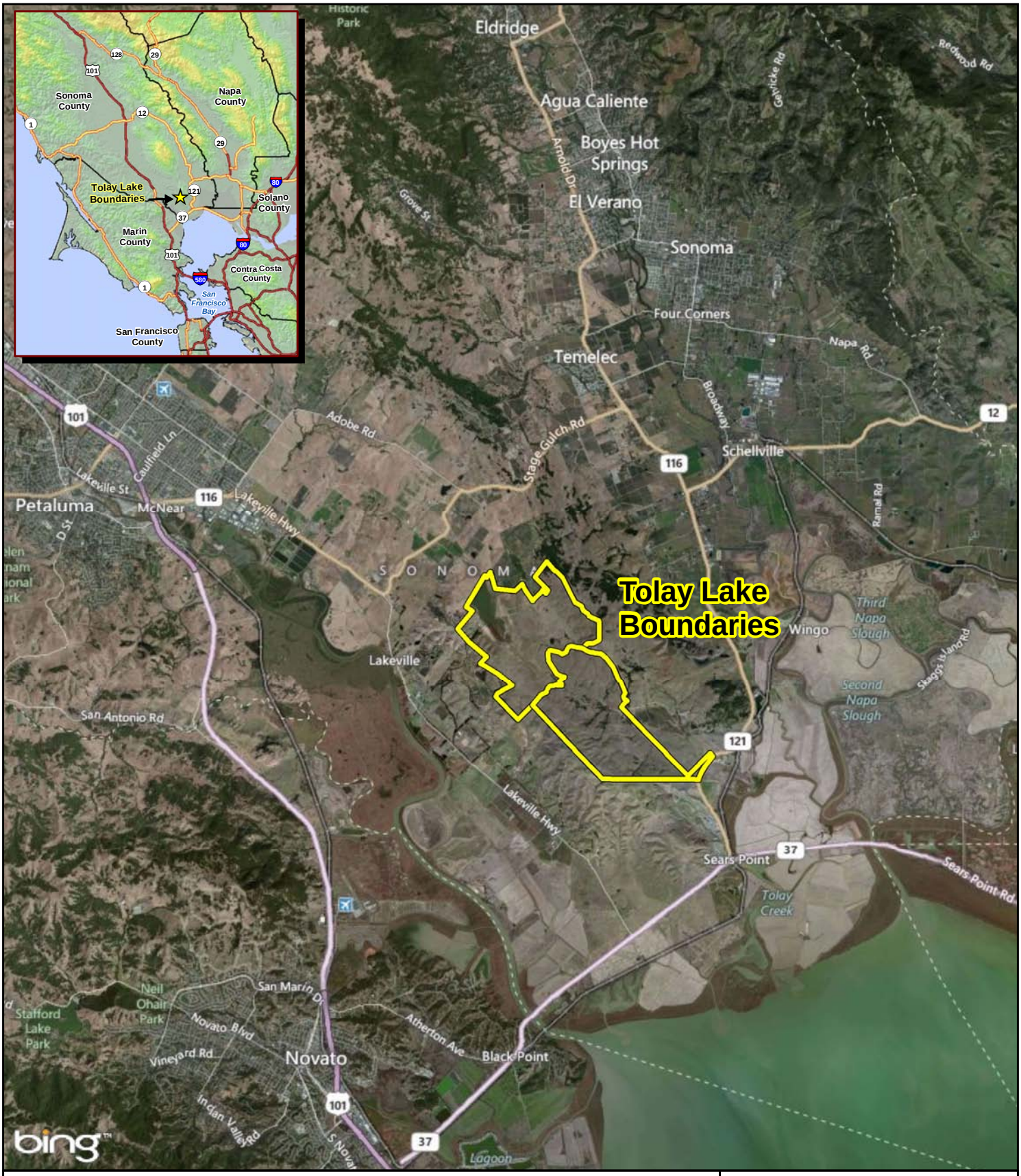


Figure 1. Location and Setting of Tolay Regional Park

Tolay Lake Regional Park
Sonoma County, California

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Miles

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ENVIRONMENTAL CONSULTANTS

Date: January 2012
Map By: Michael Rochelle

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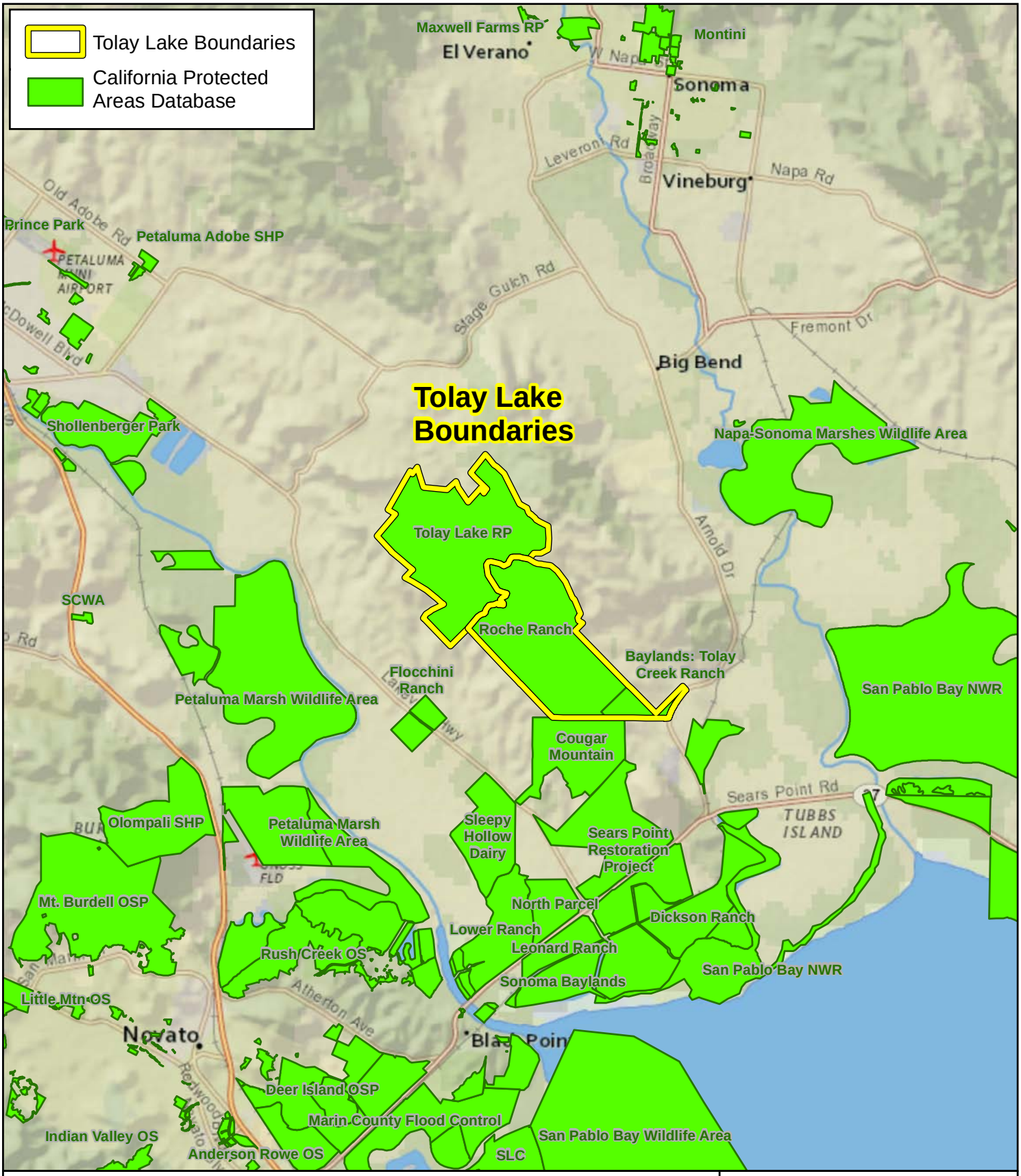


Figure 2. Conserved Lands in the Tolay Lake Regional Park Region

Tolay Lake Regional Park
Sonoma County, California

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Miles

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ENVIRONMENTAL CONSULTANTS

Date: March 2013
Map By: Michael Rochelle
Basemap: NatGeo

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Conserved Lands.mxd

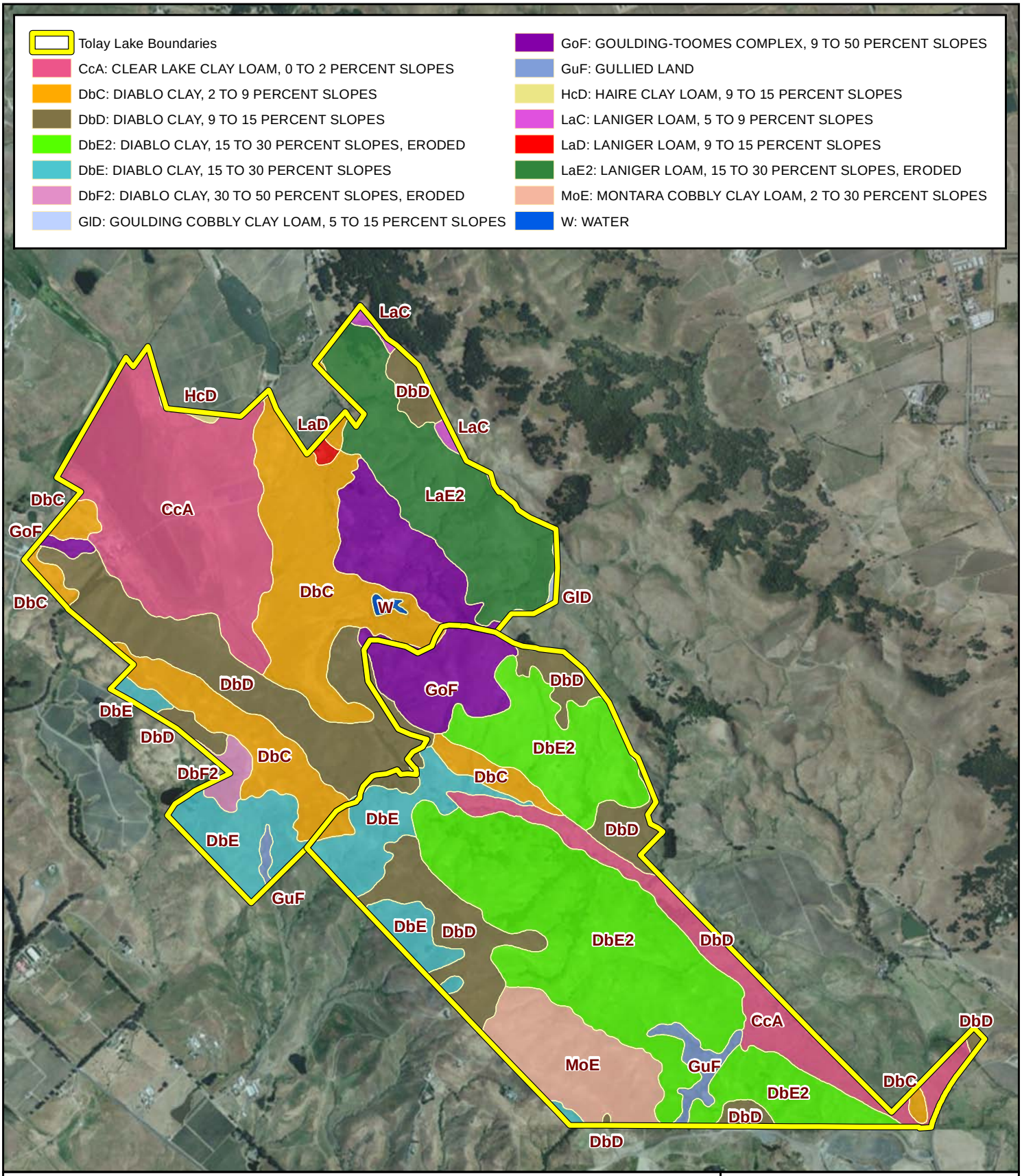


Figure 3. Mapped Soil Units within Tolay Lake Regional Park

Tolay Lake Regional Park
Sonoma County, California

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Feet

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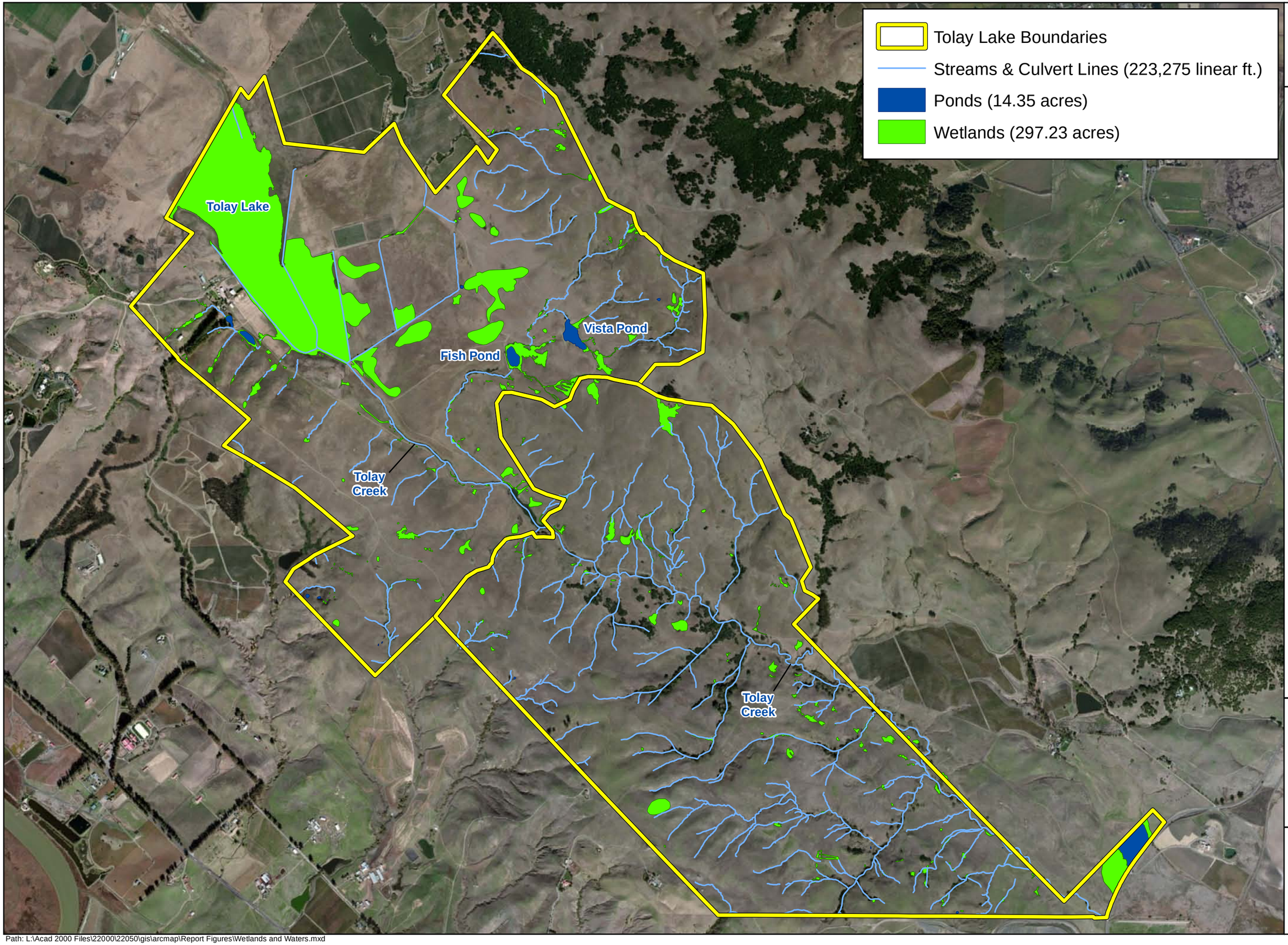
ENVIRONMENTAL CONSULTANTS

Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Soils.mxd

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Tolay Lake Regional Park

Sonoma County, California

Figure 4.

Wetlands and Waters Mapped in Tolay Lake Regional Park

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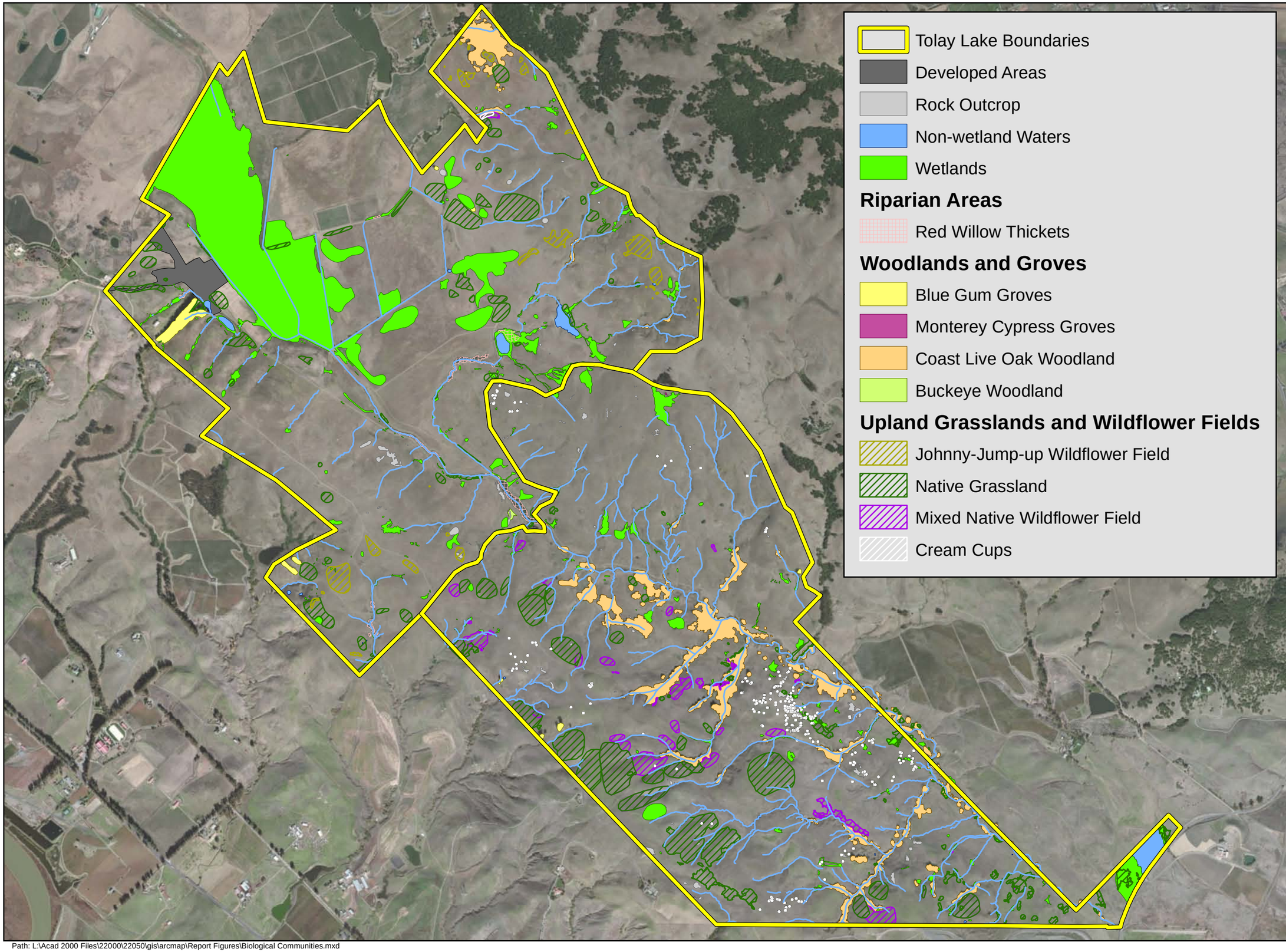
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Wetlands and Waters.mxd

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Tolay Lake Regional Park

Sonoma County, California

Figure 5.

Biological Communities within Tolay Lake Regional Park

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Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Biological Communities.mxd

Tolay Lake Boundaries

**Special-status Wildlife Occurrences**

- Burrowing Owl
- California Red-legged Frog
- Former Raptor Nest
- Golden Eagle
- Short-eared owl
- Red-tailed Hawk Nest
- Western Pond Turtle

**Speciel-status Plant Occurrences - Points**

- Johnny jump-up
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Marsh zigadene

**Special-status Plant Occurrences - Polygons**

- California western flax
- Johnny jump-up
- Cream cups

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# Tolay Lake Regional Park

Sonoma County, California

Figure 6.

Special-status Plant and Wildlife Species within Tolay Lake Regional Park

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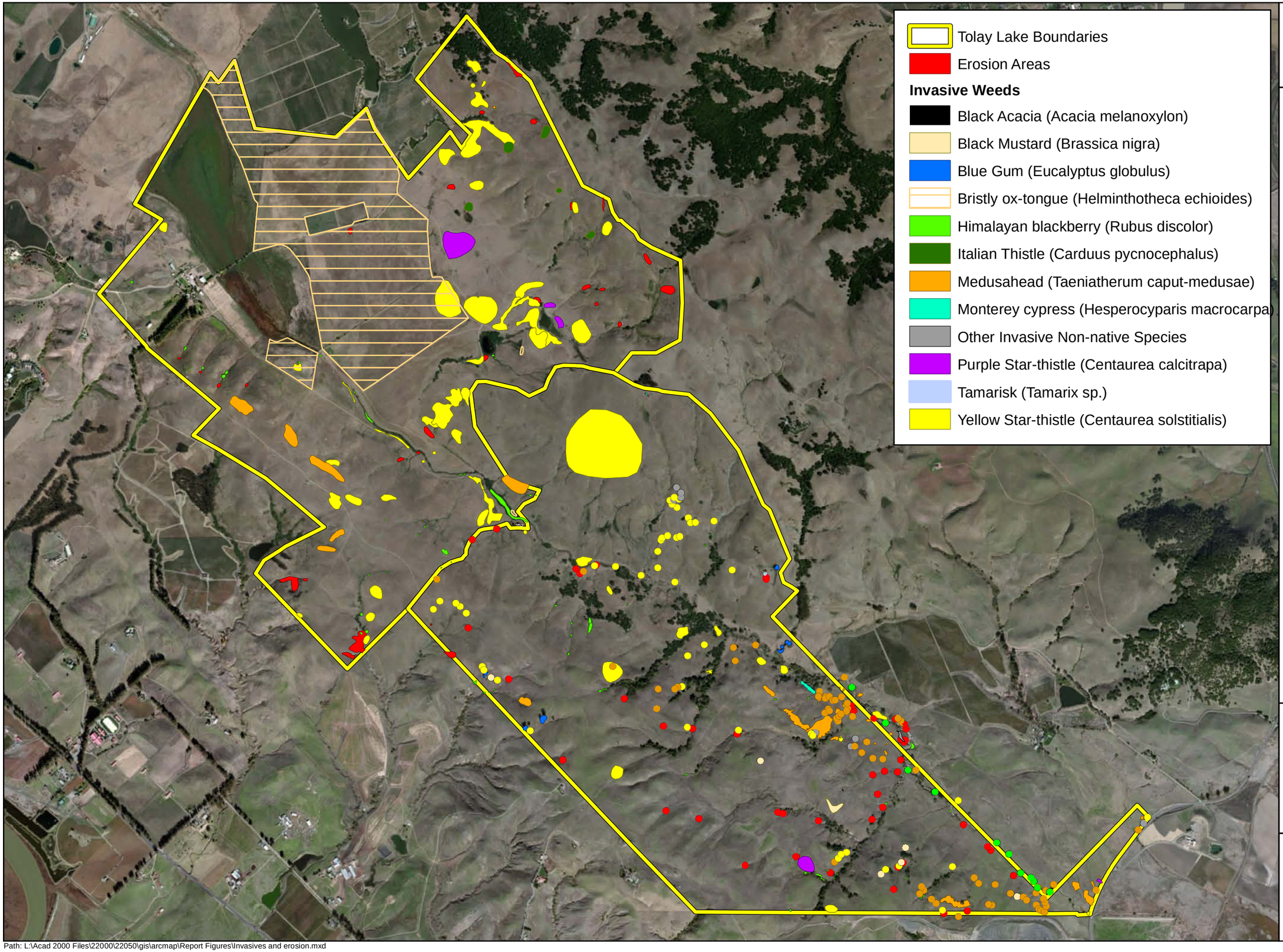
Feet

Map Date: June 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Plants and Wildlife.mxd

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Tolay Lake Regional Park

Sonoma County, California

Figure 7.

Invasive Plant Species and Erosion within Tolay Lake Regional Park

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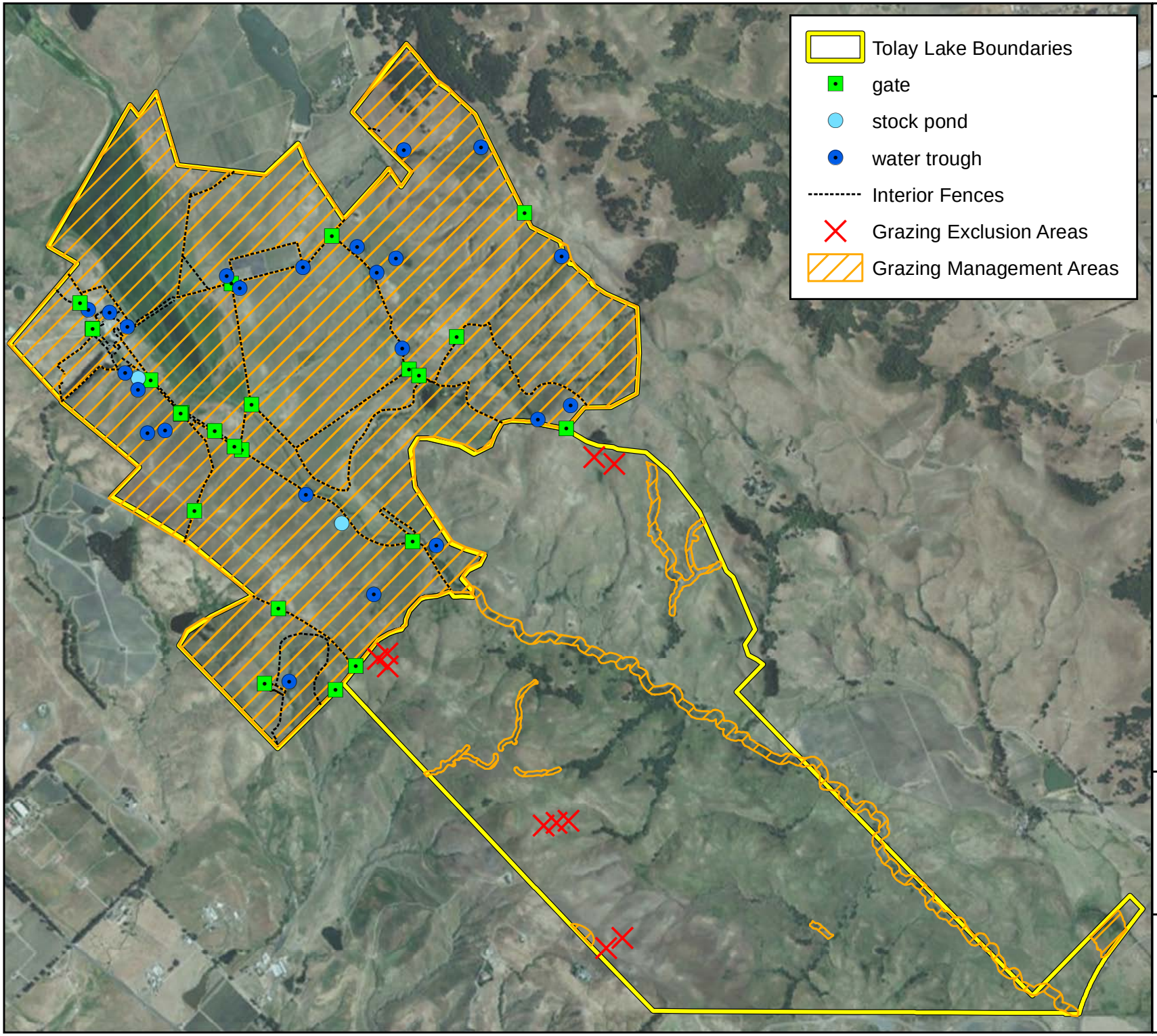
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Invasives and erosion.mxd

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Tolay Lake
Regional Park

Sonoma County,
California

Figure 8.

Grazing Management and Infastructure within Tolay Lake Regional Park

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Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Grazing.mxd

Figure 1.  Location and Setting of Tolay Lake Regional Park

Figure 2.  Conserved Lands in the Tolay Lake Regional Park Region

Figure 3.  Mapped Soil Units within Tolay Lake Regional Park

Figure 4.  Biological Communities within Tolay Lake Regional Park

Figure 5. Special-status Plant and Wildlife Species and Resources within Tolay Lake Regional Park

Figure 6.  Invasive Plant Species and Erosion within Tolay Lake Regional Park

Figure 7.  Grazing Management and Infrastructure within Tolay Lake Regional Park

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Appendix A – Plant and Wildlife Species Observed within the Park

Table A-1. Plant Species Observed at Tolay Lake Regional Park by LSA Associates 2006-2008, and WRA 2013

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Agavaceae [Liliaceae] | *Chlorogalum pomeridianum* var. *pomeridianum* | common soap plant | perennial forb | native | -- | -- | NL | -- | -- |
| Alismataceae | *Alisma lanceolatum* | water plantain | perennial forb | non-native | -- | -- | OBL | -- | -- |
| Amaranthaceae | *Amaranthus blitoides* | mat amaranth | annual forb | native | -- | -- | NL | -- | -- |
| Amaranthaceae | *Amaranthus retroflexus* | redroot amaranth | annual forb | non-native | -- | -- | NL | -- | -- |
| Anacardiaceae | *Toxicodendron diversilobum* | poison oak | deciduous shrub | native | -- | -- | NL | -- | -- |
| Apiaceae | *Conium maculatum* | poison hemlock | perennial forb | non-native | -- | moderate | FAC | -- | -- |
| Apiaceae | *Daucus pusillus* | American wild carrot | annual forb | native | -- | -- | NL | -- | -- |
| Apiaceae | *Eryngium aristulatum* var. *aristulatum* | California button celery | perennial forb | native | -- | -- | OBL | -- | VPA? |
| Apiaceae | *Eryngium armatum* | coastal button celery | perennial forb | native | -- | -- | FACW | -- | VPA? |
| Apiaceae | *Foeniculum vulgare* | fennel | perennial forb | non-native | -- | high | NL | -- | -- |
| Apiaceae | *Lomatium utriculatum* | hog fennel | perennial forb | native | -- | -- | NL | WI | -- |
| Apiaceae | *Lomatium* sp. | biscuit root | perennial forb | native | -- | -- | NL | unknown | -- |
| Apiaceae | *Osmorhiza berteroi* | sweet cicely | perennial forb | native | -- | -- | FACU | -- | -- |
| Apiaceae | *Perideridia kelloggii* | Kellogg's yampah | perennial forb | native | -- | -- | NL | WI | -- |
| Apiaceae | *Sanicula bipinnata* | poison sanicle | perennial forb | native | -- | -- | NL | -- | -- |
| Apiaceae | *Sanicula bipinnatifida* | purple sanicle | perennial forb | native | -- | -- | NL | WI | -- |
| Apiaceae | *Sanicula crassicaulis* | Gamble weed | perennial forb | native | -- | -- | NL | -- | -- |
| Apiaceae | *Scandix pecten-veneris* | shepherd’s needle | annual forb | non-native | -- | -- | NL | -- | -- |
| Apiaceae | *Torilis arvensis* | hedge parsley | annual forb | non-native | -- | moderate | NL | -- | -- |
| Apiaceae | *Torilis nodosa* | knotted hedgeparsley | annual forb | non-native | -- | -- | NL | -- | -- |
| Apocynaceae [Asclepiadaceae] | *Asclepias fascicularis* | Mexican milkweed | perennial forb | native | -- | -- | FAC | -- | GEN |
| Araceae | *Lemna* sp. | duck weed | perennial forb | native | -- | -- | OBL | -- | unknown |
| Araliaceae [Apiaceae] | *Hydrocotyle ranunculoides* | water pennywort | perennial forb | native | -- | -- | OBL | -- | -- |
| Aristolochiaceae | *Aristolochia californica* | Dutchman's pipe | perennial vine | native | -- | -- | NL | -- | -- |
| Asteraceae | *Achillea millefolium* | common yarrow | perenial forb | native | -- | -- | FACU | -- | -- |
| Asteraceae | *Achyrachaena mollis* | soft blow wives | annual forb | native | -- | -- | FAC | -- | GEN |
| Asteraceae | *Agoseris grandiflora* | large-flowered agoseris | perenial forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Anthemis cotula* | mayweed | annual forb | non-native | -- | assessed | FACU | -- | -- |
| Asteraceae | *Artemisia douglasiana* | mugwort | perennial forb | native | -- | -- | FACW | -- | -- |
| Asteraceae | *Baccharis pilularis* ssp. *consanguinea* | coyote brush | evergreen shrub | native | -- | -- | NL | -- | -- |
| Asteraceae | *Baccharis salicifolia* | mule fat | evergreen shrub | native | -- | -- | FACW | -- | -- |
| Asteraceae | *Blennosperma nanum* var. *nanum* | common blennosperma | annual forb | native | -- | -- | FACW | -- | VPI? |

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Asteraceae | *Carduus pycnocephalus* | Italian thistle | annual forb | non-native | -- | moderate | NL | -- | -- |
| Asteraceae | *Centaurea calcitrapa* | purple star thistle | annual forb | non-native | -- | moderate | NL | -- | -- |
| Asteraceae | *Centaurea melitensis* | tocalote | annual forb | non-native | -- | moderate | NL | -- | -- |
| Asteraceae | *Centaurea solstitialis* | yellow star thistle | annual forb | non-native | -- | high | NL | -- | GEN |
| Asteraceae | *Cirsium vulgare* | bull thistle | perennial forb | non-native | -- | moderate | FACU | -- | -- |
| Asteraceae | *Cotula coronopifolia* | brass buttons | perennial forb | non-native | -- | limited | OBL | -- | GEN |
| Asteraceae | *Erigeron philadelphicus* | Philadelphia fleabane | perennial forb | native | -- | -- | FACU | -- | -- |
| Asteraceae | *Eurybia radulina* [*Aster radulinus*] | roughleaf aster | perennial forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Grindelia camporum* | common gumplant | perennial forb | native | -- | -- | FACW | WI | -- |
| Asteraceae | *Helminthotheca echioides* [*Picris echioides*] | bristly ox-tongue | perennial forb | non-native | -- | limited | FAC | -- | -- |
| Asteraceae | *Hemizonia congesta* ssp. *lutescens* | yellow hayfield tarweed | annual forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Hemizonia congesta* ssp. *luzulifolia* | white hayfield tarweed | annual forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Hesperevax sparsiflora* var. *sparsiflora* | erect dwarf cudweed | annual forb | native | -- | -- | FACU | WI | -- |
| Asteraceae | *Hypochaeris glabra* | smooth catsear | annual forb | non-native | -- | limited | NL | -- | GEN |
| Asteraceae | *Hypochaeris radicata* | hairy catsear | perennial forb | non-native | -- | moderate | FACU | -- | -- |
| Asteraceae | *Lactuca saligna* | willowleaf lettuce | annual forb | non-native | -- | -- | FACU | -- | -- |
| Asteraceae | *Lactuca serriola* | prickly lettuce | annual forb | non-native | -- | assessed | FACU | -- | -- |
| Asteraceae | *Lasthenia californica* ssp. *californica* | California goldfields | annual forb | native | -- | -- | UPL | -- | VPA? |
| Asteraceae | *Lasthenia glaberrima* | smooth goldfields | annual forb | native | -- | -- | OBL | -- | VPI? |
| Asteraceae | *Layia chrysanthemoides* | smooth tidytips | annual forb | native | -- | -- | FACW | -- | GEN |
| Asteraceae | *Layia gaillardioides* | woodland tidytips | annual forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Layia platyglossa* | coastal tidytips | annual forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Madia gracilis* | gumweed tarweed | annual forb | native | -- | -- | NL | -- | -- |
| Asteraceae | *Madia sativa* | coast tarweed | annual forb | native | -- | -- | NL | -- | GEN |
| Asteraceae | *Matricaria discoidea* [*Chamomilla suaveolens*] | pineapple weed | annual forb | non-native | -- | -- | FACU | -- | GEN |
| Asteraceae | *Microseris douglasii* ssp. *tenella* | Douglas' silverpuffs | annual forb | native | -- | -- | UPL | WI/IN | GEN |
| Asteraceae | *Pseudognaphalium luteoalbum* [*Gnaphalium luteoalbum*] | Jersey cudweed | annual forb | non-native | -- | -- | FACW | -- | -- |
| Asteraceae | *Pseudognaphalium stramineum* [*Gnaphalium stramineum*] | cotton batting plant | perennial forb | native | -- | -- | FAC | -- | -- |
| Asteraceae | *Senecio vulgaris* | old man in the Spring | annual forb | non-native | -- | -- | FACU | -- | GEN |
| Asteraceae | *Silybum marianum* | milk thistle | perennial forb | non-native | -- | limited | NL | -- | -- |
| Asteraceae | *Sonchus asper* ssp. *asper* | prickly sow thistle | annual forb | non-native | -- | assessed | FACU | -- | -- |

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|---|---|---|---|---|---|---|---|---|---|
| Asteraceae | *Sonchus oleraceus* | common sow thistle | annual forb | non-native | -- | -- | NL | -- | -- |
| Asteraceae | *Taraxacum officinale* | common dandelion | perennial forb | non-native | -- | assessed | FACU | -- | -- |
| Asteraceae | *Tragopogon porrifolius* | purple salsify | perennial forb | non-native | -- | -- | NL | -- | -- |
| Asteraceae | *Wyethia angustifolia* | narrow leaf mule ears | perennial forb | native | -- | -- | FACU | -- | -- |
| Asteraceae | *Xanthium spinosum* | spiny cocklebur | annual forb | native | -- | -- | FACU | -- | -- |
| Asteraceae | *Xanthium strumarium* | rough cocklebur | annual forb | native | -- | -- | FAC | -- | GEN |
| Boraginaceae | *Amsinckia intermedia* [*Amsinckia menziesii* var. *intermedia*] | common fiddleneck | annual forb | native | -- | -- | NL | -- | -- |
| Boraginaceae | *Amsinckia menziesii* [*Amsinckia menziesii* var. *menziesii*] | Menzies' fiddleneck | annual forb | native | -- | -- | NL | -- | -- |
| Boraginaceae | *Heliotropium curassavicum* var. *oculatum* | heliotrope | perennial forb | native | -- | -- | OBL | -- | GEN |
| Boraginaceae [Hydrophyllaceae] | *Nemophila heterophylla* | white baby blue eyes | annual forb | native | -- | -- | NL | -- | -- |
| Boraginaceae [Hydrophyllaceae] | *Phacelia* sp. | phacelia | annual or perennial forb | native | unknown | -- | unknown | unknown | -- |
| Boraginaceae | *Plagiobothrys nothofulvus* | rusty popcornflower | annual forb | native | -- | -- | FAC | -- | GEN |
| Boraginaceae | *Plagiobothrys stipitatus* | slender popcornflower | annual forb | native | -- | -- | FACW | -- | VPA? |
| Brassicaceae | *Brassica nigra* | black mustard | annual forb | non-native | -- | moderate | NL | -- | -- |
| Brassicaceae | *Capsella bursa-pastoris* | shepherd's purse | annual forb | non-native | -- | -- | FACU | -- | GEN |
| Brassicaceae | *Cardamine californica* | California Toothwort | perennial forb | native | -- | -- | NL | -- | -- |
| Brassicaceae | *Cardamine oligosperma* | Idaho bittercress | annual forb | native | -- | -- | NL | -- | GEN |
| Brassicaceae | *Caulanthus lasiophyllus* [*Guillenia lasiophylla*] | California mustard | annual forb | native | -- | -- | NL | -- | -- |
| Brassicaceae | *Lepidium nitidum* | shining pepperweed | annual forb | native | -- | -- | FAC | -- | VPA? |
| Brassicaceae | *Nasturtium officinale* [*Rorippa nasturtium-aquaticum*] | watercress | perennial forb | native | -- | -- | OBL | -- | GEN |
| Brassicaceae | *Raphanus raphanistrum* | jointed charlock | perennial forb | non-native | -- | -- | NL | -- | -- |
| Brassicaceae | *Raphanus sativus* | wild radish | perennial forb | non-native | -- | limited | NL | -- | -- |
| Brassicaceae | *Rorippa curvisiliqua* | curvepod yellowcress | perennial forb | native | -- | -- | OBL | -- | GEN |
| Brassicaceae | *Sinapis arvensis* | charlock | annual forb | non-native | -- | limited | NL | -- | -- |
| Brassicaceae | *Sisymbrium officinale* | hedge mustard | annual forb | non-native | -- | -- | NL | -- | -- |
| Campanulaceae | *Downingia pulchella* | flat-face calicoflower | annual forb | native | -- | -- | OBL | -- | VPA |
| Caprifoliaceae | *Symphoricarpos albus* var. *laevigatus* | upright snowberry | deciduous shrub | native | -- | -- | FACU | -- | -- |
| Caprifoliaceae | *Symphoricarpos mollis* | creeping snowberry | deciduous shrub | native | -- | -- | NL | -- | -- |
| Caryophyllaceae | *Cerastium fontanum* ssp. *vulgare* | mouse-ear chickweed | perennial forb | non-native | -- | -- | FACU | -- | -- |
| Caryophyllaceae | *Cerastium glomeratum* | mouse-ear chickweed | annual forb | non-native | -- | -- | FACU | -- | GEN |

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|---|---|---|---|---|---|---|---|---|---|
| Caryophyllaceae | *Minuartia douglasii* | Douglas' stitchwort | annual forb | native | -- | -- | NL | SI | -- |
| Caryophyllaceae | *Polycarpon tetraphyllum* | fourleaf manyseed | annual forb | non-native | -- | -- | NL | -- | GEN |
| Caryophyllaceae | *Sagina apetala* | annual pearlwort | annual forb | native | -- | -- | FAC | -- | -- |
| Caryophyllaceae | *Silene gallica* | windmill pink | annual forb | non-native | -- | -- | NL | -- | GEN |
| Caryophyllaceae | *Spergularia rubra* | red sandspurry | perennial forb | non-native | -- | -- | FAC | -- | GEN |
| Caryophyllaceae | *Stellaria media* | common chickweed | annual forb | non-native | -- | -- | FACU | -- | GEN |
| Chenopodiaceae | *Atriplex prostrata* [*Atriplex triangularis*] | fat hen | annual forb | non-native | -- | -- | FAC | -- | -- |
| Chenopodiaceae | *Chenopodium album* | white goosefoot | annual forb | non-native | -- | -- | FACU | -- | -- |
| Convolvulaceae | *Calystegia subacaulis* ssp. *subacaulis* | hillside morning glory | perennial forb | native | -- | -- | NL | -- | -- |
| Convolvulaceae | *Convolvulus arvensis* | field bindweed | perennial forb | non-native | -- | assessed | NL | -- | GEN |
| Convolvulaceae [Cuscutaceae] | *Cuscuta* sp. | dodder | annual forb | unknown | unknown | unknown | unknown | unknown | unknown |
| Convolvulaceae | *Cressa truxillensis* | spreading alkaliweed | perennial forb | native | -- | -- | FACW | -- | VPA |
| Crassulaceae | *Crassula aquatica* | water pygmyweed | annual forb | native | -- | -- | OBL | -- | VPI? |
| Crassulaceae | *Crassula connata* | sand pygmyweed | annual forb | native | -- | -- | FAC | -- | GEN |
| Cucurbitaceae | *Marah fabacea* | wild cucumber | perennival vine | native | -- | -- | NL | -- | -- |
| Cupressaceae | *Hesperocyparis macrocarpa* [*Cupressus macrocarpus*] | Monterey cypress | evergreen tree | native | Rank 1B.2* | -- | NL | -- | -- |
| Cyperaceae | *Bolboschoenus maritimus* [*Scirpus maritimus*] | saltmarsh bulrush | perennial graminoid | native | -- | -- | OBL | -- | -- |
| Cyperaceae | *Carex abrupta* | abrupt-beaked bulrush | perennial graminoid | native | -- | -- | FAC | -- | -- |
| Cyperaceae | *Carex* sp. | sedge | perennial graminoid | native? | unknown | -- | unknown | unknown | unknown |
| Cyperaceae | *Carex* sp. | sedge | perennial graminoid | native? | unknown | -- | unknown | unknown | unknown |
| Cyperaceae | *Cyperus eragrostis* | tall flatsedge | perennial graminoid | native | -- | -- | FACW | -- | GEN |
| Cyperaceae | *Eleocharis macrostachya* | common spikerush | perennial graminoid | native | -- | -- | OBL | -- | VPI? |
| Cyperaceae | *Schoenoplectus acutus* var. *occidentalis* [*Scirpus acutus* var. *occidentalis*] | hardstem bulrush | perennial graminoid | native | -- | -- | OBL | -- | -- |
| Cyperaceae | *Schoenoplectus americanus* [*Scirpus americanus*] | chairmaker's bulrush | perennial graminoid | native | -- | -- | OBL | -- | -- |
| Dipsacaceae | *Dipsacus fullonum* | Fuller's teasel | perennial forb | non-native | -- | moderate | FAC | -- | -- |
| Dryopteridaceae | *Dryopteris arguta* | California wood fern | perennial fern | native | -- | -- | NL | -- | -- |
| Equisetaceae | *Equisetum arvense* | field horsetail | perennial fern | native | -- | -- | FAC | -- | -- |
| Equisetaceae | *Equisetum laevigatum* | smooth horsetail | perennial fern | native | -- | -- | FACW | -- | -- |
| Equisetaceae | *Equisetum telmateia* ssp. *braunii* | giant horsetail | perennial fern | native | -- | -- | FACW | -- | -- |
| Ericaceae | *Arbutus menziesii* | Pacific madrone | evergreen tree | native | -- | -- | NL | -- | -- |

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|---|---|---|---|---|---|---|---|---|---|
| Euphorbiaceae | *Chamaesyce maculata* | spotted spurge | annual forb | non-native | -- | -- | NL | -- | -- |
| Euphorbiaceae | *Chamaesyce* sp. | spurge | annual or perennial forb | unknown | unknown | unknown | unknown | unknown | unknown |
| Euphorbiaceae | *Euphorbia crenulata* | Chinese caps | perennial forb | native | -- | -- | NL | -- | -- |
| Euphorbiaceae | *Euphorbia peplus* | petty spurge | annual forb | non-native | -- | -- | NL | -- | -- |
| Fabaceae | *Acacia melanoxylon* | blackwood acacia | evergreen tree | non-native | -- | limited | NL | -- | -- |
| Fabaceae | *Acmispon americanus* var. *americanus* [*Lotus purshianus* var. *purshianus*] | American lotus | annual forb | native | -- | -- | NL | -- | GEN |
| Fabaceae | *Acmispon wrangelianus* [*Lotus wrangelianus*] | Wrangel's lotus | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Astragalus gambelianus* | Gambel's dwarf milk vetch | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Glycyrrhiza lepidota* | American licorice | perennial forb | native | -- | -- | FAC | -- | -- |
| Fabaceae | *Lathyrus vestitus* var. *vestitus* | common Pacific pea | perennial forb | native | -- | -- | NL | WI | -- |
| Fabaceae | *Lathyrus* sp. | pea | annual or perennial forb | unknown | unknown | unknown | unknown | unknown | unknown |
| Fabaceae | *Lotus corniculatus* | bird's-foot trefoil | perennial forb | non-native | -- | assessed | FAC | -- | GEN |
| Fabaceae | *Lotus tenuis* | narrowleaf bird's-foot trefoil | perennial forb | non-native | -- | -- | NL | -- | -- |
| Fabaceae | *Lupinus bicolor* | miniature lupine | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Lupinus formosus* var. *formosus* | summer lupine | perennial forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Lupinus microcarpus* var. *densiflorus* | chick lupine | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Lupinus nanus* | sky lupine | annual forb | native | -- | -- | NL | -- | GEN |
| Fabaceae | *Lupinus succulentus* | hollowleaf annual lupine | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Medicago polymorpha* | bur medic | annual forb | non-native | -- | limited | FACU | -- | -- |
| Fabaceae | *Melilotus indicus* | yellow annual sweetclover | annual forb | non-native | -- | -- | FACU | -- | -- |
| Fabaceae | *Melilotus officinalis* | yellow sweetclover | annual forb | non-native | -- | assessed | FACU | -- | -- |
| Fabaceae | *Thermopsis californica* var. *californica* | California goldenbanner | perennial forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium albopurpureum* | rancheria clover | annual forb | native | -- | -- | FACU | -- | -- |
| Fabaceae | *Trifolium bifidum var. bifidum* | Pinole clover | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium campestre* | hop clover | annual forb | non-native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium ciliolatum* | tree clover | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium depauperatum* | cowbag clover | annual forb | native | -- | -- | FAC | -- | -- |
| Fabaceae | *Trifolium dubium* | Shamrock clover | annual forb | non-native | -- | -- | FACU | -- | -- |
| Fabaceae | *Trifolium fragiferum* | strawberry clover | perennial forb | non-native | -- | -- | FACU | -- | -- |
| Fabaceae | *Trifolium fucatum* | bull clover | annual forb | native | -- | -- | FACU | WI/IN | -- |
| Fabaceae | *Trifolium gracilentum* | pinpoint clover | annual forb | native | -- | -- | NL | WI/IN | -- |
| Fabaceae | *Trifolium hirtum* | rose clover | annual forb | non-native | -- | moderate | NL | -- | -- |
| Fabaceae | *Trifolium incarnatum* | crimson clover | annual forb | non-native | -- | -- | NL | -- | -- |

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|---|---|---|---|---|---|---|---|---|---|
| Fabaceae | *Trifolium microdon* | thimble clover | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium oliganthum* | mini-tomcat clover | annual forb | native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium subterraneum* | subterranean clover | annual forb | non-native | -- | -- | NL | -- | -- |
| Fabaceae | *Trifolium variegatum* | small-flowered variegated clover | annual forb | native | -- | -- | FAC | -- | VPA? |
| Fabaceae | *Vicia benghalensis* | reddish tufted vetch | annual forb | non-native | -- | -- | NL | -- | -- |
| Fabaceae | *Vicia sativa ssp. nigra* | garden spring vetch | annual forb | non-native | -- | -- | UPL | -- | -- |
| Fabaceae | *Vicia sativa ssp. sativa* | pubescent spring vetch | annual forb | non-native | -- | -- | UPL | -- | -- |
| Fagaceae | *Quercus agrifolia* var. *agrifolia* | coast live oak | evergreen tree | native | -- | -- | NL | -- | -- |
| Fagaceae | *Quercus kelloggii* | California black oak | deciduous tree | native | -- | -- | NL | -- | -- |
| Fagaceae | *Quercus lobata* | valley oak | deciduous tree | native | -- | -- | FACU | -- | -- |
| Frankeniaceae | *Frankenia salina* | alkali heath | perennial forb | native | -- | -- | FACW | -- | VPA? |
| Gentianaceae | *Zeltnera muehlenbergii* [*Centaurium muehlenbergii*] | Monterey centaury | annual forb | native | -- | -- | FACW | -- | GEN |
| Geraniaceae | *Erodium botrys* | longbeak stork's bill | annual forb | non-native | -- | assessed | FACU | -- | GEN |
| Geraniaceae | *Erodium cicutarium* | redstem stork's bill | annual forb | non-native | -- | limited | NL | -- | -- |
| Geraniaceae | *Erodium moschatum* | musky stork's bill | annual forb | non-native | -- | assessed | NL | -- | GEN |
| Geraniaceae | *Geranium dissectum* | cutleaf geranium | annual forb | non-native | -- | moderate | NL | -- | GEN |
| Geraniaceae | *Geranium molle* | woodland geranium | perenial forb | non-native | -- | assessed | NL | -- | GEN |
| Iridaceae | *Sisyrinchium bellum* | blue-eyed grass | perennial forb | native | -- | -- | FACW | -- | -- |
| Juncaceae | *Juncus balticus* ssp. *ater* | Baltic rush | perennial graminoid | native | -- | -- | FACW | -- | -- |
| Juncaceae | *Juncus bufonius* | toad rush | annual graminoid | native | -- | -- | FACW | -- | VPA? |
| Juncaceae | *Juncus effusus* ssp. *pacificus* | Pacific rush | perennial graminoid | native | -- | -- | FACW | -- | -- |
| Juncaceae | *Juncus mexicanus* | Mexican rush | perennial graminoid | native | -- | -- | FACW | -- | GEN |
| Juncaceae | *Juncus patens* | common rush | perennial graminoid | native | -- | -- | FACW | -- | -- |
| Juncaceae | *Juncus phaeocephalus* | brownhead rush | perennial graminoid | native | -- | -- | FAC | -- | VPA? |
| Juncaginaceae | *Triglochin scilloides* [*Lilaea scilloides*] | flowering-quillwort | annual forb | native | -- | -- | OBL | -- | VPI? |
| Lamiaceae | *Lamium purpureum* | purple deadnettle | annual forb | non-native | -- | -- | NL | -- | -- |
| Lamiaceae | *Marrubium vulgare* | horehound | perennial forb | non-native | -- | limited | FACU | -- | -- |
| Lamiaceae | *Mentha pulegium* | pennyroyal | perennial forb | non-native | -- | moderate | OBL | -- | VPA? |
| Lamiaceae | *Stachys ajugoides* | bugle hedgenettle | perennial forb | native | -- | -- | OBL | -- | VPA? |
| Lauraceae | *Umbellularia californica* | California bay | evergreen tree | native | -- | -- | FAC | -- | -- |
| Liliaceae | *Calochortus luteus* | yellow mariposa lily | perennial forb | native | -- | -- | NL | -- | -- |
| Liliaceae | *Calochortus venustus* | butterfly mariposa | perennial forb | native | -- | -- | NL | -- | -- |
| Liliaceae | *Fritillaria liliacea* | fragrant fritillary | perennial forb | native | Rank 1B.2 | -- | NL | WI | GEN |

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|---|---|---|---|---|---|---|---|---|---|
| Limnanthaceae | *Limnanthes douglasii* | Douglas' meadowfoam | annual forb | native | -- | -- | OBL | -- | VPA |
| Linaceae | *Hesperolinon californicum* | California dwarf flax | annual forb | native | -- | -- | NL | SI | -- |
| Lythraceae | *Ammannia coccinea* | purple ammannia | annual forb | native | -- | -- | OBL | -- | -- |
| Lythraceae | *Lythrum hyssopifolia* | hyssop loosestrife | annual forb | non-native | -- | moderate | OBL | -- | VPA? |
| Malvaceae | *Abutilon theophrasti* | velvet-leaf | annual forb | non-native | -- | -- | FACU | -- | -- |
| Malvaceae | *Malva nicaeensis* | bull mallow | annual forb | non-native | -- | -- | NL | -- | -- |
| Malvaceae | *Malvella leprosa* | alkali mallow | perennial forb | native | -- | -- | FACU | -- | GEN |
| Malvaceae | *Sidalcea malviflora* ssp. *laciniata* | California checkerbloom | perennial forb | native | -- | -- | FACW | -- | -- |
| Martyniaceae | *Proboscidea lutea* | yellow devil's claw | annual forb | non-native | -- | -- | NL | -- | -- |
| Melanthiaceae [Liliaceae] | *Toxicoscordion fontanum* [*Zigadenus micranthus* var. *fontanus*] | marsh star lily | perennial forb | native | Rank 4.2 | -- | OBL | BE/SI | -- |
| Melanthiaceae [Liliaceae] | *Toxicoscordion fremontii* [*Zigadenus fremontii*] | Fremot's star lily | perennial forb | native | -- | -- | NL | -- | -- |
| Montiaceae [Portulacaceae] | *Calandrinia ciliata* | common redmaids | annual forb | native | -- | -- | FACU | -- | GEN |
| Montiaceae [Portulacaceae] | *Claytonia exigua* | serpentine springbeauty | annual forb | native | -- | -- | NL | SI | -- |
| Montiaceae [Portulacaceae] | *Claytonia perfoliata* | miner's lettuce | annual forb | native | -- | -- | FAC | -- | GEN |
| Moraceae | *Ficus carica* | common fig | deciduous tree | non-native | -- | moderate | FACU | -- | -- |
| Myrsinaceae [Primulaceae] | *Anagallis arvensis* | scarlet pimpernel | annual forb | non-native | -- | -- | NL | -- | GEN |
| Myrsinaceae [Primulaceae] | *Anagallis minima* [*Centunculus minimus*] | chaffweed | annual forb | native | -- | -- | NL | -- | VPI? |
| Myrtaceae | *Eucalyptus globulus* | blue gum | evergreen tree | non-native | -- | moderate | NL | -- | -- |
| Onagraceae | *Clarkia purpurea* ssp. *quadrivulnera* | winecup clarkia | annual forb | native | -- | -- | NL | -- | -- |
| Onagraceae | *Clarkia* sp. | clarkia | annual forb | native | unknown | -- | -- | unknown | -- |
| Onagraceae | *Epilobium brachycarpum* | annual willowherb | annual forb | native | -- | -- | NL | -- | GEN |
| Onagraceae | *Epilobium campestre* [*Epilobium pygmaeum*] | smooth willowherb | annual forb | native | -- | -- | OBL | -- | VPI? |
| Onagraceae | *Ludwigia* sp. | floating primrose | perennial forb | unknown | -- | unknown | OBL | -- | -- |
| Onagraceae | *Taraxia ovata* [*Camissonia ovata*] | sun cup | perennial forb | native | -- | -- | NL | -- | -- |
| Orobanchaceae [Scrophulariaceae] | *Bellardia trixago* | Mediterranean lineseed | annual forb | non-native | -- | limited | NL | -- | -- |
| Orobanchaceae [Scrophulariaceae] | *Castilleja attenuata* | valley tassels | annual forb | native | -- | -- | NL | -- | GEN |

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|---|---|---|---|---|---|---|---|---|---|
| Orobanchaceae [Scrophulariaceae] | *Castilleja densiflora* | dense-flowered owl's-clover | annual forb | native | -- | -- | NL | -- | GEN |
| Orobanchaceae [Scrophulariaceae] | *Castilleja exserta* | exserted owl's-clover | annual forb | native | -- | -- | NL | -- | -- |
| Orobanchaceae [Scrophulariaceae] | *Castilleja rubicundula* ssp. *lithospermoides* | cream sacs | annual forb | native | -- | -- | NL | WI | -- |
| Orobanchaceae [Scrophulariaceae] | *Parentucellia viscosa* | yellow glandweed | annual forb | non-native | -- | limited | FAC | -- | -- |
| Orobanchaceae [Scrophulariaceae] | *Triphysaria eriantha* ssp. *eriantha* | Johnny-tuck | annual forb | native | -- | -- | NL | -- | GEN |
| Orobanchaceae [Scrophulariaceae] | *Triphysaria pusilla* | dwarf owl's clover | annual forb | native | -- | -- | NL | -- | GEN |
| Orobanchaceae [Scrophulariaceae] | *Triphysaria versicolor* ssp. *faucibarbata* | yellowbeak owl's clover | annual forb | native | -- | -- | NL | -- | GEN |
| Papaveraceae | *Eschscholzia californica* | California poppy | perennial forb | native | -- | -- | NL | -- | -- |
| Papaveraceae | *Platystemon californicus* | creamcups | annual forb | native | -- | -- | NL | WI | -- |
| Phrymaceae [Scrophulariaceae] | *Mimulus aurantiacus* var. *aurantiacus* | sticky monkey | evergreen shrub | native | -- | -- | NL | -- | -- |
| Phrymaceae [Scrophulariaceae] | *Mimulus guttatus* | common monkeyflower | perennial forb | native | -- | -- | OBL | -- | VPA? |
| Plantaginaceae [Callitriche] | *Callitriche* sp. | starwort | annual or perennial forb | unknown | -- | -- | unknown | -- | unknown |
| Plantaginaceae [Scrophulariaceae] | *Collinsia heterophylla* var. *heterophylla* | purple Chinese houses | annual forb | native | -- | -- | NL | -- | -- |
| Plantaginaceae [Scrophulariaceae] | *Kickxia elatine* | sharpleaf cancerwort | perennial forb | non-native | -- | -- | FAC | -- | -- |
| Plantaginaceae | *Plantago erecta* | foothill plantain | annual forb | native | -- | -- | NL | WI/IN | GEN |
| Plantaginaceae | *Plantago lanceolata* | English plantain | perennial forb | non-native | -- | limited | FACU | -- | GEN |
| Plantaginaceae | *Plantago major* | common plantain | perennial forb | non-native | -- | -- | FAC | -- | -- |
| Plantaginaceae | *Plantago subnuda* | tall coastal plantain | perennial forb | native | -- | -- | FACW | -- | -- |
| Plantaginaceae [Scrophulariaceae] | *Veronica peregrina* ssp. *xalapensis* | purslane speedwell | annual forb | native | -- | -- | OBL | -- | VPA? |
| Plantaginaceae [Scrophulariaceae] | *Veronica persica* | bird's-eye speedwell | annual forb | non-native | -- | -- | NL | -- | -- |
| Poaceae | *Agrostis exarata* | spike bentgrass | perennial graminoid | native | -- | -- | FACW | -- | -- |
| Poaceae | *Avena barbata* | slender wild oat | annual graminoid | non-native | -- | moderate | NL | -- | -- |
| Poaceae | *Avena fatua* | wild oat | annual graminoid | non-native | -- | moderate | NL | -- | -- |
| Poaceae | *Brachypodium distachyon* | false brome | perennial graminoid | non-native | -- | moderate | NL | -- | -- |
| Poaceae | *Briza minor* | little rattlesnake grass | annual graminoid | non-native | -- | -- | FAC | -- | GEN |

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Poaceae | *Bromus diandrus* | ripgut brome | annual graminoid | non-native | -- | moderate | NL | -- | -- |
| Poaceae | *Bromus hordeaceus* | soft chess | annual graminoid | non-native | -- | limited | FACU | -- | GEN |
| Poaceae | *Crypsis schoenoides* | swamp pricklegrass | annual graminoid | non-native | -- | -- | FACW | -- | UNK |
| Poaceae | *Cynodon dactylon* | Bermuda grass | perennial graminoid | non-native | -- | moderate | FACU | -- | -- |
| Poaceae | *Cynosurus echinatus* | dogtail grass | annual graminoid | non-native | -- | moderate | NL | -- | -- |
| Poaceae | *Danthonia californica* | California oat grass | perennial graminoid | native | -- | -- | FAC | SI | GEN |
| Poaceae | *Distichlis spicata* | saltgrass | perennial graminoid | native | -- | -- | FACW | -- | VPA? |
| Poaceae | *Elymus caput-medusae* [*Taeniatherum caput-medusae*] | Medusa head | perennial graminoid | non-native | -- | high | NL | -- | GEN |
| Poaceae | *Elymus glaucus* | blue wild rye | perennial graminoid | native | -- | -- | FACU | -- | GEN |
| Poaceae | *Elymus multisetus* | big squirreltail | perennial graminoid | native | -- | -- | NL | -- | -- |
| Poaceae | *Elymus triticoides* [*Leymus triticoides*] | creeping wild rye | perennial graminoid | native | -- | -- | FAC | -- | GEN |
| Poaceae | *Festuca arundinacea* | tall fescue | perennial graminoid | non-native | -- | moderate | FAC | -- | -- |
| Poaceae | *Festuca bromoides* [*Vulpia bromoides*] | brome fescue | perennial graminoid | non-native | -- | -- | FACU | -- | GEN |
| Poaceae | *Festuca myuros* [*Vulpia myuros*] | rattail fescue | perennial graminoid | non-native | -- | moderate | FACU | -- | GEN |
| Poaceae | *Festuca perennis* [*Lolium multiflorum*] | Italian rye grass | annual graminoid | non-native | -- | moderate | FAC | -- | GEN |
| Poaceae | *Gastridium phleoides* [*Gastridium ventricosum*] | nit grass | annual graminoid | non-native | -- | -- | FACU | -- | GEN |
| Poaceae | *Glyceria* X *occidentalis* [*Glyceria occidentalis*] | western mannagrass | perennial graminoid | non-native | -- | -- | OBL | -- | GEN |
| Poaceae | *Holcus lanatus* | common velvet grass | perennial graminoid | non-native | -- | moderate | FAC | -- | -- |
| Poaceae | *Hordeum brachyantherum* ssp. *brachyantherum* | meadow barley | perennial graminoid | native | -- | -- | FACW | -- | GEN |
| Poaceae | *Hordeum brachyantherum* ssp. *californicum* | California barley | perennial graminoid | native | -- | -- | FACW | SI | GEN |
| Poaceae | *Hordeum marinum* ssp. *gussoneanum* | Mediterranean barley | annual graminoid | non-native | -- | moderate | FAC | -- | GEN |
| Poaceae | *Hordeum murinum* ssp. *leporinum* | mouse barley | annual graminoid | non-native | -- | moderate | FAC | -- | GEN |
| Poaceae | *Melica californica* | California onion grass | perennial graminoid | native | -- | -- | NL | -- | -- |
| Poaceae | *Paspalum dilatatum* | dallis grass | perennial graminoid | non-native | -- | -- | FAC | -- | -- |
| Poaceae | *Phalaris aquatica* | harding grass | perennial graminoid | non-native | -- | moderate | FACU | -- | -- |
| Poaceae | *Phalaris paradoxa* | hood canary grass | annual graminoid | non-native | -- | -- | FAC | -- | VPA? |
| Poaceae | *Pleuropogon californicus* var. *californicus* | annual semaphore grass | perennial graminoid | native | -- | -- | OBL | -- | VPA? |
| Poaceae | *Poa annua* | annual bluegrass | annual graminoid | non-native | -- | -- | FAC | -- | GEN |
| Poaceae | *Polypogon australis* | Chilean rabbit's-foot grass | perennial graminoid | non-native | -- | -- | FACW | -- | -- |
| Poaceae | *Polypogon monspeliensis* | rabbit's-foot grass | annual graminoid | non-native | -- | limited | FACW | -- | VPA? |

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Poaceae | *Polypogon viridis* [*Agrostis viridis*] | water beard grass | annual graminoid | non-native | -- | -- | FACW | -- | -- |
| Poaceae | *Stipa lepida* [*Nassella lepida*] | foothill needlegrass | perennial graminoid | native | -- | -- | NL | -- | -- |
| Poaceae | *Stipa pulchra* [*Nassella pulchra*] | purple needlegrass | perennial graminoid | native | -- | -- | NL | -- | -- |
| Poaceae | *Triticum aestivum* | bread wheat | annual graminoid | non-native | -- | -- | NL | -- | -- |
| Polemoniaceae | *Gilia capitata* ssp. *capitata* | bluehead gilia | annual forb | native | -- | -- | NL | WI | -- |
| Polemoniaceae | *Leptosiphon bicolor* [*Linanthus bicolor*] | true babystars | annual forb | native | -- | -- | FACU | -- | -- |
| Polemoniaceae | *Leptosiphon parviflorus* [*Linanthus parviflorus*] | variable linanthus | annual forb | native | -- | -- | NL | -- | -- |
| Polygonaceae | *Persicaria amphibia* [*Polygonum amphibium*] | water smartweed | perennial forb | native | -- | -- | OBL | -- | -- |
| Polygonaceae | *Persicaria hydropiperoides* [*Polygonum hydropiperoides*] | common smartweed | perennial forb | native | -- | -- | OBL | -- | -- |
| Polygonaceae | *Polygonum aviculare* ssp. *aviculare* [*Polygonum arenastrum*] | dooryard knotweed | perennial forb | non-native | -- | -- | FAC | -- | GEN |
| Polygonaceae | *Polygonum* sp. | knotweed | annual or perennial forb | unknown | unknown | unknown | unknown | unknown | unknown |
| Polygonaceae | *Rumex acetosella* | common sheep sorrel | perennial forb | non-native | -- | moderate | FACU | -- | GEN |
| Polygonaceae | *Rumex conglomeratus* | clustered dock | perennial forb | non-native | -- | -- | FACW | -- | -- |
| Polygonaceae | *Rumex crispus* | curly dock | perennial forb | non-native | -- | limited | FAC | -- | GEN |
| Polygonaceae | *Rumex pulcher* | fiddle dock | perennial forb | non-native | -- | -- | FAC | -- | GEN |
| Polypodiaceae | *Polypodium californicum* | California polypody | perennial fern | native | -- | -- | NL | -- | -- |
| Portulacaceae | *Portulaca oleracea* | common purslane | annual forb | non-native | -- | -- | FAC | -- | -- |
| Primulaceae | *Dodecatheon hendersonii* | shooting stars | perennial forb | native | -- | -- | NL | -- | -- |
| Pteridaceae | *Adiantum jordanii* | California maidenhair fern | perennial fern | native | -- | -- | FAC | -- | -- |
| Pteridaceae | *Pellaea andromedifolia* | coffee fern | perennial fern | native | -- | -- | NL | -- | -- |
| Pteridaceae | *Pentagramma triangularis* | gold back fern | perennial fern | native | -- | -- | NL | -- | -- |
| Ranunculaceae | *Delphinium variegatum* ssp. *variegatum* | royal larkspur | perennial forb | native | -- | -- | NL | -- | -- |
| Ranunculaceae | *Ranunculus aquatilis* var. *aquatilis* | aquatic buttercup | perennial forb | native | -- | -- | OBL | -- | VPA? |
| Ranunculaceae | *Ranunculus californicus* | California buttercup | perennial forb | native | -- | -- | FAC | -- | GEN |
| Ranunculaceae | *Ranunculus lobbii* | Lobb's aquatic buttercup | annual forb | native | Rank 4.2 | -- | OBL | -- | VPA? |
| Ranunculaceae | *Ranunculus muricatus* | spiny buttercup | perennial forb | non-native | -- | -- | FACW | -- | VPA? |
| Ranunculaceae | *Ranunculus occidentalis* | western buttercup | perennial forb | native | -- | -- | FACW | -- | -- |
| Ranunculaceae | *Ranunculus orthorhynchus* var. *bloomeri* | Bloomer's beaked buttercup | perennial forb | native | -- | -- | FACW | -- | VPA? |
| Rhamnaceae | *Frangula californica* | California coffeeberry | evergreen shrub | native | -- | -- | NL | -- | -- |

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Rosaceae | *Aphanes occidentalis* | lady's mantle | perennial forb | native | -- | -- | NL | -- | -- |
| Rosaceae | *Holodiscus discolor* var. *discolor* | oceanspray | deciduous shrub | native | -- | -- | FACU | WI/IN | -- |
| Rosaceae | *Prunus* sp. | domestic plum | tree | unknown | -- | unknown | -- | -- | -- |
| Rosaceae | *Rosa californica* | California wildrose | evergreen shrub | native | -- | -- | FAC | -- | -- |
| Rosaceae | *Rosa* sp. | domestic rose | evergreen shrub | unknown | -- | unknown | unknown | -- | -- |
| Rosaceae | *Rubus armeniacus* | Himalayan blackberry | evergreen shrub | non-native | -- | high | FACU | -- | -- |
| Rosaceae | *Rubus ursinus* | California blackberry | evergreen shrub | native | -- | -- | FACU | -- | -- |
| Rubiaceae | *Galium aparine* | stickywilly | annual forb | native | -- | -- | FACU | -- | -- |
| Rubiaceae | *Galium murale* | yellow wall bedstraw | annual forb | non-native | -- | -- | NL | -- | -- |
| Rubiaceae | *Galium trifidum* | threepetal bedstraw | perennial forb | native | -- | -- | FACW | -- | -- |
| Rubiaceae | *Galium* sp. | bedstraw | annual or perennial forb | unknown | unknown | unknown | -- | unknown | -- |
| Rubiaceae | *Sherardia arvensis* | blue fieldmadder | annual forb | non-native | -- | -- | NL | -- | -- |
| Salicaceae | *Populus fremontii* | Fremont cottonwood | deciduous tree | native | -- | -- | FACW | -- | -- |
| Salicaceae | *Salix exigua var. exigua* | sandbar willow | deciduous tree | native | -- | -- | FACW | -- | -- |
| Salicaceae | *Salix laevigata* | red willow | deciduous tree | native | -- | -- | FACW | -- | -- |
| Salicaceae | *Salix lasiandra* var. *lasiandra* | yellow willow | deciduous tree | native | -- | -- | FACW | -- | -- |
| Salicaceae | *Salix lasiolepis* | arroyo willow | deciduous tree | native | -- | -- | FACW | -- | -- |
| Sapindaceae [Aceraceae] | *Acer macrophyllum* | big leaf maple | deciduous tree | native | -- | -- | FACU | -- | -- |
| Sapindaceae [Hippocastanaceae] | *Aesculus californica* | California buckeye | deciduous tree | native | -- | -- | NL | -- | -- |
| Saxifragaceae | *Lithophragma affine* | woodland star | perennial forb | native | -- | -- | NL | -- | -- |
| Scrophulariaceae | *Scrophularia californica* | California figwort | perennial forb | native | -- | -- | FAC | -- | -- |
| Solanaceae | *Solanum americanum* | American black nightshade | perennial forb | native | -- | -- | FACU | -- | -- |
| Tamaricaceae | *Tamarix* sp. | tamarisk | evergreen shrub | non-native | -- | unknown | unknown | -- | -- |
| Themidaceae [Liliaceae] | *Brodiaea elegans* ssp. *elegans* | harvest brodiaea | perennial forb | native | -- | -- | FACU | -- | -- |
| Themidaceae [Liliaceae] | *Dichelostemma capitatum* ssp. *capitatum* | bluedicks | perennial forb | native | -- | -- | FACU | -- | VPA? |
| Themidaceae [Liliaceae] | *Muilla maritima* | sea muilla | perennial forb | native | -- | -- | NL | WI | VPA? |
| Themidaceae [Liliaceae] | *Triteleia hyacinthina* | white hyacinth | perennial forb | native | -- | -- | FAC | -- | VPA? |
| Themidaceae [Liliaceae] | *Triteleia laxa* | Ithuriel's spear | perennial forb | native | -- | -- | NL | -- | -- |
| Typhaceae | *Typha angustifolia* | narrowleaf cattail | perennial forb | non-native | -- | -- | OBL | -- | -- |
| Urticaceae | *Urtica dioica* ssp. *holosericea* | hoary nettle | perennial forb | native | -- | -- | FAC | -- | -- |

| FAMILY | SCIENTIIFC NAME | COMMON NAME | LIFE FORM | ORIGIN | RARE STATUS[1] | INVASIVE STATUS[2] | WETLAND INDICATOR STATUS[3] | SERPENTINE STATUS[4] | VERNAL POOL STATUS[5] |
|---|---|---|---|---|---|---|---|---|---|
| Urticaceae | *Urtica urens* | dwarf nettle | annual forb | non-native | -- | -- | NL | -- | -- |
| Valerianaceae | *Plectritis macrocera* | longhorn plectritis | annual forb | native | -- | -- | FACU | -- | -- |
| Verbenaceae | *Phyla nodiflora* | common lippia | perennial forb | native | -- | -- | FAC | -- | -- |
| Verbenaceae | *Verbena lasiostachys* var. *lasiostachys* | western vervain | perennial forb | native | -- | -- | FAC | -- | -- |
| Violaceae | *Viola pedunculata* | Johnny jump-up | perennial forb | native | -- | -- | NL | -- | -- |
| Viscaceae | *Phoradendron serotinum* ssp. *macrophyllum* [*Phoradendron macrophyllum*] | bigleaf mistletoe | perennial forb | native | -- | -- | NL | -- | -- |
| Viscaceae | *Phoradendron serotinum* ssp. *tomentosum* [*Phoradendron villosum*] | pine mistletoe | perennial forb | native | -- | -- | NL | -- | -- |
| Woodsiaceae [Dryopteridaceae] | *Athyrium filix-femina* var. *cyclosorum* | subarctic lady fern | perennial fern | native | -- | -- | FAC | -- | -- |

Species identified with the *Jepson Manual* (Hickman 1993), *Jepson Manual, 2nd Edition* (Baldwin et al. 2012), and *A Flora of Sonoma County* (Best et al. 1996); nomenclature follows Baldwin et al. 2012 with those in brackets from Hickman 1993

[1]Rare Status: The CNPS Inventory of Rare and Endangered Plants (CNPS 2013)

| | |
|---|---|
| FE: | Federal Endangered |
| FT: | Federal Threatened |
| SE: | State Endangered |
| ST: | State Threatened |
| SR: | State Rare |
| Rank 1A: | Plants presumed extinct in California |
| Rank 1B: | Plants rare, threatened, or endangered in California and elsewhere (*List 1B: Species rare in native stands only; native stands not present in the Park) |
| Rank 2: | Plants rare, threatened, or endangered in California, but more common elsewhere |
| Rank 3: | Plants about which we need more information – a review list |
| Rank 4: | Plants of limited distribution – a watch list |

[2]Invasive Status: California Invasive Plant Inventory (Cal-IPC 2006)

| | |
|---|---|
| High: | Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically. |
| Moderate: | Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited-moderate distribution ecologically |
| Limited: | Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically |
| Assessed: | Assessed by Cal-IPC and determined to not be an existing current threat |

[3]Wetland Status: National List of Plant Species that Occur in Wetlands, California – Arid West (Lichvar 2012)

| | |
|---|---|
| OBL: | Almost always found in wetlands; >99% frequency |
| FACW: | Usually found in wetlands; 67-99% frequency |
| FAC: | Equally found in wetlands and uplands; 34-66% frequency |
| FACU: | Usually not found in wetlands; 1-33% frequency |
| UPL: | Almost never found in wetlands; >1% frequency |
| NL: | Not listed, assumed almost never found in wetlands; >1% frequency |
| NI: | No information; not factored during wetland delineation |

[4]Serpentine Status: Serpentine Endemism in the California Flora: A Database of Serpentine Affinity (Safford et al. 2005)

| | |
|---|---|
| SE: | Strict Endemic; 95% occurrence on ultramafic soils |
| BE: | Broad Endemic; 85-94% occurrence on ultramafic soils |
| BE/SI: | Broad Endemic/Strong Indicator; 75-84% occurrence on ultramafic soils |
| SI: | Strong Indicator; 65-74% occurrence on ultramafic soils |
| WI: | Weak Indicator; 55-64% occurrence on ultramafic soils |
| WI/IN: | Weak Indicator/Indifferent: 50-54% occurrence on ultramafic soils |

[5]Vernal Pool Status: California Vernal Pool Assessment Preliminary Report (Keeler-Wolf et al. 1998)

| | |
|---|---|
| VPI: | Species restricted to vernal pools and not known from other habitats |
| VPA: | Species regularly occurring in vernal pools, but not restricted to them; also occurring in other wetland habitats |
| GEN: | Species that can occur in wetland or upland, or sometimes both, including vernal pools, pool margins, disturbed areas, and grasslands |
| VPI?: | Species that is VPI in certain region(s) only, and can be a VPA or GEN in other regions |
| VPA?: | Species that is VPA in certain region(s), and is GEN in other regions |
| VPI/VPA: | Species that is VPI in some regions and VPA in other regions, but not known to be GEN |

Table A-2. Wildlife Species Observed at Tolay Lake Regional Park by LSA Associates, Steve Ehret, PWA volunteers 2006-2008, and WRA 2013

| CLASS | COMMON NAME | SCIENTIFIC NAME |
|---|---|---|
| Amphibian | bull frog | *Rana catesbeiana* |
| Amphibian | Sierran tree frog | *Pseudacris sierra* |
| Reptile | Western fence lizard | *Sceloporus occidentalis* |
| Reptile | Southern alligator lizard | *Elgaria multicarinata* |
| Reptile | red-sided garter snake | *Thamnophis infernalis* |
| Reptile | common garter snake | *Thamnophis sirtalis* |
| Reptile | ring-necked snake | *Diadophis punctatus* |
| Reptile | common king snake | *Lampropeltis getula californiae* |
| Reptile | gopher snake | *Pituophis catenifer* |
| Birds | Canada goose | *Branta canadensis* |
| Birds | gadwall | *Anas strepara* |
| Birds | American widgeon | *Anas americana* |
| Birds | mallard | *Anas platyrhynchos* |
| Birds | cinnamon teal | *Anas cyanoptera* |
| Birds | Northern shoveler | *Anas clypeata* |
| Birds | Northern pintail | *Anas acuta* |
| Birds | green-winged teal | *Anas cracca* |
| Birds | canvasback | *Aythya valisineria* |
| Birds | greater schaup | *Aythya marila* |
| Birds | bufflehead | *Bucephala albeola* |
| Birds | ruddy duck | *Oxyura jamaicensis* |
| Birds | wild turkey | *Meleagris gallopavo* |
| Birds | California quail | *Callipepla californica* |
| Birds | pied-billed grebe | *Podilymbus podiceps* |
| Birds | double-crested cormorant | *Phalacrocorax auritus* |
| Birds | great blue heron | *Ardea Herodias* |
| Birds | great egret | *Ardea alba* |
| Birds | snowy egret | *Egrettia thula* |
| Birds | turkey vulture | *Cathartes aura* |
| Birds | white-tailed kite | *Elanus leucurus* |
| Birds | Northern harrier | *Circus cyaneus* |
| Birds | sharp-shinned hawk | *Accipiter striatus* |
| Birds | Cooper's hawk | *Accipiter cooperi* |
| Birds | red-shouldered hawk | *Buteo lineatus* |
| Birds | red-tailed hawk | *Buteo jamaicensis* |
| Birds | golden eagle | *Aquila chrysaetos* |
| Birds | American kestrel | *Falco sparverius* |

| CLASS | COMMON NAME | SCIENTIFIC NAME |
|---|---|---|
| Birds | American coot | *Fulica americana* |
| Birds | killdeer | *Charadrius vociferous* |
| Birds | black-necked stilt | *Himantropus mexicanus* |
| Birds | greater yellowlegs | *Tringa melanoleuca* |
| Birds | Western sandpiper | *Calidris mauri* |
| Birds | least sandpiper | *Calidris minutilla* |
| Birds | long-billed dowitcher | *Limnodromus scolopaceus* |
| Birds | Wilson's snipe | *Gallinago delicata* |
| Birds | Caspian tern | *Hydroprogne caspia* |
| Birds | rock pigeon | *Columba livia* |
| Birds | band-tailed pigeon | *Patagioenas fasciata* |
| Birds | mourning dove | *Zenaida macroura* |
| Birds | barn owl | *Tyto alba* |
| Birds | great horned owl | *Bubo virginianus* |
| Birds | burrowing owl | *Athene cunicularia* |
| Birds | short-eared owl | *Asio flammeus* |
| Birds | Vaux's swift | *Chaetura vauxi* |
| Birds | Anna's hummingbird | *Calypte anna* |
| Birds | rufous hummingbird | *Selasphorus rufus* |
| Birds | Allen's hummingbird | *Selasphorus sasin* |
| Birds | Nuttall's woodpecker | *Picoides nuttallii* |
| Birds | acorn woodpecker | *Melanerpes formicivorus* |
| Birds | downy woodpecker | *Picoides pubescens* |
| Birds | Northern flicker | *Colaptes auratus* |
| Birds | willow flycatcher | *Empidonax traillii* |
| Birds | black phoebe | *Sayornis nigricans* |
| Birds | Say's phoebe | *Sayornis saya* |
| Birds | Western kingbird | *Tyrannus verticalis* |
| Birds | loggerhead shrike | *Lanius ludovicianus* |
| Birds | Hutton's vireo | *Vireo huttoni* |
| Birds | warbling vireo | *Vireo gilvus* |
| Birds | Steller's jay | *Cyanocitta stelleri* |
| Birds | Western scrub-jay | *Aphelocoma californica* |
| Birds | American crow | *Corvus brachyrhynchos* |
| Birds | common raven | *Corvus corax* |
| Birds | horned lark | *Eremophila alpestris* |
| Birds | tree swallow | *Tachycineta bicolor* |
| Birds | violet-green swallow | *Tachycineta thalassina* |

| CLASS | COMMON NAME | SCIENTIFIC NAME |
|---|---|---|
| Birds | Northern rough-winged swallow | *Stelgidopteryx serripennis* |
| Birds | cliff swallow | *Petrochelidon pyrrhonata* |
| Birds | barn swallow | *Hirundo rustica* |
| Birds | chestnut-backed chickadee | *Poecile rufescens* |
| Birds | oak titmouse | *Baeolophus inornatus* |
| Birds | bushtit | *Psaltriparus minimus* |
| Birds | brown creeper | *Certhia americana* |
| Birds | white-breasted nuthatch | *Sitta caroliniensis* |
| Birds | rock wren | *Salpinctes obsoletus* |
| Birds | Bewick's wren | *Thryomanes bewickii* |
| Birds | house wren | *Troglodytes aedon* |
| Birds | winter wren | *Troglodytes troglodytes* |
| Birds | marsh wren | *Citothorus palustris* |
| Birds | ruby-crowned kinglet | *Regulus calendula* |
| Birds | Western bluebird | *Sialia mexicana* |
| Birds | hermit thrush | *Catharus guttatus* |
| Birds | American robin | *Turdus migratorius* |
| Birds | Northern mockingbird | *Mimus polyglottos* |
| Birds | European starling | *Sturnus vulgaris* |
| Birds | cedar waxwing | *Bombycilla cedrorum* |
| Birds | American pipit | *Anthus rubescens* |
| Birds | orange-crowned warbler | *Vermivora celata* |
| Birds | yellow warbler | *Dendroica petechial* |
| Birds | yellow-rumped warbler | *Dendroica coronata* |
| Birds | Wilson's warbler | *Wilsonia pusilla* |
| Birds | Western tanager | *Piranga ludoviciana* |
| Birds | spotted towhee | *Pipilo maculatus* |
| Birds | California towhee | *Pipilo crissalis* |
| Birds | lark sparrow | *Chondestes grammacus* |
| Birds | savannah sparrow | *Passerculus sandwichensis* |
| Birds | grasshopper sparrow | *Ammodramus savannarum* |
| Birds | fox sparrow | *Passerella iliaca* |
| Birds | song sparrow | *Melospiza melodia* |
| Birds | Lincoln's sparrow | *Melospiza lincolnii* |
| Birds | white-throated sparrow | *Zonotrichia albicollis* |
| Birds | white-crowned sparrow | *Zonotrichia leucophrys* |
| Birds | golden-crowned sparrow | *Zonotrichia atricapilla* |
| Birds | dark-eyed junco | *Junco hyemalis* |

| CLASS | COMMON NAME | SCIENTIFIC NAME |
|---|---|---|
| Birds | red-winged blackbird | *Agelaius phoeniceus* |
| Birds | tricolored blackbird | *Agelaius tricolor* |
| Birds | Western meadowlark | *Sturnella neglecta* |
| Birds | Brewer's blackbird | *Euphagus cyanocephalus* |
| Birds | brown-headed cowbird | *Molothrus ater* |
| Birds | Bullock's oriole | *Icterus bullockii* |
| Birds | house finch | *Carpodacus mexicanus* |
| Birds | lesser goldfinch | *Carduelis psaltria* |
| Birds | American goldfinch | *Carduelis tristis* |
| Birds | house sparrow | *Passer domesticus* |
| Mammals | Virginia opossum | *Didelphis virginiana* |
| Mammals | skunk (sp.) | *Mephitis* or *Spilogale* |
| Mammals | coyote | *Canis latrans* |
| Mammals | raccoon | *Procyon lotor* |
| Mammals | black-tailed deer | *Odocoileus hemionus* |
| Mammals | California ground squirrel | *Spermophilis beecheyi* |
| Mammals | California vole | *Microtus californicus* |
| Mammals | deer mouse (sp.) | *Peromyscus* sp. |
| Mammals | Botta's pocket gopher | *Thomomys bottae* |
| Mammals | black-tailed jackrabbit | *Lepus californicus* |

Appendix B – Special-status Plant and Wildlife Species with the Potential to Occur

Table B. Potential for Special Status Plant and Wildlife Species to Occur in the Park. List compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database (2013), U.S. Fish and Wildlife Service (USFWS) Species Lists (2013), and California Native Plant Society (CNPS) Electronic Inventory (2013) searches of the Cotati, Glen Ellen, Sonoma, Napa, Petaluma, Petaluma River, Sears Point, Cuttings Wharf, Nicasio, Novato, Petaluma Point, and Mare Island USGS 7.5' quadrangles.

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| **PLANTS** | | | | |
| *Allium peninsulare* var. *franciscanum* Franciscan onion | Rank 1B | Cismontane woodland, valley and foothill grassland; on clay substrate, often derived from serpentine. Elevation range 170 – 985 feet. Blooms: May – June. | **Moderate Potential.** The Park contains serpentine clays underlying grassland habitat. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Alopecurus aequalis* var. *sonomensis* Sonoma alopecurus | FE, Rank 1B | Freshwater marshes and swamps, riparian scrub; closely associated with other wetland species. Elevation range: 15 – 1200 feet. Blooms: May – July. | **Moderate Potential.** The Park contains perennial wetland habitat that may support this species; however, the degree of disturbance and hydrologic modification as well as grazing reduces this species potential. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Amorpha californica* var. *napensis* Napa false indigo | Rank 1B | Openings in broadleaf upland forest, chaparral, cismontane woodland. Elevation range: 395 – 6560 feet. Blooms: April – July. | **Moderate Potential.** The Park contains cismontane woodland that may support this species; however, the presence of cattle and relatively thin shrub understory reduces this species potential. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Amsinckia lunaris* bent-flowered fiddleneck | Rank 1B | Cismontane woodland, valley and foothill grassland, coastal bluff scrub. Elevation range: 10 – 1625 feet. Blooms: March – June. | **Moderate Potential.** The Park contains grassland habitat that may support this species; however, this species has not been reported from the Sonoma Mountains, Petaluma or Sonoma valleys. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Antirrhinum virga*<br>twig-like snapdragon | Rank 4 | Chaparral, lower montane coniferous forest; located on rocky openings often derived from serpentine. Elevation range: 325 – 6550 feet. Blooms: June – July. | **No Potential.** The Park does not contain chaparral or coniferous forest necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Arabis blepharophylla*<br>coast rock cress | Rank 4 | Broadleaf upland forest, coastal bluff scrub, coastal prairie, coastal scrub; located on rocky sites, often on coastal bluffs. Elevation range: 10 – 3575 feet. Blooms: February – May. | **No Potential.** Although the Park contains poison oak scrub (coastal scrub), this species is closely associated with rock outcrops and bluffs near the coast within direct maritime influence. | **Not Present.** No further actions are recommended for this species. |
| *Arctostaphylos bakeri* ssp. *bakeri*<br>Baker's manzanita | SR, Rank 1B | Broadleaf upland forest, chaparral, closed-cone coniferous forest; located on serpentine substrate. Elevation range: 240 – 975 feet. Blooms: February – April. | **No Potential.** This species is closely associated to serpentine chaparral and Sargent cypress woodland not present within the Park. | **Not Present.** No further actions are recommended for this species. |
| *Arctostaphylos canescens* ssp. *sonomensis*<br>Sonoma manzanita | Rank 1B | Chaparral, lower montane coniferous forest; sometimes on serpentine substrate. Elevation range: 590 – 5495 feet. Blooms: January – June. | **No Potential.** The Park does not contain chaparral or coniferous forest habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Arctostaphylos montana* ssp. *montana*<br>Mt. Tamalpais manzanita | Rank 1B | Chaparral, valley and foothill grassland; on rocky serpentine slopes in scrub and grassland. Elevation range: 520 – 2470 feet. Blooms: February – April. | **Unlikely.** Although the Park contains grassland habitat with serpentine substrates, this species is closely associated with chaparral habitats on Mt. Tamalpais. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Astragalus tener* var. *tener* alkali milk-vetch | Rank 1B | Playas, vernal pools, valley and foothill grassland; located in mesic grassy areas on alkaline substrate. Elevation range: 0 – 195 feet. Blooms: March – June. | **Moderate Potential.** The Park contains seasonal wetland habitat with some assumed alkali conditions that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Atriplex joaquiniana* San Joaquin spearscale | Rank 1B | Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; located on alkaline substrate. Elevation range: 0 – 2715 feet. Blooms: April – October. | **No Potential.** The Park does not contain high alkaline habitats (i.e. grassland, playa) necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Blennosperma bakeri* Sonoma sunshine | FE, SE, Rank 1B | Vernal pools, vernal swales, and mesic areas in valley grassland; highly restricted to the Santa Rosa Plain and Valley of the Moon. Elevation range: 35 – 360 feet. Blooms: March – April. | **Moderate Potential.** The Park contains mesic grassland, seasonal wetland, and vernal pool-like wetlands that may support this species; however, this species is closely associated with native/natural vernal pools on the Santa Rosa Plain and Sonoma Valley. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Brodiaea leptandra* narrow-anthered California brodiaea | Rank 1B | Broadleaf upland forest, chaparral, lower montane coniferous forest; located on volcanic tuff substrates. Elevation range: 360 – 3000 feet. Blooms: May – July. | **No Potential.** The Park does not contain upland forest, chaparral, or coniferous forest habitat nor does it contain extensive, nutrient-poor volcanic tuff soils necessary to support this species. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Calandrinia breweri* Brewer's Calandrinia | Rank 4 | Chaparral, coastal scrub; located on sandy or loamy substrate in areas often recently disturbed or burned. Elevation range: 30 – 3965 feet. Blooms: March – June. | **Unlikely.** Although the Park contains poison oak scrub (coastal scrub), this species is closely associated with burnt chaparral and diverse coastal scrub not present within the Park. | **Not Present.** No further actions are recommended for this species. |
| *California macrophylla* round-leaved filaree | Rank 1B | Cismontane woodland, valley and foothill grassland; located in areas underlain by clay substrate. Elevation range: 45 – 3900 feet. Blooms: March – May. | **Moderate Potential.** The Park contains clay substrates underlying grassland habitat that may support this species; however, this species' distribution is closely associated with the Central Valley and Interior Coast Range valleys. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Castilleja affinis* ssp. *neglecta* Tiburon paintbrush | FE; ST; Rank 1B | Valley and foothill grassland; located in grassy, open areas and rock outcrops underlain by serpentine substrate. Elevation range: 195 – 1300 feet. Blooms: April – June. | **Moderate Potential.** The Park contains serpentine grassland habitat that may support this species; however, this species is restricted to Ring Mountain in the North Bay, and has not been documented on other well-surveyed serpentine outcrops (e.g. Mount Burdell). | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Ceanothus sonomensis* Sonoma ceanothus | Rank 1B | Chaparral; located on sandy serpentine or volcanic substrates. Elevation range: 705 – 2625 feet. Blooms: February – April. | **No Potential.** The Park does not contain chaparral habitat necessary to support this species. This species is known from a diverse mosaic of chaparral types in the Mayacama Mountains. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Centromadia parryi* ssp. *parryi*<br>pappose tarplant | Rank 1B | Coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland; in vernally mesic sites, often with alkali substrate. Elevation range: 5 – 1380 feet. Blooms: May – November. | **Moderate Potential.** The Park contains grassland and wetland habitat that may support this species; however, this species typically occurs in alkali grassland-brackish marsh ecotones not present in the Park. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Chloropyron maritimum* ssp. *palustre*<br>Point Reyes bird's-beak | Rank 1B | Coastal salt marshes; located in low-growing saltgrass and pickleweed mats. Elevation range: 0 – 35 feet. Blooms: June – October. | **No Potential.** The Park does not contain coastal brackish marsh necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Chloropyron molle* ssp. *molle*<br>soft bird's-beak | FE, SR, Rank 1B | Coastal brackish or salt marshes; located in low-growing saltgrass and picklweed mats. Elevation range: 0 – 10 feet. Blooms: June – November. | **No Potential.** The Park does not contain coastal brackish marsh necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Chorizanthe valida*<br>Sonoma spineflower | FE, SE, Rank 1B | Coastal prairie; in sandy soils. Elevation range: 35 – 1000 feet. Blooms: June – August. | **No Potential.** The Park does not contain coastal prairie underlain by sandy substrates necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Cirsium hydrophilum* var. *vaseyi*<br>Mt. Tamalpais thistle | Rank 1B | Broadleaf upland forest, chaparral; located on streams and serpentine seeps in woodland and scrub habitat. Elevation range: 780 – 2015 feet. Blooms: May – August. | **No Potential.** The Park does not contain serpentine scrub or woodland habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Delphinium bakeri*<br>Baker's larkspur | FE; SE;<br>Rank 1B | Coastal scrub, valley and foothill grassland; located on rocky north-facing slopes derived of decomposed shale. Elevation range: 260 – 995 feet. Blooms: March – May. | **No Potential.** The Park does not contain chaparral or grassland habitat underlain by decomposing shale on north-facing slopes necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Delphinium luteum*<br>yellow larkspur | FE; SR;<br>Rank 1B | Chaparral, coastal prairie, coastal scrub; located on rocky north-facing slopes. Elevation range: 0 – 325 feet. Blooms: March – May. | **No Potential.** The Park does not contain chaparral, coastal prairie, or coastal scrub necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Dirca occidentalis*<br>western leatherwood | Rank 1B | Broadleaf upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, North Coast coniferous forest, riparian forest, riparian woodland; located on brushy, mesic slopes in woodland and forest. Elevation range: 165 – 1285 feet. Blooms: January – April. | **Unlikely.** Although the Park contains woodland habitat, this species is closely associated with a mixed scrub-woodland community on mesic slopes. Additionally, the relatively denuded shrub understory likely precludes the presence of this species. | **Not Present.** No further actions are recommended for this species. |
| *Downingia pusilla*<br>dwarf downingia | Rank 2 | Valley and foothill grassland, vernal pools; located in mesic grassy sites, pool and lake margins. Elevation range: 3 – 1450 feet. Blooms: March – May. | **Moderate Potential.** The Park contains mesic grassland and vernal-pool like habitats that may support this species; however, this species is closely associated with a mosaic of native vernal pools containing low-growing, native annual vegetation not present in the Park. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Elymus californicus*<br>California bottle-brush grass | Rank 4 | Broadleaf upland forest, cismontane woodland, North Coast coniferous forest, riparian woodland; located in mesic areas. Elevation range: 50 – 1530 feet. Blooms: May – August, sometimes November. | **Unlikely.** Although the Park contains woodland habitat, this species is closely associated with coastal or near-coastal sites within the direct maritime influence. | **Not Present.** No further actions are recommended for this species. |
| *Erigeron biolettii*<br>Streamside daisy | Rank 3 | Broadleaf upland forest, cismontane woodland, North Coast coniferous forest; on rocky, mesic. Elevation range: 95 – 3610 feet. Blooms: June – October. | **Unlikely.** Although the Park contains woodland habitat, this species is closely associated with dense woodland-forest fringes not present in the Park. | **Not Present.** No further actions are recommended for this species. |
| *Erigeron greenei*<br>Greene's narrow-leaved daisy | Rank 1B | Chaparral; located on volcanic or serpentine substrate. Elevation range: 260 – 3270 feet. Blooms: May – September. | **No Potential.** The Park does not contain chaparral habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Eriogonum luteolum* var. *caninum*<br>Tiburon buckwheat | Rank 1B | Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie; located on sandy or gravelly substrate derived from serpentine. Elevation range: 0 – 2275 feet. Blooms: May – September. | **Moderate Potential.** The Park contains serpentine grassland habitat that may support this species; however, this species is typically located on open talus or serpentine with extensive bare ground not present in the Park. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Fritillaria lanceolata* var. *tristulis*<br>Marin checker lily | Rank 1B | Coastal bluff scrub, coastal scrub, coastal prairie; observed in canyons, riparian areas, and rock outcrops; often located on serpentine substrate. Elevation range: 45 – 490 feet. Blooms: February – May. | **No Potential.** The Park does not contain coastal bluff scrub, coastal scrub, or coastal prairie habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Fritillaria liliacea*<br>fragrant fritillary | Rank 1B | Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland; located in grassy sites underlain by clay, typically derived from volcanics or serpentine. Elevation range: 10 – 1335 feet. Blooms: February – April. | **High Potential.** The Park contains grassland and open woodland habitat underlain by clay substrates derived from both volcanic and serpentine parent material. | **Present.** Several populations were observed and mapped in the northern portion of the Park during plant surveys 2006-2008. |
| *Helianthella castanea*<br>Diablo helianthella | Rank 1B | Broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland; typically located in oak woodland/chaparral ecotone underlain by rocky, azonal substrates, often in partial shade. Elevation range: 195 – 4225 feet. Blooms: March – June. | **Unlikely.** This species is closely associated with chaparral-woodland fringes not present in the Study Area. | **Not Present.** No further actions are recommended for this species. |
| *Hemizonia congesta ssp. congesta*<br>white hayfield tarplant | Rank 3 | Coastal scrub, valley and foothill grassland. Elevation range: 65 – 1840 feet. Blooms: April – October. | **High Potential.** The Park contains grassland habitat that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Hesperolinon congestum*<br>Marin western flax | FT, ST, Rank 1B | Chaparral, valley and foothill grassland; located on serpentine substrate. Elevation range: 15 – 1205 feet. Blooms: April – July. | **Moderate Potential.** The Park contains serpentine grassland that may support this species; however, this species is restricted to sites in Marin County. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Holocarpha macradenia*<br>Santa Cruz tarplant | FT, SE,<br>Rank 1B | Coastal prairie, coastal scrub, valley and foothill grassland; typically located on sandy clay substrate. Elevation range: 30 – 715 feet. Blooms: June – October. | **Unlikely.** Although the Park contains grassland habitat, this species has not been documented north of southern Marin County. | **Not Present.** No further actions are recommended for this species. |
| *Horkelia tenuiloba*<br>thin-lobed horkelia | Rank 1B | Broadleaf upland forest, coastal scrub, valley and foothill grassland, chaparral; in mesic openings, on sandy substrate. Elevation range: 165 – 1640 feet. Blooms: May – July. | **Unlikely.** Although the Park contains grassland habitat, this species is restricted to sandy substrates and is most closely associated with open chaparral and open woodland sites. | **Not Present.** No further actions are recommended for this species. |
| *Iris longipetala*<br>coast iris | Rank 4 | Coastal prairie, lower montane coniferous forest, meadows and seeps; located on mesic sites. Elevation range: 0 – 1950 feet. Blooms: March – May. | **Unlikely.** This species is closely associated with coastal sites within direct maritime influence. | **Not Present.** No further actions are recommended for this species. |
| *Juglans hindsii*<br>North California black walnut | Rank 1B | Riparian forest, riparian woodland. Elevation range: 0 – 1430 feet. Blooms: April – May. | **Unlikely.** Although the Park contains riparian areas, native stands of this species were historically restricted to the interior Coast Ranges. | **Not Present.** No further actions are recommended for this species. |
| *Lasthenia burkei*<br>Burke's goldfields | FE; SE;<br>Rank 1B | Vernal pools, meadows and seeps; typically located in pools and swales. Elevation range: 45 – 1950 feet. Blooms: April – June. | **Moderate Potential.** The Park contains mesic grassland, seasonal wetland, and vernal pool-like wetlands that may support this species; however, this species is closely associated with native/natural vernal pools on the Santa Rosa Plain and Ukiah Valley. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Lasthenia conjugens* Contra Costa goldfields | FE; Rank 1B | Valley and foothill grassland, vernal pools, cismontane woodland; located in pools, swales, and depressions in mesic grassy sites underlain by alkaline substrate. Elevation range: 0 – 1530 feet. Blooms: March – June. | **Moderate Potential.** The Park contains mesic grassland, seasonal wetland, and vernal pool-like wetlands that may support this species; however, this species is closely associated with native/natural vernal pools on the coastal Bay plain and Delta. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Lathyrus jepsonii* var. *jepsonii* Delta tule pea | Rank 1B | Freshwater and brackish marshes; typically located near or on slough margins, closely associated with cattail, tules, bulrushes, Baltic rush, California rose, and Suisun Marsh aster; known widely throughout Suisun Bay and Delta regions. Elevation range: 0 – 15 feet. Blooms: May – July, sometimes September. | **No Potential.** The Park does not contain coastal brackish marsh necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Legenere limosa* legenere | Rank 1B | Vernal pools; typically located in the deepest portions of pools. Elevation range: 3 – 2860 feet. Blooms: April – June. | **Moderate Potential.** The Park contains mesic grassland and vernal-pool like habitats that may support this species; however, this species is closely associated with a mosaic of native vernal pools containing low-growing, native annual vegetation not present in the Park. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Leptosiphon acicularis* bristly leptosiphon | Rank 4 | Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland; often located on shallow, rocky substrate in foothill positions. Elevation range: 175 – 4875 feet. Blooms: April – July. | **Moderate Potential.** The Park contains shallow, rocky areas in woodland and grassland habitat that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Leptosiphon jepsonii* Jepson's leptosiphon | Rank 1B | Chaparral, cismontane woodland; on open to partially shaded grassy slopes on volcanic or the periphery of serpentine substrate. Elevation range: 330 – 1640 feet. Blooms: April – May. | **Moderate Potential.** The Park contains woodland habitat underlain by volcanic soils; however, this species is typically located within openings of or adjacent to chaparral habitat. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Lessingia hololeuca* woolly-headed lessingia | Rank 3 | Broadleaf upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; typically on clay, serpentine substrate. Elevation range: 3 – 2885 feet. Blooms: April – June. | **Moderate Potential.** The Park contains grassland habitat underlain by serpentine clay substrate that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Lessingia micradenia* var. *micradenia* Tamalpais lessingia | Rank 1B | Chaparral, valley and foothill grassland; usually located on serpentine, often on roadsides. Elevation range: 325 – 1625 feet. Blooms: June – October. | **Unlikely.** Although the Park contains serpentine grassland habitat, this species is closely associated with extensive bare ground and serpentine talus not present in the Park. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Lilaeopsis masonii*<br>Mason's Lilaeopsis | SR, Rank 1B | Freshwater and brackish coastal marshes, riparian scrub; located on channel banks in the splash zone on bare mud substrate. Elevation range: 0 – 35 feet. Blooms: April – November. | **No Potential.** The Park does not contain coastal brackish marsh necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Lilium rubescens*<br>redwood lily | Rank 4 | Broadleaf upland forest, chaparral, lower montane coniferous forest, upper montane coniferous forest, North Coast coniferous forest; often located on serpentine substrates, and along roadcuts. Elevation range: 95 – 6210 feet. Blooms: April – September. | **No Potential.** The Park does not contain chaparral or coniferous forest habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Limnanthes vinculans*<br>Sebastopol meadowfoam | FE, SE, Rank 1B | Mesic meadows, valley and foothill grassland, vernal pools; located in swales, wet meadows, depressions, and pools in the oak savanna of the Santa Rosa Plain on heavy adobe clay substrate. Elevation range: 3 – 2885 feet. Blooms: April – June. | **Moderate Potential.** The Park contains mesic grassland, seasonal wetland, and vernal pool-like wetlands that may support this species; however, this species is closely associated with native/natural vernal pools on the Santa Rosa Plain. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Lomatium repostum*<br>Napa Lomatium | Rank 4 | Chaparral, cismontane woodland; located on serpentine substrate. Elevation range: 290 – 2700 feet. Blooms: March – June. | **Unlikely.** Although the Park contains woodland habitat, this species is known from serpentine chaparral and serpentine woodland habitat. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Lupinus sericatus*<br>Cobb Mountain lupine | Rank 1B | Broadleaf upland forest, chaparral, cismontane woodland, lower montane coniferous forest; typically located in stands of knobcone pine-oak woodland, on open wooded slopes in gravelly substrate, sometimes serpentine. Elevation range: 890 – 4960 feet. Blooms: March – June. | **No Potential.** This species is closely associated with forest, chaparral, and woodland habitat underlain by volcanic tuffs or serpentine substrate not present within the Park. | **Not Present.** No further actions are recommended for this species. |
| *Micropus amphibolus*<br>Mt. Diablo cottonweed | Rank 3 | Broadleaf upland forest, chaparral, cismontane woodland, valley and foothill grassland; typically on thin, rocky soils. Elevation range: 145 – 2710 feet. Blooms: March – May. | **Moderate Potential.** The Park contains grassland and open woodland habitat underlain by shallow soils that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Microseris paludosa*<br>marsh microseris | Rank 1B | Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. Elevation range: 5 – 300 feet. Blooms: April – June. | **Moderate Potential.** The Park contains grassland habitat that may support this species; however, this species is typically located in coastal sites and the Santa Rosa Plain. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Navarretia leucocephala* ssp. *bakeri*<br>Baker's navarretia | Rank 1B | Wet, mesic sites underlain by adobe and/or alkaline substrate in cismontane woodland, meadows, seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest. Elevation range: 15 – 5710 feet. Blooms: April – July. | **Moderate Potential.** The Park contains seasonal wetland and vernal pool-like wetlands that may support this species; however, this species is closely associated with valley-bottom vernal pools. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Navarretia rosulata*<br>Marin County navarretia | Rank 1B | Closed-cone coniferous forest, chaparral; located on dry, rocky sites often formed from serpentine. Elevation range: 650 – 2065 feet. Blooms: May – July. | **No Potential.** The Park does not contain serpentine coniferous forest or serpentine habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Plagiobothrys mollis* var. *vestitus*<br>Petaluma popcornflower | Rank 1A | Coastal salt marsh, valley and foothill grassland; presumed to occur in mesic grasslands on marsh fringe. Elevation range: 30 – 165 feet. Blooms: June – July. | **Moderate Potential.** The Park contains grassland-wetland fringe that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Pleuropogon hooverianus*<br>North coast semaphore grass | ST, Rank 1B | Broadleaf upland forests, meadows and seeps, freshwater marshes and swamps, North Coast coniferous forest, shaded, wet, and grassy areas in forested habitat. Elevation range: 10 – 635 feet. Blooms May – August. | **Moderate Potential.** The Park contains mesic openings and meadows in woodland habitat that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Ranunculus lobbii*<br>Lobb's buttercup | Rank 4 | Cismontane woodland, North Coast coniferous forest, valley and foothill grassland, vernal pools; located in mesic, vernally wet areas. Elevation range: 45 – 1530 feet. Blooms: February – May. | **High Potential.** The Park contains aquatic features and vernal pool-like wetlands that may support this species. | **Present.** This species was observed during 2006-2008 surveys in several aquatic features in the southern portion of the Park. The resource management plan should account for the preservation of this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Rhynchospora globularis* round-headed beaked-rush | Rank 2 | Freshwater marshes and swamps. Elevation range: 145 – 200 feet. Blooms: July – August. | **Unlikely.** Although the Park contains perennial wetland features, this species is closely associated with high acid wetlands, and is highly restricted to freshwater marsh features near Sebastopol. | **Not Present.** No further actions are recommended for this species. |
| *Ribes victoris* Victor's gooseberry | Rank 4 | Broadleaf upland forest, chaparral; located in shady, mesic sites. Elevation range: 325 – 2440 feet. Blooms: March – April. | **Unlikely.** The Park does not contain forest or chaparral habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Senecio aphanactis* chaparral ragwort | Rank 2 | Cismontane woodland, chaparral, coastal scrub; located on drying alkaline flats. Elevation range: 45 – 2600 feet. Blooms: January – April. | **No Potential.** The Park does not contain drying alkaline flats in chaparral, scrub, or woodland habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Sidalcea calycosa* ssp. *rhizomata* Point Reyes checkerbloom | Rank 1B | Marshes and swamps; located in freshwater marsh habitat near the coast. Elevation range: 10 – 245 feet. Blooms: April – September. | **Moderate Potential.** The Park contains perennial wetland habitat that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Sidalcea hickmanii* ssp. *viridis* Marin checkerbloom | Rank 1B | Chaparral; situated on dry hillslopes underlain by serpentine or volcanic, typically near the coast. Elevation range: 160 – 1400 feet. Blooms: May – June. | **No Potential.** The Park does not contain serpentine chaparral habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
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| *Streptanthus batrachopus* Tamalpais jewel-flower | Rank 1B | Closed-cone coniferous forest, chaparral; located on serpentine talus slopes. Elevation range: 990 – 2115 feet. Blooms: April – July. | **No Potential.** The Park does not contain serpentine coniferous or serpentine chaparral habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Streptanthus glandulosus* ssp. *pulchellus* Mt. Tamalpais jewelflower | Rank 1B | Chaparral, valley and foothill grassland; located on serpentine slopes. Elevation range: 490 – 2600 feet. Blooms: May – August. | **Unlikely.** Although the Park contains serpentine habitat, this species is closely associated with rock outcrops and barrens, with substantial serpentine cobble and bare ground at the surface. | **Not Present.** No further actions are recommended for this species. |
| *Symphyotrichum lentum* Suisun Marsh aster | Rank 1B | Freshwater and brackish marshes and swamps; typically located on slough margins and edges, closely associated with cattail, tules, bulrushes, California rose, and Delta Tule pea. Elevation range: 0 – 10 feet. Blooms: May – November. | **No Potential.** The Park does not contain coastal brackish marsh necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Toxicoscordion fontanum* marsh zigzag | Rank 4 | Chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, marshes and swamps; located in vernally mesic sites, often underlain by serpentine. Elevation range: 45 – 3250 feet. Blooms: April – July. | **High Potential.** The Park contains seep habitat underlain by serpentine that may support this species. | **Present.** Several populations were observed and mapped in the southern portion of the Park during plant surveys 2006-2008. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Trichostema ruygtii*<br>Napa bluecurls | Rank 1B | Cismontane woodland, chaparral, valley and foothill grassland, vernal pools, lower montane coniferous forest; located in open, sunny locations, and dried vernal pools. Elevation range: 95 – 2210 feet. Blooms: June – October. | **Unlikely.** Although the Park contains vernal pool-like and grassland habitat, this species is highly restricted to east Napa County. | **Not Present.** No further actions are recommended for this species. |
| *Trifolium amoenum*<br>showy rancheria clover | FE, Rank 1B | Valley and foothill grassland, coastal bluff scrub, swales, open sunny sites, sometimes on serpentine. Elevation range: 15 – 1365 feet. Blooms: April – June. | **Moderate Potential.** The Park contains serpentine grasslands and roadcuts that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Trifolium hydrophilum*<br>saline clover | Rank 1B | Marshes and swamps, mesic portions of alkali vernal pools, mesic, alkali valley and foothill grassland. Elevation range: 0 – 985 feet. Blooms: April – June. | **Moderate Potential.** The Park contains seasonal wetland habitat with some assumed alkali conditions that may support this species. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| *Triteleia lugens*<br>dark-mouthed triteleia | Rank 4 | Broadleaf upland forest, chaparral, lower montane coniferous forest, coastal scrub. Elevation range: 325 – 3250 feet. Blooms: April – June. | **No Potential.** The Park does not contain forest or chaparral habitat necessary to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Viburnum ellipticum*<br>oval-leaved viburnum | Rank 2 | Chaparral, cismontane woodland, lower montane coniferous forest. Elevation range: 705 – 4595 feet. Blooms: May – June. | **Moderate Potential.** The Park contains cismontane woodland that may support this species; however, the presence of cattle and relatively thin shrub understory reduces this species potential. | **Not Observed.** This species was not observed during rare plant surveys in 2006-2008. |
| **WILDLIFE** | | | | |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| **Invertebrates** | | | | |
| *Andrena blennospermatis* Blennosperma vernal pool android bee | SAL | Generalist pollinator of common blennosperma (*Blennosperma nanum* ssp. *nanum*) and Sonoma sunshine (*B. bakeri*). Located in grasslands with vernal pools and seeps that support blennosperma; ground-nesting. | **Moderate Potential.** The Park supports common blennosperma and suitable upland nesting habitat. | **Unknown.** Individuals were not observed or surveyed. |
| *Adella oplerella* Opler's longhorn moth | SAL | Grasslands in the Bay Area; cream cups (*Platystemon californicus*) are suspected / assumed larval and nectar source; often serpentine, but not restricted. | **High Potential.** The Park contains grasslands with cream cups. | **Present.** One individual observed in the southwest portion of the Park. |
| *Speyeria zerene myrtleae* Myrtle's silverspot butterfly | FE, RP, SSI | Restricted to the foggy, coastal dunes/hills of the Point Reyes peninsula; extirpated from coastal San Mateo County. Larval foodplant thought to be *Viola adunca*. | **No Potential.** This species is generally found within three miles of the coast. The inland nature of the Park precludes this species from being found on the site. | **Not Present.** No further actions are recommended for this species.<br><br>**Present.** An undocumented subspecies of *Speyeria zerene* has been documented from Cougar Mountain adjacent to the Park. |
| *Hydrocharia rickseckeri* Ricksecker's water scavenger beetle | SAL | Aquatic beetle known from stock ponds, vernal pools, and small lakes throughout Bay Area. | **Moderate Potential.** The presence of stock ponds and other aquatic features may provide habitat for this species. | **Unknown.** Individuals were not observed or surveyed. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Syncaris pacifica*<br>California freshwater shrimp | FE, SE, SSI, RP | Endemic to Marin, Napa, and Sonoma counties. Found in low elevation, low gradient (generally less than 1%) perennial streams where riparian cover is moderate to heavy. Shallow pools away from main stream flow. Winters near undercut banks with exposed roots. In the summer uses leafy branches touching water. | **Unlikely.** This species is not known from the Tolay Creek watershed. | **Not Present.** No further actions are recommended. |
| *Linderella occidentalis*<br>California linderella | SAL | Freshwater fairy shrimp known from vernal pools in the Central Valley and Coast Ranges. Pool size varies and water is typically clear to slightly turbid. | **Moderate Potential.** The presence of stock ponds and vernal pool-like wetland habitat may support this species. | **Unknown.** Individuals were not observed or surveyed. |
| **Amphibians & Reptiles** | | | | |
| *Rana aurora draytonii*<br>California red-legged frog | FT, SSC | Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. Requires 11 to 20 weeks of permanent water for larval development. Must have access to aestivation habitat. | **High Potential.** Perennial stock ponds within the Park provides high quality aquatic breeding habitat, and CRLF have been previously documented within the Park. Wetland complexes provide non-breeding aquatic habitat and grassland and woodland habitats within the Park provide upland and dispersal habitat | **Assumed Present.** Anecdotal observations of this species suggest it is present. Considerations for this species within the management plan to protect existing habitat. |

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|---|---|---|---|---|
| *Rana boylii*<br>foothill yellow-legged frog | SSC | Found in or near rocky streams in a variety of habitats. Prefers partly-shaded, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on both aquatic and terrestrial invertebrates. | **Moderate Potential.** The drainages within the Park provide suitable breeding, foraging, and dispersal habitat. | **Not Observed.** This species was not observed during surveys conducted in 2006-2008; however, confirmed absence is still unknown. |
| *Ambystoma californiense*<br>California tiger salamander | FE, ST | Populations in Santa Barbara and Sonoma counties currently listed as endangered. Inhabits grassland, oak woodland, ruderal and seasonal pool habitats. Seasonal ponds and vernal pools are crucial to breeding. Adults utilize mammal burrows as aestivation habitat. | **No Potential.** The Park is south of the southern extent of the range of the Santa Rosa DPS. | **Not Present.** No further actions are recommended. |
| *Actinemys marmorata*<br>Pacific pond turtle | SSC | A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches with aquatic vegetation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat for egg-laying. | **High Potential.** The Park provides suitable aquatic and nesting habitat for Pacific pond turtles. This species has been documented in San Antonio Creek and in pools in the lower sections of the unnamed tributary to San Antonio Creek within the Park. | **Assumed Present.** Anecdotal observations of this species suggest it is present. Considerations for this species within the management plan to protect existing habitat. |
| **Fishes** | | | | |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Pogonichthys macrolepidotus* Sacramento splittail | SSC | Endemic to the lakes and rivers of the Central Valley, but now confined to the Sacramento Delta, Suisun Bay and associated marshes. Occurs in slow-moving river sections and dead end sloughs. Requires flooded vegetation for spawning and foraging for young. Splittail are primarily freshwater fish, but are tolerant of moderate salinity and can live in water where salinity levels reach of 10-18 parts per thousand. | **Unlikely.** Flooded vegetation along Tolay Creek in summer generally absent. Addtionally, barriers to upstream migration are present along Tolay Creek near Highway 121 which would preclude this species from occurring within the Park. | **Not Present.** No further actions are recommended for this species |
| *Eucyclogobius newberryi* tidewater goby | FE, SSC | Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels. | **No Potential**. No lagoon, estuary or suitable low flow habitat within the Park. Additionally, this species is believed to be extirpated from San Francisco and San Pablo Bays. | **Not Present.** No further actions are recommended for this species |
| *Oncorhynchus mykiss* steelhead – Central CA Coast ESU | FT, NMFS | Occurs from the Russian River south to Soquel Creek and Pajaro River. Also in San Francisco and San Pablo Bay Basins. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for one or more years before migrating downstream to the ocean. | **No Potential.** No documented occurrences from Tolay Creek watershed (Leidy et al. 2005). | **Not Present.** No further actions are recommended for this species |

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|---|---|---|---|---|
| **Birds** | | | | |
| *Aquila chrysaetos* golden eagle | BCC, CFP | Rolling foothills mountain areas, sage-juniper flats, desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas. | **High Potential.** The Park contains deep canyons with large trees suitable for nesting and a robust population of black-tailed jackrabbits. | **Present.** Repeated observations of this species suggest it utilizes the Park. Considerations for this species within the management plan to protect existing habitat. |
| *Elanus leucurus* white-tailed kite | CFP | Year-long resident of coastal and valley lowlands; frequently found around grasslands and agricultural areas. Specific plant associations appear unimportant for nesting and roosting, but vegetation structure and prey abundance are considered important. Preys on small diurnal mammals and occasional birds, insects, reptiles, and amphibians. | **High Potential.** Suitable nesting and foraging habitat is present within the Park. | **Present.** LSA (2009b, 2009c) and others have observed this species foraging on site. Considerations for this species within the management plan to protect existing habitat. |
| *Haliaeetus leucocephalus* bald eagle | SE, CFP | Frequents ocean shores, lake margins, and rivers for both nesting and wintering. Requires large bodies of water, or free-flowing rivers with abundant fish and adjacent snags or other perches. Most nests are located within 1 mile of water. Nests in large, old-growth, or dominant live tree with open branchwork. Shows a preference for ponderosa pine. Roosts communally in winter. | **Unlikely.** The Park is outside of the known breeding range. Bald eagles may roost here in the winter. The Park may offer wintering roosting sites. | **Not Present.** No observations of bald eagle from the Park. No further actions are recommended for this species. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Rallus longirostris obsoletus*<br>California clapper rail | FE, SE, CFP | Salt-water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed (*Salicornia pacifica*), but feeds away from cover on invertebrates from mud-bottomed sloughs. | **No Potential**. No suitable nesting or foraging habitat present within the Park. | **Not Present.** No further actions are recommended for this species. |
| *Laterallus jamaicensis coturniculus* | ST, BCC, CFP | Mainly inhabits salt marshes bordering larger bays. Occurs in tidal salt marsh heavily grown to pickleweed; also in fresh-water and brackish marshes, all at low elevation. | **No Potential**. No suitable nesting or foraging habitat present within the Park. | **Not Present.** No further actions are recommended for this species. |
| *Coccyzus americanus occidentalis*<br>western yellow-billed cuckoo | FC, SE, BCC | Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow (*Salix* spp.) often mixed with cottonwoods (*Populus fremontii*), with understory of blackberry (*Rubus* sp.), nettles (*Urtica* sp.), or wild grape (*Vitis californica*). | **No Potential.** Riparian habitat within the Park is not extensive enough to support this species. | **Not Present.** No further actions are recommended for this species. |
| *Athene cunicularia*<br>burrowing owl | BCC, SSC | Found in open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel. | **High Potential.** Wintering habitat is present in the Park. Low-growing vegetation around mammal burrows. | **Present.** Burrowing owls have been detected on numerous occasions within the Park. Unlikely to breed within the Park. Considerations for this species within the management plan to protect existing habitat. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Asio flammeus*<br>short-eared owl | SSC | Freshwater and salt swamp and marsh habitats; as well as lowland meadows, grasslands, and irrigated alfalfa fields. Tule patches and/or tall grass needed for nesting and daytime seclusion. Nests on dry ground in depression concealed in tall, herbaceous vegetation. | **Moderate Potential.** The Park offers wetland and grassland habitat sufficient to support foraging and overwintering site; however, only one documented occurrence of nesting in Sonoma County suggests this species is unlikely to utilize the Park for nesting. | **Present.** One adult was observed in November 2005; however nesting has not been observed. Considerations within the management plan Considerations for this species within the management plan to protect existing habitat. |
| *Chaetura vauxi*<br>Vaux's swift | SSC | Found in redwood, Douglas fir, and other coniferous forests. Nests in large hollow trees and snags. Often nests in flocks. Forages over most terrains and habitats but shows a preference for foraging over rivers and lakes. | **Unlikely.** Marginal nesting habitat may be present within the cavities of the large trees on-site, however, the Park lacks suitable coniferous forest with such cavities. This species may pass through the Park during migration periods. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013a). | **Present.** Vaux's swift observed within the Park September and October; likely migrating. No further actions are recommended for this species. |
| *Cypseloides niger*<br>black swift | BCC, SSC | Generally found in the coastal belt of Santa Cruz and Monterey County; central and southern Sierra Nevada; San Bernardino and San Jacinto Mountains. Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above surf; forages widely. | **Unlikely.** No waterfalls are present within the Park. Species may rarely occur over the Park during migration periods. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013A). | **Not Present.** No further actions are recommended. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Riparia riparia*<br>bank swallow | ST | Migrant in riparian and other lowland habitats in western California. Colonial nester in riparian areas with vertical cliffs and bands with fine-textured or fine-textured sandy soils near streams, rivers, lakes or the ocean. | **Unlikely.** Low quality breeding habitat is present along the banks of San Antonio Creek, however, the Park is outside of this species' documented range. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013A). | **Not Observed.** No further actions are recommended for this species. |
| *Contopus cooperi*<br>olive-sided flycatcher | BCC, SSC | Nesting habitats are mixed conifer, montane hardwood-conifer, douglas-fir, redwood, red fir and lodgepole pine. Most numerous in montane conifer forests where tall trees overlook canyons, meadows, lakes or other open terrain. | **Unlikely.** Marginal nesting habitat may be present within the cavities of the large trees on-site, however, the Park lacks suitable coniferous forest. This species may pass through the Park during migration periods. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013A). | **Present.** Observed within the Park in May 2007. Possible migrating individual. No further actions are recommended. |
| *Lanius ludovicianus*<br>loggerhead shrike | BCC, SSC | Generally nests in broken woodlands, savannah, pinyon-juniper, Joshua tree and riparian woodlands, desert oases, scrub, and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting. Found throughout much of the state. | **Moderate Potential.** Suitable foraging habitat exists within the open grassland habitats and nesting habitat is present within chaparral habitats within the Park. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013A). | **Present.** Observed in the Park. No further actions are recommended. Considerations for this species within the management plan to protect existing habitat |

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|---|---|---|---|---|
| *Dendroica petechia brewsteri* yellow warbler | SSC | Frequents riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores and alders for nesting and foraging. Also nests in montane shrubbery in open conifer forests. | **Moderate Potential.** Within the Park, relatively large patches of willows are present along San Antonio Creek where the overstory is comprised of Oaks, maples, buckeye and ash. No known nesting occurrences are known from within 5.0 miles of the Park (CDFW 2013A). | **Present.** Observed in the Park. No further actions are recommended. Considerations for this species within the management plan to protect existing habitat. |
| *Geothlypis trichas sinuosa* saltmarsh common yellowthroat | BCC, SCC | Resident of the San Francisco Bay region, in fresh and saltwater marshes with riparian forest. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting. | **Moderate Potential.** The Park contains sufficient freshwater marsh with riparian forest habitat for this species. Documented nesting in Petaluma Marsh to the west and Sonoma Marsh to the east (CDFW 2013A). | **Present.** Common yellowthroat observed in September 2007 within the Park. No documented nesting activity within the Park. |
| *Agelaius tricolor* tricolored blackbird | BCC, SSC, RP | A highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony. | **High Potential.** Aquatic emergent vegetation within Tolay Lake may provide nesting habitat for this species. | **Present.** Tricolored blackbird has been observed within the Park, but nesting behavior has not been detected. No further actions are recommended for this species. |
| **Mammals** | | | | |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Antrozous pallidus*<br>pallid bat | SSC, WBWG High | Found in deserts, grasslands, shrublands, woodlands, and forests. Roost sites include old ranch buildings, rocky outcrops and caves within sandstone outcroppings. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites. | **Moderate Potential.** There are suitable building and rocky outcrops for roosting sites for this species. A pallid bat maternity colony is known from nearby Olompali State Park approximately five miles to the west (CNDDB 2013a). | **Unknown.** This species has not been documented or surveyed in the Park. Future surveys in areas where impacts are scheduled to potential roost sites. Considerations for this species within the management plan to protect existing habitat. |
| *Corynorhinus townsendii*<br>Townsend's big-eared bat | SSC, WBWG High | This species is associated with a wide variety of habitats from deserts to mid-elevation mixed coniferous-deciduous forest. Females form maternity colonies in buildings, caves and mines and males roost singly or in small groups. Foraging occurs in open forest habitats where they glean moths from vegetation. | **Moderate Potential.** There are suitable building and rocky outcrops for roosting sites for this species. A big-eared bat maternity colony is known from nearby Olompali State Park approximately five miles to the west (CNDDB 2013a). | **Unknown.** This species has not been documented or surveyed in the Park. Future surveys in areas where impacts are scheduled to potential roost sites. Considerations for this species within the management plan to protect existing habitat. |

| SPECIES | STATUS* | HABITAT REQUIREMENTS | POTENTIAL TO OCCUR IN THE PARK | RESULTS AND RECOMMENDATIONS |
|---|---|---|---|---|
| *Taxidea taxus*<br>American badger | SSC | Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Requires friable soils and open, uncultivated ground. Preys on burrowing rodents. | **Moderate Potential.** Friable soils are present in pockets of grassland habitat within the Park, particularly on East Ridge and West Ridge. American badger has been documented in the Petaluam environs (CDFW 2013a). | **Unknown.** Several large burrows have been observed within the Park. Future surveys in areas where impacts are scheduled to potential burrow sites. Considerations for this species within the management plan to protect existing habitat. |
| *Reithrodontomys raviventris*<br>saltmarsh harvest mouse | FE, SE, CFP | Found only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed is primary habitat. Do not burrow, build loosely organized nests. Require higher areas for flood escape. | **No Potential.** No pickleweed or saltmarsh habitat found within the Park. | **Not Present.** No further actions are recommended this species. |
| *Sorex ornatus sinuosus*<br>Suisun shrew | SSC | Found in tidal marshes of the northern shores of San Pablo Bay and Suisun Bay; requires dense low-growing cover and vegetative litter above the mean high tide line for nesting and foraging. | **No Potential.** The Park does not contain tidal marsh habitat necessary to support this species. | **Not Present.** No further actions are recommended this species. |

*** Key to status codes:**

| | |
|---|---|
| FE | Federal Endangered |
| FT | Federal Threatened |
| FC | Federal Candidate |
| FD | Federal De-listed |
| BCC | USFWS Birds of Conservation Concern |
| SE | State Endangered |
| SD | State Delisted |
| ST | State Threatened |
| SR | State Rare |
| SSC | CDFW Species of Special Concern |
| CFP | CDFW Fully Protected Animal |
| SAL | CDFW Special Animals List |
| WBWG | Western Bat Working Group High or Medium Priority species |
| Rank 1A | CNPS List 1A: Plants presumed extinct in California |
| Rank 1B | CNPS List 1B: Plants rare, threatened or endangered in California and elsewhere |
| Rank 2 | CNPS List 2: Plants rare, threatened, or endangered in California, but more common elsewhere |
| Rank 3 | CNPS List 3: Plants about which CNPS needs more information (a review list) |
| Rank 4 | CNPS Rank 4: Plants of limited distribution (a watch list) |

**Potential to Occur:**

No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.

Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

**Results and Recommendations:**

Unknown. Species has the potential to occur, but surveys have not been performed to document occurrence.

Assumed Present. Species has been reported historically, but recent documentation of presence is lacking.

Present. Species was observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

Not Present. Species is assumed to not be present due to a lack of key habitat components.

Not Observed. Species was not observed during surveys.

Appendix C – LSA & PWA Bird Survey Analysis (LSA 2009b)

## BIRD SURVEY ANALYSIS, TOLAY LAKE REGIONAL PARK

A dedicated and technically proficient group of about a dozen volunteer birders associated with Petaluma Wetland Alliance have regularly surveyed the Tolay Lake Regional Park for birds starting on April 15, 2006. They have conducted 28 surveys as of February 21, 2009, having made visits in every month of the year except August over the nearly three-year period. On each visit, the survey covers most of the property, but not all. All birds are identified to species and the number of individuals is tallied. Data are also recorded regarding weather conditions. Although there is some variation in the coverage of each survey, methodologically the visits are roughly comparable and scientifically valid.

The quality of the data is excellent. With a year or two more of surveys, the accumulated data should be used to develop a checklist of bird species with seasonal frequency of abundance information. The data are also extremely useful for park planning and conservation purposes. For example, introductions of new species can be tracked, such as the observation of Eurasian collared dove on September 23, 2007, and again on April 19, 2008. Special-status species such as grasshopper sparrow can be monitored. The data can also be mined to see what ordinarily common species, such as hermit thrush, are under-represented at the park due to marginal habitat conditions that could be enhanced, particularly bird species requiring mature trees or developed underbrush.

Table A compiles the results of these bird surveys. Number of species observed on each survey varied from 34 to 75. Number of individual birds counted on each survey varied from 419 to 5,204. Cumulatively, 149 species and 23,050 individuals have been observed.

Table B aggregates the data by species to give the frequency of abundance of birds observed. The five most frequently observed species in order of abundance were red-winged blackbird, European starling, western meadowlark, house finch, and Savannah sparrow. All of these species are birds that primarily forage in grasslands and marshlands, which are the two most abundant habitat types on Tolay Lake Regional Park.

Table C aggregates the data by relative seasonal abundance and by guilds. For the relative seasonal abundance analysis, the months of the year were joined in pairs; e.g., December with January and so forth. Then the number of birds counted in each monthly pair was added together and divided by the number of counts in that monthly pair to create an index of relative abundance. The six pairs of months roughly correspond to the following phenologies in the annual cycles of birds: April-May is the nesting season; June-July is the fledgling season; August-September is the post breeding season/migration season; October-November is the peak of migration for many non-resident birds; December-January is the beginning of the winter resident season; and February-March is end of the winter resident season and the beginning of the migratory season. Of course, the phenologies of some individuals and even species will differ in particulars from this generalized pattern.

Table C also groups the birds observed at Tolay Lake Regional Park by guilds, which are groupings of species using the same or similar habitats. Table D presents a summary of the data contained in Table C. The groups are necessarily broad but are designed to illustrate the relative seasonal abundances. The following guilds are delineated:

- The **forest, riparian, and brush guild** is generally composed of birds that are dependent on woody habitat from shrubs to mature trees for important phases of their life cycle, particularly for foraging and nesting.

- The **grassland guild** is generally composed of birds that forage primarily in grasslands. Some of these species also nest in grasslands. All the swallows were placed in this guild, even though some forage over forest and marsh as well; none of them nest in grass.
- The **raptor guild** is the most taxonomically parsimonious grouping, composed of hawks and falcons along with the turkey vulture.
- The **waterbird guild** is broken into marsh birds such herons and egrets, shorebirds such as sandpipers and plovers, and waterfowl and allies. The latter category includes ducks and geese along with gulls, a tern species, grebes, American coot, and belted kingfisher.

With the exception of marsh birds and shorebirds, each of the guilds is broken into two or three of the following seasonal categories: breeding/summer resident, migratory/winter resident, and year-round resident. These seasonal categorizations are based on the findings of the *Birds of Sonoma County California* (Bolander and Parmeter 2000) for the part of Sonoma County where Tolay Lake Regional Park is located. Some species, such as the European starling and the western meadowlark, are year-round residents, nesting in the park. But in the winter their numbers are greatly enhanced by migratory conspecifics. In the case of the starling and meadowlark, winter abundance is so disproportionately greater than in the breeding season that these birds were treated as migratory/winter residents.

Figures 1-4 graph the relative abundances of the four guilds. Among the forest, riparian, and brush guild birds, the most abundant are the year-round residents, although their numbers drop considerably in the nesting season (Figure 1). This drop suggests that suitable nesting habitat may be limited for some of these birds, many of which require mature trees or developed brush habitat. The breeding/summer resident birds, using forest, riparian, and brush habitat, have very low relative abundance in the winter, early spring, and fall as would be expected. But their breeding season numbers are not especially strong either, suggesting a paucity of suitable habitat for this group, which is composed mainly of neotropical migrants (i.e., bird species that winter in the neotropics).

Figure 2 illustrates the relative abundances of birds that comprise the grassland guilds. The largest group are the migratory/winter resident species with large numbers of migratory European starlings, western meadowlarks, and white-crowned and golden-crowned sparrows. The sparrow species may nest in Sonoma County, but mainly along the coast (Bolander and Parmeter 2000). Resident grassland birds, such as Savannah sparrow and Brewer's blackbird, are present year-round in moderate numbers with a slight depression in numbers during the breeding season. The grassland breeding/summer resident species, mainly swallows, peak as expected in the breeding season and into the summer. However, their numbers may be limited by the lack of suitable nesting habitat on-site.

Figure 3 illustrates the relative abundances of raptors. Tolay Lake Regional Park has an exceptionally healthy population of year-round resident raptors. Many forage in the grasslands and nest in the riparian and oak woodlands. Their numbers peak in the late summer/early fall augmented by migratory conspecifics coming down from the north. The more strictly migratory species are found on-site in relatively low numbers in the winter, early spring, and fall. The relatively low abundance of migratory raptors likely reflects mainly that these top predators occur at naturally low numbers, rather than lack of suitable habitat.

Figure 4 illustrates the relative abundances of birds that comprise the waterbird guilds. Both migratory and year-round resident waterfowl peak in February/March, but are virtually absent the rest of the year, reflecting the hydration period of Tolay Lake. Augmentation of the seasonal hydration of Tolay Lake could significantly increase waterfowl presence on-site. Shorebirds, which are primarily

migrants and winter residents, are present at low numbers primarily due to the limited amount of suitable habitat. The marsh bird group is dominated by the large number of red-winged blackbirds, especially in the fall and winter.

Figure 5 illustrates the relative abundance by season of all species and individuals. Both relative number of species and relative number of individuals track the same seasonal pattern at Tolay Lake Regional Park with high numbers in the winter, early spring, and fall and correspondingly low numbers in the latter part of the spring and through the summer, when the seasonal wetlands desiccate and many bird species migrate to the coast or to the north to breed.

Overall the data indicate a substantially rich avifauna at Tolay Lake Regional Park. Raptor populations are particularly strong. Waterfowl occur in large numbers when Tolay Lake is hydrated, but are limited by the seasonal nature of that waterbody. Enhancement of riparian, brush, and woody understory vegetation would likely increase the numbers of neotropical migrant breeding birds as well as year-round resident birds that use such habitat.

REFERENCE:

Bolander, G.L., and B.D. Parmeter. 2000. Birds of Sonoma County, California: An Annotated Checklist and Birding Gazetteer. Redwood Ornithological Society, Napa, CA. 155 pp.

**Table A: Bird Species Observed, Number of Individuals and Dates, Tolay Lake Regional Park, Sonoma County, California**

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Grebe, Horned | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | | |
| Grebe, Eared | | | | | | | | | | | | | | | | | 2 | 2 | | | | | | | | | | |
| Grebe, Pied-billed | 2 | 4 | | | | | | | 1 | 1 | | | | | | | 2 | 2 | | | | | | | | | | 1 |
| Pelican, Am. White | | | | | | | | | | | | | | 14 | 5 | | | | | | | | | | | | | |
| Cormorant, D.-cr. | | | | | | | | 3 | | 2 | | | | | | 2 | | 1 | | | | | | | 13 | | 3 | 1 |
| Heron, Great Blue | | 1 | 3 | 1 | | 2 | | | | | | 1 | 1 | 1 | | 4 | 1 | 1 | 1 | 1 | | 1 | | 2 | 2 | | 2 | 1 |
| Egret, Great | | | 1 | | 2 | 3 | 3 | 1 | | 5 | 2 | | | 1 | 3 | 1 | 1 | | 3 | 5 | 3 | 2 | 3 | 2 | 1 | | 1 | 2 |
| Heron, Green | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Heron, Bl.-cr. Night | | | | | | | | | | | | 1 | | | | | | | | | | 4 | 1 | 1 | | | | |
| Goose, Canada | 7 | 5 | 26 | 6 | | 238 | 10 | 10 | | 8 | | | | | 8 | 9 | 29 | 22 | | 4 | | | | | | 12 | 30 | 133 |
| Goose, Gr. White-fr. | | | | | | 2 | | | | | | | | | | | | | | | | | | | | | 4 | 8 |
| Duck, Wood | | | | | | | | | | | | | | | | 4 | | | | | | | | | | | | |
| Mallard | 9 | 12 | | 1 | | 5 | 18 | 11 | 4 | 14 | 1 | 7 | | 14 | | 6 | 12 | 22 | 14 | 18 | 1 | 5 | 5 | 5 | | 11 | 21 | 40 |
| Gadwall | 10 | 7 | | | | 5 | | 3 | 2 | 6 | | | | | | 4 | 18 | 3 | 3 | 4 | | | | | | | | 38 |
| Pintail, Northern | 2 | | | | | | | 1 | | | | | | | | | 241 | 9 | 1 | | | | | | | | 1 | 87 |
| Wigeon, American | 8 | | | | | | | | | | | | | | | | 60 | 83 | 2 | | | | | | | | 2 | 306 |
| Shoveler, Northern | 1 | 3 | | | | | | 126 | | 1 | | | | | | | 36 | 10 | | | | | | | | | | 4 |
| Teal, Cinnamon | 2 | 1 | | | | | | 4 | 3 | 4 | | | 1 | 1 | | | 3 | 13 | 6 | 8 | | | | | | | | 9 |
| Teal, Blue-winged | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Teal, Green-winged | 2 | | | | | | | 12 | | | | | | | | | 19 | 27 | 2 | | | | | | | | 1 | 38 |
| Canvasback | | | | | | | | | | | | | | | | | 40 | | | | | | | | | | 1 | 55 |
| Scaup, Greater | 2 | | | | | | | | | | | | | | | | 5 | 1 | | | | | | | | | 6 | |
| Scaup, Lesser | | | | | | | | | | | | | | 5 | | 10 | | | | | | | | | | | | |
| Bufflehead | 12 | 1 | | | | | | 2 | | | | | | | | 7 | 37 | 30 | | | | | | | | | 1 | 56 |
| Merganser, Com. | | | | | | | 1 | | | | | | | | | 4 | | | | | | | | | | | 2 | 2 |
| Duck, Ring-necked | | | | | | | | | | | | | | | | | 100 | 2 | | | | | | | | | | 21 |
| Duck,Ruddy | | | | | | | | | | | | | | | | | 76 | 41 | | | | | | | | | | 22 |
| Vulture, Turkey | 1 | 1 | 8 | 4 | 4 | 10 | | 9 | 5 | 16 | 4 | 3 | 8 | 4 | 6 | 2 | 19 | 3 | 7 | 10 | 1 | 6 | 11 | 13 | 1 | 2 | 10 | 6 |
| Harrier, Northern | 0 | 0 | 3 | 4 | 4 | 6 | 3 | 1 | 1 | | 1 | 3 | 10 | 8 | 8 | 8 | | | | | | | 3 | 3 | 5 | 4 | 7 | 2 |
| Kite, White-tailed | 0 | 0 | 2 | 7 | 4 | 5 | 7 | 5 | | 1 | | 12 | 25 | 7 | 17 | 5 | 4 | 3 | | | | 2 | 1 | 6 | 3 | 4 | 4 | 3 |
| Hawk, Sharp-shin. | | | 2 | | | | | | | | | | | | 2 | | | | | | | | | 1 | 2 | | | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Hawk, Cooper's | | | | | | | | | 1 | 1 | | | | | 3 | 1 | 1 | | | | 1 | | 2 | | 1 | 1 | 1 | 2 |
| Hawk, Red-sh. | 1 | 0 | | 4 | | 1 | | 1 | | | 1 | 2 | 9 | 1 | 3 | 3 | | 2 | | | 2 | | 2 | 3 | 1 | | 3 | 5 |
| Hawk, Swainson's | | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | |
| Hawk, Red-tailed | 2 | 1 | 7 | 3 | 9 | 6 | 3 | 4 | 4 | 11 | | 2 | 15 | 12 | 11 | 6 | 6 | 7 | 4 | 4 | 1 | 10 | 10 | 7 | 6 | 9 | 10 | 6 |
| Hawk, Ferruginous | | | | | 1 | | | | | | | | | | 1 | | | 1 | | | | | | | 1 | 2 | 1 | |
| Hawk, Rough-leg. | | | | | | 1 | | | | | | | | | 1 | 1 | | 1 | | | | | | | 2 | 2 | 2 | 1 |
| Eagle, Golden | | | | | | | | 1 | | | | 1 | | 3 | 2 | 2 | 2 | | | | 2 | | 1 | | 2 | | 1 | |
| Osprey | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Merlin | | | | | | | 1 | | | | | | | | | | | 2 | | | | | | | | | 1 | 1 |
| Kestrel, American | 1 | 2 | 6 | 6 | 7 | 6 | 9 | 1 | | | | 7 | 9 | 5 | 6 | 11 | 4 | 4 | 3 | | 1 | 4 | 7 | 5 | 5 | 8 | 9 | 4 |
| Falcon, Prairie | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | |
| Falcon, Peregrine | | | | | 1 | 1 | | | 1 | | | | | | | | | 1 | | | 1 | | | 2 | | | | |
| Quail, California | 0 | 9 | | 16 | 6 | | 8 | 19 | 20 | 15 | 12 | 14 | 26 | | 4 | | 8 | 13 | 11 | 20 | 18 | 15 | 2 | 20 | 66 | | 37 | 6 |
| Pheasant, Ring-n. | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Turkey, Wild | | 1 | | | 1 | | | | | | | | | | | | | | 7 | | | 3 | 15 | | 10 | | | |
| Moorhen, Common | | | | 1 | | | | | | 2 | | 3 | 2 | 1 | | | | | | | | 3 | | | | 1 | | |
| Coot, American | 14 | 34 | | | | 2 | | 28 | 5 | 3 | | 1 | 1 | 3 | | 4 | 150 | 225 | 18 | | | | | 1 | | | | 16 |
| Sora | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| Killdeer | 5 | 7 | 14 | 86 | 58 | 20 | 10 | 2 | 1 | 5 | 2 | 12 | 6 | 1 | 26 | 14 | 9 | 1 | 6 | 2 | 3 | 2 | 4 | 21 | 17 | 8 | 119 | 6 |
| Yellowlegs, Greater | 3 | 1 | | | | | | 2 | 1 | | | | | | | | 1 | 1 | 7 | | | | | | | | | |
| Curlew, Long-billed | | | | | | 1 | | 1 | 3 | | | | | | | 5 | | | | | | | | | | 16 | 10 | 10 |
| Sandpiper, West. | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sandpiper, Least | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dowitcher, Long-b. | 5 | 119 | | | | | | | | | | | | | | | 9 | | 15 | | | | | | | | | 14 |
| Snipe, Wilson's | | | | | | | | 9 | | | | | | | | | 1 | 4 | 5 | | | | | | | 1 | 2 | 3 |
| Gull, Glaucous-w. | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Gull, California | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 1 | |
| Tern, Caspian | | 1 | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| Dove, Mourning | 4 | 0 | 3 | 4 | 14 | 2 | | | 7 | 18 | 19 | 18 | 1 | 1 | 2 | 2 | | | 7 | 19 | 16 | 16 | 4 | 5 | 11 | | 4 | 2 |
| Dove, Eurasian Co. | | | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | | | |
| Pigeon, Rock | 8 | 8 | 14 | 15 | 9 | 2 | | 12 | 7 | 3 | | | | 2 | | 1 | 14 | 4 | 3 | 7 | 7 | 1 | | 13 | 12 | 1 | 7 | 3 |
| Pigeon, Band-t. | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 1 | |
| Owl, Barn | 2 | 2 | 3 | 4 | 2 | 2 | 2 | | | 2 | 1 | 7 | 9 | 4 | 3 | 1 | 2 | 3 | 1 | | 2 | 2 | 2 | 1 | 2 | | 2 | 1 |
| Owl, Great Horned | 1 | | 2 | 1 | | | 2 | 1 | 1 | 1 | | 4 | | | | 1 | | 1 | | 2 | | 6 | 1 | 4 | 1 | 1 | 2 | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Swift, Vaux's | | | 2 | | | | | | | | | | | 10 | | | | | | | | | | | | | | |
| Humming., Allen's | 2 | 4 | | | | | | 5 | 3 | | 2 | 1 | | | | | | 1 | 7 | 4 | | 1 | | | | | | 1 |
| Humming., Rufous | 1 | | | | | | | 1 | 4 | 1 | | | | | | | 1 | 1 | | | | | | | | | | |
| Humming., Anna's | 7 | 12 | 2 | | 1 | 1 | 7 | 16 | 5 | 2 | 1 | 2 | 1 | 2 | 2 | | 5 | 3 | 7 | 1 | 2 | | 2 | 5 | 2 | 3 | 7 | 2 |
| *Selasphorus* sp. | | | | | | | | | | | | | | | | | | 4 | | | | | | | | | | |
| Kingfisher, Belted | | | | | | | | | | | | 1 | | | | | 1 | | | | | | 1 | | | | | |
| Woodpecker, Acorn | | | | | | 1 | | | | | | 1 | | | | | | 3 | 1 | | 4 | | 2 | | 4 | | 5 | 4 |
| Sapsucker, Red-br. | | | | | | | | | | | | | | | | | | | | | | | 1 | | 1 | | | 1 |
| Woodpeck., Downy | | | 1 | 4 | | | | | | | 1 | | 3 | 2 | | 1 | | | 1 | | 2 | 1 | 1 | 1 | | | | 1 |
| Woodpeck., Hairy | | | | | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | |
| Woodpeck., Nuttall's | 2 | 1 | | 1 | | | | | 1 | 3 | | 2 | 4 | 3 | 3 | 1 | 1 | 2 | 5 | 2 | 4 | 2 | 9 | 2 | 1 | 1 | 4 | 2 |
| Flicker, Northern | | | | | 4 | 11 | 3 | 1 | | | | 1 | | 1 | 7 | 10 | 8 | 19 | 1 | 1 | 1 | | 1 | 3 | 8 | 7 | 17 | 6 |
| Flycatcher, Olive-s. | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Wood-Pewee, W. | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | | | | | |
| Flycatcher, Pac. S. | | | | | | | | | | 1 | | | | 1 | | | | | | | 1 | | 3 | | | | | |
| Flycatcher, Willow | | | 1 | 1 | | | | | | | | | 1 | | | | | | | | | | 1 | | | | | |
| Flycatcher, Least | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| Phoebe, Black | 3 | 2 | 11 | 10 | 6 | 6 | 2 | 6 | 4 | 2 | 12 | 6 | 16 | 5 | 14 | 9 | 1 | 1 | 5 | 4 | 4 | 29 | 10 | 22 | 7 | 2 | 10 | 3 |
| Phoebe, Say's | | | 10 | 10 | 11 | 4 | 2 | | | | | | | 9 | 8 | 10 | 5 | 1 | | | | | 3 | 12 | 5 | 4 | 7 | 2 |
| Flycatcher, Ash-thr. | | | | | | | | | | | | 2 | | | | | | | 4 | | 1 | 3 | | | | | | |
| Kingbird, Western | 2 | 1 | | | | | | 3 | | 1 | 2 | 7 | 1 | | | | | | 5 | 11 | 3 | 2 | | | | | | |
| Shrike, Loggerhead | | | | 5 | 1 | 2 | | | 1 | 2 | | 2 | 2 | | 1 | 3 | 2 | 1 | 2 | | 2 | 4 | 1 | 3 | 4 | 4 | 2 | 2 |
| Vireo, Warbling | | | 1 | | | | | | | | | | | 1 | | | | | | | | 2 | 1 | | | | | |
| Vireo, Hutton's | | | 1 | | 1 | | | | | | | | 2 | | 1 | 1 | | | | | | | | | 1 | 1 | | |
| Jay, Steller's | | | | | | 5 | | | | 5 | | 8 | | 2 | | 3 | 3 | 3 | 2 | | 2 | | 5 | | 5 | | 12 | 4 |
| Scrub-Jay, Western | | | 2 | | 5 | 8 | 5 | | | | 4 | 5 | 9 | 1 | 3 | 9 | 3 | 3 | | 4 | 5 | 5 | 3 | 4 | 3 | 2 | 6 | 2 |
| Raven, Common | 4 | 4 | 4 | 10 | 21 | 10 | 11 | 3 | 5 | 10 | 4 | 7 | 8 | 2 | 25 | 12 | 5 | 11 | 5 | 9 | 7 | 9 | 4 | 19 | 6 | 13 | 18 | 4 |
| Crow, American | 2 | 1 | 1 | 1 | 5 | 5 | 1 | 1 | | 2 | | 3 | | 6 | 12 | 2 | | 6 | 3 | 18 | 3 | | | 3 | 1 | 9 | 11 | 5 |
| Lark, Horned | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Swallow, N. R.-w. | 1 | 4 | | | | | | | | | | | | 2 | | | | | | | | | | | | | | |
| Swallow, Violet-gr. | 23 | 5 | 54 | 2 | | | | 10 | 3 | 31 | 3 | 24 | | 24 | | | 1 | | 35 | | 17 | 1 | 23 | 14 | | | | |
| Swallow, Tree | 9 | 40 | 20 | | | 12 | | 8 | 30 | 2 | 3 | 11 | | | | | 2 | 24 | 29 | 55 | 19 | 43 | 8 | | | 2 | | 1 |
| Swallow, Cliff | 70 | 80 | | | | | | | 52 | 70 | 25 | 66 | | | | | | | 72 | 75 | 60 | 4 | | | | | | |
| Swallow, Barn | | 241 | 5 | 3 | 1 | | | 72 | 20 | 19 | 19 | 41 | 18 | 5 | | | | | 18 | 90 | 35 | 31 | 13 | | | | | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Titmouse, Oak | | | | | | | | | | | | 4 | | 3 | | 2 | 2 | 1 | 3 | | 7 | | | | 2 | | 8 | 1 |
| Chickadee, Ch.-b. | | | | | | | | | | 2 | | | 3 | | | | 2 | | 2 | | 4 | 1 | 1 | | 3 | | | |
| Bushtit | 1 | | | 15 | 45 | 3 | | | 5 | 4 | 7 | 5 | | | | 20 | 21 | 2 | 3 | 16 | 1 | 3 | 20 | 25 | 24 | 7 | 59 | 5 |
| Nuthatch, Wh.-br. | | | | | | 1 | | | | | | | | | | 1 | 2 | 3 | 3 | | 2 | | 4 | | 2 | | 2 | 1 |
| Creeper, Brown | | | | | | | | | | | | | | 1 | | | | | | | | | | | 2 | 2 | 4 | 1 |
| Wren, Bewick's | | | | 1 | 3 | | | | | 1 | | | 2 | 1 | | 1 | 2 | 2 | 4 | | 2 | | | | | | 4 | 2 |
| Wren, House | | | 1 | 2 | | | | 1 | | 2 | | 12 | | | 1 | | | 1 | 3 | 3 | 3 | | | | | 2 | | |
| Wren, Marsh | | | | 2 | | | | | | | | 1 | | | 1 | | | | | | | | | | | | 1 | |
| Kinglet, Golden-cr. | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| Kinglet, Ruby-cr. | | | | | 6 | 6 | | | | | | | | 1 | 2 | | | 3 | | | | | | | 6 | 2 | 1 | 2 |
| Bluebird, Western | 9 | 5 | 2 | 2 | 14 | 19 | 15 | | 1 | 1 | | 10 | 19 | 17 | 5 | | 6 | 13 | 12 | 20 | 12 | 5 | 14 | 28 | 24 | 7 | 9 | 18 |
| Robin, American | 3 | 3 | | | | 5 | 26 | | 3 | | | 2 | 1 | | 1 | 2 | 4 | 6 | 11 | 8 | 6 | 8 | | | 16 | 3 | 3 | 12 |
| Varied Thrush | | | | | | | | | | | | | | | | | | | | | | | | | | | 30 | 22 |
| Thrush, Hermit | | | | | | | 2 | | | | | | | | | 1 | 1 | 2 | | | | | | | 1 | 1 | | |
| Mockingbird, N. | 1 | 1 | 3 | 2 | 4 | | | 2 | | 1 | | 6 | 4 | | 2 | | | 1 | | 1 | | | 2 | 6 | | | 1 | |
| Starling, European | 15 | 12 | 9 | 63 | 64 | 978 | 169 | 27 | 12 | 15 | 24 | 6 | 21 | 47 | 4249 | 3 | 20 | 25 | 24 | 15 | 21 | 15 | 605 | 51 | 101 | 16 | 73 | 102 |
| Pipit, American | | | | | 1 | 1 | | | | | | | | | 94 | 7 | | | | | | | | | 25 | | 5 | |
| Waxwing, Cedar | | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Warbler, Or.-cr. | | | | 1 | | | | | 1 | 1 | | | | | | | | | 5 | | | | | | | | | |
| Warbler, Yellow | | | 3 | 2 | | | | | | | | | | 1 | | | | | | | | | 3 | 1 | | | | |
| Warbler, Yellow-r. | 6 | | | | 11 | 6 | 4 | | | | | | | | 12 | 3 | 3 | 11 | 3 | | | | 3 | 1 | 12 | 2 | 5 | 11 |
| Warbler, Towns. | | | | | | 1 | | | | | | | | 3 | | | | | | | | | | | 1 | | | |
| Warbler, MacGilliv. | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Yellowthroat, C. | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Warbler, Wilson's | | | 1 | 2 | | | | | | 3 | | | 1 | | | | | | | | | | | | | | | |
| Grosbeak, Black-h. | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| Tanager, Western | | | 1 | | | | | | | | | | | | | | | | | | | | 11 | | | | | |
| Bunting, Lazuli | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Towhee, Spotted | | | 1 | | 3 | | 1 | | 1 | 6 | | 2 | | 2 | | 2 | 3 | 2 | 6 | | 6 | 2 | 4 | | 8 | 1 | 11 | 8 |
| Towhee, California | 7 | 4 | 10 | 4 | 3 | 1 | 6 | 10 | 5 | 3 | 7 | 15 | 8 | 3 | 10 | 5 | 3 | 7 | 9 | 7 | 8 | 12 | 5 | 8 | 3 | 7 | 13 | 3 |
| Sparrow, Grasshop. | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| Sparrow, Savannah | | | 13 | 99 | 82 | 69 | 87 | 7 | 16 | 6 | 5 | 4 | 10 | 65 | 69 | 58 | 13 | 11 | 10 | 1 | | | 4 | 158 | 37 | 13 | 35 | 6 |
| Sparrow, Lark | | | 1 | 2 | | | | | | 8 | | 10 | | 1 | | | | | 4 | | 2 | | | | | | | |
| Sparrow, Golden-cr. | 2 | 1 | | | 21 | 22 | 77 | 21 | 5 | | | | | 1 | 5 | 21 | 4 | 22 | 14 | | | | | | 8 | 21 | 47 | 37 |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Sparrow, White-thr. | 1 | | | | | | 35 | 1 | | | | | | | | | | | | | | | | | | | | |
| Sparrow, White-cr. | 14 | | 6 | 30 | 11 | 19 | | 59 | 7 | | | | | 46 | 88 | 84 | 102 | 82 | 3 | | | | | 18 | 8 | 88 | 157 | 19 |
| Sparrow, Fox | | | | | | | | | | | | | | | 1 | | | | | | | | | | | 2 | 1 | |
| Sparrow, Song | 7 | 4 | 6 | 23 | 2 | | 2 | 9 | 6 | 1 | 16 | 16 | 8 | 21 | 3 | 2 | 2 | 4 | 2 | 10 | 3 | 7 | 6 | 7 | 8 | 3 | 5 | 5 |
| Sparrow, Lincoln's | | | 3 | 4 | 5 | | 1 | 7 | | | | | | 2 | | | 2 | 4 | 3 | | | | | 7 | | 5 | | 1 |
| Junco, Dark-eyed | 5 | 8 | | | 5 | 69 | 54 | 5 | | 12 | | 6 | | 10 | 31 | 22 | 75 | 24 | 6 | 1 | 42 | | 21 | | 59 | 25 | 199 | 79 |
| Meadowlark, West. | | 1 | 29 | 62 | 81 | 110 | 211 | 6 | 15 | 29 | 8 | 47 | 26 | 20 | 176 | 150 | 65 | 193 | 17 | 40 | 2 | 17 | 26 | 53 | 37 | 96 | 150 | 43 |
| Cowbird, Brown-h. | 1 | 1 | | | | | | 1 | 1 | | 1 | | | | | | | | 4 | 4 | 1 | | | 1 | | | | |
| Blackbird, Red-w. | 152 | 243 | 285 | 296 | 3000 | 2034 | 153 | 137 | 113 | 269 | 263 | 164 | 45 | 214 | 157 | 167 | 67 | 258 | 182 | 490 | 59 | 25 | 950 | 522 | 110 | 235 | 120 | 125 |
| Blackbird, Brewer's | 25 | 23 | 1 | 6 | 14 | 2 | 20 | 13 | 15 | 11 | 5 | 17 | 12 | 25 | 59 | 7 | | 41 | 16 | 23 | 17 | 13 | 14 | 13 | 10 | 116 | 31 | 15 |
| Oriole, Bullock's | 1 | 1 | | | | | | 1 | | 5 | 3 | 4 | | | | | | | 9 | 6 | 1 | | | | | | | |
| Finch, Purple | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| Finch, House | 11 | 64 | 24 | 21 | 1 | 22 | | 10 | 12 | 19 | 22 | 32 | 49 | 62 | 19 | 9 | 18 | 17 | 22 | 40 | 41 | 108 | 94 | 106 | 31 | 6 | 16 | 6 |
| Goldfinch, Lesser | | | | | 4 | | | | | 5 | | 5 | 19 | 4 | 3 | 25 | | 44 | 16 | 4 | 2 | 2 | 3 | 64 | | | 19 | |
| Goldfinch, American | | 2 | 7 | 25 | 3 | 64 | | 4 | 6 | 15 | 8 | 26 | 86 | 16 | 28 | 7 | 50 | 30 | 16 | 21 | 26 | 54 | 9 | 57 | 30 | 6 | 16 | 16 |
| Sparrow, House | 7 | 2 | 2 | 2 | 2 | 4 | | 9 | | 1 | 6 | 2 | 3 | | 1 | | | | | 1 | 5 | 2 | | | | | | |
| Total No. Counted | 498 | 1,039 | 617 | 876 | 3,564 | 3,821 | 973 | 728 | 419 | 692 | 495 | 688 | 507 | 733 | 5,204 | 779 | 1,417 | 1,437 | 745 | 1,090 | 504 | 494 | 1,966 | 1,330 | 781 | 799 | 1,435 | 1,495 |
| Number of Species | 56 | 55 | 48 | 48 | 48 | 51 | 38 | 56 | 45 | 59 | 34 | 61 | 44 | 61 | 51 | 60 | 66 | 73 | 70 | 45 | 55 | 46 | 57 | 49 | 60 | 51 | 75 | 75 |

**Table B: Birds Observed in Order of Frequency of Observation, 4/15/06 to 02/21/09**
**Tolay Lake Regional Park, Sonoma County, California**

| Species | Number |
|---|---|
| Blackbird, Red-winged | 10,835 |
| Starling, European | 6,782 |
| Meadowlark, Western | 1,710 |
| Finch, House | 882 |
| Sparrow, Savannah | 878 |
| Sparrow, White-crowned | 841 |
| Junco, Dark-eyed | 758 |
| Swallow, Barn | 631 |
| Goldfinch, American | 628 |
| Swallow, Cliff | 574 |
| Blackbird, Brewer's | 564 |
| Goose, Canada | 557 |
| Coot, American | 505 |
| Killdeer | 467 |
| Wigeon, American | 461 |
| Quail, California | 365 |
| Pintail, Northern | 342 |
| Sparrow, Golden-crowned | 329 |
| Swallow, Tree | 318 |
| Bushtit | 291 |
| Bluebird, Western | 287 |
| Swallow, Violet-green | 270 |
| Mallard | 256 |
| Raven, Common | 250 |
| Goldfinch, Lesser | 219 |
| Phoebe, Black | 212 |
| Sparrow, Song | 188 |
| Towhee, California | 186 |
| Shoveler, Northern | 181 |
| Dove, Mourning | 179 |
| Hawk, Red-tailed | 176 |
| Vulture, Turkey | 174 |
| Dowitcher, Long-billed | 162 |
| Pigeon, Rock | 153 |
| Bufflehead | 146 |
| Duck, Ruddy | 139 |
| Pipit, American | 133 |
| Kestrel, American | 130 |
| Kite, White-tailed | 127 |
| Duck, Ring-necked | 123 |
| Robin, American | 123 |
| Flicker, Northern | 110 |
| Gadwall | 103 |
| Phoebe, Say's | 103 |
| Teal, Green-winged | 101 |
| Crow, American | 101 |
| Hummingbird, Anna's | 100 |
| Canvasback | 96 |

| Species | Number |
|---|---|
| Warbler, Yellow-rumped | 93 |
| Scrub-Jay, Western | 91 |
| Harrier, Northern | 84 |
| Towhee, Spotted | 69 |
| Owl, Barn | 62 |
| Jay, Steller's | 59 |
| Woodpecker, Nuttall's | 56 |
| Teal, Cinnamon | 55 |
| Thrush, Varied | 52 |
| Sparrow, House | 49 |
| Curlew, Long-billed | 46 |
| Shrike, Loggerhead | 46 |
| Egret, Great | 45 |
| Hawk, Red-shouldered | 44 |
| Sparrow, Lincoln's | 44 |
| Kingbird, Western | 38 |
| Turkey, Wild | 37 |
| Mockingbird, Northern | 37 |
| Sparrow, White-throated | 37 |
| Titmouse, Oak | 33 |
| Owl, Great Horned | 32 |
| Hummingbird, Allen's | 31 |
| Wren, House | 31 |
| Oriole, Bullock's | 31 |
| Sandpiper, Least | 30 |
| Kinglet, Ruby-crowned | 29 |
| Sparrow, Lark | 28 |
| Heron, Great Blue | 26 |
| Cormorant, Double-crested | 25 |
| Snipe, Wilson's (Common) | 25 |
| Woodpecker, Acorn | 25 |
| Wren, Bewick's | 25 |
| Nuthatch, White-breasted | 21 |
| Pelican, American White | 19 |
| Woodpecker, Downy | 19 |
| Chickadee, Chestnut-backed | 18 |
| Eagle, Golden | 17 |
| Yellowlegs, Greater | 16 |
| Waxwing, Cedar | 16 |
| Scaup, Lesser | 15 |
| Hawk, Cooper's | 15 |
| Cowbird, Brown-headed | 15 |
| Goose, Greater White-fronted | 14 |
| Scaup, Greater | 14 |
| Grebe, Pied-billed | 13 |
| Moorhen, Common | 13 |
| Swift, Vaux's | 12 |
| Tanager, Western | 12 |

| Species | Number |
|---|---|
| Hawk, Rough-legged | 11 |
| Flycatcher, Ash-throated | 10 |
| Creeper, Brown | 10 |
| Warbler, Yellow | 10 |
| Merganser, Common | 9 |
| Hummingbird, Rufous | 9 |
| Vireo, Hutton's | 8 |
| Thrush, Hermit | 8 |
| Warbler, Orange-crowned | 8 |
| Heron, Black-crowned Night | 7 |
| Hawk, Sharp-shinned | 7 |
| Hawk, Ferruginous | 7 |
| Falcon, Peregrine | 7 |
| Swallow, N. Rough-winged | 7 |
| Warbler, Wilson's | 7 |
| Flycatcher, Pacific Slope | 6 |
| Merlin | 5 |
| Vireo, Warbling | 5 |
| Wren, Marsh | 5 |
| Warbler, Townsend's | 5 |
| Grebe, Eared | 4 |
| Duck, Wood | 4 |
| *Selasphorus* sp. | 4 |
| Flycatcher, Willow | 4 |
| Sparrow, Fox | 4 |
| Grebe, Horned | 3 |
| Sandpiper, Western | 3 |
| Gull, California | 3 |
| Kingfisher, Belted | 3 |
| Sapsucker, Red-breasted | 3 |
| Hawk, Swainson's | 2 |
| Falcon, Prairie | 2 |
| Tern, Caspian | 2 |
| Dove, Eurasian Collared | 2 |
| Pigeon, Band-tailed | 2 |
| Woodpecker, Hairy | 2 |
| Wood-Pewee, Western | 2 |
| Heron, Green | 1 |
| Teal, Blue-winged | 1 |
| Osprey | 1 |
| Pheasant, Ring-necked | 1 |
| Sora | 1 |
| Gull, Glaucous-winged | 1 |
| Flycatcher, Olive-sided | 1 |
| Flycatcher, Least | 1 |
| Lark, Horned | 1 |
| Kinglet, Golden-crowned | 1 |
| Warbler, McGillivray's | 1 |
| Yellowthroat, Common | 1 |
| Grosbeak, Black-headed | 1 |
| Bunting, Lazuli | 1 |
| Sparrow, Grasshopper | 1 |
| Finch, Purple | 1 |
| Total no. individuals | 23,050 |

**Table C: Seasonal Occurrence, Relative Abundance of Bird Species Observed**
**Tolay Lake Regional Park, Sonoma County, California**

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Forest, Riparian, and Brush - breeding/summer resident | | | | | | |
| Hummingbird, Allen's | 0.0 | 0.7 | 3.6 | 1.0 | 0.0 | 0.0 |
| Flycatcher, Olive-sided | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Wood-Pewee, Western | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 |
| Flycatcher, Pacific Slope | 0.0 | 0.0 | 0.1 | 0.3 | 1.3 | 0.0 |
| Flycatcher, Ash-throated | 0.0 | 0.0 | 0.6 | 1.5 | 0.0 | 0.0 |
| Wren, House | 0.4 | 0.3 | 1.3 | 3.8 | 0.0 | 0.7 |
| Kingbird, Western | 0.0 | 0.0 | 3.3 | 3.5 | 0.3 | 0.0 |
| Vireo, Warbling | 0.0 | 0.0 | 0.0 | 0.5 | 0.7 | 0.2 |
| Warbler, Orange-crowned | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.2 |
| Warbler, Wilson's | 0.0 | 0.0 | 0.4 | 0.0 | 0.3 | 0.5 |
| Warbler, Yellow | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.0 |
| Grosbeak, Black-headed | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Tanager, Western | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 0.2 |
| Bunting, Lazuli | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Oriole, Bullock's | 0.0 | 0.0 | 3.3 | 2.0 | 0.0 | 0.0 |
| Total | 0.4 | 1.0 | 13.9 | 12.8 | 8.3 | 2.7 |
| Forest, Riparian, and Brush - migratory/winter resident | | | | | | |
| Flycatcher, Willow | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 |
| Flycatcher, Least | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Warbler, Yellow-rumped | 4.0 | 8.3 | 1.3 | 0.0 | 1.0 | 6.0 |
| Warbler, MacGillivray's | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Swift, Vaux's | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 0.3 |
| Hummingbird, Rufous | 0.0 | 0.7 | 1.0 | 0.0 | 0.0 | 0.0 |
| *Selasphorus* sp. | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Phoebe, Say's | 5.4 | 2.7 | 0.0 | 0.0 | 4.0 | 9.3 |
| Kinglet, Ruby-crowned | 1.8 | 1.7 | 0.0 | 0.0 | 0.3 | 2.3 |
| Thrush, Varied | 6.0 | 7.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Waxwing, Cedar | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 |
| Warbler, Townsend's | 0.2 | 0.0 | 0.0 | 0.0 | 1.0 | 0.2 |
| Sparrow, Fox | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Total | 18.0 | 22.0 | 4.6 | 0.0 | 10.7 | 18.8 |
| Forest, Riparian, and Brush - year-round resident | | | | | | |
| Turkey, Wild | 0.0 | 0.0 | 1.1 | 0.8 | 5.0 | 1.8 |
| Dove, Mourning | 1.6 | 0.7 | 7.9 | 17.3 | 2.0 | 6.5 |
| Dove, Eurasian Collared | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 |
| Pigeon, Rock | 2.2 | 7.0 | 6.9 | 2.0 | 0.7 | 10.5 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Pigeon, Band-tailed | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Hummingbird, Anna's | 3.6 | 3.3 | 7.1 | 1.3 | 1.7 | 2.0 |
| Phoebe, Black | 5.8 | 1.7 | 3.7 | 12.8 | 10.3 | 11.7 |
| Jay, Steller's | 4.0 | 3.3 | 1.0 | 2.5 | 2.3 | 0.8 |
| Scrub-Jay, Western | 6.0 | 2.7 | 0.6 | 4.8 | 4.3 | 2.8 |
| Titmouse, Oak | 2.0 | 1.3 | 0.4 | 2.8 | 1.0 | 0.3 |
| Chickadee, Chestnut-backed | 0.0 | 0.7 | 0.6 | 1.3 | 1.3 | 0.5 |
| Bushtit | 17.8 | 9.3 | 4.1 | 4.0 | 6.7 | 18.2 |
| Nuthatch, White-breasted | 0.8 | 2.0 | 0.4 | 0.5 | 1.3 | 0.3 |
| Creeper, Brown | 1.2 | 0.3 | 0.0 | 0.0 | 0.3 | 0.3 |
| Wren, Bewick's | 1.0 | 2.0 | 0.7 | 0.5 | 1.0 | 0.7 |
| Robin, American | 7.8 | 7.3 | 4.0 | 4.0 | 0.3 | 2.8 |
| Thrush, Hermit | 0.8 | 1.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Mockingbird, Northern | 0.2 | 0.3 | 0.9 | 1.5 | 2.0 | 2.8 |
| Kinglet, Golden-crowned | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Towhee, Spotted | 3.0 | 4.3 | 1.9 | 2.5 | 2.0 | 2.0 |
| Towhee, California | 6.4 | 4.3 | 6.4 | 10.5 | 5.3 | 6.3 |
| Junco, Dark-eyed | 73.8 | 59.3 | 5.3 | 12.0 | 10.3 | 15.8 |
| Finch, Purple | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Finch, House | 10.6 | 13.7 | 25.4 | 50.8 | 68.3 | 33.7 |
| Sparrow, House | 0.8 | 0.0 | 2.9 | 3.8 | 1.0 | 1.2 |
| Owl, Barn | 1.4 | 2.0 | 1.0 | 3.0 | 5.0 | 2.5 |
| Owl, Great Horned | 1.2 | 0.3 | 0.9 | 2.5 | 0.3 | 1.3 |
| Woodpecker, Acorn | 1.2 | 2.3 | 0.1 | 1.3 | 0.7 | 0.7 |
| Sapsucker, Red-breasted | 0.0 | 0.3 | 0.0 | 0.0 | 0.3 | 0.2 |
| Woodpecker, Downy | 0.2 | 0.3 | 0.1 | 1.0 | 2.0 | 1.0 |
| Woodpecker, Hairy | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Woodpecker, Nuttall's | 1.2 | 1.7 | 2.0 | 2.0 | 5.3 | 1.2 |
| Flicker, Northern | 9.6 | 11.0 | 0.4 | 0.5 | 0.7 | 3.7 |
| Total | 165.0 | 142.7 | 86.1 | 146.0 | 142.7 | 132.7 |
| Grassland - breeding/summer resident | | | | | | |
| Swallow, Northern Rough-winged | 0.0 | 0.0 | 0.7 | 0.0 | 0.7 | 0.0 |
| Swallow, Violet-green | 0.0 | 0.3 | 15.3 | 11.3 | 15.7 | 11.7 |
| Swallow, Tree | 2.8 | 9.0 | 24.7 | 19.0 | 2.7 | 3.3 |
| Swallow, Cliff | 0.0 | 0.0 | 59.9 | 38.8 | 0.0 | 0.0 |
| Swallow, Barn | 0.0 | 0.0 | 65.7 | 31.5 | 12.0 | 1.5 |
| Cowbird, Brown-headed | 0.0 | 0.0 | 1.7 | 0.5 | 0.0 | 0.2 |
| Sparrow, Grasshopper | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Total | 2.8 | 9.3 | 168.0 | 101.3 | 31.0 | 16.7 |
| Grassland - migratory/winter resident | | | | | | |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Starling, European | 247.8 | 49.0 | 17.1 | 16.5 | 224.3 | 756.2 |
| Pipit, American | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 |
| Meadowlark, Western | 143.4 | 100.3 | 15.4 | 18.5 | 24.0 | 73.0 |
| Sparrow, Golden-crowned | 37.6 | 21.0 | 6.1 | 0.0 | 0.3 | 5.7 |
| Sparrow, White-throated | 7.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Sparrow, White-crowned | 69.6 | 67.7 | 11.9 | 0.0 | 15.3 | 26.8 |
| Sparrow, Lincoln's | 1.2 | 2.3 | 1.4 | 0.0 | 0.7 | 3.2 |
| Total | 509.2 | 240.3 | 52.3 | 35.0 | 264.7 | 884.8 |
| Grassland - year-round resident | | | | | | |
| Quail, California | 9.0 | 9.0 | 13.4 | 14.8 | 9.3 | 18.7 |
| Pheasant, Ring-necked | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Lark, Horned | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Bluebird, Western | 10.0 | 12.3 | 6.9 | 6.8 | 16.7 | 12.5 |
| Shrike, Loggerhead | 2.2 | 1.7 | 0.7 | 2.0 | 1.0 | 2.3 |
| Raven, Common | 12.8 | 6.7 | 5.7 | 6.8 | 4.7 | 14.2 |
| Crow, American | 5.6 | 3.7 | 3.9 | 1.5 | 2.0 | 3.8 |
| Sparrow, Savannah | 52.4 | 10.0 | 5.7 | 2.3 | 26.3 | 76.3 |
| Sparrow, Song | 2.4 | 3.7 | 5.6 | 10.5 | 11.7 | 8.2 |
| Sparrow, Lark | 0.0 | 0.0 | 1.7 | 3.0 | 0.3 | 0.5 |
| Blackbird, Brewer's | 35.2 | 18.7 | 18.0 | 13.0 | 17.0 | 17.2 |
| Goldfinch, Lesser | 8.8 | 14.7 | 3.6 | 2.3 | 8.7 | 11.8 |
| Goldfinch, American | 18.6 | 32.0 | 9.1 | 28.5 | 37.0 | 25.0 |
| Total | 157.0 | 112.3 | 74.4 | 91.5 | 134.7 | 190.5 |
| Marsh Birds | | | | | | |
| Heron, Great Blue | 1.6 | 1.0 | 0.4 | 0.5 | 0.7 | 1.3 |
| Egret, Great | 1.6 | 1.0 | 2.0 | 1.8 | 1.3 | 1.5 |
| Heron, Green | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Heron, Black-crowned Night | 0.0 | 0.0 | 0.0 | 1.3 | 0.3 | 0.2 |
| Wren, Marsh | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.5 |
| Yellowthroat, Common | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Blackbird, Red-winged | 541.8 | 150.0 | 226.6 | 127.8 | 403.0 | 728.3 |
| Sora | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 545.4 | 152.0 | 229.0 | 131.8 | 405.7 | 731.8 |
| Raptors - migratory/winter resident | | | | | | |
| Hawk, Sharp-shinned | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 |
| Hawk, Cooper's | 0.6 | 1.0 | 0.3 | 0.3 | 0.7 | 0.7 |
| Hawk, Swainson's | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Hawk, Ferruginous | 0.6 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 |
| Hawk, Rough-legged | 1.2 | 0.7 | 0.0 | 0.0 | 0.0 | 0.5 |
| Merlin | 0.4 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Falcon, Prairie | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Falcon, Peregrine | 0.2 | 0.3 | 0.1 | 0.3 | 0.0 | 0.5 |
| Total | 3.2 | 3.3 | 0.7 | 0.5 | 0.7 | 3.5 |
| Raptors - year-round resident | | | | | | |
| Vulture, Turkey | 4.8 | 9.3 | 7.0 | 3.5 | 7.7 | 6.0 |
| Harrier, Northern | 5.6 | 0.7 | 0.3 | 1.0 | 7.0 | 4.5 |
| Kite, White-tailed | 5.0 | 3.3 | 0.9 | 3.5 | 11.0 | 6.5 |
| Hawk, Red-shouldered | 1.4 | 2.3 | 0.3 | 1.3 | 4.0 | 1.8 |
| Hawk, Red-tailed | 6.8 | 6.3 | 4.3 | 3.3 | 12.3 | 7.2 |
| Eagle, Golden | 0.6 | 0.7 | 0.1 | 0.8 | 1.3 | 0.7 |
| Osprey | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Kestrel, American | 8.6 | 4.0 | 1.0 | 3.0 | 7.0 | 5.8 |
| Total | 33.0 | 26.7 | 13.9 | 16.3 | 50.3 | 32.5 |
| Shorebirds - migratory/winter resident | | | | | | |
| Yellowlegs, Greater | 0.0 | 0.7 | 2.0 | 0.0 | 0.0 | 0.0 |
| Curlew, Long-billed | 6.4 | 3.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Sandpiper, Western | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| Sandpiper, Least | 0.0 | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 |
| Dowitcher, Long-billed | 0.0 | 7.7 | 19.9 | 0.0 | 0.0 | 0.0 |
| Snipe, Wilson's | 0.6 | 2.7 | 2.0 | 0.0 | 0.0 | 0.0 |
| Killdeer | 34.2 | 5.3 | 4.0 | 4.8 | 3.7 | 37.0 |
| Total | 41.2 | 19.7 | 33.1 | 4.8 | 3.7 | 37.0 |
| Waterfowl and Allies - migratory/winter resident | | | | | | |
| Grebe, Horned | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| Grebe, Eared | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pelican, American White | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 0.8 |
| Cormorant, Double-crested. | 1.0 | 0.7 | 0.7 | 0.0 | 0.0 | 2.2 |
| Goose, Gr. White-fronted | 1.2 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Teal, Blue-winged | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Pintail, Northern | 0.2 | 112.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Wigeon, American | 0.4 | 149.7 | 1.4 | 0.0 | 0.0 | 0.0 |
| Shoveler, Northern | 0.0 | 16.7 | 18.7 | 0.0 | 0.0 | 0.0 |
| Teal, Green-winged | 0.2 | 28.0 | 2.3 | 0.0 | 0.0 | 0.0 |
| Duck, Ruddy | 0.0 | 46.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Canvasback | 0.2 | 31.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scaup, Greater | 1.2 | 2.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Scaup, Lesser | 2.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 |
| Bufflehead | 1.6 | 41.0 | 2.1 | 0.0 | 0.0 | 0.0 |
| Merganser, Common | 1.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Duck, Ring-necked | 0.0 | 41.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Gull, Glaucous-winged | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gull, California | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Tern, Caspian | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Total | 10.2 | 474.0 | 26.9 | 0.0 | 6.7 | 3.0 |
| Waterfowl and Allies - year-round resident | | | | | | |
| Grebe, Pied-billed | 0.0 | 1.7 | 1.1 | 0.0 | 0.0 | 0.0 |
| Goose, Canada | 59.8 | 61.3 | 4.9 | 0.0 | 0.0 | 6.7 |
| Duck, Wood | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mallard | 12.2 | 24.7 | 11.7 | 3.5 | 6.3 | 1.0 |
| Gadwall | 1.8 | 19.7 | 5.0 | 0.0 | 0.0 | 0.0 |
| Teal, Cinnamon | 0.0 | 8.3 | 4.0 | 0.0 | 0.7 | 0.0 |
| Moorhen, Common | 0.2 | 0.0 | 0.3 | 1.5 | 1.0 | 0.2 |
| Coot, American | 1.2 | 130.3 | 14.6 | 0.3 | 1.3 | 0.2 |
| Kingfisher, Belted | 0.0 | 0.3 | 0.0 | 0.3 | 0.3 | 0.0 |
| Total | 76.0 | 246.3 | 41.6 | 5.5 | 9.7 | 8.0 |
| Total No. Counted | 1,561 | 1,450 | 744 | 545 | 1,069 | 2,062 |
| Number of Species | 55 | 71 | 55 | 49 | 54 | 51 |

**Table D: Seasonal Occurrence of Bird Guilds**
**Tolay Lake Regional Park, Sonoma County, California**
(Numbers represent relative abundance)

| Guilds | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Forest, Riparian, and Brush | | | | | | |
| Forest, Riparian, and Brush - breeding/summer resident | 0.4 | 1.0 | 13.9 | 12.8 | 8.3 | 2.7 |
| Forest, Riparian, and Brush - migratory/winter resident | 18.0 | 22.0 | 4.6 | 0.0 | 10.7 | 18.8 |
| Forest, Riparian, and Brush - year-round resident | 165.0 | 142.7 | 86.1 | 146.0 | 142.7 | 132.7 |
| Grassland | | | | | | |
| Grassland - breeding/summer resident | 2.8 | 9.3 | 168.0 | 101.3 | 31.0 | 16.7 |
| Grassland - migratory/winter resident | 509.2 | 240.3 | 52.3 | 35.0 | 264.7 | 884.8 |
| Grassland - year-round resident | 157.0 | 112.3 | 74.4 | 91.5 | 134.7 | 190.5 |
| Raptors | | | | | | |
| Raptors - migratory/winter resident | 3.2 | 3.3 | 0.7 | 0.5 | 0.7 | 3.5 |
| Raptors - year-round resident | 33.0 | 26.7 | 13.9 | 16.3 | 50.3 | 32.5 |
| Waterbirds | | | | | | |
| Marsh Birds | 545.4 | 152.0 | 229.0 | 131.8 | 405.7 | 731.8 |
| Shorebirds | 41.2 | 19.7 | 33.1 | 4.8 | 3.7 | 37.0 |
| Waterfowl and Allies - migratory/winter resident | 10.2 | 474.0 | 26.9 | 0.0 | 6.7 | 3.0 |
| Waterfowl and Allies - year-round resident | 76.0 | 246.3 | 41.6 | 5.5 | 9.7 | 8.0 |
| Relative numbers of individual birds | 1,561 | 1,450 | 744 | 545 | 1,069 | 2,062 |
| Relative number of Species | 55 | 71 | 55 | 49 | 54 | 51 |

**Figure 1: Forest, Riparian, and Brush Guild, Birds of Tolay Lake Regional Park**

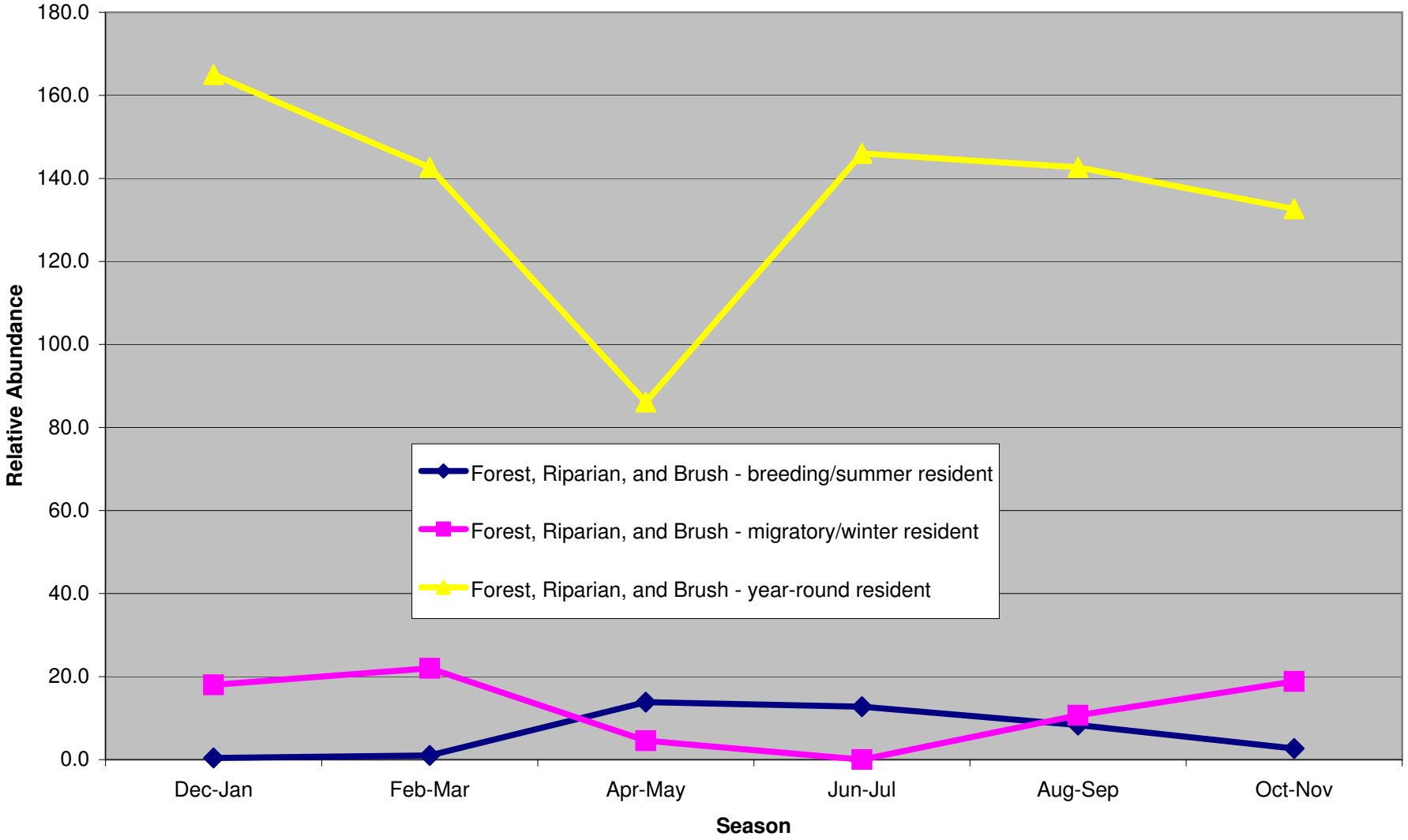


**Figure 2: Grassland Guild, Birds of Tolay Lake Regional Park**

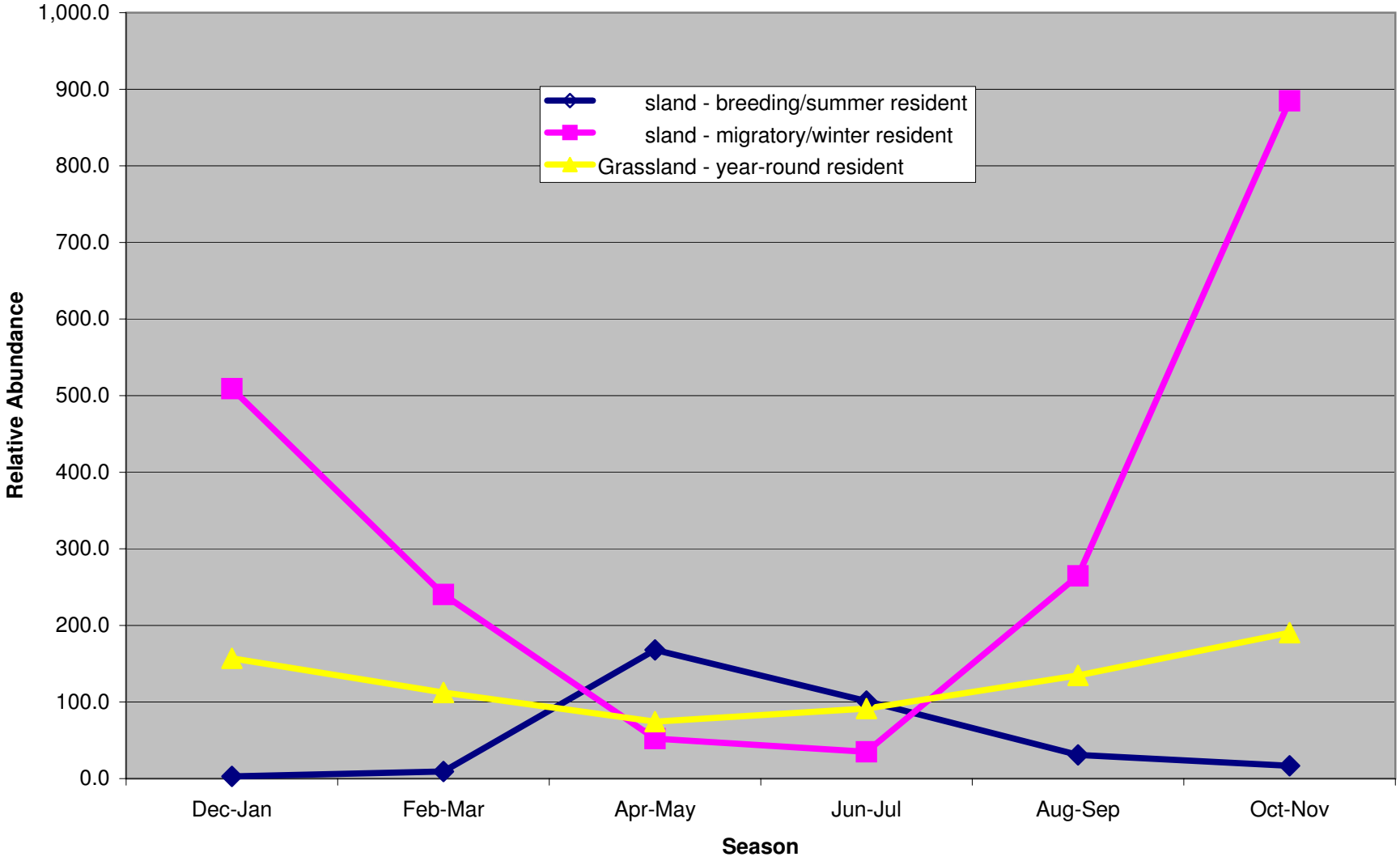


**Figure 3: Raptors, Birds of Tolay Lake Regional Park**

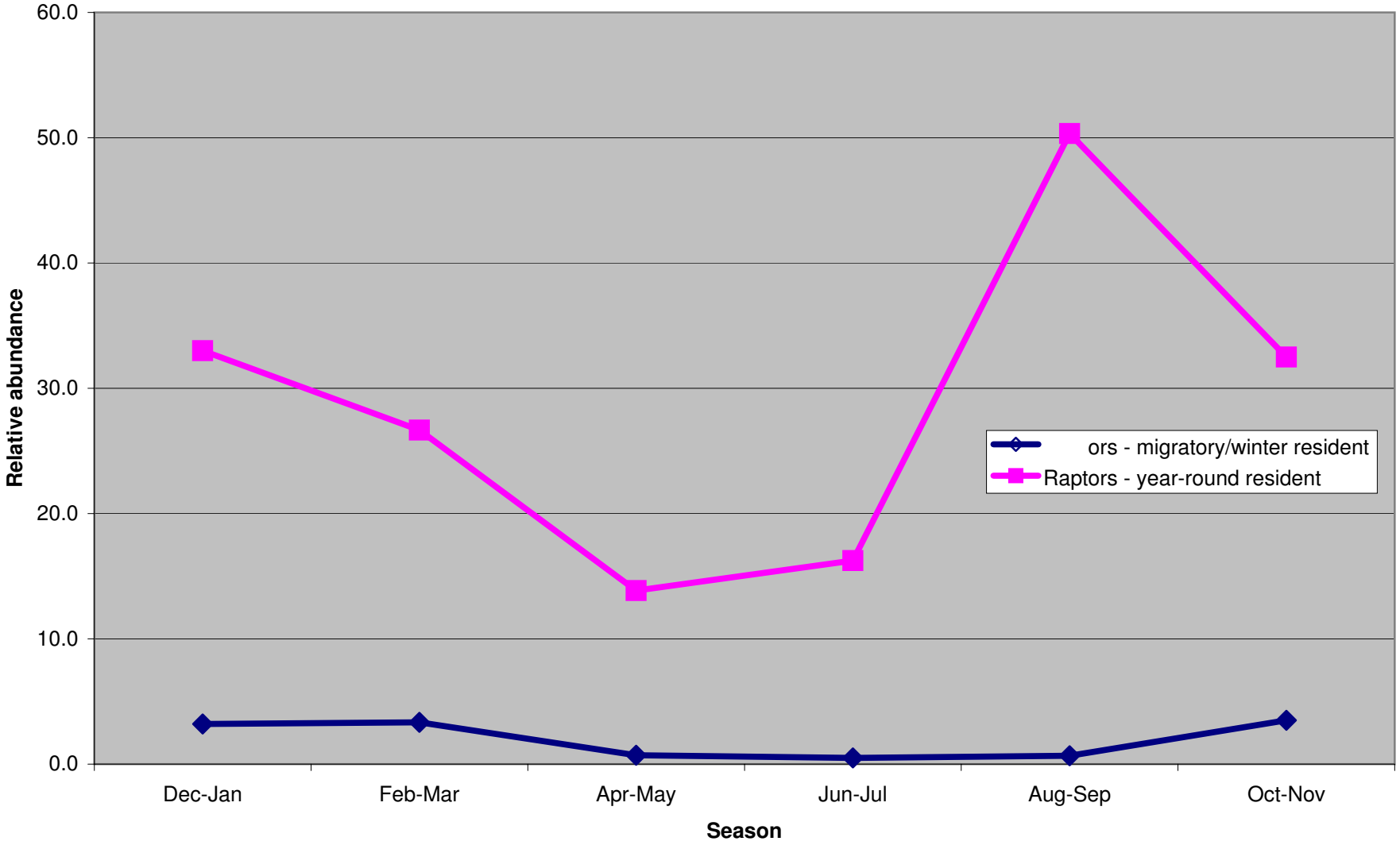


**Figure 4: Waterbirds, Birds of Tolay Lake Regional Park**

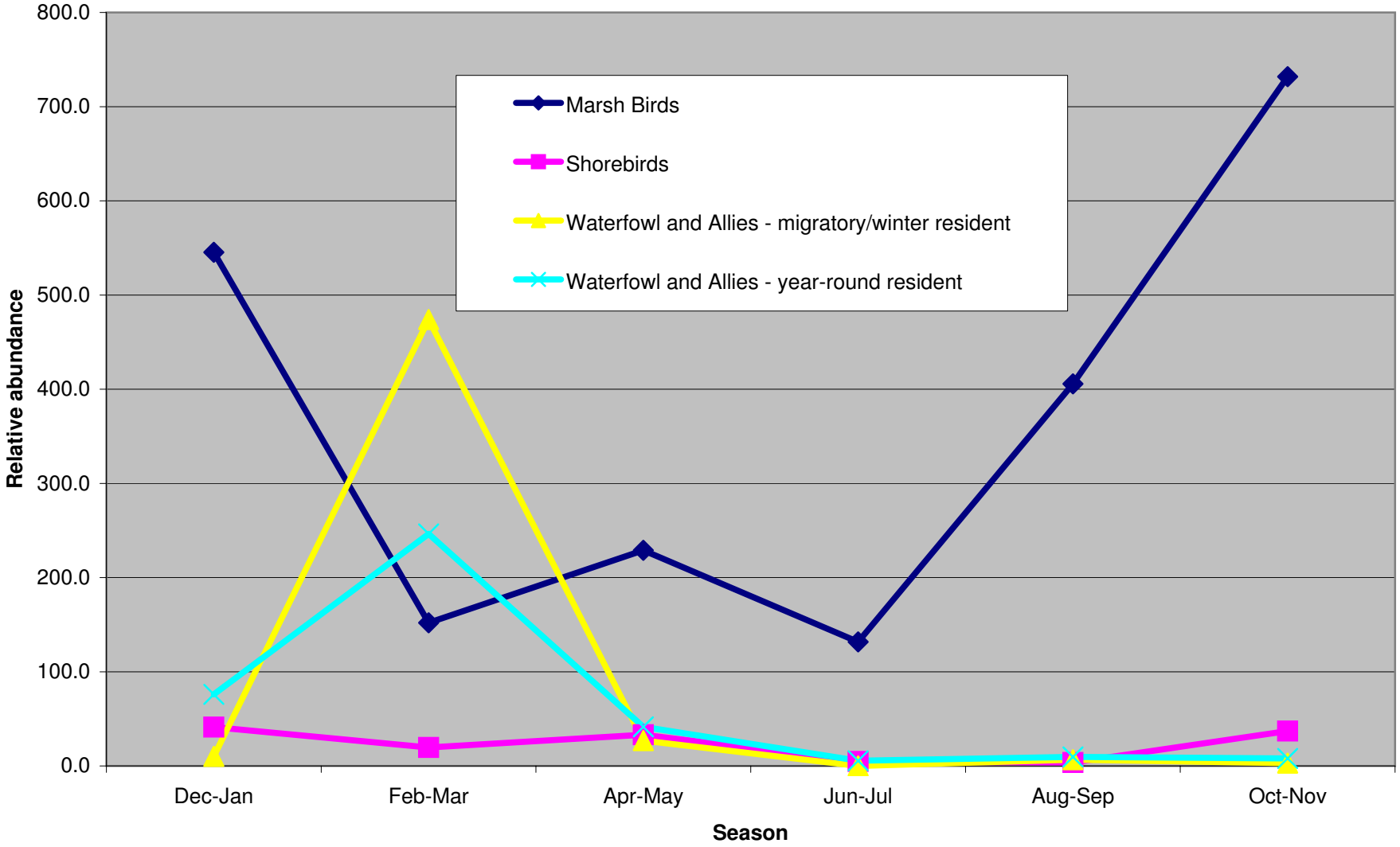
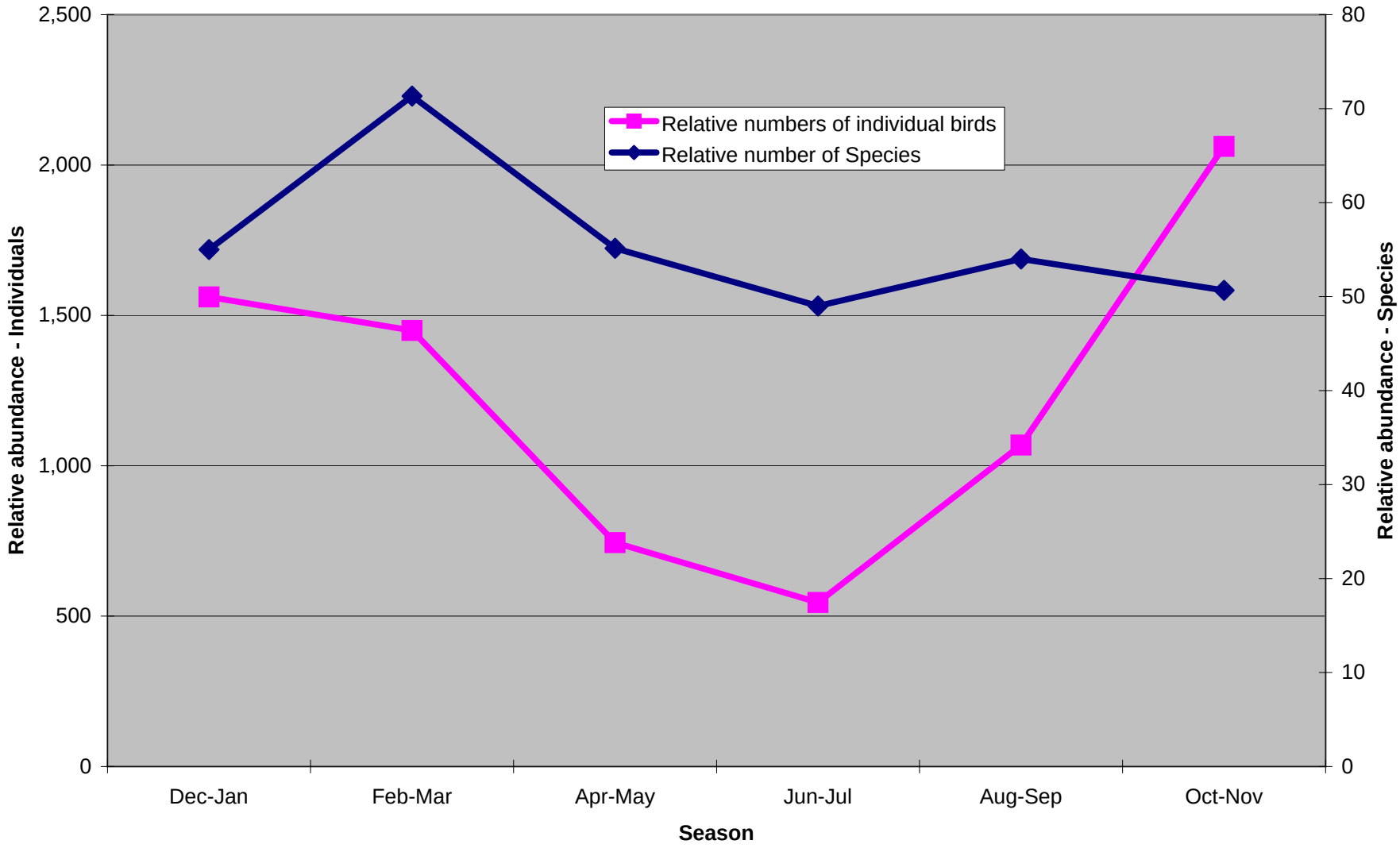


**Figure 5: Relative Abundance by Season, Birds of Tolay Lake Regional Park**



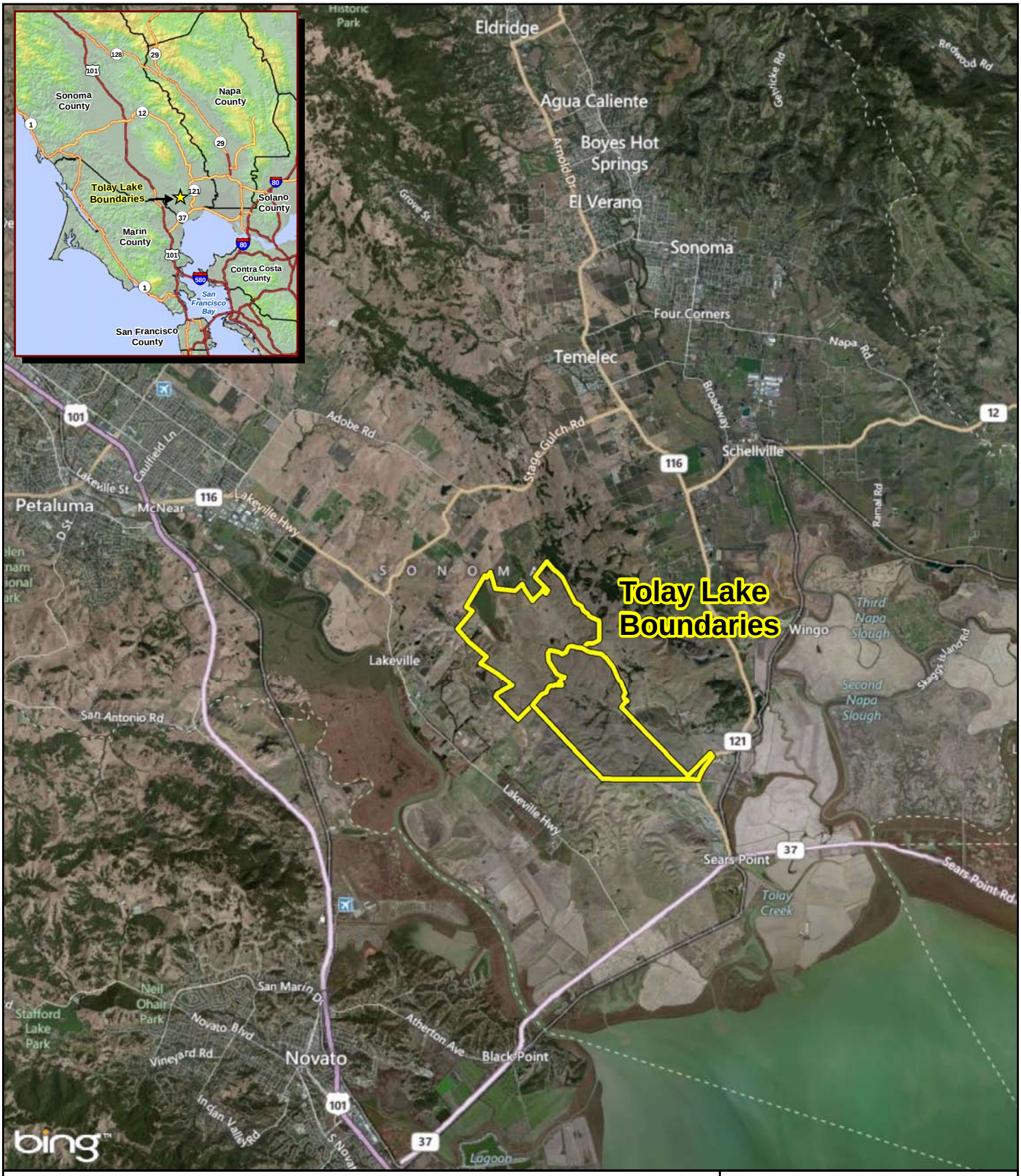



Figure 1. Location and Setting of Tolay Regional Park

Tolay Lake Regional Park
Sonoma County, California

N
W E
S

0 0.5 1 2
Miles

wra
ENVIRONMENTAL CONSULTANTS

Date: January 2012
Map By: Michael Rochelle

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Location.mxd

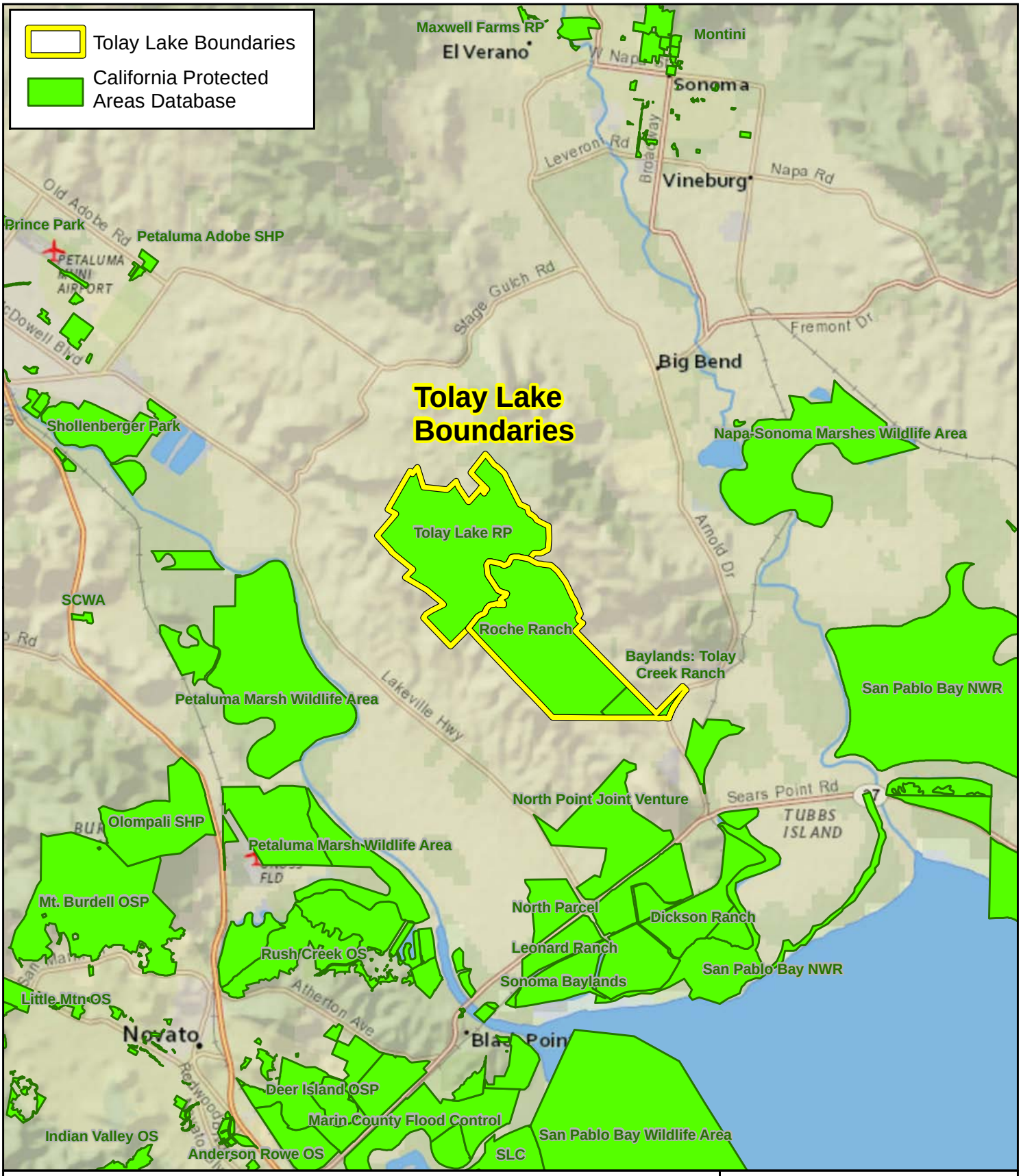



Figure 2. Conserved Lands in the Tolay Lake Regional Park Region

Tolay Lake Regional Park
Sonoma County, California

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W E
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0 0.5 1 2
Miles

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ENVIRONMENTAL CONSULTANTS

Date: March 2013
Map By: Michael Rochelle
Basemap: NatGeo

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Conserved Lands.mxd

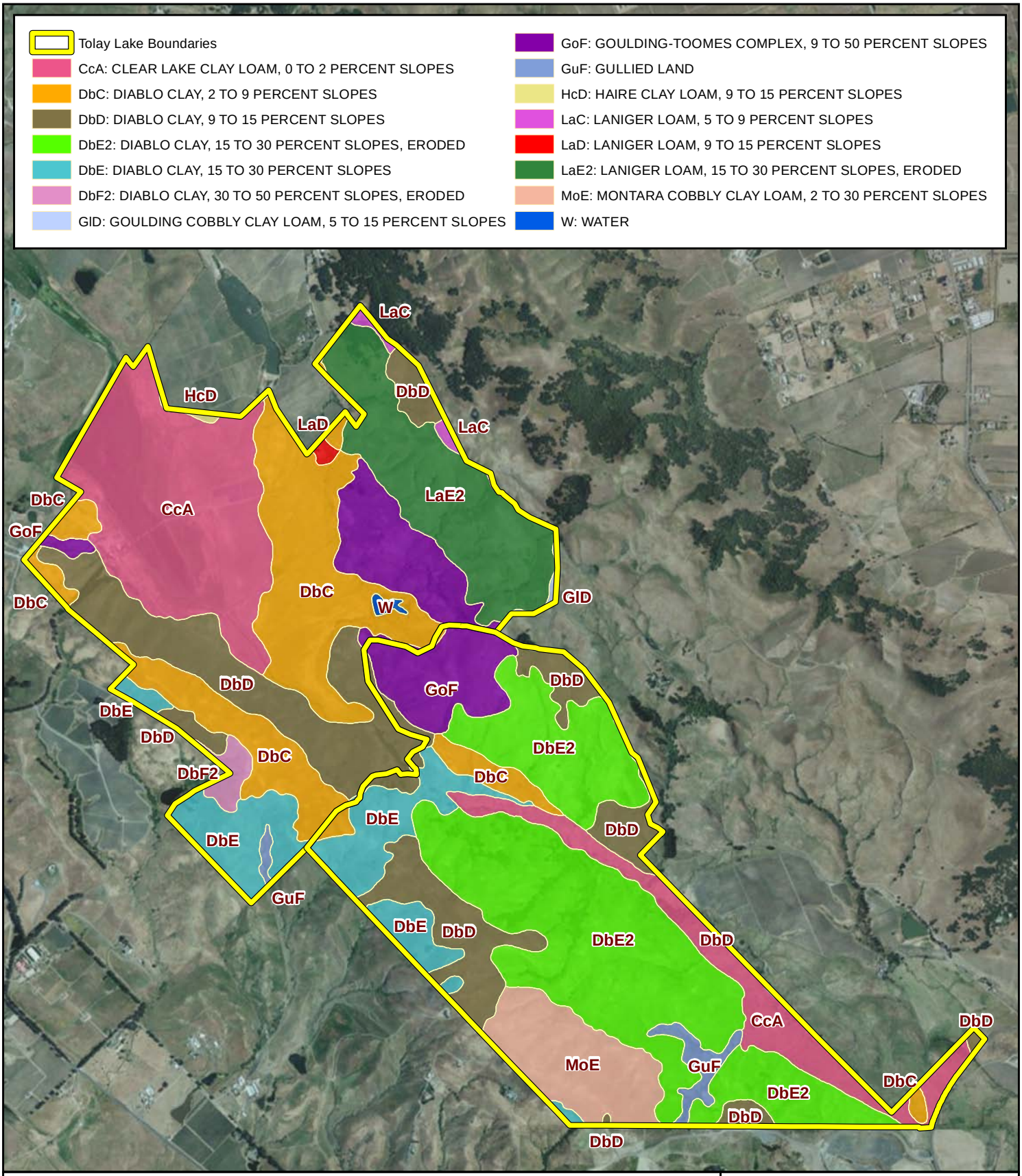



Figure 3. Mapped Soil Units within Tolay Lake Regional Park

Tolay Lake Regional Park
Sonoma County, California

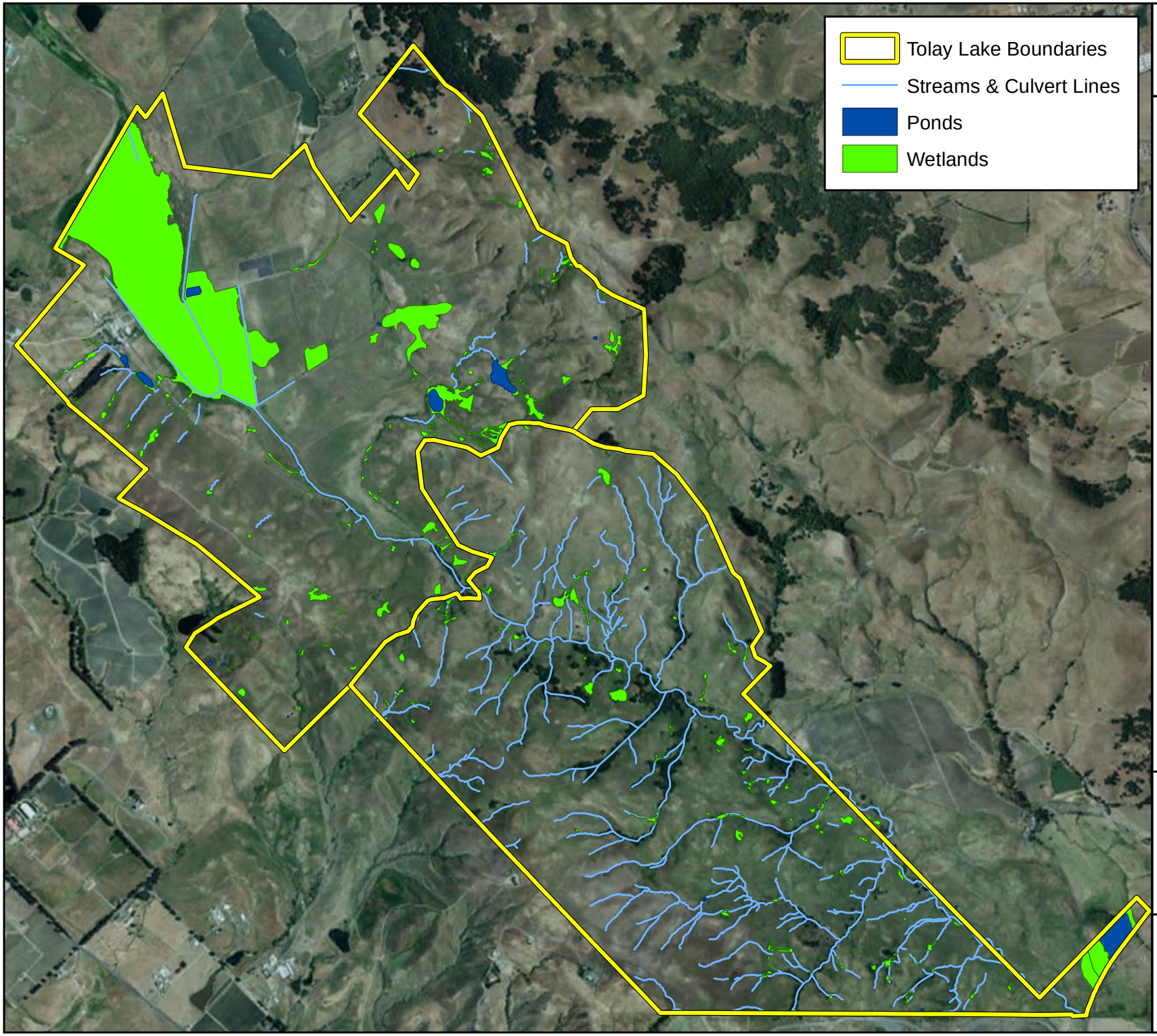
N
W E
S

0 1,250 2,500 5,000
Feet

wra
ENVIRONMENTAL CONSULTANTS

Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Soils.mxd

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# Tolay Lake Regional Park

Sonoma County, California

Figure 4.

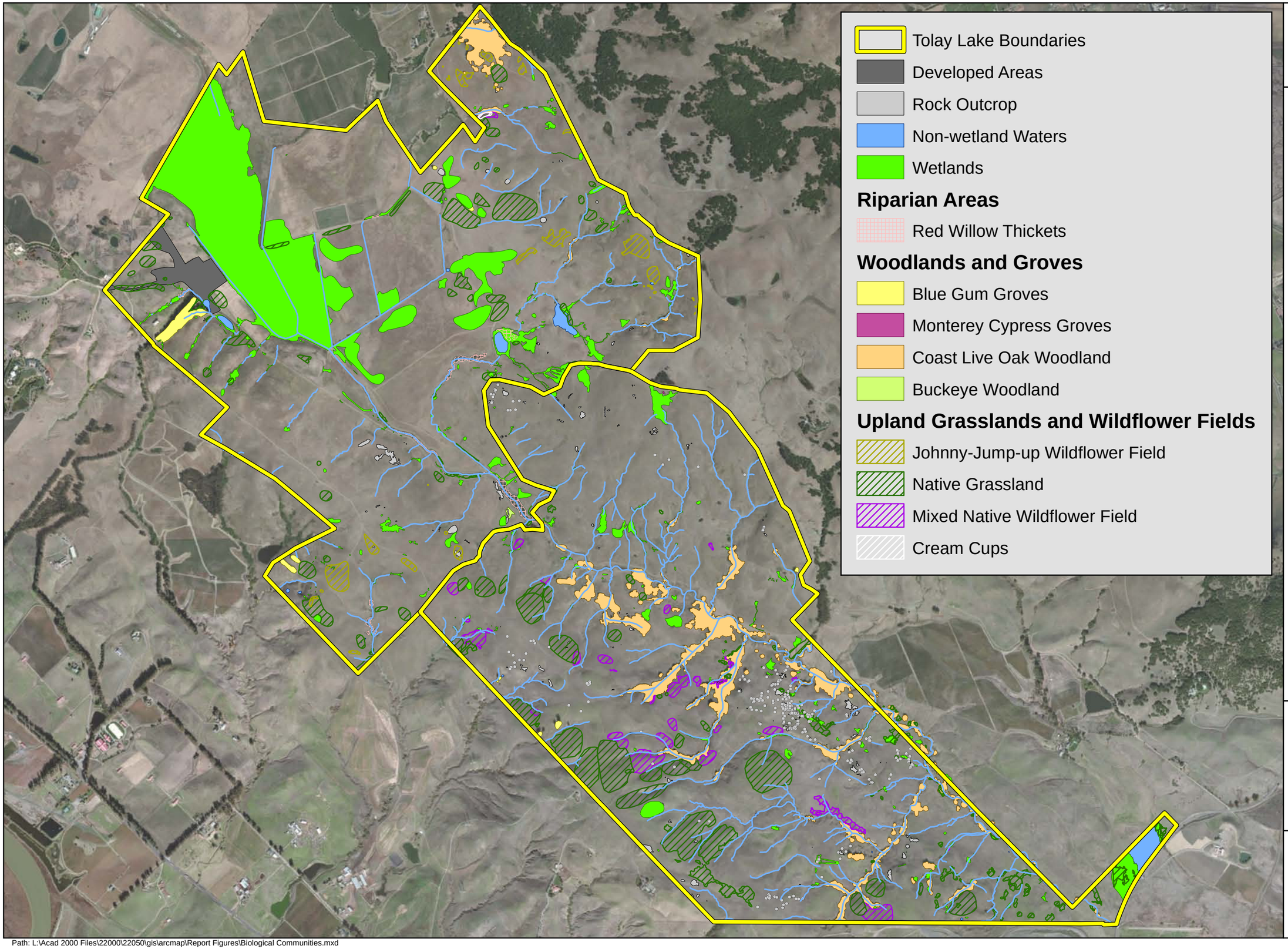
Wetlands and Waters Mapped in Tolay Lake Regional Park

N
W E
S

0 1,500 3,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Wetlands and Waters.mxd

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Tolay Lake Regional Park

Sonoma County, California

Figure 5.

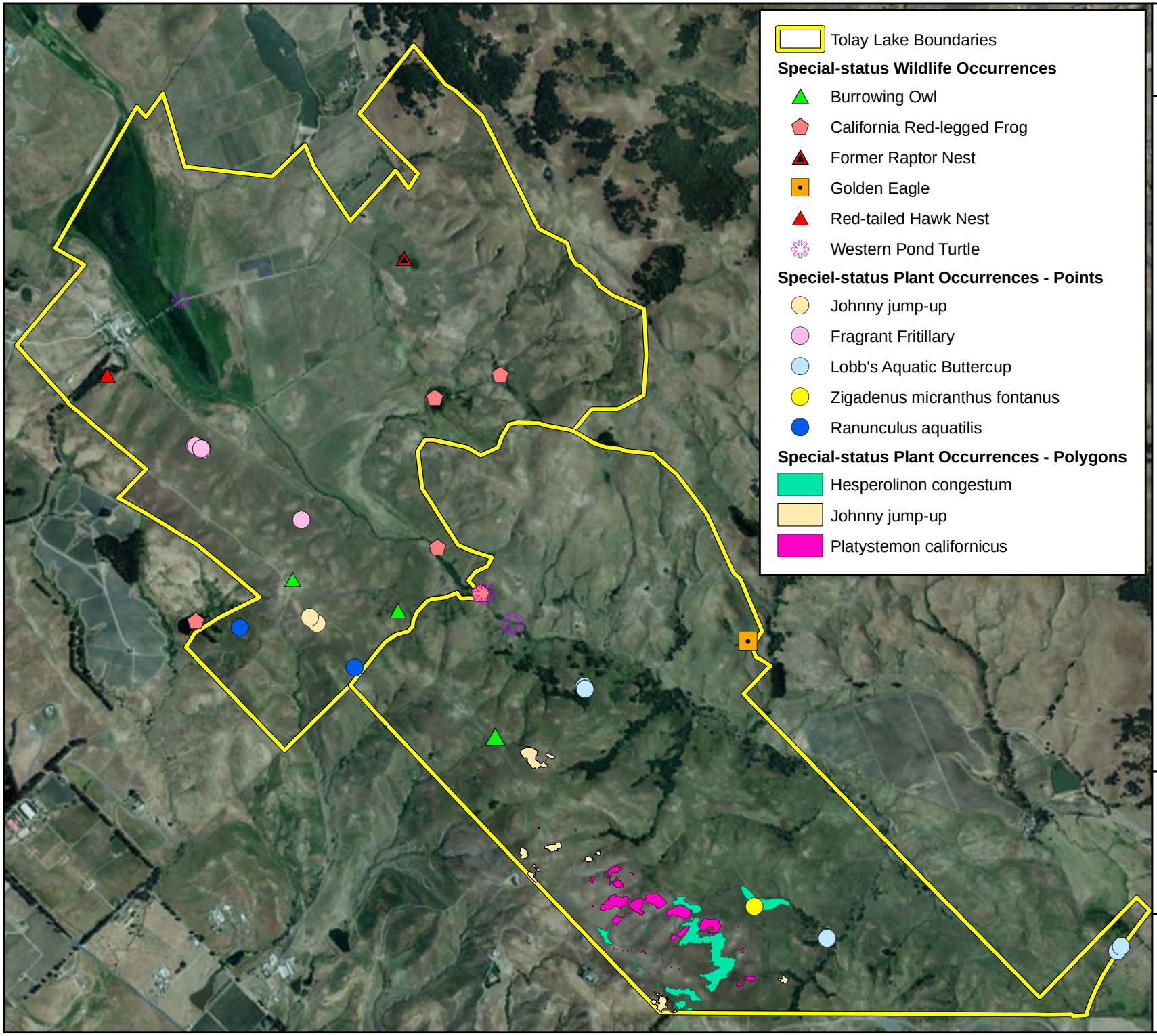
Biological Communities within Tolay Lake Regional Park

N
W E
S

0 1,000 2,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Biological Communities.mxd

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# Tolay Lake Regional Park

Sonoma County, California

Figure 6.

Special-status Plant and Wildlife Species within Tolay Lake Regional Park

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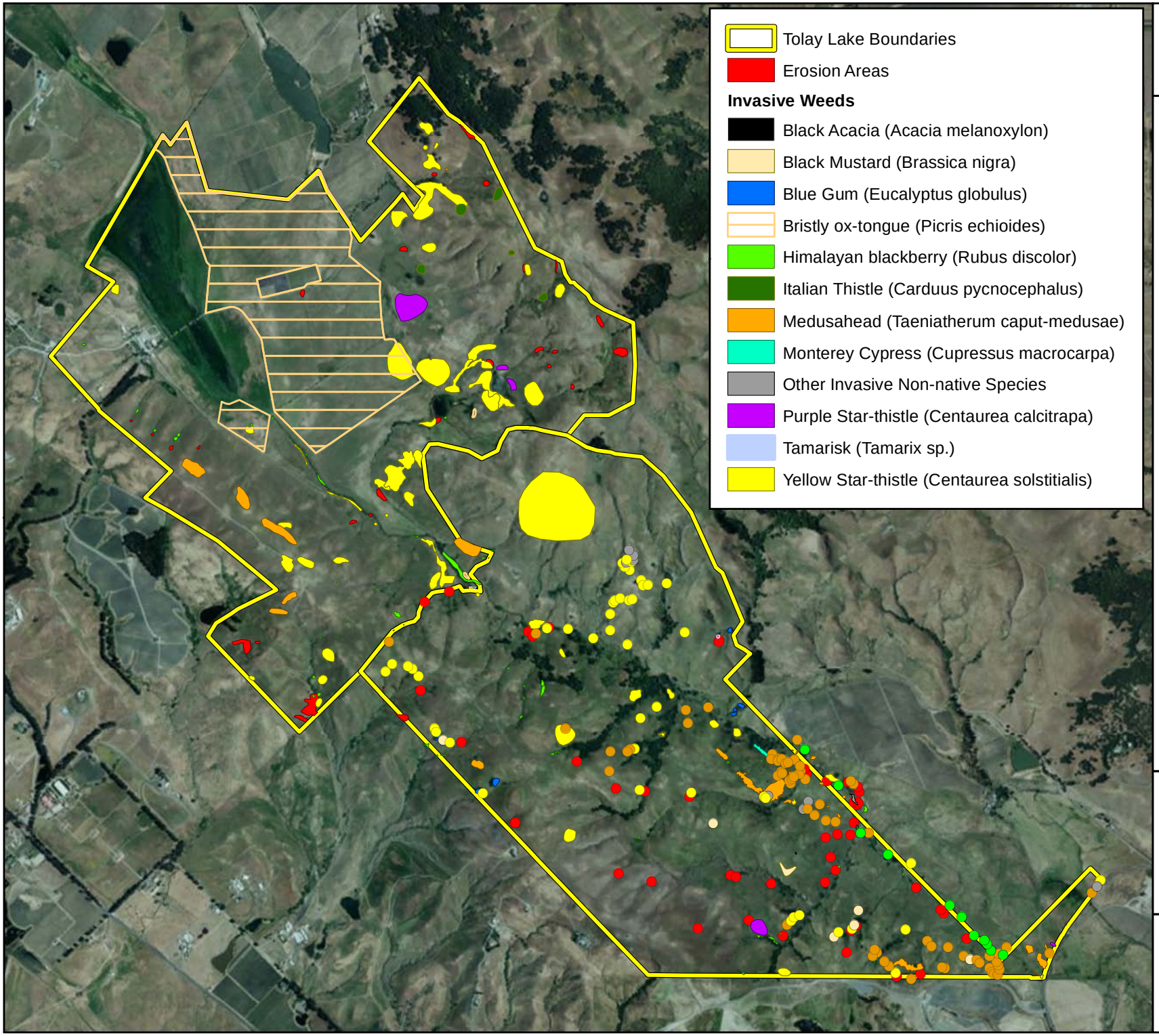
0 1,500 3,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Plants and Wildlife.mxd

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ENVIRONMENTAL CONSULTANTS

# Tolay Lake Regional Park

Sonoma County, California

Figure 7.

Invasive Plant Species and Erosion within Tolay Lake Regional Park

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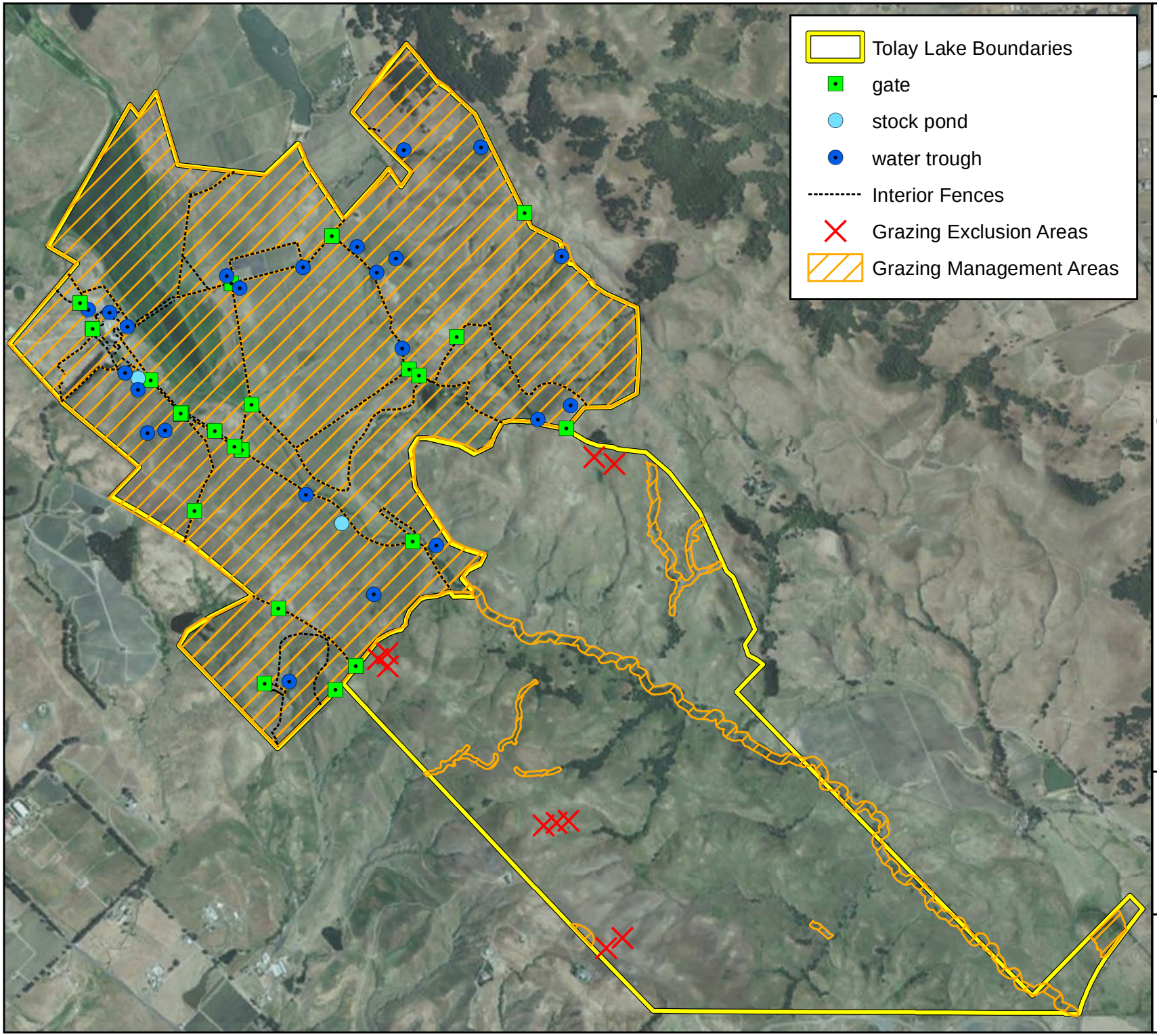
W E
S

0 1,500 3,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Invasives and erosion.mxd

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Tolay Lake
Regional Park

Sonoma County,
California

Figure 8.

Grazing Management and Infastructure within Tolay Lake Regional Park

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S

0 1,500 3,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Path: L:\Acad 2000 Files\22000\22050\gis\arcmap\Report Figures\Grazing.mxd

appendix j

# Biological Resources Study for Tolay Lake Regional Park

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# BIOLOGICAL RESOURCES STUDY
# TOLAY LAKE REGIONAL PARK
## SONOMA COUNTY, CALIFORNIA

Submitted to:

Sonoma Regional Parks Department
2300 County Center Drive #120A
Santa Rosa, California 95403

Prepared by:

LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
(510) 236-6810

LSA Project No. SOG0602

LSA

April 2009

# TABLE OF CONTENTS

## FIGURES

(at the end of report)



## TABLES

(at the end of report, after Figures)

# 1.0 INTRODUCTION

## 1.1 PURPOSE

This report presents the results of a study of the biological resources of Tolay Lake Regional Park. It describes the vegetation, including wetlands, occurrences of special-status species, and occurrences of other sensitive biological resources at Tolay Lake Regional Park. This study was prepared in conjunction with the Rangeland Resources Study (LSA 2009), and both documents address erosion and non-native species control, and recommend restoration of sensitive habitats such as wetlands, native grasslands, and riparian areas. The recommendations of this report are also consistent with the Cultural Resources Study (LSA 2008) with respect to avoiding impacts to significant archaeological resources. This biological resources report specifically addresses those land management activities not related to grazing and range management, and both reports should be considered for purposes of habitat enhancement. The biological resources report also assesses impacts of park development and various management activities and proposes mitigation to ameliorate those impacts. Both reports will be used to develop the master plan for the park and the biological section of the CEQA analysis for the master plan.

## 1.2 LOCATION

Tolay Lake Regional Park is located in a valley of the Sonoma Mountains in southern Sonoma County. The Sonoma Creek watershed is to the east and the Petaluma Creek watershed is to the west of the park. Access to Tolay Lake Regional Park is from Cannon Lane, off Lakeville Road, 5.5 miles south of Petaluma. Figure 1 shows the regional location of Tolay Lake Regional Park and Figure 2 shows the location of the park on a USGS topographical map.

## 1.3 PROJECT DESCRIPTION

Tolay Lake Regional Park has recently been acquired by the Sonoma County Regional Parks Department, and they are currently in the process of developing a master plan for the park. They are proposing to open the park for visitation by the general public and implement several restoration projects. The master plan would include enhancing existing ranch roads and developing new trails. Providing visitation to Pond 1 and/or Pond 2, the riparian area along Tolay Creek, and to the oaks on the East Ridge, and providing picnicking opportunities are also components of the master plan. The restoration portion of the master plan includes restoring Tolay Lake, enhancing Pond 1, restoring riparian vegetation, restoring native grassland vegetation, and reducing erosion at the outlet of Pond 1 and possibly Pond 2.

## 1.4 REGULATORY CONTEXT

Biological resources on the site may fall under the jurisdiction of various regulatory agencies and be subject to regulations, as described below. In general, the greatest legal protections are provided for formally listed species. Informally listed species and habitats receive lesser legal protection.

### 1.4.1 Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over federally listed threatened and endangered plant and animal species. The Federal Endangered Species Act (FESA) protects listed species from harm or "take," broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Any such activity can be defined as a "take" even if it is unintentional or accidental.

Section 9 of the FESA and its applicable regulations restrict certain activities with respect to endangered and threatened plants. Nevertheless, these restrictions are less stringent than those applicable to animal species. The provisions of the FESA prohibit the removal of, malicious damage to, or destruction of any listed plant species "from areas under federal jurisdiction." Furthermore, listed plants may not be cut, dug up, damaged or destroyed in, or removed from any other area (including private lands) in known violation of a state law or regulation.

An endangered species is one that is considered in danger of becoming extinct throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future. Federal agencies involved in permitting projects that may result in take of federally listed species (e.g., U.S. Army Corps of Engineers) are required under Section 7 of the FESA to consult with the USFWS prior to issuing such permits. Any activity that could result in the take of a federally listed species and is not authorized as part of a Section 7 consultation, requires an FESA Section 10 take permit from the USFWS.

In addition to endangered and threatened species, which are legally protected under the FESA, the USFWS has a list of proposed and candidate species. Proposed species are those for which a proposed rule to list them as endangered or threatened has been published in the Federal Register. A candidate species is one for which the USFWS currently has enough information to support a proposal to list it as a threatened or endangered species. Proposed species could be listed at any time, and many federal agencies protect them as if they already are listed. Candidate species are not afforded legal protection under the FESA.

### 1.4.2 Clean Water Act

The U.S. Army Corps of Engineers (Corps) is responsible under Section 404 of the Clean Water Act to regulate the discharge of fill material into waters of the United States. Waters of the U.S. and their lateral limits are defined in 33 CFR Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the Ordinary High Water Mark (OHWM) (33 CFR Part 328.3[e]) or the limit of adjacent wetlands (33 CFR Part 328.3[b]). Any permanent extension of the limits of an existing water of the U.S., whether natural or man-made, results in a similar extension of Corps jurisdiction (33 CFR Part 328.5).

Waters of the U.S. fall into two broad categories: wetlands and other waters. Other waters include waterbodies and watercourses such as rivers, streams, lakes, springs, ponds, coastal waters, and estuaries. Wetlands include marshes, wet meadows, seeps, floodplains, basins, and other areas experiencing extended seasonal or permanent soil saturation. Seasonally or intermittently inundated features, such as seasonal ponds, ephemeral streams, and tidal marshes, are categorized as wetlands if they have hydric soils and support wetland plant communities. Seasonally inundated waterbodies or watercourses that do not exhibit wetland characteristics are classified as other waters of the U.S.

Wetlands and other waters that cannot trace a continuous hydrologic connection to a navigable water of the U.S. are not tributary to waters of the U.S. These are termed "isolated" wetlands and waters. Isolated wetlands and waters are jurisdictional when their destruction or degradation can affect interstate or foreign commerce (33 CFR Part 328.3[a]). The Corps may or may not take jurisdiction over isolated wetlands, depending on the specific circumstances.

In general, a Section 404 permit must be obtained from the Corps before filling or grading wetlands or other waters of the U.S. Certain projects may qualify for authorization under a Nationwide Permit (NWP). The purpose of the NWP program is to streamline the evaluation and approval process throughout the nation for certain types of activities that have only minimal impacts to the aquatic environment. Many NWPs are only authorized after the applicant has submitted a pre-construction notification (PCN) to the appropriate Corps office. The Corps is required to consult with the USFWS and/or NOAA-Fisheries under Section 7 of the ESA if the permitted activity may result in the take of federally listed species.

All Corps permits require state water quality certification under Section 401 of the Clean Water Act. This regulatory program for the park is administered by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Projects that propose to fill wetlands or other waters of the U.S. must apply for water quality certification from the RWQCB. The RWQCB has adopted a policy requiring mitigation for any loss of wetland, streambed, or other waters of the U.S.

### 1.4.3 Porter-Cologne Water Quality Control Act

Under this Act (California Water Code Sections 13000–14920), the RWQCB is authorized to regulate the discharge of waste that could affect the quality of the State's waters. Therefore, even if a project does not require a federal permit, it may still require review and approval by the RWQCB (e.g., for impacts to isolated wetlands and other waters). When reviewing applications, the RWQCB focuses on ensuring that projects do not adversely affect the "beneficial uses" associated with waters of the State. In most cases, the RWQCB seeks to protect these beneficial uses by requiring the integration of water quality control measures into projects that will require discharge into waters of the State. For most construction projects, the RWQCB requires the use of construction and post-construction Best Management Practices (BMPs).

### 1.4.4 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) prohibits the taking, hunting, killing, selling, purchasing, etc. of migratory birds, parts of migratory birds, or their eggs and nests. As used in the

MBTA, the term "take" is defined as "to pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill, unless the context otherwise requires." Most bird species native to North America are covered by this act.

### 1.4.5 California Endangered Species Act

The California Department of Fish and Game (CDFG) has jurisdiction over threatened or endangered species that are formally listed by the State under the California Endangered Species Act (CESA). The CESA is similar to the FESA both in process and substance; it is intended to provide additional protection to threatened and endangered species in California. The CESA does not supersede the FESA, but operates in conjunction with it. Species may be listed as threatened or endangered under both acts (in which case the provisions of both state and federal laws apply) or under only one act. A candidate species is one that the Fish and Game Commission has formally noticed as being under review by CDFG for addition to the State list. Candidate species are protected by the provisions of the CESA.

### 1.4.6 California Fish and Game Code

The CDFG is also responsible for enforcing the California Fish and Game Code, which contains several provisions potentially relevant to construction projects. For example, Section 1600 of the Fish and Game Code governs the issuance of Lake and Streambed Alteration Agreements by the CDFG. Lake and Streambed Alteration Agreements are required whenever project activities substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated as such by the CDFG.

The Fish and Game Code also lists animal species designated as Fully Protected, which may not be taken or possessed. The Fully Protected designation does not allow "incidental take" and is thus more restrictive than the CESA,. Fully Protected species are listed in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the Fish and Game Code, while protected amphibians and reptiles are listed in Chapter 5, Sections 41 and 42.

Section 3503 of the Fish and Game Code prohibits the take, possession, or needless destruction of the nest or eggs of any bird. Subsection 3503.5 specifically prohibits the take, possession, or destruction of any birds in the orders Falconiformes (hawks and eagles) or Strigiformes (owls) and their nests. These provisions, along with the federal MBTA, essentially serve to protect nesting native birds. Non-native species, including European starling and house sparrow, are not afforded any protection under the MBTA or California Fish and Game Code.

### 1.4.7 California Environmental Quality Act

The California Environmental Quality Act (CEQA) applies to "projects" proposed to be undertaken or requiring approval by State or local governmental agencies. Projects are defined as having the potential to have a physical impact on the environment. Under Section 15380 of CEQA, a species not included on any formal list "shall nevertheless be considered rare or endangered if the species can be shown by a local agency to meet the criteria" for listing. With sufficient documentation, a species

could be shown to meet the definition of rare or endangered under CEQA, which would lower the threshold of significance for project impacts. .

The Oak Woodlands Conservation Act would require as part of their CEQA review, that counties determine, for projects that result in the conversion of oak woodlands, whether that conversion would have a significant effect on the environment. Conversion of oak woodland entails the removal of at least 30 percent of the canopy of the oak woodland. The Oak Woodlands Conservation Act requires each county to adopt an oak woodland management plan and to set mitigation standards. The Oak Woodlands Conservation Act would be implemented at the county level.

### 1.4.8 State Species of Special Concern and Special Plants List

The CDFG maintains an informal list of *species of special concern* (Jennings and Hayes 1994, Shuford and Gardali 2008, Williams 1986), *list of special vascular plants, bryophytes, and lichens* (CDFG 2007a), and *list of special animals* (CDFG 2007 b). These are broadly defined as species that are of concern to the CDFG because of population declines and restricted distributions, and/or they are associated with habitats that are declining in California. These species are inventoried in the California Natural Diversity Data Base (CNDDB) regardless of their legal status. Impacts to s*pecies of special concern* and *special plants* may be considered significant under CEQA.

### 1.4.9 California Native Plant Society

The non-governmental California Native Plant Society (CNPS) has developed lists of plants of concern in California (CNPS 2001).

- A CNPS List 1A plant is a species, subspecies, or variety that is considered to be extinct.
- A List 1B plant is considered rare, threatened, or endangered in California and elsewhere.
- A List 2 plant is considered rare, threatened, or endangered in California but is more common elsewhere.
- A List 3 plant is potentially endangered but additional information on taxonomy, rarity, and endangerment is needed.
- A List 4 plant has a limited distribution but is presently not endangered. Impacts to List 1B and List 2 plants are frequently considered significant under CEQA, depending on the lead agency.

Plants on lists 1A, 1B, and 2 typically qualify for coverage under CEQA based on the policy of the lead agency. Plants on Lists 3 and 4 may be evaluated on a case-by-case basis to determine significance thresholds under CEQA.

Hydrophytic plant species are listed by the U.S. Fish and Wildlife Service in *National List of Plant Species That Occur in Wetlands* (Reed 1988). The *National List* identifies five categories of plants according to their frequency of occurrence in wetlands. The categories are:

| | |
|---|---|
| Obligate wetland plants (OBL) | Plants that occur almost always in wetlands. |
| Facultative wetland plants (FACW) | Plants that usually occur in wetlands. |
| Facultative plants (FAC) | Plants that are equally likely to occur in wetlands or non-wetlands. |
| Facultative upland plants (FACU) | Plants that usually occur in uplands. |
| Obligate upland plants (UPL) | Plants that occur almost always in non-wetlands. |

An area is considered to meet the hydrophytic vegetation criterion when more than 50 percent of the dominant species in each stratum (e.g., tree, shrub, and herb) present are in the obligate wetland, facultative wetland, or facultative categories.

Hydric soils are defined by criteria set forth by the National Technical Committee for Hydric Soils (NTCHS). These criteria are given in the *Wetlands Delineation Manual* (Environmental Laboratory 1987) and are based on depth and duration of soil saturation. Hydric soils are commonly identified in the field by using indirect indicators of saturated soil, technically known as redoximorphic features. These features are caused by anaerobic, reduced soil conditions that are brought about by prolonged soil saturation. The most common redoximorphic features are distinguished by soil color, which is strongly influenced by the frequency and duration of soil saturation. Hydric soils tend to have dark (low chroma) colors which are often accompanied by reddish mottles (iron mottles), reddish stains on root channels (oxidized rhizospheres), or gray colors (gleying).

Under natural conditions, development of hydrophytic vegetation and hydric soils are dependent on a third characteristic, wetland hydrology. The wetland hydrology criterion is met if the area experiences inundation or soil saturation to the surface for a period equal to at least 5 percent of the growing season (about 14 days in the project area) in a year of average rainfall. In most cases, this criterion can only be measured directly by monitoring of the site through an entire wet season. In practice, the hydrological status of a particular area is usually evaluated using indirect indicators. Some of the indicators that are commonly used to identify wetland hydrology include recent sediment deposits, surface scour, and oxidized rhizospheres around living roots.

### 2.2.2 Field Methodology

LSA surveyed the study areas on June 2, 5, and July 12, 13, and 16, 2006, to identify potential wetlands and other waters of the United States. A scale of 1 inch equals 200 feet aerial ortho-photo map of the property and a GPS unit with approximately 39-inch (1 meter) accuracy were used in the field for mapping purposes. Areas determined by LSA to meet Clean Water Act jurisdictional criteria are mapped on Figures 3a and 3b. It should be noted results may have been affected by the fact that

# 2.0 METHODS

## 2.1 PLANT SURVEYS

Prior to initiating field work, LSA reviewed the CDFG's California Natural Diversity Data Base (CNDDB) and relevant environmental documents (Parsons 1996) for records of special-status species in the area of Tolay Lake. Based on this review, a list of 30 special-status plant species was compiled for focusing survey efforts. This list documented blooming periods and habitat affinities of special-status plant species. Aerial photos and global positioning (GPS) technology were used for mapping vegetation types, habitats, and special-status species occurrences.

LSA botanists Clint Kellner, Greg Gallaugher, Tim Milliken, and Zoya Akulova participated in the botanical surveys of the Tolay Lake site. Early season surveys (March 22, 23, and 30, May 5, 8, and 24) were conducted by a team of three or four botanists and late season surveys (July 28, August 6, August 21, November 5, 2006, and January 19, 2007) were conducted by one or two botanists. Additional surveys were conducted on a single day in March 2007 and March 2008. The stand of fragrant fritillaries was checked on April 1 2008 by a team of 3 botanists. The surveys were conducted by walking 100 to 200-foot-wide transects in the core areas of the site and in areas that provided potentially suitable habitat for special-status plants. Areas outside of core areas were less intensively surveyed. Late season surveys were conducted by checking the habitats of late blooming special-status plant species such as pappose tarweed (*Centromadia parryi* ssp. *parryi*) and other species associated with seeps or wetlands.

The special-status fragrant fritillary (*Fritillaria liliacea*) often grows in association with the common Fremont's star lily (*Zigadenus fremontii*), and populations of the star lily were examined for fragrant fritillary. This included walking 20-foot wide transects through stands of Fremont's star lily.

Plants were identified using dichotomous keys in the Jepson Manual (Hickman 1993), and Flora of Sonoma County (Best et al.1996). Plants collected in the field were also identified by comparing them to images from Calphotos and Google Images, and pressed specimens housed at the UC Berkeley and Jepson herbaria.

## 2.2 WETLANDS

### 2.2.1 Wetland Identification Methodology

Field investigations of potential wetlands occurring on the property were conducted using the routine determination method given in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). This methodology entails examination of specific sample points within potential wetlands for hydrophytic vegetation, hydric soils, and wetland hydrology. By the federal definition, all three of these parameters must be present for an area to be considered a wetland. The amount of information collected at each sample point was sufficient to characterize the wetlands. Formal jurisdictional delineation data sheets were completed for selected sample points and were used to characterize the different types of wetlands at Tolay Lake Regional Park.

the previous year's rainfall was approximately 35 inches, approximately 7 inches above average. Rainfall in 2005 was unusually high and only rivaled that of 1982, 1986, 1995, and 1997. On the other hand, the area had not received significant rain since mid-April in 2006.

Prior to the wetland field survey, LSA reviewed aerial photographs, previous wetland characterization maps by Parsons (1996) and Circuit Rider Productions (2006, with field work completed in 2005), and field notes and maps from LSA's botanical field surveys of March and May 2006. Field surveys in June and July verified the 2006 wetland status of areas previously identified during LSA's botanical surveys of March and May. Some smaller seasonal wetlands, 0.1 acre or less, may have been missed.

Wetlands and other waters potentially subject to regulation were identified predominantly by the presence of basins, ditches or other depressed topographic features, and by the presence of hydrophytic vegetation. Sample points for potential wetland areas were not recorded on data sheets, but were investigated at multiple locations to establish the presence and boundaries of potential wetlands. The three routine determination criteria were investigated: the presence and wetland indicator category of hydrophytic plant species; wetland hydrology indicators such as surface water, saturated soil, oxidized rhizospheres, and matting from seasonal ponding; and hydric soil indicators such as oxidized rhizospheres, redoximorphic mottling, dark value, and low chroma. The diagnostic wetland indicators used for particular potential wetland locations were recorded in field notes.

Drainage features were considered to be potentially jurisdictional if they contained water at the time of the survey, exhibited scour, shelving, a low-flow channel, debris deposits at the side of the channel, or otherwise showed evidence of prolonged flow.

Potential wetland boundaries were mapped using three different methods: 1) by following vegetation and land forms; 2) tracing features on the aerial ortho-photo; and/or 3) using the GPS.

## 2.3 ANIMAL SURVEYS

LSA wildlife biologists Matt Ricketts and Rebecca Doubledee conducted reconnaissance-level surveys on March 23 (both), May 2 (Ricketts only), June 8 (Ricketts only), and August 29, 2006 (Doubledee only). Surveys consisted of traversing selected areas of the site by foot while recording animal observations in field notes and noting areas of particular habitat value on aerial photos. These selected areas included representative examples of the existing habitats (e.g., oak woodland, grassland, riparian woodland) of Tolay Lake Regional Park. Portions of the site covered on each survey date are summarized below.

The primary intent of the March 23 survey was to gather information on wintering waterbird use of Tolay Lake and to check the site's aquatic features for California red-legged frogs (*Rana draytonii*), western pond turtles (*Actinemys marmorata*), and other amphibians and reptiles. The waterbird use of Tolay Lake was surveyed with a spotting scope from the knoll off the northwestern corner of the lake. Other areas visited during the March 23 survey included the "Oak Grove" (i.e., the oak woodland on the East Ridge at the northeastern corner of the site), the Eagle Creek drainage, the pasture and isolated blue gum (*Eucalyptus globulus*) trees on the gently sloping area west of the East Ridge, the east-west drainage ditch, and the ornamental vegetation and large grove of blue gum trees in the Park Center.

During the March 23 visit, Ms. Doubledee surveyed the majority of the prominent water features on the property for California red-legged frogs, western pond turtles, and other wildlife species during daylight hours. The survey method included walking along the banks of each water feature first scanning the banks with binoculars, then surveying with the naked eye and listening for the sound of frogs jumping into the water. The main water features surveyed during the March 23 visit by Ms. Doubledee included the entire length of Tolay Creek on the property, the small Stock Pond at the southern portion of the West Ridge, Cardoza Creek between the confluence with Tolay Creek and Pond 1, Pond 1, Pond 2, the small pond that occurs in the eastern portion of the farmed area, the East-West Drainage Ditch that is tributary to Eagle Creek, the portion of Tolay Lake adjacent to the causeway, Willow Pond, and Duck Pond near the Park Center.

The May 2 survey focused on the riparian habitat along Tolay Creek, Cardoza Creek below Pond 2, and Pond 2. The survey also included the grasslands along the base of the West Ridge, grasslands north of Cardoza Creek, scattered rock outcrops near Cardoza Creek, and oak trees within Cardoza Creek.

The June 8 survey entailed re-examining Tolay Creek for riparian passerines (i.e., songbirds), checking the isolated blue gum trees on the gently sloping area west of the East Ridge for nesting raptors and surveying the West Ridge and the drainages in the southwestern site corner (e.g., South Creek) for wildlife.

The August 29 survey was also conducted only during daylight hours and focused on surveying for recently metamorphosed California red-legged frogs within waterbodies that remained inundated. Areas surveyed included South Creek, the small Stock Pond at the southern portion of the West Ridge, Tolay Creek east of the small Stock Pond, Cardoza Creek between the confluence with Tolay Creek and Pond 1, Pond 1, Pond 2, the small Irrigation Pond that occurs in the eastern portion of the farmed area and Pond 4 near the Park Center. In addition, an off-site farm pond just west of the southern portion of the West Ridge was surveyed with binoculars.

Volunteers from the Petaluma Wetlands Alliance have been conducting surveys of the birds of Tolay Lake Regional Park since April of 2006. They have conducted 28 surveys to date, and their information has been incorporated into this report. In addition, volunteers of the Raptor Project (Thiessen and Wilson 2007) have noted raptor activity on 4 days in 2007. Their results are also incorporated into this report. (These on-going survey efforts provide valuable data for park management.)

Nomenclature used in this report for amphibians and reptiles conforms to Crother (2008), while nomenclature for mammals conforms to Baker et al. (2003). Nomenclature for special-status species conforms to the CNDDB (2006). Scientific names of bird species are not provided in the text because English vernacular names are standardized in the American Ornithologists' Union (AOU) *Check-list of North American Birds* (AOU 1998).

# 3.0 VEGETATION AND WILDLIFE VALUES

## 3.1 WOODLAND

### 3.1.1 Botanical Values

**Oak Woodland.** Oak woodland occurs in a relatively large stand on the top of the East Ridge and in smaller stands in the draws (gullies) on the East Ridge (Figure 3a). This community is dominated by coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*) with scattered madrone (*Arbutus menziesii*) and black oak (*Quercus kellogii*). A number of large California bay trees also occur in the woodland on the East Ridge. The coast live oak trees on the East Ridge are very large with many trunk diameters averaging or exceeding 4 feet diameter at breast height (4.5 feet from ground). Tree height averages 30 feet or less. Main branches exceeding 2 feet in diameter have broken from some of the oak trees, while other trees have the intact round canopy of a mature tree.

Understory consists primarily of herbaceous species with few woody plants. Heavy levels of year-round cattle grazing, in the past, have likely eradicated most shrubs. Herbaceous species in the understory include miner's lettuce (*Claytonia perfoliata*), bedstraw (*Galium aparine*), Pacific sanicle (*Sanicula crassicaulis*), and nemophila (*Nemophila heterophylla*). Down wood and rocky substrate covers much of the surface in oak woodland on the East Ridge. Table A provides a list of the plant species observed within Tolay Lake Regional Park.

**Buckeye Woodland.** Buckeye woodland occurs in a small stand on a rock outcrop at the base of the West Ridge near Tolay Creek at the southern boundary of the park (Figure 3b). This woodland is dominated by California buckeye (*Aesculus californica*) with an understory of weedy plant species such as dwarf nettle (*Urtica urens*), Italian thistle (*Carduus pycnocephalus*), and yellow star-thistle (*Centaurea solstitialis*). Mistletoe (*Phoradendron villosum*) is common on the branches of the buckeye trees.

**Blue Gum Trees.** A grove of blue gum trees occurs in the Park Center area of Tolay Lake Regional Park (Figure 3b). A smaller stand occurs on the west-facing slope of the southern portion of the West Ridge, and isolated blue gum trees occur on the base of the East Ridge (Figure 3a). These trees are large and provide a complete canopy cover. The understory of these groves is largely absent because of heavy loads of litter (fallen branches and exfoliating bark).

The large eucalyptus stand near the Park Center is associated with the Cardoza Ranch and thus has historical significance. The historical significance is currently undetermined regarding the two large eucalyptus trees growing at the base of the East Ridge and the small stand of eucalyptus growing on the western edge of the West Ridge, because their association with the Cardoza Ranch is not known (LSA 2008).

### 3.1.2 Wildlife Values

Oak woodlands are one of the most species-rich wildlife habitats in California, primarily due to their production of acorns, which are an important food source for a variety of wildlife (CalPIF 2002). The ecological relationship between birds and oaks can often be reciprocal when species such as western scrub-jay and Steller's jay disperse acorns. Large oak trees also provide cover and nest sites for both cup-nesting and cavity-nesting birds, and are used as caching sites for the storage of acorns by acorn woodpeckers (CalPIF 2002). Such trees also provide nest sites for raptors. A pair of red-tailed hawks was seen by LSA performing courtship flights over the Oak Grove on March 23, and likely nest in the area. Behavior consistent with nesting red-tailed hawks was also observed at the eucalyptus grove near the Park Center. Figure 3b shows the estimated location of the nest.

Although not seen by LSA, a pair of golden eagles is also known to frequent the Oak Grove area of Tolay Lake Regional Park (Steve Ehret pers. comm.). Several bird species observed in the Oak Grove were not seen in other portions of the site, indicating its unique habitat value. Species in this category include band-tailed pigeon, Steller's jay, oak titmouse, brown creeper, winter wren, and spotted towhee. Table B provides a list of animal species observed by LSA at Tolay Lake Regional Park in 2006. For an in-depth analysis of the bird usage of Tolay Lake Regional Park, please see the Appendix where we analyze data collected by volunteers for the Petaluma Wetland Alliance (PWA).

Mature trees and snags provide potential roost sites for bat species known to occur in the region, although not detected by LSA. These species include Yuma myotis (*Myotis yumanensis*), little brown myotis (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and pallid bat (*Antrozous pallidus*). Black-tailed deer (*Odocoileus hemionus*), while not restricted to oak woodlands, browse upon the foliage provided by the lower tree branches and take shelter there. Other mammal species likely to use this habitat include northern raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), and striped skunk (*Mephitis mephitis*). Feral pigs (*Sus scrofa*) are occasionally observed off-site in oak woodland adjacent to the East Ridge, but have not yet been observed on Tolay Lake Regional Park.

Oak woodlands typically occur on north-facing and east-facing slopes, where precipitation is concentrated and moisture is lost less rapidly to evaporation (Block and Morrison 1998). As a result of these relatively dense and moist conditions, salamanders often occur in oak woodlands on north-facing slopes. Although not detected by LSA, salamander species typically observed in oak woodlands within this region include California slender salamander (*Batrachoseps attenuatus*), and arboreal salamander (*Aneides lugubris*). Common reptiles expected within oak woodland include the western skink (*Plestiodon skiltonianus*), southern alligator lizard (*Elgaria multicaranata*), ring-necked snake (*Diadophis punctatus*), and sharp tailed snake (*Contia tenuis*). Down branches and rock outcrops provide cover for the animals inhabiting the oak woodland.

## 3.2 RIPARIAN VEGETATION

### 3.2.1 Botanical Values

Tolay Creek and Cardoza Creek support the most developed stands of riparian woodland at Tolay Lake Regional Park with the largest stands at the southern portion of the park along Tolay Creek (Figure 3b). Other watercourses support single willows or small stands composed of a few trees.

Riparian woodland is dominated by various combinations of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), yellow willow (*Salix lucida* ssp. *lasiandra*), and sandbar willow (*Salix exigua*), with scattered cottonwood (*Populus fremontii* ssp. *fremontii*), coast live oak, California bay, California buckeye, and non-native wild plums (*Prunus* sp).

Native shrubs are largely absent from the riparian woodland apparently due to heavy year-round browsing by cattle. Himalayan blackberry (*Rubus discolor*), an invasive non-native vine, which is resistant to cattle browsing, occurs in some riparian areas.

### 3.2.2 Wildlife Values

Riparian areas are generally recognized as an important wildlife habitat (Faber 2003) and have been identified as the most important habitats for landbirds in California (Manley and Davidson 1993, cited in RHJV 2004). Several species depend on riparian habitats for their entire breeding cycle (e.g., yellow warbler), while many others use them for roosting and foraging during the winter (e.g., yellow-rumped warblers) or during migration (e.g., western tanager).

Based on observations by LSA and volunteers from PWA, no riparian-obligate passerines (e.g., yellow-breasted chat) are currently known to breed in the riparian habitat on-site, despite the relatively well developed and extensive willow vegetation along Tolay and Cardoza creeks. Although the specific reasons for the lack of riparian-obligate birds are unknown, the on-site riparian corridors may be too narrow to support breeding populations of such species. Red-winged blackbirds and song sparrows were the two most abundant species along both creeks, with red-winged blackbirds occurring along the entire length of Tolay Creek.

LSA observed a single warbling vireo and orange-crowned warbler at Tolay Creek on May 2, and PWA volunteers observed three Wilson's warblers on May 7, 2007 and an orange-crowned warbler on April 21 and May 7, 2007. Although these species could possibly breed in the riparian vegetation, breeding has not been confirmed. PWA also observed yellow warblers and a willow flycatcher on September 17, 2006 but these birds were likely migrants. PWA observed a number of Bullock's orioles at Tolay Lake in 2007 and LSA observed a single Bullock's oriole on May 2 and June 8, 2006 in riparian habitat. Bullock's orioles nest in the eucalyptus at the base of the East Ridge.

Although no stick nests were found in 2006, the dense willows and occasional emergent cottonwood potentially provide nest sites for raptors. Other birds that use riparian woodland include mourning dove, Anna's hummingbird, downy woodpecker, northern flicker, black phoebe, tree swallow, bushtit, Bewick's wren, ruby-crowned kinglet (winter), hermit thrush (winter), American robin, yellow-rumped warbler (winter), spotted towhee, California towhee, white-crowned sparrow (winter), golden-crowned sparrow (winter), and house finch. Although most of these species also occur in non-riparian habitats, the dense foliage of riparian woodland provides particularly good habitat.

Riparian habitats also function as movement corridors and foraging habitat for mammals, including those mentioned in the oak woodland section above. Additional mammal species that may occur in riparian woodland include common gray fox (*Urocyon cinereoargenteus*) and Virginia opossum (*Didelphis virginiana*).

## 3.3 GRASSLANDS

### 3.3.1 Botanical Values

**Native Grasslands.** Native grasslands are sensitive biological resources because little of the original native California grassland remains in low elevation areas of California, including Tolay Lake Regional Park. Communities dominated by native grasses and graminoids that occur in Tolay Lake Regional Park (Figures 3a and b) include moist grasslands, and needlegrass grasslands.

Moist grasslands are noted as unique features in and around Tolay Lake (Goals Project 1999). Moist grasslands vary in species composition depending on moisture levels. The wettest areas (often meeting the criteria of jurisdictional wetlands) support California semaphore grass (*Pleuropogon californicus*), sedges (*Carex* spp.), and rushes (*Juncus* spp.). Other moist grasslands may not be saturated or inundated long enough to meet the wetland criterion, but support native grass species that require relatively high summer moisture levels such as creeping wildrye (*Leymus triticoides*), meadow barley (*Hordeum brachyantherum*), and California oatgrass (*Danthonia californica*).

For the purposes of this report, stands of meadow barley and California oat grass are considered a native grassland because of their characteristic "bunch" growth habit (that is characteristic of a native bunch grass) and because they grow in dryer areas than the majority of wetland plant species. Stands of sedges and rushes were mapped as wetlands because they grow in areas that are saturated or inundated for relatively long periods of time. Meadow barley, California oat grass, and a mosaic of meadow barley, California oat grass, sedges, and rushes were mapped as moist grasslands. Stands of California semaphore grass and areas dominated by both California semaphore grass and rushes were mapped as California semaphore grass wetland. Moist grasslands and California semaphore grass wetlands are common in the north central portion of the park east of Tolay Lake (Figure 3a).

A second native grass community occurs on slopes exhibiting the driest conditions. These occur as small stands of purple needlegrass (*Nassella pulchra*), often in association with California oat grass. Needlegrass grassland occurs in scattered small stands throughout Tolay Lake Regional Park, but more commonly in the south-eastern portion (Figure 3a).

**Non-Native Grasslands.** Non-native grasslands at Tolay Lake Regional Park are dominated by Italian ryegrass (*Lolium multiflorum*) and medusahead (*Taeniatherum caput-medusae*). Italian ryegrass is dominant in spring and early summer throughout the whole site. Later in summer, medusahead becomes dominant in large areas, especially on the West Ridge. Medusahead grows in less extensive stands on the East Ridge and central part of Tolay Lake Regional Park. Other non-native grass species include wild oats (*Avena fatua, Avena barbata*), barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome (*Bromus diandrus*), and soft chess (*Bromus hordeacous*). Some non-native grass species occur sparsely in wetland areas, for instance, annual canary grass (*Phalaris paradoxa*) and swamp timothy (*Crypsis schoenoides*).

Non-native grasslands include many other weedy species including broad-leaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), common vetch (*Vicia sativa* ssp. *nigra*), geranium (*Geranium molle*), shepherd's needle (*Scandix pecten-veneris*), rose clover (*Trifolium hirtum*), subterranean clover (*Trifolium subterraneum*), and milk thistle (*Silybum marianum*). These species do not form large stands but grow sparsely among the grasses. Small amounts of wheat (*Triticum aestivum*) continued to persist in some parts of the cultivated fields.

Non-native grasslands support numerous native wildflowers including Ithuriel's spears (*Triteleia laxa*), white brodiaea (*Triteleia hyacinthina*), Fremont's star lily, blue-eyed grass (*Sisyrinchum bellum*), California poppy (*Eschscholzia californica*), cream cups (*Platystemon californicus*), sun cups (*Camissonia ovata*), soap plant (*Chlorogalum pomeridianum*), California checker mallow (*Sidalcea malvaeflora*.), Johnny jump-up (*Viola pedunculata*), morning-glory (*Calystegia subacaulis*), false lupine (*Thermopsis macrophylla*), mule ears (*Wyethia angustifolia*), and yampah (*Perideridia kelloggii*.).

**Invasive Plant Species.** Medusahead, Italian thistle, bristly ox-tongue (*Picris echioides*), yellow star-thistle, and purple star-thistle (*Centaurea calcitrapa*) are the most common non-native invasive plants at Tolay Lake Regional Park. Large stands of these weeds occur throughout the site, especially in the central part (Figures 4a and 4b). Bristly ox-tongue covers large areas in the central part of the site, especially in the formerly cultivated areas east of Tolay Lake. From these formerly cultivated areas, bristly ox-tongue has colonized the adjacent grasslands. Milk thistle, another invasive species, is less common at Tolay Lake Regional Park. Other non-native weed species that are less invasive and grow relatively sparsely on the site include bull thistle (*Cirsium vulgare*), jointed charlock (*Raphanus raphanistrum*), and dandelion (*Taraxacum officinale*).

### 3.3.2 Wildlife Values

Grasslands constitute the most widespread habitat type at Tolay Lake Regional Park. In addition to common bird species such as western meadowlark, grasslands on the site are likely to support breeding grasshopper sparrows and horned larks judging by the observation of a pair of horned larks and singing male grasshopper sparrows (LSA obs.). Both of these species are more restricted in their distribution and together indicate high-quality, diverse grasslands with horned larks preferring short grass and bare areas while grasshopper sparrows preferring comparatively tall grass habitats. Grasslands also provide foraging habitat for raptor species such as red-tailed hawk, northern harrier, white-tailed kite, American kestrel, great horned owl, and barn owl, which feed on the small mammals that occur in grasslands (see below). Other local bird species that spend a large portion of their life cycle within or adjacent to grasslands include turkey vulture, loggerhead shrike, western kingbird, Say's phoebe, American crow, Savannah sparrow, and red-winged blackbird. Five swallow species (tree, violet-green, northern rough-winged, barn, and cliff) were observed on site in 2006, most of which were seen foraging over the grasslands on either side of the dirt road that parallels the eastern side of the West Ridge.

The grasslands of Tolay Lake Regional Park are likely to support several species of small mammals such as deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californica*), Botta's pocket gopher (*Thomomys bottae*), and western harvest mouse (*Reithrodontomys megalotis*). Grasslands also provide suitable foraging habitat for bat species, northern raccoon, and striped skunk. Skunks would forage in the grasslands while raccoon would forage in the ponds, seeps, and other wet areas of Tolay Lake Regional Park.

Black-tailed jackrabbit (*Lepus californicus*) and coyote (*Canis latrans*) are known to occur on the site, and spend the majority of their time foraging or resting in grasslands. The jackrabbit would comprise a major prey item for the carnivores that occur at Tolay Lake Regional Park. Brush rabbits (*Sylvilagus bachmani*) were not observed at the park. A limiting factor for this species is the small

amount of shrubby cover. With additional cover, rabbit and other small mammals could occur on-site in greater numbers than currently and provide a greater prey base for the carnivores.

The California ground squirrel (*Spermophilus beecheyi*) creates burrows that are used by a wide variety of animals including reptiles, amphibians, insects, arachnids, and snails. Because of this and their importance as prey for foxes, coyotes, golden eagles, and other raptors, the California ground squirrel has a positive influence on the diversity of animal species in grasslands.

California ground squirrels experience natural fluctuations in their population numbers at Tolay Lake and the adjacent ranches according to Jenette Cardoza, the owner of the Cardoza Ranch (Steve Ehret pers. comm.). They were often observed on two areas of the West Ridge, and LSA observed a small number of holes and scat near a rock outcrop at the base of the East Ridge. Their current population numbers are very low at Tolay Lake Regional Park. Given the extensive suitable habitat for ground squirrels and the past favorable land management regime of intensive grazing, the scarcity of ground squirrels on the site could be the result of a low point of a natural population fluctuation and/or intense predation by a suite of predators.

Common reptiles typically found in grasslands in this region include western fence lizards (*Sceloporus occidentalis*), gophersnakes (*Pituophis catenifer*), and northern American racers (*Coluber constrictor*). Grassland areas adjacent to seasonal wetlands in this area could also support the sierran treefrog (*Pseudacris sierra*) [formerly Pacific treefrog], and western toad (*Anaxyrus boreas*).

## 3.4 TOLAY LAKE

Tolay Lake has been greatly altered in historic times by the removal of its natural dam, construction of drainage ditches, the straightening, widening, and deepening of Tolay Creek to drain Tolay Lake, diverting North Creek around Tolay Lake, and farming the bottom of Tolay Lake. These activities have reduced the size and duration of ponding of Tolay Lake and greatly altered the flora of the lake.

Review of Kammon Hydrology and Engineering (2003), Ducks Unlimited (2005), Hanson (1999), and the supplemental information included in the water rights application 30558 submitted to the State Water Resources Control Board provided background information on the amount of water contained in Tolay Lake. These accounts indicate that Tolay Lake was perennial during years of high rainfall and extended to Stage Gulch Road prior to the breaching of the dam sometime after 1859. Tolay Lake will still extend nearly to Stage Gulch Road in wet years, as it did in 2006.

Tolay Lake will become inundated any time between December and February in a typical year. Ponding remains until April or early May. The Cardoza's pumped water out of the lake in April or May to begin their farming operations. Some isolated pools in the lake bottom that were not connected to the channel of Tolay Creek, remained ponded longer.

A relatively large amount of water seems to have been passing through the Tolay Lake watershed based on these reports. The observation of water in Tolay Creek in August and November 2006 by LSA staff confirms that water is present nearly year-round, during wet years, in Tolay Creek despite a dry Tolay lakebed. Furthermore, Parsons (1996) indicates that 1 acre-foot of water is present in

Tolay Creek in the late summer during dry years and that 2 acre-feet are present in Tolay Creek during average years and wet years.

Tolay Lake is now a large, shallow basin divided by excavated drainages into a series of formerly cultivated agricultural fields. A mosaic of ponded areas, wetland vegetation, and upland areas occurs at the edge of Tolay Lake, and disturbance from former farming activities has made it difficult to determine the natural pattern of vegetation. Nevertheless, a slight break in the slope of the formerly cultivated field appears to indicate the historic shoreline along a portion of the eastern shore of Tolay Lake.

There have been several studies of the hydrology of Tolay Lake in preparation of developing plans for its restoration (Kamman 2003). A variety of lake alternative restoration scenarios have been developed, but the precise details of each of the alternatives have not yet been selected (Ducks Unlimited 2005).

### 3.4.1 Botanical Values

The lake bottom is bare of vegetation while ponded and is dominated by cultivated vegetation when it was farmed. Under fallow conditions it supports a variety of plant species as it dries. Native plant species that appear along the lakeshore in the late spring including slender popcorn flower (*Plagiobothrys stipitatus*), water-starwort (*Callitriche* sp.), purslane speedwell (*Veronica peregrina*), hyssop loosestrife (*Lythrum hyssopifolium*), and common monkey-flower (*Mimulus guttatus*). In the summer a variety of native and non-native weedy species emerge in the dry bottom of the lake. A dense monoculture of water smartweed (*Polygonum amphibium* ssp. *emersum*) occurrs in Tolay Lake south of the causeway. North of the causeway, water smartweed grew mixed with mayweed (*Anthemis cotula*), spearscale (*Atriplex triangularis*), willowherb (*Epilobium pygmaeum*), velvet-leaf (*Abutilon theophrastii*), devil's claw (*Proboscidea lutea*), swamp timothy, red ammannia (*Ammannia coccinea*), heliotrope (*Heliotropium curassavicum*), common purslane (*Portulaca oleracea*), and water plantain (*Alisma lanceolatum*).

Wetlands upslope of the ponded area of Tolay Lake are dominated by hyssop loosestrife, meadow barley, popcorn flower, and California semaphore grass. Common non-native species in this area include Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), spiny-fruit buttercup (*Ranunculus muricatus*), curly dock (*Rumex crispus*), field bindweed (*Convolvulus arvensis*), mustard (*Brassica* sp.), and charlock (*Sinapis arvensis*). Above a wrack line of flotsam deposited during the previous winter by the high water elevation in Tolay Lake, the vegetation shifts to dominance by Italian ryegrass and prickly ox-tongue, facultative species (occurring with equal probability in wetlands and uplands) that are common in the grasslands surrounding Tolay Lake.

### 3.4.2 Wildlife Values

Tolay Lake is a major wintering area for migratory waterfowl (Steve Ehret pers. comm.; LSA obs.). The large size and shallow depth of the lake attracts large numbers of dabbling ducks and other waterbirds. The accessible vegetation growing on the lake bottom provides forage for over-wintering waterfowl. Eleven duck species, eight of them dabblers, were observed by LSA and PWA

volunteers in 2006. These species included gadwall, American widgeon, mallard, cinnamon teal, northern shoveler, northern pintail, green-winged teal, canvasback, greater scaup, bufflehead, and ruddy duck. Other water bird species observed on the lake include Canada goose, pied-billed grebe, double-crested cormorant, American coot, and Caspian tern. Wading birds such as great blue heron, great egret, and snowy egret forage along the lake margins as well as within the seasonally flooded fields adjacent to and east of the lake. These shallow wetlands also provide foraging habitat for wintering and migrating shorebirds such as killdeer, greater yellowlegs, least sandpiper, western sandpiper, and long-billed dowitcher.

Mammals primarily use Tolay Lake as a source of drinking water. Several of the common reptiles typically found in the surrounding grassland habitat may also use the lake for drinking water.

The importance of Tolay Lake as habitat for invertebrates is not known. The seasonal nature of the lake reduces macro-invertebrate diversity. Bats and swallows are likely to forage for adult insects flying over Tolay Lake. Tolay Lake also provides suitable breeding habitat for Pacific treefrogs and western toads. Due to the seasonal nature of the Lake, it is not suitable breeding habitat for American bullfrogs *(Lithobates catesbiana)* although bullfrogs probably travel to Tolay Lake from upstream reservoirs and adjacent areas. California red-legged frogs may be able to breed in protected areas of Tolay Lake if water remains until July.

## 3.5 SEEPS AND SPRINGS

### 3.5.1 Botanical Values

Seasonal to perennial wetland seeps and springs occur on many of the slopes within the study area. These areas do not have a significant surface watershed and show no evidence of being the result of surface runoff. The hydrology of these seeps and springs appears to be the result of groundwater flowing from cracks in the underlying bedrock or from the "daylighting" of water that is flowing down slope above the soil's contact with bedrock. Some of these seeps and springs are extensive, especially those that occur near Pond 2 (Figure 3a). Permanent springs produce flowing surface water and support wetland vegetation including soft rush (*Juncus effusus*), iris-leaf rush (*Juncus xiphioides*), common monkey-flower, water cress (*Rorippa nasturtium-aquaticum*), spiny-fruit buttercup, and straight-beaked buttercup (*Ranunculus orthorhynchus* var. *bloomeri*). Permanent seeps support green vegetation during the dry season. Permanent seeps were dominated by brown-headed rush (*Juncus phaeocephalus*), common monkey-flower, and pennyroyal (*Mentha pulegium*). Seasonal seeps provide a relatively short wet season hydrology. Depending on the amount of rainfall, these seeps may dry by the end of May in a dry year and by the end of June in a wet year. Their dominant surface feature is the presence of brown-headed rush. Trampling by cattle has reduced the cover of some seeps and appears to have reduced the numbers of some species (such as straight-beaked buttercup) that grow in the seeps.

### 3.5.2 Wildlife Values

Birds, mammals, and reptiles would all be expected to frequent the seeps for drinking water. Cover would be provided within the dense growth of rushes and other vegetation. Shrews would be expected to occur within the seeps where they would conduct the majority of their foraging. Bird

species such as killdeer, great egret, and Wilson's snipe are more likely to forage within the wet areas of seeps and springs than in the drier adjacent grassland habitats.

The use of seeps and springs by amphibians largely depends on the seasonal duration of the seep. Seasonal seeps that have relatively short wet season hydrology, may aid in the dispersal of adult frogs. Nevertheless, permanent seeps and springs are more useful to amphibians during the summer months and common amphibian species, such as Pacific treefrogs and western toads are likely to use these areas in the summer. Pacific treefrogs may breed in the livestock watering troughs that are fed by some of the springs. Trampling by cattle may reduce the wildlife value of the seeps by degrading the quality of water and reducing cover. Nevertheless, grazing by cattle may reduce the weed cover of seeps.

## 3.6 VERNAL POOLS AND SEASONAL WETLANDS

### 3.6.1 Botanical Values

Seasonal wetlands occur on the flat top of the West Ridge and on shallow slopes and swales of the East Ridge (Figures 3a and 3b). Hydrology of these features is provided by direct rainfall and run-off. The seasonal wetlands of the West Ridge occur on level, impermeable soils or a shallow soil over impermeable bedrock. Small seasonally wet areas above these impermeable substrates are dominated by armed coyote thistle (*Eryngium armatum*).

Two small and shallow vernal pools occur on the crest of the West Ridge near the southern boundary of the park (Figure 3b). Because they are shallow, they would be expected to dry sometime between March and May on any given year. Plant species include Mediterranean barley, armed coyote thistle, Lobb's aquatic buttercup (*Ranunculus lobbii*), and water-starwort.

Certain seeps have created conditions resulting in rotational land slumps. Soil water, along with some surface runoff, collects in seasonal ponds above these rotational land slumps. These seasonal ponds are dominated by rabbit's-foot grass, brown-headed rush, creeping spike rush (*Eleocharis macrostachya*), smooth rush, white water buttercup (*Ranunculus aquatilis*), Lobb's aquatic buttercup, and flowering quillwort (*Lilaea scillioides*). Annual miner's lettuce and spiny-fruit buttercup also occur in these seasonal ponds in the spring.

Several small seasonal wetlands occur on shallow slopes or swales on the East Ridge that appear to concentrate runoff sufficiently to saturate the soil and support hydrophytic plant species. These wetlands are interesting because their water source derives from both surface hydrology and seepage from groundwater. These habitats support soft rush, brown-headed rush, annual water miner's lettuce (*Montia fontana*), and common monkeyflower.

The relatively level portion of the site that is east of Tolay Lake that was formerly cultivated, supports large seasonal wetlands that are ponded in the spring and support California semaphore grass, meadow foam (*Limnanthes douglasii*), and white-tip clover (*Trifolium variegatum*). In summer, these areas become dry and are invaded by non-native grasses and weeds. Other types of California semaphore grass wetlands occur in areas where rushes are co-dominant. In these areas the California semaphore grass grows in saturated soils or where there are small ponded areas on the order of a few feet wide or less.

Seasonal wetlands occur in drainages that cross beneath Cannon Lane and in low areas located beside Lakeville Road (Figure 5). The wetlands near Lakeville Road are connected to salt marshes surrounding the Petaluma River and support saline-adapted species such as the non-native brass buttons (*Cotula coronopifolia*).

### 3.6.2 Wildlife Values

The wildlife values discussed in Section 3.5.2 (*Seeps and Springs*) are also relevant for vernal pools and seasonal wetlands. The large seasonal wetlands that remain ponded into the spring provide suitable breeding habitat for Pacific treefrogs and western toads. Common garter snakes (*Thamnophis sirtalis*) and terrestrial garter snakes (*Thamnophis elegans*) would also be expected to occur in and adjacent to seasonal wetlands. Garter snakes predominantly feed on fish, toads, frogs, salamanders, and their larvae. In wet years, portions of two large seasonal wetland areas on the eastern side of Tolay Creek, towards the southern edge of the property, retain enough ponded water to provide hydration habitat for bullfrogs. They can be expected to dry early in years of low rainfall.

## 3.7 PONDS

Ponds have been developed on Tolay Lake Regional Park for watering cattle, irrigating crops, and for other human uses. These ponds are located at the base of the West Ridge and at the base of the East Ridge (Figure 3a and 3b).

Two small reservoirs, Pond 1 and Pond 2, at the base of East Ridge are supplied by a combination of seasonal surface runoff and seasonal and perennial springs. Pond 1 receives runoff from a large area up-slope, from seeps, and from the headwaters of the Main Fork of Cardoza Creek. Pond 2 receives overflow from Pond 1, flow from the North Fork of Cardoza Creek, and water from two large seep/spring complexes.

The Willow Pond and Duck Pond, near the Park Center, are supplied by springs located in the eastern side of the park. Over a mile of pipes brings water to these ponds. Duck Pond receives overflow from Willow Pond. A small Stock Pond occurs at the southern portion of the West Ridge. A small Irrigation Pond at the base of the East Ridge receives water from a drainage ditch. The Old Duck Pond consists of a shallow basin surrounded by a low berm, where inundation is a result of direct rainfall and a seasonally elevated water table.

### 3.7.1 Botanical Values

The northeastern shoreline of Pond 2 supports a broad band of cattails and tules surrounded by a small but well developed riparian woodland. Wetland vegetation along the shore of Pond 1 includes prostrate amaranthus (*Amaranthus blitoides*), spiny clotbur (*Xanthium spinosum*), and strawberry clover (*Trifolium fragiferum*). The rapid drawdown of the water level in Pond 1 for irrigation likely precludes the establishment of substantial amounts of wetland vegetation.

The surface of Willow Pond is covered with duckweed (*Lemna* sp.). The vegetation of Duck Pond is dominated by the noxious weedy water primrose (*Ludwigia* sp.). The water primrose grows through the shallow portions of the pond and nearly reaches the middle of the pond by the middle of autumn.

The small Stock Pond supports several species of rush and short herbaceous species. The Irrigation Pond is ringed with a dense band of cattails and the Old Duck Pond supports a dense stand of creeping spikerush.

### 3.7.2 Wildlife Values

The habitat values of ponds are similar to those of seeps, springs, and seasonal wetlands, but are likely to receive more wildlife use by virtue of their greater size and presence of standing water. Pond 2, in particular, provides open water habitat for species such as American coot, pied-billed grebe, cinnamon teal, and mallard. Stands of cattails and tules at Pond 2 and the Irrigation Pond also provide habitat for passerines such as black phoebe, marsh wren, song sparrow, and Lincoln's sparrow.

The ponds on the property likely provide breeding habitat for native Pacific treefrogs and western toads, which also makes them likely habitat for common garter snakes and terrestrial garter snakes. Ponds 1 and 2, the Irrigation Pond in the eastern portion of the farmed area, and the Duck Pond are all perennial and contained introduced bullfrogs. Ponds 1 and 2 also contain non-native mosquito fish (*Gambusia affinis*). The Willow Pond is perennial but no bullfrogs were observed during the site visits. This pond is shaded and is dominated by duckweed making it less likely to support bullfrogs. The Old Duck Pond may be perennial during wet years and it supported bullfrogs in 2006. All of the ponds on the property could provide habitat for California red-legged frogs and western pond turtles, if the ponds were not occupied by bullfrogs or mosquito fish. The presence of introduced bullfrogs does not necessarily exclude the presence of these two species, but it can have a significant effect on their abundance.

## 3.8 STREAMS

### 3.8.1 Tolay Creek

Tolay Creek extends approximately 1.25 miles downstream of Tolay Lake before exiting the southern boundary of Tolay Lake Regional Park. South of Tolay Lake, Tolay Creek is contained within a defined, incised channel of 4 to 10 feet in depth with a channel width of 10 to 20 feet. Much of this channel appears to have been straightened or deepened by excavation for the purpose of draining Tolay Lake for agriculture. Berms of dredged spoils are visible at multiple locations along the channel. Most of the channel supports hydrophytic plants and flows all year. Portions of the channel contained standing or flowing water into early November 2006 although other portions dried by August. Tolay Creek typically dries completely in the dry season approximately 3 miles downstream from Tolay Lake Regional Park (LSA obs.).

The vegetation of Tolay Creek consists of water smartweed and small stands of cattails and tules that form a complete cover over the creek between Tolay Lake and the Farm Bridge, 700 feet downstream of the lake. Non-native poison hemlock (*Conium maculatum*) grows on the upper edge of the banks. This portion of Tolay Creek could potentially provide suitable habitat for California red-legged frogs and western pond turtles, although none were observed during the March or August surveys.

Downstream of the bridge, cattle graze in the channel of Tolay Creek resulting in a more diverse and open vegetation, including cattails, tules, water smartweed, curly dock, water cress, and various species of native rushes. Juvenile bullfrogs were observed in the portion of Tolay Creek, just above

the confluence with Cardoza Creek. Arroyo willow and red willow occur as single individuals scattered 1,900 feet downstream of Tolay Lake. These willows merge into a narrow band about a half mile downstream from Tolay Lake. A relatively wide band of riparian vegetation grows along Tolay Creek beginning about a mile downstream from the lake. The southern most stretch of Tolay Creek on the property, downstream of the confluence with Cardoza Creek, supports the largest area of riparian woodland. A braided series of channels flows through willows and dense stands of Himalayan blackberries in this area. At least one California red-legged frog was previously recorded at this location (Parsons 1996), although none were observed during this study. This entire portion of Tolay Creek contains suitable habitat for California red-legged frogs. The dense riparian cover and cooler temperatures makes it less suitable for introduced bullfrogs and none were observed here during surveys. Nevertheless, one adult bullfrog was observed in a seep adjacent to Tolay Creek.

### 3.8.2 North Creek – Oak Grove Fork

The North Creek – Oak Grove Fork originates on the eastern slope of East Ridge and crosses the northern corner of the project site before leaving Tolay Lake Regional Park. North Creek later re-enters the site as a channelized ditch that flows along the eastern edge of Tolay Lake. The Oak Grove Fork starts as a slumped gully without wetland characteristics, and then flows through approximately 600-feet of channel with wetland vegetation and seeps, followed by an approximately 700-foot reach without wetland characteristics underneath the canopy of oak woodland. The channel of the Oak Grove Fork appears unmodified except for a small bridge crossing.

### 3.8.3 Cardoza Creek

The Main Fork of Cardoza Creek upstream of Pond 1 supports brown-headed rush in the channel and California figwort (*Scrophularia californica*), creeping snowberry (*Symphoricarpos mollis*), California coffeeberry (*Rhamnus californica*), poison oak (*Toxicodendron diversilobum*), and narrow horsetail (*Equisetum laevigatum*) on the banks. Scattered coast live oak and willow trees grow along the Main Fork of Cardoza Creek.

The North Fork of Cardoza Creek, upstream of the confluence of the channel draining Pond 1, does not support wetland vegetation. Scattered buckeye and bay trees grow along banks of the North Fork. The Pond 1 spillway is a deeply incised constructed channel that joins the north fork of Cardoza Creek upstream of Pond 2. The banks of this channel and the outfall of Pond 1 are actively eroding and are in need of repair to reduce downstream sedimentation.

The streambed between Pond 1 and Pond 2 has been bypassed due to the construction of the dam for Pond 1. This former streambed flows during winter and spring but is reduced to a large wetland seep during the summer. One adult bullfrog was observed in a plunge pool in the streambed between Pond 1 and Pond 2.

Pond 2 discharges onto a concrete-lined spillway that concentrates flows causing erosion of the channel several hundred yards downstream to the confluence with the Main Fork of Cardoza Creek. The end of the spillway is undercut and large chunks of the spillway have fallen into the deeply eroded channel. Old automobile bodies and large blocks of cement have been added to the banks of the eroded channel to prevent erosion. Large willow trees have grown along the banks emerging

through the car bodies. Although the spillway is eroding, the channel bottom appears to be stabilized because it has attained a stable elevation upstream from the Main Fork of Cardoza Creek. The banks of the channel are overly steep and portions are actively eroding into the channel. The former Cardoza Creek channel upstream of the juncture with the Pond 2 spillway channel and below the dam to Pond 2 no longer shows evidence of wetland or stream characteristics but does support riparian woodland predominantly composed of sandbar willow.

### 3.8.4 Eagle Creek

The extreme headwaters of Eagle Creek are mapped as a series of seeps and channels supporting wetland vegetation including brown-headed rush and soft rush. A few coast live oak and bay trees occur along the upstream part of the creek. Eagle Creek contained standing water at its confluence with Tolay Creek as late as August in 2006, although this was an extraordinary wet year and not typical.

### 3.8.5 Un-named Streams

Numerous small drainages flow toward Tolay Lake and Tolay Creek from the West Ridge in the southwest portion of the project site. Many of these streams were flowing as late as August and November of 2006, but may flow less in dryer years. Channel characteristics of these streams range from relatively narrow segments without wetland characteristics to wider segments consisting of a defined channel with adjacent wetland vegetation dominated by brown-headed rush and common monkey-flower. These varying channel characteristics are caused by changes in gradient, underlying bedrock, and the occurrence of seeps.

## 3.9 ROCK OUTCROPS

Rock outcrops provide habitat for native plants and animals. Rock outcrops are often surrounded by shallow soils that support a higher proportion of native plant species than adjacent grasslands. Some of the rock outcrops, however, are heavily used by cattle for rubbing and support ruderal plants typical of disturbed areas. Rock outcrops of the East Ridge have the most diversity of native plant species including shooting star (*Dodecatheon hendersonii*), California polypody (*Polypodium californicum*), California maidenhair fern (*Adiantum jordanii*), clarkia (*Clarkia* sp.), phacelia (*Phacelia* sp.), and woodland star (*Lithophragma* sp.).

Rock outcrops have been used by the burrowing owl at Tolay Lake Regional Park. Other wildlife species are likely to use rock outcrops for dens or observation posts.

# 4.0 SPECIAL-STATUS SPECIES

A variety of special-status species and sensitive habitat types occur at Tolay Lake Regional Park. Special-status species observed during field work or otherwise known to occur on-site include fragrant fritillary, Lobb's aquatic buttercup, California linderiella (*Linderiella occidentalis*), California red-legged frog, western pond turtle, golden eagle, burrowing owl, and Grasshopper sparrows.

Habitat for several species of special-status insects occurs at Tolay Lake Regional Park. This habitat consists of cream cups, the food plant of Opler's longhorn moth (*Adela oplerella*), and ponds that could be used by Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*). Johnny jump-up, the food plant of an unnamed subspecies of zerene silverspot butterfly (*Speyeria zerene*), occurs at Tolay Lake Regional Park and the butterfly may also occur there.

Red-tailed hawks are not a special-status species, but their nest area at Tolay Lake Regional Park is considered sensitive. California horned larks were formerly a special-status species and have been recently placed on the CDFG watch list. Because this change is recent we include a write-up for them.

Sensitive habitats that occur at Tolay Lake Regional Park are oak woodlands, riparian woodlands, buckeye woodlands, native grasslands, wetlands, and rock outcrops (Figures 3a and 3b).

## 4.1 PLANTS

### 4.1.1 Known Occurrences of Special-status Plants

Two special-status plant species described below have been observed at Tolay Lake Regional Park. The fragrant fritillary and Lobb's aquatic buttercup should be avoided by park plans to the extent possible, especially because they only occur on-site in a few locations.

**Fragrant Fritillary.** Fragrant fritillary is a CNPS list 1B species and is on CDFG's list of Special Vascular Plants, Bryophytes and Lichens. It has no federal status. It occurs in two locations on the east-facing portion of the West Ridge. Approximately fifteen plants were observed with Fremont's star lily at a northern location (designated by two dots on Figure 3b) and a single plant grew with non-native annual grasses at a southern location (designated by one dot on Figure 3b) on March 22, 2006. Approximately 13 fragrant fritillary plants were observed in March of 2007 at the northern location and no fragrant fritillary plants were observed at the southern location. On April 1, 2008, hundreds of fragrant fritillary plants were observed at the northern location. Fragrant fritillary grows from a bulb and, along with Fremont's star lily, can be one of the first wildflowers to bloom in the spring beginning in February. Nevertheless, it appears that it blooms somewhat later at Tolay Lake Regional Park.

**Lobb's Aquatic Buttercup.** Lobb's aquatic buttercups is a CNPS list 4 species and is on CDFG's list of Special Vascular Plants, Bryophytes and Lichens. It has no federal status. It grows in shallow pools in the spring. Their white flowers and leaves float on the surface of the water. It was found in a seasonal pool at the base of a slump and a vernal pool on the top of the West Ridge.

**Yampah.** Gairdner's yampah, (*Perideridia gairdneri* ssp. *gairdneri*), a CNPS List 4 species potentially occurs at Tolay Lake Regional park. It looks very similar to and can grow with Kellogg's yampah (*Perideridia kelloggii*), a common species that grows on the West Ridge. Gairdner's yampah grows in moist grassland areas, adobe flats, and grassland areas beneath pine trees (Best et al. 1996). In Sonoma County, Gairdner's yampah occurs much west and north of Tolay Lake Regional Park mostly from the Laguna de Santa Rosa westward to the coast. Kellogg's yampah is common and grows in grassland including adobe flats and serpentine (Best et al. 1996).

### 4.1.2 Potential Occurrences of Special-status Plants

The following plant species are not known to occur within Tolay Lake Regional Park, but are known from the vicinity. They were not found during surveys and they are unlikely to occur within the park.

**Franciscan onion.** Franciscan onion (*Allium peninsulare* var. *franciscanum*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on clay soils, often on serpentine, and on dry hillsides at an elevation between 330 and 1,000 feet. It is not likely to occur because serpentine is absent from Tolay Lake Regional Park and it was not found during surveys of suitable habitats.

**Sonoma alopecurus.** Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), federal endangered, CNPS List 1B, and CDFG Special Plant occurs in wet areas, vernal pools, marshes and riparian banks. It is not likely to occur within the site because it was not found during surveys in suitable habitats.

**Napa false indigo.** Napa false indigo (*Amorpha californica* var. *napensis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in openings in forest, or woodland, and/or chaparral vegetation at an elevation between 500 and 6,500 feet. It is not likely to occur in the site because it was not found during surveys of openings within woodland habitats.

**Bent-flowered fiddleneck.** Bent-flowered fiddleneck (*Amsinckia lunaris*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in woodland and grassland habitats. It is not likely to occur within Tolay Lake Regional Park because it was not found during surveys.

**Alkali milk-vetch.** Alkali milk-vetch (*Astragalus tener* var. *tener*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on alkali flats, flooded areas of annual grassland, in playas, or in vernal pools at an elevation between 1 and 550 feet. It is not likely to occur within Tolay Lake Regional Park because alkaline soils are absent and because it was not found during surveys.

**Sonoma sunshine.** Sonoma sunshine (*Blennosperma bakeri*), federal and State Endangered and CNPS List 1B, occurs in vernal pools and swales at an elevation between 30 and 330 feet. It is not likely to occur at Tolay Lake Regional Park because it was not found during surveys.

**Narrow-anthered California brodiaea.** Narrow-anthered California brodiaea (*Brodiaea californica* var. *leptandra*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in broad-leaved upland forest, chaparral, and lower montane coniferous forest at an elevation between 360 and 3,000 feet. Most of the observations were from areas beside scrub or chaparral (CNDDB 2006). It is not likely to occur on the site because it was not found during surveys within suitable habitats.

**Round-leaved filaree.** Round-leaved filaree (*California* (*Erodium*) *macrophyllum*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in grasslands on clay soil between an elevation of 50 and 4,000 feet. It is not likely to occur on the site because it was not found during the surveys of the grassland areas.

**Pappose tarplant.** Pappose tarplant (*Centromadia parryi* ssp. *parryi*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in vernally mesic, often alkaline sites at an elevation between 6 and 1,400 feet. It is not likely to occur within Tolay Lake Regional Park because alkaline soils are absent and it was not found during surveys of other habitats.

**Sonoma spineflower.** Sonoma spineflower (*Chorizanthe valida*), federal and State endangered and CNPS List 1B, occurs in sandy soil at an elevation between 30 and 160 feet. It is not likely to occur within the site because sandy soils are absent.

**Yellow larkspur.** Yellow larkspur (*Delphinium luteum*), federal endangered, State rare, and CNPS List 1B, occurs on north-facing rocky slopes at an elevation up to 330 feet. It is not likely to occur on the site because suitable habitat appears to be missing.

**Western leatherwood.** Western leatherwood (*Dirca occidentalis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on brushy slopes and mesic sites; mostly in mixed evergreen and foothill woodland communities at an elevation between 100 and 1,800 feet. It is not likely to occur in the site because its mesic scrub habitat is absent and it was not observed during surveys.

**Dwarf downingia.** Dwarf downingia (*Downingia pusilla*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in vernal lake and pool margins at an elevation between 1 and 1,600 feet. It is not likely to occur in the site because it was not found during surveys of vernal pools or other seasonally ponded areas.

**Marin western flax.** Marin western flax (*Hesperolinon congestum*), federal and State threatened and CNPS List 1B, occurs in serpentine barrens and serpentine grassland and chaparral at an elevation between 100 and 1,200 feet. It is not likely to occur at Tolay Lake Regional Park because serpentine is absent.

**Burke's goldfields.** Burke's goldfields (*Lastenia burkei*), federal and State endangered and CNPS List 1B, occurs in vernal pools and swales at an elevation between 50 and 1,900 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas or the saturated soil of wetlands.

**Contra Costa goldfields.** Contra Costa goldfields (*Lastenia conjugens*), federal endangered, CNPS List 1B, and CDFG Special Plant, occurs in vernal pools, swales, low depressions, and open grassy

areas at an elevation between 1 and 1,500 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas or the saturated soils of wetlands.

**Legenere.** Legenere (*Legenere limosa*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in the beds of vernal pools at an elevation between 1 and 3,000 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas.

**Jepson's leptosiphon.** Jepson's leptosiphon (*Leptosiphon jepsonii*), CNPS List 1B, CDFG Special Plant and no federal Status, occurs on grassy slopes of volcanic or serpentine substrates at an elevation between 300 and 1,600 feet. It is not likely to occur within the site because serpentine is absent and it was not found during surveys in suitable habitats.

**Sebastopol meadowfoam.** Sebastopol meadowfoam (*Limnanthes vinculans*), federal and State endangered and CNPS List 1B, occurs in swales, wet meadows, vernal pools, and marshy areas in valley oak savanna. Soil types include poorly drained soil of clay and sandy loam at an elevation between 50 and 400 feet. It is not likely to occur at Tolay Lake Regional Park because it was not observed during surveys of the vernal pools and other wet areas of the site.

**Marsh microseris.** Marsh microseris (*Microseris paludosa*), CNPS List 1B, CDFG Special Plant and no federal status, occurs in grassland areas between an elevation of 15 and 1,000 feet. It is not likely to occur within the site because it was not found during surveys in suitable habitats.

**Baker's navarretia.** Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), CNPS List 1B, CDFG Special Plant and no federal status, occurs in vernal pools and swales on adobe or alkaline soils at an elevation between 15 and 3,000 feet. It is not likely to occur at Tolay Lake Regional Park because it was not found during surveys of vernal pools or other ponded and wet areas.

**Marin County navarretia.** Marin County navarretia (*Navarretia rosulata*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in dry open rocky places and sometimes on serpentine at an elevation between 600 and 2,000 feet. It is not likely to occur at Tolay Lake Regional Park because it was not observed during surveys of rocky areas. In addition, rocky areas were often trampled by cows and supported a weedy flora.

**Petaluma popcorn-flower.** Petaluma popcorn-flower (*Plagiobothrys mollis* var. *vestitus*), CNPS List 1A, CDFG Special Plant, and no federal status, is known from a single specimen collected in the late 1800s from Petaluma. It is thought to occur in wet sites in grasslands or the edges of coastal marshes at a probable elevation between 30 and 150 feet. It is not likely to occur because it was not found during surveys of wet areas of Tolay Lake Regional Park.

**North Coast semaphore grass.** North Coast semaphore grass (*Pleuropogon hooverianus*), State threatened, CNPS List 1B, and no federal status, occurs in wet, grassy, and usually shady areas, and sometimes in freshwater marshes at an elevation between 30 and 4,000 feet. It is not likely to occur on the site because it was not found during surveys of wet and ponded areas. A similar species, California semaphore grass was observed in a number of areas in the central portion of Tolay Lake Regional Park.

**Point Reyes checkerbloom.** Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in freshwater marshes near the coast usually at an elevation between 15 and 240 feet. It is not likely to occur in the site because it was not observed during surveys of wet areas.

**Marin checkerbloom.** Marin checkerbloom (*Sidalcea hickmanii* ssp. *viridis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on serpentine or volcanic soils and sometimes appears after burns. Its elevational range varies between sea level and 1,400 feet. It is not likely to occur on the site because serpentine soils are absent.

**Oval-leaved viburnum.** Oval-leaved viburnum (*Viburnum ellipticum*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in chaparral, cismontane woodland, and lower montane coniferous forest at an elevation between 705 and 4,600 feet. It was not found during surveys and is therefore not likely to occur at Tolay Lake Regional Park.

## 4.2 INSECTS AND CRUSTACEANS

The special-status species of insects discussed below are not known from Tolay Lake Regional Park, but are known from nearby areas. The food plants for both species of lepidoptera occur at Tolay Lake Regional Park: cream cups (food plant for Opler's longhorn moth) and Johnny jump-up (food plant for an un-named subspecies of zerene silverspot butterfly). Ponds that could be used by Ricksecker's water scavenger beetle also occur at Tolay Lake Regional Park. The crustacean, California linderiella, is a species of fairy shrimp that has been observed in Tolay Lake.

### 4.2.1 Opler's Longhorn Moth

Opler's longhorn moth is on the CDFG Special Animal list but has no federal status. It feeds on the flowers of cream cups, and the adult moths are usually observed resting on the petals of cream cups. Opler's longhorn moth was observed on Sonoma Land Trust's Baylands Property, approximately 5 miles south. A large stand of cream cups grows mid-slope on the northern part of the East Ridge. Opler's longhorn moth could occur at Tolay Lake Regional Park because of the occurrence of its food plant.

### 4.2.2 Zerene Silverspot Subspecies

An un-named subspecies of the zerene silverspot occurs on the Baylands Property just south of Tolay Lake Regional Park. This taxon has no federal or State status. The larvae of the zerene silverspot feed upon violets. Johnny jump-up commonly grows on both the East and West ridges of Tolay Lake Regional Park. This un-named subspecies of silverspot butterfly is likely to be very uncommon and therefore a resource that should be protected. This butterfly could occur at Tolay Lake Regional Park because of the occurrence of its food plant and because it occurs nearby at the Baylands Property.

### 4.2.3 Ricksecker's Water Scavenger Beetle

Ricksecker's water scavenger beetle is on the CDFG Special Animal list but has no federal status. It is an aquatic insect that is known from only a few localities in the San Francisco Bay Area. The

closest known locality to Tolay Lake Regional Park is approximately10 miles further north on Sonoma Mountain. Due to the limited amount of scientific information currently available on the status and distribution of the Ricksecker's water scavenger beetle, we are unable to assess its potential occurrence at Tolay Lake Regional Park. Ricksecker's water scavenger beetles occur in ponds where their predaceous larvae remain on vegetation near the shore. Little else is known regarding Ricksecker's water scavenger beetles. Habitat for Ricksecker's water scavenger beetles occurs in Tolay Lake, Pond 1, Pond 2, Duck Pond, Willow Pond, and the permanent and semi-permanent stock ponds within Tolay Lake Regional Park.

### 4.2.4 California Linderiella

California linderiella is on the CDFG Special Animal list but has no federal status. It is the most common fairy shrimp in California and is found in 39 locations in the Great Central Valley and in the Coast Range from Mendocino to Ventura counties (Eng et al. 1990, Erickson and Belk 1999). California linderiella was observed in Tolay Lake (Sam Bacchini pers. comm.).

California fairy shrimp inhabit clear to tea-colored, often vegetated ephemeral or temporary pools of lightly turbid fresh water (vernal pools) that form in the cool, wet months of the year (Helm 1998, Erickson and Belk 1999). The pools inhabited by California fairy shrimp range in size from one square meter in sandstone depressions to 40 hectares in Boggs Lake, but typically occupy reasonably large pools (Erickson and Belk 1999).

California fairy shrimp swim or glide upside down by means of beating movements that pass along their 11 pairs of swimming legs in a wave-like motion from head to tail. The diet of California fairy shrimp consists of algae, bacteria, protozoa, rotifers, and bits of organic detritus (Pennak 1989).

Female California fairy shrimp carry their eggs in an oval or elongate brood sac on their abdomen. Eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Federal Register 1994). Resting (summer) eggs are known as cysts and are capable of withstanding heat, cold, and prolonged dry periods. The cyst bank in the soil may be comprised of cysts from several years of breeding (Donald 1983). As the vernal pools refill with rainwater, in the same or subsequent seasons, some of the cysts may hatch and the cycle repeats itself.

## 4.3 AMPHIBIANS

### 4.3.1 California Red-Legged Frog

**Legal Status.** California red-legged frog was federally listed as threatened on May 23, 1996 (USFWS 1996) and is a CDFG species of special concern. The USFWS published a recovery plan (USFWS 2002) identifying core areas and priority watersheds for focused recovery efforts. Tolay Lake Regional Park falls within the Petaluma Creek-Sonoma Creek Core Recovery Area, which was designated because it currently supports frogs, may serve as a source of frogs that colonize adjacent areas, and provides connectivity to core recovery areas to the east and west. The conservation needs identified for this area include protecting existing populations, reducing impacts of urban development, and protecting, restoring, and creating breeding and dispersal habitat.

**Pesticide Injunction.** The Center for Biological Diversity (CBD) filed a lawsuit in Federal District Court for the Northern District of California, alleging that EPA failed to comply with section 7(a)(2) of the Endangered Species Act by not ensuring that its registration of 66 named pesticide active ingredients will not affect the California red-legged frog, a federally-listed Threatened species. The Court, EPA, and CBD agreed to a Stipulated Injunction that 1) establishes deadlines for the EPA to determine the effect of the 66 pesticides on the California red-legged frog, 2) affects the use of these pesticides in selected counties including Sonoma County, and 3) requires the drafting of a bilingual brochure on the California red-legged frog and pesticides.

The injunction applies to areas designated as critical habitat for CRLF and in specified areas outside of critical habitat. Tolay Lake Regional Park is not located within designated critical habitat but a small portion is located within one of the non-critical habitat areas covered by the injunction (Figure 6). The injunction is not a blanket ban on the use of these 66 pesticides (Table C) within the covered areas. The ban applies only to specified buffers in the portions of these areas which meet the definition of primary constituent habitat elements in the April 13, 2006 CRLF Critical Habitat designation published in the Federal Register. These are 1) Aquatic breeding habitat, 2) Non-breeding aquatic habitat, and 3) Upland habitat (natural areas within 200' of breeding and non-breeding aquatic habitat).

The injunction prohibits the use of these materials within 60 feet of these aquatic habitat areas. Beyond 60 feet out to a distance of 200 feet these pesticides may be used for localized spot treatments using a handheld device. Beyond 200 feet there are no restrictions on method of application.

**Habitat Characterization.** The habitat types that the California red-legged frog occupies are diverse and include ephemeral ponds, intermittent streams, seasonal wetlands, springs, seeps, permanent ponds, perennial creeks, constructed aquatic features, marshes, lagoons, riparian corridors, blackberry (*Rubus* spp.) thickets, non-native annual grasslands, and oak savannas (USFWS 2002), several of which occur within Tolay Lake Regional Park. Breeding occurs within ponds in streams, stock ponds, or other types of ponds. The egg and tadpole stages are limited to a variety of aquatic habitats.

**Limiting Factors.** The occurrence of introduced bullfrogs limits the suitability of aquatic habitat at Tolay Lake Regional Park for the California red-legged frog. Several researchers have attributed the decline and extirpation of California red-legged frogs throughout their range to the introduction of bullfrogs and predatory fishes (Hayes and Jennings 1986). The presence of California red-legged frogs has been negatively correlated with the presence of bullfrogs (Fisher and Shaffer 1996) and bullfrog adults have been observed preying on tadpole, juvenile, and adult California red-legged frogs. Bullfrogs were observed in all suitable aquatic habitat features listed above except in the small Stock Pond at the southern portion of the West Ridge and the southern portion of South Creek. The stock pond just beyond the western border of Tolay Lake Regional Park, with the historic California red-legged frog record, was surveyed with binoculars from the park boundary and was filled with several thousand juvenile bullfrogs in August 2006. Many of these juvenile bullfrogs will disperse onto Tolay Lake Regional Park.

**Potential Habitat at the Park.** Potential habitat for California red-legged frogs occurs in Tolay Creek (particularly the riparian vegetation along the southern portion of the creek), Pond 1, Pond 2, the small Stock Pond located at the southern portion of the West Ridge, the Irrigation Pond that occurs in the eastern portion of the farmed area, Duck Pond and potentially the southern portion of

South Creek, just before it exits Tolay Lake Regional Park. Nevertheless, the value of this habitat for California red-legged frogs is greatly reduced by the occurrence of bullfrogs throughout the park and by fish in Pond 1, Pond 2, and the Duck Pond.

Tolay Creek mostly varies between 3 and 6 feet wide and is mostly covered by an overstory of willow trees at its downstream end. It is perennial or nearly perennial in wet years only and provides 1) cover during both the rainy season and dry season, 2) hydration habitat, and 3) may provide breeding habitat in a few pools or areas of slowly flowing water.

South Creek is similar to Tolay Creek and provides similar potential habitat for California red-legged frogs. In years of low rainfall, these creeks may not provide habitat for breeding red-legged frogs. Pond 1 is a small reservoir that supports little shoreline vegetation. It provides hydration habitat and breeding habitat for California red-legged frogs although bullfrogs and mosquito fish also occur in Pond 1. Pond 2 is ringed by cattails and willow trees both of which would provide cover for California red-legged frogs. Pond 2 also provides hydration habitat for California red-legged frogs. Bullfrogs, sunfish, and mosquito fish occur in this pond which would limit breeding potential for California red-legged frogs.

The small Stock Pond is created by a dam across a small watercourse and is also fed by a seep. Cover is limited to stands of spikerush. This pond provides cover, hydration habitat, and breeding habitat for California red-legged frogs.

The Irrigation Pond supports a thick band of cattails at its edge that could provide cover for California red-legged frogs. This pond would also provide summer hydration habitat and breeding habitat for California red-legged frogs, although bullfrogs were observed there.

The Duck Pond appears to be permanently inundated and supports a dense growth of water primrose. Nevertheless, in years past, this pond was completely drained (Steve Ehret pers. comm.). This pond could support hydration and breeding habitat for California red-legged frog although bullfrogs were abundant.

**Observations of California Red-legged Frog.** California red-legged frogs have been observed on and adjacent to Tolay Lake Regional Park, in the riparian vegetation in Tolay Creek at the southern end of the park (Parsons 1996), and within Pond 1 and Pond 2 (Steve Ehret pers comm.). California red-legged frogs have also been noted within a stock pond and tributary to Tolay Creek within a half mile up-stream of the northern boundary of Tolay Lake Regional Park (CNDDB 2006). The frogs were actually observed at various locations within the tributary and could conceivably occur in Tolay Creek at the northern boundary of Tolay Lake Regional Park. California red-legged frogs are also known to occur in a stock pond beyond the western boundary of Tolay Lake Regional Park (Parsons 1996), and approximately 10 recently metamorphosed and 1 sub-adult California red-legged frogs were observed in ponds beneath riparian vegetation in Tolay Creek downstream from the park boundary (Sam Bacchini pers. comm.). These locations include the pond immediately downstream (south) of the boundary of Tolay Lake Regional Park.

No California red-legged frogs were observed during LSA's field visits. The surveys were conducted during the day when there is less chance of success of encountering California red-legged frogs, as compared to a combination of day-time and night-time surveys (Fellers and Kleeman 2006). California red-legged frogs appear to be sparse at Tolay Lake Regional Park, if not extirpated, and

that is the most likely reason for not encountering them during surveys. Even with a robust survey effort, we may not observe California red-legged frogs at the park.

Although California red-legged frogs were not observed during surveys by LSA, they potentially occur at Tolay Lake Regional Park at a low density. They have been known from Tolay Lake Regional Park in the past and because habitat has not appeared to have changed, they potentially continue to occur there. Although bullfrogs significantly reduce the quality of habitat for California red-legged frogs, they are known to occur in areas with large numbers of bullfrogs. Because of these reasons, the USFWS is likely to consider the California red-legged frog to occupy habitat at Tolay Lake Regional Park.

**Conclusion.** LSA did not detect California red-legged frogs on our surveys, although the species is known from past surveys. This indicates that the species is currently either present in extremely low numbers or has become extirpated. Suitable physical habitat is present on the property to support California red-legged frogs. However, habitat suitability is substantially compromised by the presence of fish, which predate on the egg and larval stages of the California red-legged frog, the enormous population of bullfrogs, which predate on larvae and adults, and perennial waterbodies that provide breeding and hydration habitat for bullfrogs. More exhaustive surveys, than those conducted by LSA in 2006, could confirm the negative presence of California red-legged frogs or detect a remnant population.

Regardless of the results of even exhaustive surveys, if they were to be conducted and if no California red-legged frogs were detected, the USFWS would still likely consider California red-legged frogs present on the park property on the basis of past records and the continued presence of potentially suitable physical habitat. For management purposes, LSA recommends that the Regional Parks Department consider the California red-legged frog as a potentially present species.

## 4.4 REPTILES

### 4.4.1 Western Pond Turtle

Western pond turtle is a California species of special concern and has no federal status. Western pond turtles have been previously observed in Tolay Lake (Parsons 1996) and in a pond in Tolay Creek immediately downstream of the southern boundary of Tolay Lake Regional Park. They occur along the shore of waterbodies and on floating debris. Egg laying occurs in soft or sandy soil, often a considerable distance from any body of water. The limiting resources for the species are the aquatic and the egg-laying habitats.

Potentially suitable habitat includes Tolay Lake, Tolay Creek, Pond 1, Pond 2, the Irrigation Pond, Duck Pond, and Willow Pond. The occurrence of introduced bullfrogs limits the suitability of aquatic habitat at Tolay Lake Regional Park for the western pond turtles. Adult western pond turtles are frequently observed in ponds with introduced bullfrogs, but bullfrogs prey on juvenile turtles which can lead to population declines.

No pond turtles were observed during the LSA surveys. Based on previous sightings of turtles and the presence of potentially suitable habitat, western pond turtles are likely still present in low densities at Tolay Lake Regional Park.

## 4.5 BIRDS

### 4.5.1 White-tailed Kite

White-tailed kite is a state fully protected species and has no federal status. This species requires open habitats (e.g., grasslands, agricultural fields, marshes) for foraging and dense-topped trees or shrubs for nesting. The diet of white-tailed kites consists almost entirely of mice and voles (Peeters and Peeters 2005). Although no nests were found during our 2006 surveys, suitable nesting habitat is present and numerous white-tailed kites have been observed on site.

### 4.5.2 Golden Eagle

Golden eagles are a state fully protected species and have no federal Status. They nest in trees or cliffs and forage in grasslands. Major food items consist of the California ground squirrel and a variety of rabbit species. Golden eagles have been observed (Steve Ehret pers. comm.; LSA field observations) flying over and perching on the site. Although nesting was not observed by LSA, suitable nesting habitat is present in the eucalyptus and perhaps coast live oak trees.

Golden eagles are frequently observed (10 of 28 field visits by PWA volunteers) flying over Tolay Lake Regional Park. Five active nests of golden eagles apparently occur in the Tolay Lake area (Janet Thiessen pers. comm.), which may account for the frequent observations. They are often observed near the East Ridge. Because of the remote location of the East Ridge and because of the oak trees that grow within and beyond the property boundary of Tolay Lake Regional Park, the most likely location of a nest is in the vicinity of the East Ridge. Optimal nest locations appear to be in trees midway down a north- or east-facing slope or other areas that shelter the nest from strong wind. Golden eagles do not tend to nest on the tops of ridges (Peeters and Peeters 2005). The Oak Grove on the East Ridge extends from the top of the ridge down the west-facing slope and thus provides suitable nesting habitat, but nesting behavior was not observed by LSA.

Golden eagles usually build or repair a few nests prior to choosing one nest to use (Peeters and Peeters 2005). They may not use the same nest every year and will alternate use of several nests. Some pairs of golden eagles may not nest every year (Peeters and Peeters 2005). Golden eagles are thought to nest on an adjacent property to Tolay Lake Regional Park (Steve Ehret pers.comm) and based on our field observations, they do not appear to have nested this year at Tolay Lake Regional Park.

### 4.5.3 Burrowing Owl

Burrowing owls are a state species of special concern but have no federal status. They are known from the grasslands of Tolay Lake Regional Park (Steve Ehret pers. comm. and LSA obs.). Single individuals are regularly observed at rock outcrops during the winter and spring and occasionally summer indicating use by dispersing juvenile or over-wintering birds. The owls prefer short grass and respond well to areas that are regularly grazed. This species is dependent on burrows as nest sites and as year-round shelter. The owls typically use burrows created by small mammals, although the

owls may subsequently modify the burrows for their own uses. The owls readily occupy constructed burrows. The sensitive period for nesting burrowing owls is between February and September 1.

### 4.5.4 California Horned Lark

California horned larks are on the CDFG watch list and have no federal Status. A pair had been observed (LSA obs.) on-site and most likely nest in grasslands at Tolay Lake Regional Park. California horned larks occur in grasslands with short grass. A suitable buffer should be developed for any nests encountered. Depending on the circumstances, buffers can range in width from 50 to 100 feet. Because California horned larks can occur in any portion of the grassland at Tolay Lake Regional Park, specific observations are not indicated on Figures 3a and 3b.

### 4.5.5 Grasshopper Sparrow

Grasshopper sparrows are considered a second priority state species of special concern (Unitt 2008). Grasshopper sparrows are uncommonly found nesting in the taller grass of grasslands. Because grasshopper sparrows can occur in any portion of the grassland at Tolay Lake Regional Park, specific observations are not indicated on Figures 3a and 3b.

### 4.5.6 Nesting Birds

Although they are not considered special-status species, almost all native birds and their nests are protected by the federal MBTA and the California Fish and Game Code. Species confirmed as nesting on the site include red-tailed hawk (nesting pair observed in the grove of blue gum trees in the Park Center) and western meadowlark (nest found while walking along Tolay Creek on May 2), although there are undoubtedly many more.

## 4.6 MAMMALS

### 4.6.1 American Badger

American badger is a state species of special concern that occurs in open areas, including dry grasslands. Because of its semifossorial habits, it requires friable soils in open, uncultivated ground suitable for burrowing. It also requires healthy populations of ground squirrels and pocket gophers, its two primary prey items (Jameson and Peeters 2004). Although there are no records of this species in the immediate vicinity of Tolay Lake, suitable habitat conditions are present in the hillier portions of the site, particularly along the East and West ridges and at the southern site corner. Large holes that could have been made by a badger were observed at Tolay Lake Regional Park (Steve Ehret pers. comm.).

### 4.6.2 Townsend's Big-Eared Bat

Townsend’s big-eared bat (*Corynorhinus townsendii*) is a state species of special concern. Although this species occurs in a wide variety of habitats throughout California (CNDDB 2006), it is extremely sensitive to human disturbance as it roosts in the open (i.e., from walls or ceilings of old buildings).

Nursery colonies have been found in caves, mine shafts, and buildings (Jameson and Peeters 2004). No roosts of this species are known from the immediate vicinity of Tolay Lake, but several old farm buildings on and in the vicinity of the site represent potential habitat. In addition, Townsend's big-eared bats roosting in the region may forage over the site at night.

### 4.6.3 Pallid Bat

Pallid bat (*Antrozous pallidus*) is a state species of special concern. It is somewhat more common than other special-status bats, occurring throughout most of California at elevations below 6,500 feet (Jameson and Peeters 2004). The pallid bat feeds mostly on flightless arthropods and they have been observed flying low (6 to 36 inches) to the ground searching for prey. After locating their prey, they will drop to the ground, grab the prey in their mouth, and fly to a feeding roost to consume the prey. (Texas Parks and Wildlife 1997). Roosting occurs in fissures in cliffs, abandoned buildings, bird boxes, and under bridges (Jameson and Peeters 2004). Several roosts of this species are known from the general vicinity of Tolay Lake (CNDDB 2006), and suitable roosting habitat (i.e., old farm buildings) is present on site. As such, this species has moderate potential to occur on the project site.

# 5.0 IMPACTS AND MITIGATION

## 5.1 RESTORATION OF TOLAY LAKE

Although specific objectives and methods for restoring Tolay Lake have not yet been defined, the overall goal is to increase the area and period of inundation. This would likely result in the establishment of riparian vegetation and freshwater marsh vegetation around the lakeshore. Restoration of Tolay Lake could result in the following potentially significant impacts to biological resources (beneficial and adverse). Implementation of the following mitigation measures would help achieve the goal of enhancing biological resources in the long-term.

### 5.1.1 Beneficial Impacts

**Beneficial Impact 1: The restoration of Tolay Lake could increase the extent of freshwater marsh, seasonal wetland, and riparian habitat.** The restoration of Tolay Lake is likely to create a body of water that is permanent or semi-permanent. This could potentially provide the hydrology necessary for maintaining cattails and tules, seasonal wetlands, and willow-cottonwood riparian woodland around the lakeshore. Such freshwater wetlands have been greatly reduced in California, and the creation of new ones would be a major benefit to general wildlife habitat values. Presumably California red-legged frogs and western pond turtles would benefit from the restoration of Tolay Lake because water would be retained in the lake for a longer duration than is the current situation. If water were to be retained into the middle of July (but preferably August or early September), then California red-legged frogs may breed in Tolay Lake. However, prolonging the period of inundation could also encourage bullfrogs, which eat both California red-legged frogs and small western pond turtles.

**Beneficial Impact 2: The restoration of Tolay Lake would result in an increase in the quality of the water of Tolay Creek.** The bottom of Tolay Lake has been regularly cultivated after water is pumped from the lakebed in April or May. The absence of disking will reduce the amount of suspended sediment and loose soil particles in Tolay Lake. With a reduction of sediment, the quality of the water in Tolay Lake would improve with a corresponding reduction of sedimentation of Tolay Creek and San Pablo Bay.

**Beneficial Impact 3: The restoration of Tolay Lake would increase the recharging of ground water.** Tolay Lake was typically inundated for half the year or less beginning anytime between December and February and lasting until April or early May when the lake was pumped dry. After pumping, those portions of Tolay Lake that were not connected to the channel of Tolay Creek, remained ponded until they evaporated or the ground water fell. Pumping would not occur under the current and proposed management of Tolay Lake Regional Park and the lake would remain inundated for a longer period of time. After restoration, the increased duration of inundation of Tolay Lake is likely to result in a greater amount of water infiltrating into the ground water table.

Filling in the drainage ditches, if that becomes part of the park plan, (both within and outside of Tolay Lake) is also likely to increase ground water recharge by retaining water on-site rather than draining it from the site. An increase in the recharging of the ground water table may result in an increase in the dry-season flow of Tolay Creek downstream from the lake.

An increase in the dry season flow of Tolay Creek is likely to benefit wildlife by providing a source of water later in the season. This water would be used for drinking and hydration habitat in the case of amphibians. If water were to be retained late in the season into July but preferably into August or early September, then breeding could occur by California red-legged frogs.

### 5.1.2 Adverse Impacts

**Adverse Impact 1: Potential reduction of habitat available to foraging shorebirds.** Shorebirds, or short-legged wading birds, overwinter on beaches, estuaries, and shallow bodies of water such as Tolay Lake. Shorebirds that have been observed using Tolay Lake include killdeer, long-billed dowitcher, greater yellowlegs, least sandpiper, and western sandpiper. These shorebirds forage at the shallow edges of Tolay Lake during the winter and during the spring and fall migration. Such foraging areas are important for shorebirds because much of their winter foraging habitat has been lost to urban and agricultural development. Foraging areas that are used during the spring and fall migrations are particularly important to allow the birds to rest and regain their fat stores prior to continuing the migration.

The proposed restoration of Tolay Lake will likely result in a large increase in shallow ponded areas. Portions of these shallow areas that remain wet for a substantial amount of time may become overgrown with cattails. The upper portion of the lake shore may not be ponded long enough for the growth of cattails and could be available for foraging by shorebirds. Shorebirds do not use areas dominated by cattails. Any loss of shorebird foraging habitat would be minor because data to date indicate that shorebird use is not substantial. With the exception of killdeer (and dowitcher for one observation), shorebird use has been limited to a few individuals of a few species.

> **Mitigation Measure 1.** If needed, new shorebird foraging habitat could be created in the nearly flat lower terrace areas east of Tolay Lake by restoring seasonal wetlands. These formerly cultivated fields become saturated and pond water during the rainy season. Grading could be used to create seasonal ponds that would provide wintering and migrating habitat for shorebirds.

**Adverse Impact 2: Potential temporary increase in sediment during and immediately following construction.** Earth-moving activities would be necessary for deepening Tolay Lake, creation of islands, restoration of the dam on Tolay Creek, realignment of the ditches that drain Tolay Lake, raising the causeway across Tolay Lake, and constructing the berm at the northern property line to avoid flooding private property upstream of Tolay Lake Regional Park.

Any earth-moving activity would remove vegetation and expose the surface of the soil, which could result in an increase of suspended sediment in Tolay Lake. This suspended sediment could become deposited in Tolay Creek once water leaves the lake and flows downstream. This would create a temporary adverse impact until vegetation covers the exposed soil surface.

**Mitigation Measure 2.** Best management practices should be implemented to reduce the amount of sediment generated. If more than a minor amount of sediment would be generated, based on the size and location of the construction, straw bales, silt fence, or curtain could be installed to contain the sediment within the construction area. Areas exposed to waves or surface flows could be mulched with straw and tackifer or covered with straw, coir, or jute erosion control blankets depending on the circumstances.

### 5.1.3 Impacts to Instream Uses

**Adverse Impact 3: Potential adverse effects of Tolay Lake restoration on in-stream uses and associated wildlife, riparian vegetation, and wetland values.** (See Section 3.4 - *Tolay Lake* and Section 3.8 - *Streams* of this report for existing conditions treated in greater detail than the summary presented below.) Adequate amounts of water and its persistence into the dry season are critical for the success of restoration of riparian vegetation and wildlife values to Tolay Creek. The effect of restoring the dam to Tolay Lake is not known on downstream flows of Tolay Creek. Flows may decrease because a restored dam prevents downstream flow in Tolay Creek, or flows may increase because of an increased height of the water table due to increased infiltration from a restored Tolay Lake. Nevertheless, summer flows would continue to enter Tolay Creek from Eagle Creek and the un-named watercourses of the West Ridge. Cardoza Creek, a major tributary to Tolay Creek, would join Tolay Creek downstream of the proposed dam. Its contribution to the hydrology of Tolay Creek is substantial and would be unaffected by the dam.

Water volumes appear to be adequate to support the enhancement and restoration of the vegetation and wildlife values of Tolay Creek after the restoration of Tolay Lake. Furthermore impacts are not anticipated to existing wildlife (including the California red-legged frog), riparian vegetation, and wetland values from the restoration of Tolay Lake for the following reason. Water will continue to enter Tolay Creek, at a minimum from tributaries. Willow trees currently grow in Cardoza Creek, which is dryer than Tolay Creek. Willow trees grow in streams dryer than Tolay Creek, and Tolay Creek would continue to be wetter than the dry creeks supporting willow trees. For these reasons, the restoration of Tolay Lake and the resultant alteration of flows in Tolay Creek would not appear to appreciably alter the opportunity to enhance the vegetation of Tolay Creek.

A salmonid fishery does not appear to be associated with Tolay Creek (Leidy et al. 2005a, b). Therefore impacts to salmonids would be nonexistent. Central California coast steelhead (*Oncorhynchus mykiss*), may utilize the lower reaches of Tolay Creek, but would not be able to access the creek above Highway 37 due to a barrier to fish passage.

Earthwork associated with the restoration of Tolay Lake could affect ground nesting birds.

**Mitigation Measure 3.** Several species of ground nesting birds could nest in the lake bed of Tolay Lake. Prior to construction during the nesting season (before July 31), preconstruction surveys should be conducted to ensure that nests are not damaged. If nesting birds are observed within 50 to 100 feet of the proposed grading, then construction should be diverted to areas beyond the buffer until the young birds have fledged. The width of this buffer could vary based on recommendations by a qualified wildlife biologist depending on the circumstances at the nest.

## 5.2 FACILITIES AT UPLAND RESERVOIRS

**Adverse Impact 4: Potential direct adverse impact to wetlands and wildlife habitat depending on placement of picnic areas.** Large perennial seeps occur in the vicinity of Pond 2 that provide habitat for a variety of wildlife. Locating picnic areas within or beside the seeps could directly remove wetland habitat and could result in the loss of cover for wildlife. Wetlands could be affected directly by construction of picnic areas and associated spur trails.

> **Mitigation Measure 4.** Picnic areas and trails at Ponds 1 and 2 should be located outside of wetlands to allow wildlife access. If it is not feasible to completely avoid wetlands, the footprint of these facilities should be minimized to the extent possible to reduce wetland impact.

**Adverse Impact 5: Potential indirect impacts to wildlife at Pond 1 or 2 from an increased presence of people in picnic areas and fishing piers.** The presence of people would affect common species of wildlife that are known and/or expected to occur at Ponds 1 and 2. People would access these ponds by one or more proposed fishing piers. Human disturbance would cause waterfowl to seek shelter or fly away. Repeated flushing of waterfowl could deplete energy reserves necessary for successful migration.

Both these ponds have bass and sunfish. Restocking the ponds with the non-native bass and sunfish is not proposed as part of the project. Fishing is not likely to affect the California red-legged frog at these ponds, because the existing fish in the ponds most likely prey on any existing California red-legged frogs, eggs, or tadpoles. This predation would result in, at best, a low density of California red-legged frogs, and the frogs do not tend to breed in lakes that contain fish.

> **Mitigation Measure 5.** Piers should be strategically sited (such as in clusters on one side of a pond) to allow for a portion of those ponds to be inaccessible to humans, thereby allowing for areas of refuge for waterfowl. Picnic areas should be located away from the ponds and on the same side as the fishing piers, if possible. Signage should be installed to educate the public regarding sensitive resources. Portions of the ponds and associated wetlands should be fenced off from public access or at least posted to ensure adequate undisturbed refuge for wildlife.

**Adverse Impact 6: Potential unnatural increase in common predators that are attracted to left-overs.** Common predators such as striped skunks, raccoons, and Virginia opossums are attracted to areas that accumulate leftover food. An increased number of these predators could result in an unnatural localized reduction of prey species.

> **Mitigation Measure 6.** Mitigation would entail placement of signs at the reservoirs and other destinations that would state that garbage should be packed out of the area. These signs would emphasize the importance of removing leftovers from these areas. Garbage receptacles, which would be serviced regularly by park staff, especially on weekends and holidays, would be located at the trail heads.

**Adverse Impact 7: Potential direct adverse impact to wetland vegetation from the placement of fishing piers.** The placement of fishing piers at the edge of Pond 1 and/or Pond 2 would result in the

direct removal of wetland. Wetland would be permanently removed by the placement of the piers and temporary impacts to wetlands would occur from construction.

> **Mitigation Measure 7.** The proposed restoration of the wetlands at Tolay Lake Regional Park would more than compensate for the permanent and temporary impacts to wetland from the installation of fishing piers.

**Adverse Impact 8: Potential increase in fishing-related trash that harms wildlife.** Discarded fishing lines, hooks, and weights could harm wildlife that mistakenly ingest this trash or get caught by it.

> **Mitigation Measure 8.** Informational signs should be developed to inform the public of the risk of to wildlife and to urge them remove their trash. Park staff should regularly inspect and clean fishing areas.

## 5.3 SPILLWAY REPAIR

Prior land owners constructed two dams on Cardoza Creek creating two small reservoirs (Pond 1 and Pond 2). Flows were diverted by spillways below the dams from the historic watercourse of Cardoza Creek, and have cut new channels to the North Fork of Cardoza Creek (from Pond 1) and the Main Fork of Cardoza Creek (from Pond 2). These new channels are eroding the spillways and downcutting. This has left the banks overly steep and subject to mass wasting (a process in which entire sections of bank slough off into the bottom of the channel). Erosion of the spillways should be repaired to prevent instability of the dams. Proposed removal of concrete blocks, automobile bodies, and other objects that were placed for erosion control by previous landowners could accelerate erosion by clearing vegetation and disturbing soil.

**Beneficial Impact 5: Potential beneficial impact from reduced erosion and downstream sedimentation.** The existing dam outlet structures discharged water from Pond 1 and Pond 2 at the approximate level of the ponds, much higher than the natural channel bottom of Cardoza Creek. This caused the erosion of the outlets down to the elevation of the former channel. Although the channel bottom appears stable, these steep cuts at the discharge points of both ponds has caused downcutting and sloughing, which are sources of sediment into Cardoza Creek. Stabilizing the outlet structures and their downstream channels at Pond 1 and Pond 2 would result in a reduction of this sedimentation. This would improve the health of downstream habitat by reducing the amount of vegetation and channel bottom buried by sediment.

**Adverse Impact 9: Temporary adverse impact to willow riparian habitat from repair of the spillway of Pond 1 and Pond 2, and from the removal of automobiles, riprap, and other debris from the channels.** Willow vegetation will need to be removed for construction to stabilize the outlets of Pond 1 and Pond 2 and for removal of debris.

**Mitigation Measure 9.** Replacing the willow trees, or alternatively merely trimming them to the base, would mitigate the temporary impact to riparian vegetation from spillway repair and debris removal. Best management practices should be implemented to reduce the amount of sediment entering Cardoza Creek from these activities. The proposed restoration of riparian vegetation to

Tolay Lake Regional Park would more than mitigate for the temporary impact of willow removal at the spillways of Ponds 1 and 2.

## 5.4 PUBLIC USE TRAILS, PICNIC AREAS, AND VISTA AREAS

Potential impacts include the direct reduction of sensitive resources and indirect impacts to sensitive wildlife from the presence of people on trails, picnic areas, or vista areas.

**Adverse Impact 10: Adverse impact to wetlands, watercourses, native grasslands, riparian woodland, buckeye woodland, and oak woodland from construction of recreational facilities.** Construction of park facilities such as trails, vista areas, and picnic sites could result in the direct fill of wetlands and watercourses. Installation of these facilities could also indirectly impact wetlands by diverting or restricting water flows.

Construction of park facilities could also displace native grasslands and woodlands (riparian, oak, and buckeye). Construction could indirectly impact these habitats through alteration of hydrology or compaction of soils. The roots of oak trees could be particularly affected by compaction, resulting in increased susceptibility to attack by fungi and other pathogens.

> **Mitigation Measure 10.** Recreational facilities should be located to avoid impacts to sensitive habitats such as wetlands, native grasslands, riparian woodland, buckeye woodland, and oak woodland where possible. Trail crossings of these habitats should be designed to minimize impacts. Picnic and vista areas should be located away from sensitive resources, if possible, or should be reduced in size to lessen impacts. Unavoidable losses of acreage of native grasslands, riparian habitats, and wetlands should be replaced on a 2:1 basis through habitat creation. The proposed restoration program would most likely result in a large increase in native grasslands and wetlands, which would more than compensate for impacts from park facilities.
>
> Any trails in oak woodlands should be located outside of the root zone in a manner that avoids as much damage as possible. Trails within oak woodlands should also be designed without excavation to the extent possible to avoid damage to roots.

**Adverse Impact 11: Removal of the farm bridge could result in the temporary generation of sediment into Tolay Creek.** The Farm Bridge is likely to be removed in the course of restoring Tolay Lake. This removal could disturb the steep banks of Tolay Creek, resulting in bank erosion and increased sediment into Tolay Creek.

> **Mitigation Measure 11.** Best management practices should be used to reduce erosion and sedimentation for activities within the bed and banks of creeks.

**Adverse Impact 12: Construction of park facilities could impact special-status plants and special-status butterfly/moth food plants.** Fragrant fritillary at two locations on the West Ridge and Lobb's aquatic buttercup at two pools on the West Ridge could be affected by construction of park facilities. Cream cups (food plant of Opler's longhorn moth) and the Johnny jump-up (food plant of a rare subspecies of zerene fritillary butterfly) could also be affected by the installation of park facilities.

**Mitigation Measure 12.** Trails and other park facilities should be planned to avoid occurrences of fragrant fritillary, Lobb's aquatic buttercup, cream cups and Johnny jump-up to the extent possible.

**Adverse Impact 13: Construction of trails, picnic areas, vista areas, and the retrofitting of bridges over Tolay Creek or other watercourses could directly affect special-status and other protected wildlife species.** In addition to the removal of habitat, construction activities could directly result in mortality or injury to special-status and other protected wildlife species (such as birds protected by the MBTA).

The construction and human use of picnic facilities, trails, or viewing areas within ¼ mile of a nest is likely to disturb nesting golden eagles while nesting. Habitat use by California red-legged frogs, western pond turtles, burrowing owls, other raptors, California horned larks, grasshopper sparrows, and other birds could also be affected by park facilities. Construction and use of trails, roads, or other facilities within 300 feet of the red-tailed hawk nest in the blue gum grove near the Park Center could potentially cause stress and nest abandonment.

**Mitigation Measure 13a-Golden eagle nest.** Surveys should be conducted to determine the location of the eagle nest in order to more precisely assess impacts. If the nest is within ¼ mile of proposed park facilities, a seasonal closure of part of the East Ridge during nesting season may be appropriate. Nesting can occur between February and August but generally occurs some time between March and June or July. The specifics of this closure would depend on the distance of park facilities to the nest, the sensitivity of this particular pair of golden eagles to humans, and the presence of any cover or natural vegetation screen between the nest and park facilities.

**Mitigation Measure 13b-California red-legged frog and western pond turtle.** Picnic areas are proposed near Pond 1 and Pond 2 where there is an upland pond spring complex, seeps, and other types of wetlands. The picnic areas and spur trails should avoid these seeps, springs, and seasonal wetlands, which could be habitat of California red-legged frogs and western pond turtles in the vicinity of Ponds 1 and 2 and where the wetlands are extensive. Avoidance of wetlands elsewhere in Tolay Lake Regional Park is also recommended to protect potential frog and turtle habitat. Trail crossings should be designed to minimize disturbance to wetlands and watercourses.

Native shrubs could be planted in a manner such as to screen frogs and turtles from human disturbance and to discourage human entry into the wetlands. Preconstruction surveys, by a qualified biologist, should be conducted prior to trail construction in suitable California red-legged frog and western pond turtle habitat. Depending on the regulatory context and the potential for impacts to California red-legged frogs, consultation with the USFWS may be advised. Additional mitigation may require buffers, monitoring, fencing, and/or replacement of affected habitat. Habitat for California red-legged frogs and western pond turtles created as part of the restoration program for Tolay Lake Regional Park would also help mitigate impacts.

**Mitigation Measure 13c-Burrowing owl.** Trails and other park facilities should be located away from burrows occupied by burrowing owls. CDFG Guidelines (CDFG 1995) call for buffer widths of 250 feet during the breeding season (February – September 1) and 160 feet during the non-breeding season between disturbance and burrowing owl nests. Although no breeding activities were observed during this season, breeding could occur in the future. Prior to constructing trails, pre-construction surveys would be necessary to preclude impacts to burrowing owls and design mitigation measures.

**Mitigation Measure 13d-Other bird species.** California horned larks, grasshopper sparrows, and other ground nesting birds could nest virtually anywhere in the grassland areas of Tolay Lake Regional Park. Prior to constructing trails during the nesting season (before July 31), preconstruction surveys should be conducted to ensure that nests are not damaged. If nesting birds are observed within 50 to 100 feet of the proposed trail or park feature, then construction should be diverted to areas beyond the buffer until the young birds have fledged. The width of this buffer could vary based on recommendations by a qualified wildlife biologist depending on the circumstances at the nest.

**Adverse Impact 14: Human use of trails, picnic areas, vista areas, and other park facilities could alter habitat use and movement by wildlife.** Many species of wildlife are sensitive to the presence of humans. Locating trails and other facilities along riparian areas, at Pond 2, and other areas where there is cover used by wildlife could adversely affect wildlife use of those areas. Repeated use of trails or other park facilities in a particular area may reduce use of those areas by wildlife.

Riparian areas are known for their habitat value for migratory songbirds including use as nesting areas. Locating a trail within a songbird nesting area may result in disruption of breeding activity, and a reduction of the habitat value of the riparian woodlands.

**Mitigation Measure 14a.** Trails, picnic areas, and vista areas should be located to minimize disturbance to wildlife. Proposed restoration of a dense cover of shrubs would facilitate wildlife movement throughout the park, provide additional refuges for wildlife, increase wildlife use of the park, and increase the diversity of wildlife. This measure would offset impacts to wildlife that are dependent on cover provided by shrubs.

**Mitigation Measure 14b.** Impacts of trails in riparian habitat could be mitigated by habitat restoration at a minimum of 1:1 ratio. Widening and lengthening existing riparian habitat containing trails would further mitigate impacts.

## 5.5 PARK CENTER FACILITIES

**Adverse Impact 15: Special-status species of bats may be affected by the upgrade of the facilities at the Park Center.** Although bats were not observed at Tolay Lake Regional Park, several species of special-status bats are known from the general vicinity of the park and they could colonize existing buildings in the future. Bats, roosting in park buildings, could be killed or injured and roosting habitat adversely affected during renovation or demolition of park buildings .

**Mitigation Measure 15.** Surveys should be conducted for roosting bats prior to construction. If special-status bat species are found roosting in buildings that are proposed for construction or demolition, new roosting structures can be constructed and bats excluded from the existing roost.

**Adverse Impact 16: Potential impacts to barn owls could occur during the upgrading of buildings at the Park Center.** Barn owls occupy at least two structures at the Park Center and they remain present in the barn after being viewed by hundreds of visitors during the Fall Festival. Although nests were not observed, barn owls could nest there prior to the upgrade. Construction during the nesting season[1], at the Park Center could result in direct injury to eggs, young, or adult barn owls. Human activity close to an active nest could result in the abandoning of the nest. If an active nest is abandoned, then eggs and/or young would perish.

**Mitigation Measure 16.** Preconstruction surveys should be conducted in buildings suitable for roosting and nesting of barn owls. If barn owls are nesting, construction should be deferred on that structure until the young fledge.

## 5.6 CANNON LANE

**Adverse Impact 17: Road widening and construction of a turning lane onto Lakeville Highway would result in losses of jurisdictional wetlands along Cannon Lane.** Several watercourses cross Cannon Lane that support wetland vegetation. Road construction along Cannon Lane and Lakeville Highway would require filling of wetlands and watercourses. These could also cause addition of sediment into adjacent waterbodies and watercourses.

**Mitigation Measure 17.** The proposed restoration and creation of wetlands within Tolay Lake Regional Park may compensate for the loss of wetlands along Cannon Lane and Lakeville Road. In order to meet the "in kind" replacement regulatory requirement, creation of new watercourses may be required for some of the road improvement activities. Best management practices should be implemented during construction to minimize sedimentation.

**Adverse Impact 18: Road construction would require the removal of several large blue gum trees growing beside Cannon Lane.** The widening of Cannon Lane would result in the removal of blue gum trees which provide potential perching and nesting substrate for raptors. Removal of these trees during the nesting season could affect nesting birds.

**Mitigation Measure 18.** Proposed planting of native trees for oak and riparian woodland restoration would more than compensate for losses of non-native blue gum trees. Removal of the blue gum trees should be conducted outside of the nesting season of March through August, to avoid impacts to breeding birds.

[1] Note, barn owls can have a protracted breeding season.

## 5.7 FENCING AND GRAZING MANAGEMENT PROGRAM

**Beneficial Impact 6: Implementing the grazing management plan would have a beneficial effect on biological resources.** The grazing management plan will result in a beneficial impact to plants and wildlife because it is designed to enhance the biological resources of Tolay Lake Regional Park. Grazing will reduce thatch and weeds thereby encouraging native plants to compete with non-native species. The grazing management plan is also designed to enhance the wetlands by allowing grazing in the spring but excluding grazing in the summer, when cattle are attracted to wetlands. This would reduce the effects of trampling of the seeps and springs and improve the biological values of these wetlands. See the Rangeland Resources Study (LSA 2009) for more details.

**Adverse Impact 19: Installing fences, watering troughs, and other infrastructure related to the management of grazing could adversely affect biological resources.** Installing fences, water troughs, pipelines and other livestock facilities could impact native grasslands, wetlands, and special-status species. Impacts could include direct loss or displacement of habitat or indirect impacts due to livestock trampling.

> **Mitigation Measure 19.** Fences and water troughs should not be located in areas that would adversely affect biological resources. Water troughs should be located away from wetlands and other sensitive resources. See the Rangeland Resources Study (LSA 2009) for more details.

# 6.0 MANAGEMENT GUIDELINES AND RESTORATION RECOMMENDATIONS

The specific condition of the vegetation present at Tolay Creek Ranch prior to the arrival of Europeans is not known. Kuchler (1977) depicts the Tolay Lake region as grassland on the map of the *Natural Vegetation of California*. The current limited shrub and tree cover and the absence of stumps or logs at Tolay Lake Regional Park or Tolay Creek Ranch supports Kuchler (1977). In addition, Diablo Clay (underlain by calcareous fine-grained sandstone, clayey shale, and weathered siltstone) and Clearlake Clay (underlain by alluvium) are common soils of Tolay Lake Regional Park and primarily support grassland vegetation (USDA 1972). The Goulding-Toomes complex (underlain by metamorphosed basic igneous and weathered andesitic basalt for Goulding and andesitic basalt and volcanic breccia for Toomes) is less common than the Diablo soils, but also supports grassland (USDA 1972).

The woodland at Tolay Creek Ranch was probably never well developed and primarily, but not entirely, restricted to the drainages and rocky outcrop areas. For areas in the vicinity of Tolay Creek Ranch that formerly supported woodland, the loss of trees is likely the result of cutting and the subsequent grazing that reduce recruitment of new trees. Upon cessation of grazing, portions of the grasslands of Tolay Creek Ranch may become woodland as have portions of the East Bay hills. Nevertheless at Tolay Lake Regional Park oak woodland occurs along portions of Cardoza Creek and East Creek and at Tolay Creek Ranch, oak woodland occurs in the drainages and rocky outcrop areas. This pattern of oak woodland is characteristic of areas that had been formerly woodland and are currently heavily grazed. Upon cessation of grazing, the grasslands of Tolay Lake Regional Park may become woodland as have portions of the East Bay hills.

In particular, the shrub layer is most notably underdeveloped at the park due to historic land use practices of grazing and agriculture. Likewise the animals associated with mid-canopy and shrub habitats are least well represented at Tolay Lake Regional Park, compared to the presumably original natural condition. Planting sub-tree willow riparian corridors and creating the conditions for the regeneration of shrubs and other understory vegetation by release from grazing and/or prescribed grazing are the most immediate and practical restoration opportunities for Tolay Lake Regional Park, which would yield the greatest cost-to-benefit results. Restoration of this mid-level vegetation layer would produce substantial benefits in terms of native plant regeneration, enhancement of a large variety of wildlife dependent on shrub cover and foraging habitat, and aesthetic improvements.

Habitat restoration options can be categorized into short-term activities that can be implemented relatively rapidly and long-term activities that require detailed study and considerable financing. These short-term activities are those that tend to be relatively simple to implement and the long-term activities are those that are relatively complex.

Short-term restoration activities include the riparian plantings carried out by the volunteer group STRAW (Students and Teachers Restoring a Watershed) in two areas of the park. Restoration of the shrub component of the understory of riparian and oak woodlands, to provide cover for wildlife, is a

short-term activity that could occur by planting shrubs or by fencing selected areas. Installation of fencing around riparian areas for grazing management is also a relatively simple restoration and management measure that can be accomplished in the short-term with minimal funding for fence materials and volunteer labor. The grazing lessee could also provide labor with the incentive of a reduction in grazing fees. Examples of long-term restoration activities at Tolay Lake Regional Park include designing and implementing a program for the restoration of moist grasslands, restoring the bed and bank, natural meanders, and natural vegetation to the channelized watercourses, and repairing the spillways of Ponds 1 and 2.

This section was designed in conjunction with the recommendations of the Rangeland Resources Study (LSA 2009). Coordination with the Rangeland Resource Study was necessary to develop an implementation strategy for the restoration program to ensure that the recommendations of both plans are compatible especially with regard to grassland restoration, enhancing the populations of special-status species, restoration of oak woodlands and riparian areas, and control of invasive species. Many of the restoration actions that are discussed below involve ground-disturbing activities be they use of earth-moving equipment to re-contour selected watercourses or use of a trowel to plant acorns. Any ground-disturbing activity could potentially disturb cultural resources and the Cultural Resource Study (LSA 2008) provides treatment options to avoid or minimize impacts. Ground-disturbing activities will be avoided on sites known to contain sensitive cultural resources.

Ground-disturbing activities may also promote the colonization of an area by non-native species. A challenge for the success of restoration is maintaining non-natives at a low density. This is especially important for Tolay Lake Regional Park because of the large amount of bristly ox-tongue and other invasive species. Control of invasive species should be a part of the restoration activities.

## 6.1 RESTORATION OF SELECTED HABITATS

### 6.1.1 Oak Woodland

The Oak Grove on the East Ridge and oak woodland along Cardoza Creek (Figure 3a) do not show evidence of recent regeneration judging from the absence of seedlings and saplings (Steve Ehret pers. comm., LSA obs.). Coast live oak has been documented as not adequately regenerating in some areas because of a combination of factors including livestock and wildlife herbivory and competition with dense stands of non-native grasses (McCreary 2001). In addition, oaks may establish seedlings and saplings only during years with unusual weather conditions of summer moisture.

It is likely that oak woodland was never very abundant at Tolay Lake Regional Park based on the presence of Diablo, Clear Lake, and Goulding-Toomes complex soil types that usually support grassland. The Langier soils are underlain by rhyolite or rhyolitic tuff and support oak woodlands on a small portion of the East Ridge and on areas just east of Tolay Lake Regional Park. Establishing oak woodland at Tolay Lake Regional Park should therefore be done on a very limited scale.

Regeneration of oak woodlands should be monitored, and oaks planted if monitoring shows an absence of natural regeneration of new oak stands in drainages. Oak trees may be planted on slopes above watercourses, such as the upper reaches of both forks of Cardoza Creek to reduce slope failure and reduce sedimentation (Figure 7a). Eagle Creek and a few un-named watercourses also present opportunities for oak woodland creation along with some of the draws on the mid slope of the East

Ridge (Figure 7a). Cardoza Creek and Eagle Creek were selected for the restoration of Oak Woodland because small stands of oaks already occur along these creeks. The upper reaches of some of the un-named watercourses of the East Ridge were also selected to provide an increase in cover for wildlife. The entire reaches of these watercourses were not selected for oak woodland restoration in order to provide open creek side habitat which is also valuable.

Planting could be done using container plants or acorns. Management of livestock grazing as discussed in the Rangeland Resources Study (LSA 2009) should be implemented to encourage oak regeneration.

Sudden oak death (*Phytophthora ramorum*) is known from southern Sonoma County and may possibly colonize Tolay Lake Regional Park at some point in the future. Coast live oak exhibiting symptoms of sudden oak death were observed along Tolay Creek on Tolay Creek Ranch south of Tolay Lake Regional Park. If the coast live oaks were to become infected by sudden oak death, restoration should include establishing single-species stands of coast live oak, without an understory. Current research indicates that coast live oaks acquire sudden oak death from other species of plants (M. Garbelletto, pers. comm.) and a mixed stand of oaks and bays would result in the more resistant bays providing a reservoir for the pathogen and providing a way for the pathogen to infect oaks. The sudden oak death pathogen does not appear to be able to infect coast live oak trees from nearby coast live oak trees. Other species of nearby trees and shrubs are required for the pathogen to infect coast live oak.

### 6.1.2 Watercourses and Riparian Woodlands

Some of the watercourses at Tolay Lake Regional Park have been straightened (North Creek, Eagle Creek, and the upper reach of Tolay Creek). Restoration options could include re-contouring the entire straightened reaches of these watercourses, re-contouring small portions of these watercourses, or leaving the watercourses as straight ditches. Planting willow and cottonwood trees could be conducted in conjunction with any of these options.

Riparian woodlands occur along both Tolay Creek and Cardoza Creek with the riparian woodland corridor reaching its widest extent along the lower reach of Tolay Creek. The ideal restoration scenario would be to establish riparian vegetation along the entire length of Tolay Creek to the same width as the lower reach. This would require widening the channel and laying back the banks to make them less steep. Restoration of riparian woodland and associated stream channels could be conducted in the short-term or in the long-term depending upon the amount of earthwork needed for re-creating sinuous channels. The Rangeland Resources Study (LSA 2009) also addresses restoration of riparian areas.

**Short-Term Actions.**

- **Riparian Nodes.** The short-term restoration approach would entail planting a series of "restoration nodes" along Eagle, North, Cardoza, and Tolay creeks (Figures 6a and 6b). These nodes would serve to provide habitat and as sources of propagules for colonization of the unvegetated portions of the watercourses.

For example, each node could consist of 10 seedlings or willow cuttings planted 10 feet apart at elevations appropriate for establishing hydrophytic vegetation along a 100-foot long reach of stream. The nodes would be spaced 200 or more feet apart. For maximum biological value, the restoration approach should keep portions of the watercourse free of woody riparian cover to provide edge and open water habitat. Fencing would be necessary to protect the plantings from cattle unless grazing could be deferred in that management unit to allow for establishment. Substantial benefit to wildlife values of Tolay Lake Regional Park would occur as a result of establishing riparian vegetation in these drainages.

LSA recommends planting of riparian nodes as a high priority restoration alternative. Planting may be done in a phased manner with installation of only a few nodes each year.

- **Willow Pole Installation.** Another short-term restoration activity would entail installing willow poles in the semi-permanent drainages of the West Ridge. Willow poles would be placed at the edge of the perennially moist soil of selected reaches of several of the drainages of the West Ridge. The entire length of some drainages and some reaches of selected drainages would remain open to provide valuable herbaceous wetland habitat (Figure 7b). Grazing would be managed to allow the willow to grow without severe browsing.

  LSA recommends this alternative as the highest priority short-term restoration action at Tolay Lake Regional Park. We believe that the restoration of the West Ridge drainages as shown on Figure 7b would yield the greatest benefit to aesthetics, native plant regeneration, and wildlife habitat enhancement for the least relative cost.

**Long-Term Actions.**

- **Laying-down Channelized Banks.** A longer-term approach would entail laying down the banks along the straightened portion of Eagle and Tolay creeks to simulate the meanders that formerly existed in these drainages. That is, the banks would be re-contoured at selected locations, but the channel would be left unaltered. The creek channels would not be rerouted.

  The majority of Eagle Creek had been straightened but only a 1,000-foot section of Tolay Creek below the Farm Bridge had been straightened. Downstream of the straightened portion, Tolay Creek has been deepened, although some meanders appear to remain. Laying back the banks of this portion of Tolay Creek would allow the establishment of a wider band of riparian vegetation. Implementing the long-term approach for Tolay and Eagle creeks would not preclude the short-term approach for Cardoza Creek, North Creek, and the un-straightened portions of Eagle and Tolay creeks.

  A benefit of re-contouring these creeks would be the ability to establish a greater width of riparian vegetation on the banks of these creeks. Currently the banks are steep and would support a narrow width of riparian vegetation. The long-term approach would require engineering design and permitting for grading activities. A storage area for the excavated fill would need to be designated. Riparian nodes could then be planted along the recreated creek channels as described above.

  Re-contouring would cause major short-term impacts in terms of removal of existing riparian

vegetation, disruption of wildlife, aesthetic impacts associated with the construction project, compaction of soil from the introduction of heavy equipment, potential for the introduction of noxious weeds, pioneering of temporary construction access roads and lay-down areas, and down stream sedimentation.

- **Rerouting Straightened Channels.** The straightened creeks could be rerouting to approximate the original meanders. Careful consideration should be given to implementation of this restoration alternative in terms of costs and benefits. Alteration of existing channels is a major capital undertaking. This undertaking requires detailed hydrologic studies to determine design parameters and even to assess whether there would be hydrologic benefits as a result of the alterations.

  The environmental and financial costs of such an undertaking may not be justified by the benefits accrued. LSA recommends intermediate measures short of rerouting channels, particularly laying-down the banks of deeply incised streams but leaving the channel intact (above). There are major financial and environmental costs entailed in channel reconstruction. The alternative of only laying down the banks is less costly in all respects than channel reconstruction and would achieve comparable environmental benefits by extending the width of the riparian corridor.

- **Lake Shoreline Revegetation.** Riparian vegetation could also be planted along the Tolay Lake shoreline (Figure 7b). The western shore would be the best location for the trees because the steeper bank would allow the roots to be closer to water as the lake dries. Riparian species recommended for this area would be Fremont cottonwood, red willow, yellow willow, arroyo willow, sandbar willow, and California buckeye. The goal would be to establish a multi-layered canopy along the western edge of the lake. The top layer would consist of cottonwood trees, red and yellow willows would occupy the intermediate layer, and arroyo willow would compose the woody understory. Sandbar willow, arroyo willow, and California buckeye would also grow at the dryer edge of the riparian area. California blackberry and shrubs consisting of creeping snowberry, coffeeberry, and coyote brush would be planted as groundcover. Plantings should be discontinuous as shown on Figure 7b to allow for views of the lakes and to create a mosaic of habitat types for wildlife.

- **Fencing South Creek.** South Creek supports small but well developed stands of riparian vegetation although a shrubby understory is absent. Fencing the area around South Creek, from the rest of the West Ridge, will allow better management of grazing, thereby allowing the understory to become re-established.

### 6.1.3 Purple Needlegrass Grassland

Purple needlegrass grows in low density stands on the lower slopes of the West and East ridges. See the Rangeland Resources Study (LSA 2009) for details on restoration and management of these grasslands.

### 6.1.4 Moist Grasslands

Restoration of moist grasslands over much of the formerly cultivated low terraces east of the restored Tolay Lake shoreline would provide high value habitat, which is otherwise of limited extent, and would provide native cover to resist invasion by non-native weeds (Figures 6a and 6b). The wettest

areas could be restored to semaphore grass, rushes, and sedges. Drier areas could be restored to creeping wildrye, meadow barley, and California oat grass. Existing wetlands and native grasslands that occur within the moist grassland creation area (Figures 6a and 6b) would be enhanced by control of non-native species by managing the grazing or other means.

**Fill Drainage Ditches.** Existing drainage ditches should be filled in conjunction with the restoration of the moist grasslands (Figures 6a and 6b). The ditches had been excavated to drain soils in preparation for tillage when the property was being farmed. An increase in the extent and duration of soil saturation would increase the likelihood of success of restoring the moist grasslands.

**Bristly Ox-Tongue Control.** The fallow ungrazed fields on the low terraces east of Tolay Lake now support a dense growth of bristly ox-tongue, a noxious and invasive weed. The high density of ox-tongue is a source of abundant seeds that facilitate its spread onto adjacent grazed areas. Prior to restoring moist grasslands, bristly-ox tongue and other invasive weeds should be controlled. The Rangeland Resources Study (LSA 2009) describes in greater detail control of these weeds and methods of restoring and managing moist grasslands. The Cultural Resources Study (LSA 2008) discusses mitigation measures for any impacts of these techniques on cultural resources.

**Grazing Exclosures.** The effects of grazing should be examined by establishing fenced grazing exclosures in selected areas. In this manner, the vegetation in grazed and ungrazed plots could be compared. Monitoring of the grazing regime will help inform management strategies. Grassland monitoring and adaptive management concepts are described in greater detail in the Rangeland Resources Study (LSA 2009).

## 6.2 WILDLIFE ENHANCEMENT

### 6.2.1 California Red-legged Frog

**Bullfrog Control.** The value of California red-legged frog habitat is substantially reduced at Tolay Lake Regional Park due to the occurrence of bullfrogs. Because of the complexity of the habitats within the park, the large size of the park, and existing off-site bullfrog sources for recolonization, bullfrog control throughout the entire park is not recommended at this time. Nevertheless, removal of bullfrogs on a trial basis, from isolated ponds such as the Irrigation Pond, Old Duck Pond, and possibly the Stock Pond could provide insight on the effectiveness of bullfrog control and resulting breeding by California red-legged frogs. If bullfrog control is successful on a trial basis, then it could be expanded and ponds designed to support breeding habitat of California red-legged frogs could be constructed. Bullfrogs would be monitored yearly and controlled as appropriate, unless experience dictates otherwise.

**Habitat Enhancement.** California red-legged frogs can breed in seasonal waterbodies whereas bullfrogs require permanent waterbodies. Breeding ponds for California red-legged frogs should be shallow and seasonally inundated. Ponds could be created in the fallow fields on the low terraces among restored moist grasslands. Selected ponds could also be created adjacent to existing springs near Pond 2 and on the East Ridge. Spike rush and other shoreline vegetation should be established on the breeding ponds to provide cover for the frogs. An alternative approach is to not create any more habitats that did not naturally occur at Tolay Lake Regional Park (such as artificial ponds) and enhance suitable existing ponds for the reproduction of California red-legged frogs.

Grazing could be used to manage the vegetation of these breeding ponds. Year-round heavy grazing can virtually eliminate freshwater marsh and riparian vegetation reducing cover for frogs and increasing the likelihood of predation. Elimination of grazing, on the other hand, can result in dense stands of cattails that reduce habitat diversity. The optimal condition for red-legged frogs is a mosaic of open water, freshwater marsh, and riparian vegetation. This condition can be created by managing the timing and intensity of livestock grazing as described in the *Tolay Lake Rangeland Resources Study* (LSA 2009).

**Recommendation.** While bullfrog control may be undertaken on an experimental basis in selected locations at Tolay Regional Park (above), we recommend that this action be given a low priority. The bullfrog population both on the park property and adjacent to the park is enormous. Even if all the bullfrogs were temporarily eliminated on the park property, Tolay Creek would provide a ready corridor for re-infestation from neighboring properties. In short, the costs of bullfrog control would be very high and the likelihood of success would be very low.

A substantially more cost effective approach to encouraging California red-legged frogs is habitat enhancement. California red-legged frogs can co-exist with bullfrogs if there is a mosaic of wetland habitat types, especially seasonal wetlands that provide sufficient cover for the former species. Habitat enhancement is also more assured of implementation success than bullfrog control and has great ancillary benefits to other wildlife and plants.

### 6.2.2 Western Pond Turtle

Western pond turtles would use the larger and more permanent bodies of water such as Pond 1 and Pond 2. They would also be expected to use the restored Tolay Lake. Providing rafts or logs for sunning in the center or at the margins of Pond 1, Pond 2, and the restored Tolay Lake would improve basking areas and be of benefit to western pond turtles. Western pond turtles were also observed in large pools of Tolay Creek immediately downstream of Tolay Lake Regional Park.

### 6.2.3 Burrowing Owl

A few burrowing owls are regularly observed at Tolay Lake Regional Park in the vicinity of rock outcrops suitable for refuge. The park does not appear to be optimal breeding habitat which is perhaps due to climatic factors. Burrows suitable for nesting by burrowing owls are limited in extent at the park, in part due to the small numbers of California ground squirrels. The burrowing owls can use the burrows of other types of animals besides ground squirrels (such as foxes), and burrowing owls have been observed using holes in rock outcrops at Tolay Lake Regional Park. Creation of artificial burrows suitable for nesting by burrowing owls could be considered in the short-term. In the long-term, proper range management may encourage an increase in the number of ground squirrels, which create burrows that are used by burrowing owls.

### 6.2.4 Mammals

Tolay Lake Regional Park consists of extensive areas of grasslands that provide little woody cover. The shrubby understory vegetation of the oak and riparian woodland is virtually absent due to past

grazing practices. Cover is limited to a few stands of Himalayan blackberry and a limited amount of wetland vegetation in seeps, ditches, and ponds. Increasing cover would likely increase mammalian diversity and the abundance of raccoon, striped skunk, Virginia opossum, gray fox, and coyote. An increase of rabbits could also increase the numbers and diversity of predators at Tolay Lake Regional Park.

Increasing cover could be accomplished by fencing riparian to prevent grazing by cattle. The grazing program for the downstream portion of Tolay Creek, Cardoza Creek, Pond 1,Pond 2, and South Creek is designed to reduce channel erosion and increase woody understory and wetland vegetation (LSA 2009).

Tolay Lake Regional Park should be managed to allow the colonies of California ground squirrels to expand. This will increase the diversity of the grassland fauna that uses the squirrel burrows for refuge. California ground squirrels are also important prey species and may be important in maintaining predator diversity.

## 6.3 NON-NATIVE PLANT SPECIES CONTROL

A number of invasive non-native species occur in sufficient density at Tolay Lake Regional Park to warrant control. Target species are bristly ox-tongue, yellow star-thistle, purple star-thistle, medusahead grass, water smartweed, water primrose, Italian thistle, milk thistle, poison hemlock, and Himalayan blackberry. Of these noxious species, priority should be given to eradication of water primrose. In addition, both acacia and blue gum should be managed. Control of invasive species typical of grasslands (bristly ox-tongue, yellow and purple star-thistle, Italian thistle, milk thistle, and medusahead) are addressed in the Rangeland Resources Study (LSA 2009).

### 6.3.1 Water Primrose

**Background.** Water primrose is a perennial species that appears to grow only in the Duck and Willow ponds (Figure 7b). It began to grow in April or May and covered much of the surface of the Duck Pond by November 2006. In addition, it has recently colonized the Willow Pond (Ehret pers. comm.). Only a small area in the center of the Duck Pond remained free of vegetation. Water primrose is an emergent species with much of its biomass growing above the surface of the water.

Water primrose colonized the Duck Pond in 2004 (Marvin Cardoza pers. comm.). It should be controlled before it becomes inadvertently established in Tolay Creek and other areas of Tolay Lake Regional Park. It will displace native species and its decomposition will contribute to the eutrophication of waterbodies.

As an example at another location, the Laguna de Santa Rosa Foundation initiated a control program in 2005 in which they sprayed a glyphosate-based herbicide on water primrose (Sears et al. 2006, Laguna de Santa Rosa Foundation 2006). The treatment killed approximately 75 percent of the plants. The incomplete kill is believed in part to be due to incomplete application of the herbicide because of the dense growth of the plant. As a result, an earlier start date, June 15 instead of July 15 was scheduled for 2006 in order to treat the plant at a lesser density.

Herbicides were effective in areas of deep water and areas that had dried out. They were not effective in areas of shallow water (Meisler et al. 2008). In addition, mechanical equipment that was designed to scoop out the water primrose also proved to be an effective measure of control with spot spraying in areas where re-growth occurred.

**Recommended Control Measures.** Contol can be effected through mechanical or herbicidal means. The drawbacks of the mechanicl removal are the use of equipment in small and relatively shallow pools and the high cost of the mechanical equipment. The drawback of using herbicides is the uncertainty of the requirement for a permit from the North Coast Regional Water Quality Control Board (RWQCB). The RWQCB requires permits for application of certain herbicides in waters of the United States containing surface waters. It is unclear if permits are required when surface water is absent.

The input of spring water into the Duck Pond and Willow Ponds should be ceased until the water primrose is removed from the ponds. These two ponds should be allowed to naturally dry out. Pumping the ponds out may occur if surveys indicate that the California red-legged frog has not colonized either of these ponds. Once these ponds have dried, a survey for California red-legged frogs should be carried out if not previously completed.

The water primrose should be sprayed with a suitable herbicide after the ponds have thoroughly dried. Glyposhate and tryclopyr have been used in the Laguna de Santa Rosa (Meisler et al. 2008). Repeated treatments may need to occur to achieve complete control. The ponds should remain dry until control is achieved. If the water primrose were to reappear after the ponds are filled, then the ponds should be allowed to dry and treatments begun anew.

In conclusion, eradication of water primrose should be a high and immediate priority, because this plant is highly invasive and could spread beyond the Duck Pond to Tolay Creek. Once in the creek, it would be nearly impossible to control and would cause inestimable environmental damage. (See http://www.lagunadesantarosa.org/programs_rp_isc_lmp.shtml for the environmental damage water primrose is causing in the Laguna de Santa Rosa.)

### 6.3.2 Water Smartweed

Water smartweed is a perennial species that covered the surface of the dried bed of Tolay Lake when fallow in 2006 and Tolay Creek immediately below the lake (Figures 6a and 6b). It also occurs further downstream in Tolay Creek and upstream of Tolay Lake. Water smartweed grows from perennial roots in the late spring and is the dominant cover by the time that the lake is dry. It may grow so thickly as to inhibit the foraging of ducks in Tolay Lake.

Cultivation of the dried bed of Tolay Lake resulted in cutting the roots and spreading them throughout the lake bed. This contributed to the dominance of water smartweed within Tolay Lake. Because of its widespread distribution, it would be nearly impossible to remove water smartweed from Tolay Lake Regional Park.

Recommendations include monitoring the cover of water smartweed in Tolay Lake. If the cover of water smartweed impedes the use of the lake by wildlife, then treatment options should be considered. At least two options are available for control of water smartweed in Tolay Lake. The first option

would entail grazing Tolay Lake. Cattle could be provided with seasonal access to Tolay Lake in order to reduce the density of water smartweed. If cattle do not provide sufficient control, then a glyphosate-based herbicide could be used (cf. Midwest AquaCare [2006] and Texas A&M University [2006]).

### 6.3.3 Poison Hemlock

Poison hemlock grows in relatively small stands along the upper banks of Tolay Creek, along the bank of Eagle Creek, and possibly in other areas of Tolay Lake Regional Park. Poison hemlock typically excludes other species from occurring within its dense single-species stands. This weed tends to grow in areas that have been previously disturbed.

Recommendations would be to control by cutting in late spring. Because poison hemlock is an annual plant, removal just before seed set should result in a nearly complete control of the current year's growth. Follow-up control will be necessary until the residual seeds in the soil have been depleted.

### 6.3.4 Himalayan Blackberry

Himalayan blackberry grows most often in the understory of riparian areas where it forms an impenetrable stand among the lower branches and trunks of the willow trees. It also grows as compact stands in a few grassland areas and at the head of unvegetated watercourses. When in riparian situations, it dominates the understory, appears to spread, and may exclude other plant species. Himalayan blackberry, however, provides excellent cover for wildlife especially considering the relative absence of cover at Tolay Lake Regional Park.

Control could be by either hand removal or use of goats. Control should be phased such that alternative understory plant species would be established nearby prior to removal of a stand or portion of a stand of Himalayan blackberry. In this manner, cover would be maintained for wildlife. We recommend that control of Himalayan blackberry be given a low priority.

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## 7.3 PERSONAL COMMUNICATIONS

Sam Bacchini, Biological Consultant, EIP Associates, Sacramento, Conducted field work for Parson (1996)

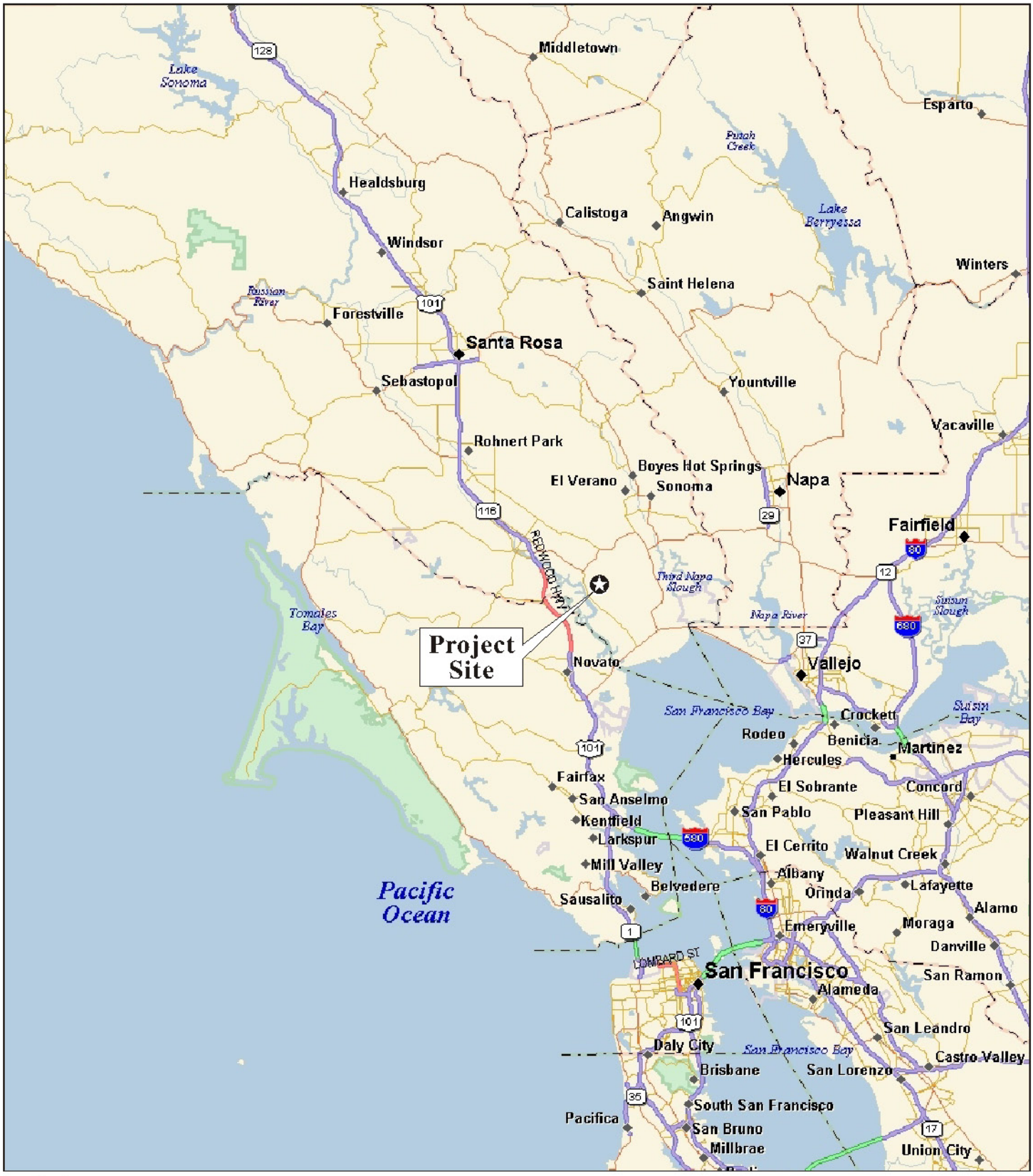
Marvin Cardoza, Rancher, Tolay Lake, California

Steve Ehret, Park Planner, Sonoma County Regional Parks, Santa Rosa, California

Matteo Garbelotto, Plant Pathologist, expert on Sudden Oak Death, University of California, Berkeley

Janet Thiessen, volunteer for The Raptor Project

# FIGURES




LSA

FIGURE 1

*Tolay Lake Regional Park*

Regional Location

N

0 10

MILES

SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

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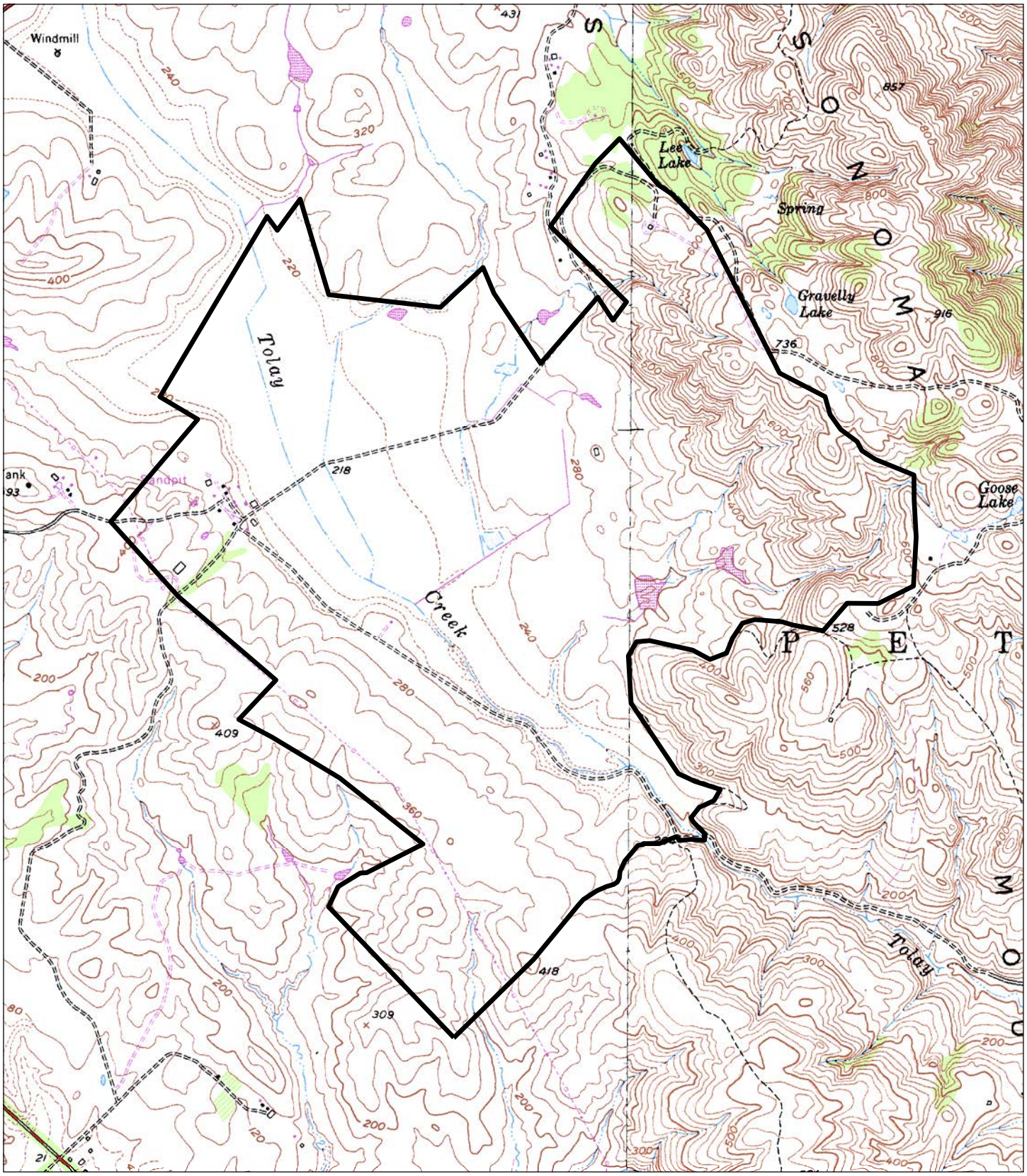


LSA

FIGURE 2

*Tolay Lake Regional Park*

Project Location

N

0 500 1,000 2,000

FEET

SOURCE: USGS 7.5-minute Topos Petaluma (1980) and Sears Point (1968).

I:\SOG0602\GIS\Maps\Figure2_Project Location.mxd (08/02/2006)

FIGURE 3a

# *Tolay Lake Regional Park*

## Biological Resources

- Johnny Jump-up
- Cream Cups
- Peridiridia sp.
- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment
- Red-tailed Hawk Nest
- Former Raptor Nest
- Burrowing Owl
- Western Pond Turtle
- California Red-legged Frog
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Project Boundary

0 400 800
Feet

1 inch equals 800 feet

LSA

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

North Creek
Oak Grove Fork
Eagle Creek
East Ridge
Cardoza Creek North Fork
Cardoza Creek Main Fork
Drainage Ditch
Pond 1
Irrigation Pond
East-West Drainage Ditch
Upland Pond/Spring Complex
Pond 2
Tolay Lake
North Creek
Eagle Creek
Old Duck Pond
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch

I:\SOG0602\GIS\Maps\Biological Resources\Figure3a-Biological Resources_north.mxd (02/23/2007)

North Creek
Eagle Creek
Old Duck Pond
Pond 2
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch
Tolay Lake
Farm Bridge
Park Center
Willow Pond
Duck Pond
Tolay Creek
Cardoza Creek
Tolay Creek
Stock Pond
West Ridge
Gate
South Creek

FIGURE 3b

# *Tolay Lake Regional Park*

## Biological Resources

- Johnny Jump-up
- Cream Cups
- Perideridia sp.
- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment
- Red-tailed Hawk Nest
- Former Raptor Nest
- Burrowing Owl
- Western Pond Turtle
- California Red-legged Frog
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Project Boundary

LSA

0 200 400 800
Feet

1 inch equals 800 feet

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

I:\SOG0602\GIS\Maps\Biological Resources\Figure3b_Biological Resources.mxd (02/23/2007)

FIGURE 4a

# *Tolay Lake Regional Park*

## Location of Selected Weeds and Erosion

Erosion

Weeds

Himalayan Blackberry *

Project Boundary

* From LSA field work and Circuit Rider Productions: Exhibit 3- Property Condition Report

0 400 800

Feet

LSA

1 inch equals 800 feet

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

*North Creek*
*Oak Grove Fork*
*Eagle Creek*
*East Ridge*
*Cardoza Creek North Fork*
*Cardoza Creek Main Fork*
*Drainage Ditch*
*Pond 1*
*Irrigation Pond*
*Upland Pond/Spring Complex*
*East-West Drainage Ditch*
*Pond 2*
*Tolay Lake*
*North Creek*
*Eagle Creek*
*Old Duck Pond*
*Cardoza Creek*
Matchline
Matchline
*Causeway*
*Drainage Ditch*

I:\SOG0602\GIS\Maps\Biological Resources\Figure4a-Location of Weeds&Erosion_north.mxd (02/23/2007)

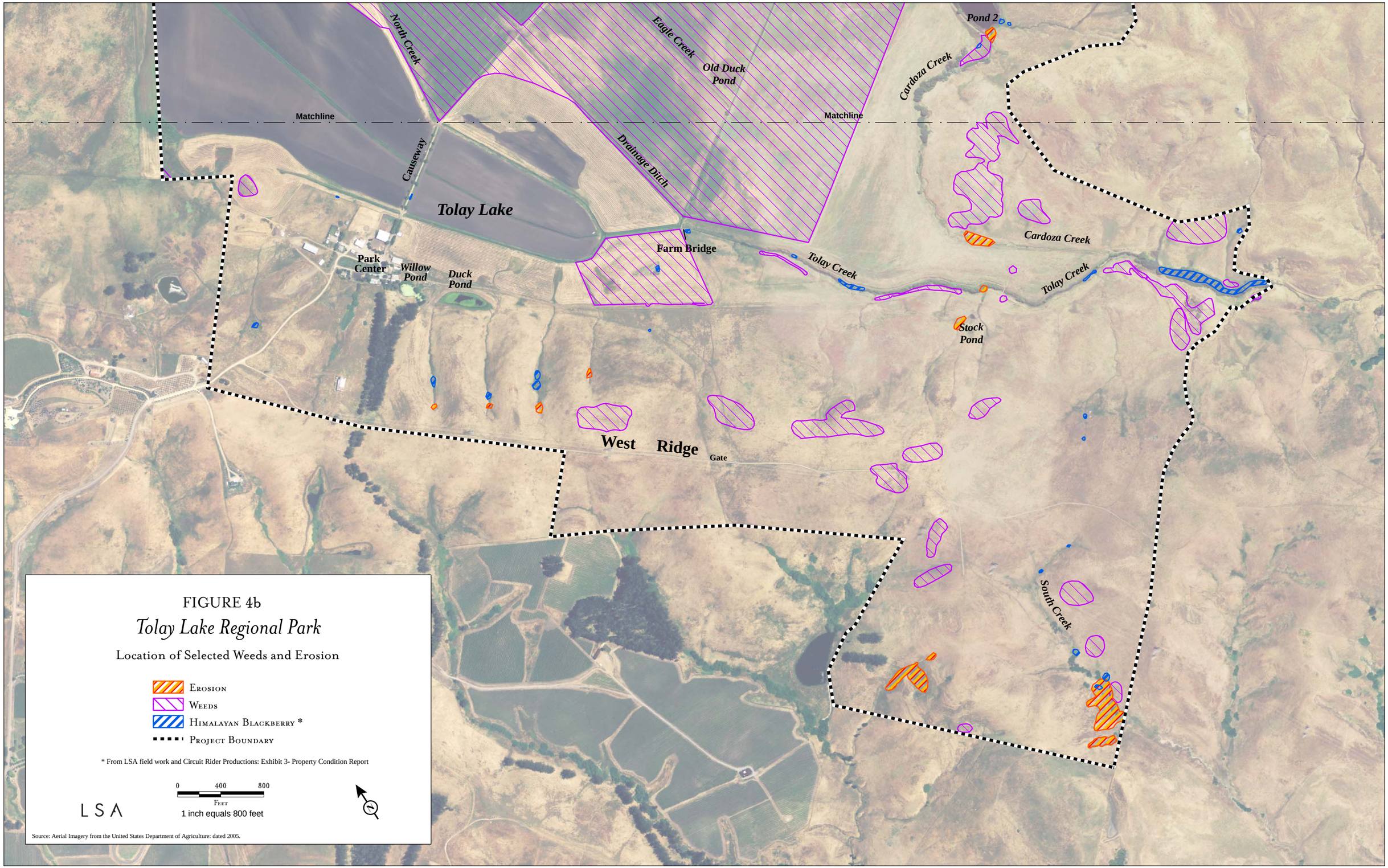


FIGURE 4b

# *Tolay Lake Regional Park*

## Location of Selected Weeds and Erosion

- Erosion
- Weeds
- Himalayan Blackberry *
- Project Boundary

* From LSA field work and Circuit Rider Productions: Exhibit 3- Property Condition Report

0 400 800

Feet

1 inch equals 800 feet

LSA

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

I:\SOG0602\GIS\Maps\Biological Resources\Figure4b_Location of Weeds&Erosion.mxd (02/23/2007)


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FIGURE 6a

# *Tolay Lake Regional Park*

Proposed Restoration Areas

**Biological Resources**

- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment

**Proposed Planting Areas**

- Moist Grassland Creation
- Oak Woodland Creation
- Willow Pole Installation
- Willow and Cottonwood Creation
- STRAW Planting Site
- Riparian Pasture Fence
- Drainage Ditch to be Filled
- Riparian Restoration at Nodes 200 Feet Apart
- Project Boundary

0 400 800
Feet

1 inch equals 800 feet

LSA

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

North Creek
Oak Grove Fork
Eagle Creek
East Ridge
Cardoza Creek North Fork
Cardoza Creek Main Fork
Drainage Ditch
Pond 1
Irrigation Pond
East-West Drainage Ditch
Upland Pond/Spring Complex
Pond 2
Tolay Lake
North Creek
Eagle Creek
Old Duck Pond
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch

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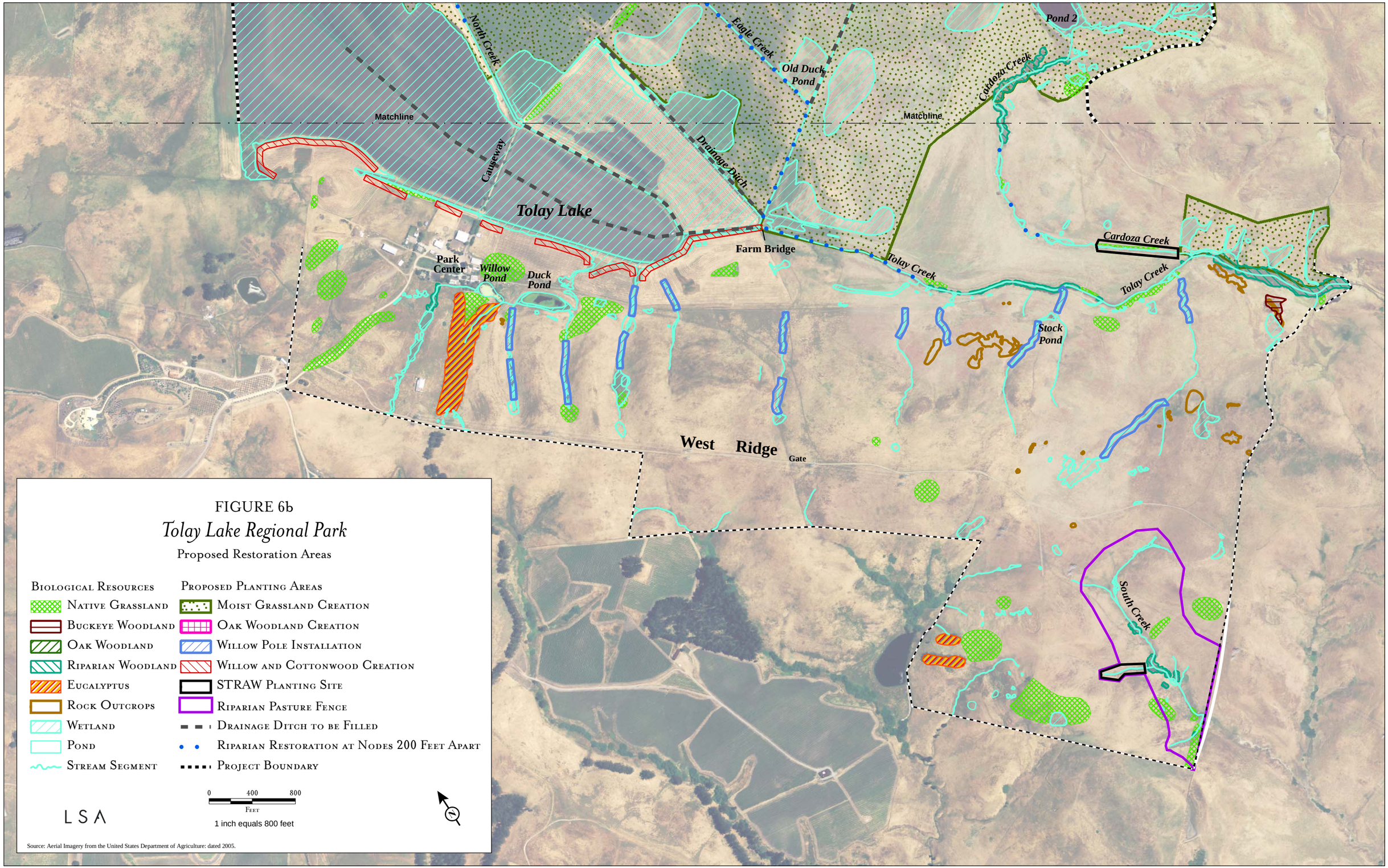



FIGURE 6b

*Tolay Lake Regional Park*

Proposed Restoration Areas

| Biological Resources | Proposed Planting Areas |
|---|---|
| Native Grassland | Moist Grassland Creation |
| Buckeye Woodland | Oak Woodland Creation |
| Oak Woodland | Willow Pole Installation |
| Riparian Woodland | Willow and Cottonwood Creation |
| Eucalyptus | STRAW Planting Site |
| Rock Outcrops | Riparian Pasture Fence |
| Wetland | Drainage Ditch to be Filled |
| Pond | Riparian Restoration at Nodes 200 Feet Apart |
| Stream Segment | Project Boundary |

0 400 800

Feet

1 inch equals 800 feet

LSA

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.

I:\SOG0602\GIS\Maps\Biological Resources\Figure6a-Restoration_north.mxd (02/20/2007)

# TABLES

## Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

| Family | Scientific Name | Common Name | Origin* |
|---|---|---|---|
| Alismataceae | *Alisma lanceolatum* | Water plantain | N |
| Amaranthaceae | *Amaranthus blitoides* | Prostrate pigweed | N |
| Amaranthaceae | *Amaranthus retroflexus* | Pigweed | I |
| Anacardiaceae | *Toxicodendron diversilobum* | Poison oak | N |
| Apiaceae | *Conium maculatum* | Poison hemlock | I |
| Apiaceae | *Eryngium armatum* | Armed coyote thistle | N |
| Apiaceae | *Lomatium sp.* | Biscuitroot | N |
| Apiaceae | *Osmorrhiza chilensis* | Sweetroot | N |
| Apiaceae | *Sanicula bipinnatifida* | Purple sanicle | N |
| Apiaceae | *Sanicula crassicaulis* | Pacific sanicle | N |
| Apiaceae | *Scandix pecten-veneris* | Venus' needle | I |
| Apiaceae | *Torilis arvensis* | Japanese hedge-parsley | I |
| Apiaceae | *Torilis nodosus* | Hedge-parsley | I |
| Asclepiadaceae | *Asclepias fascicularis* | Narrow-leaf milkweed | N |
| Asteraceae | *Achillea millefolium* | Yarrow | N |
| Asteraceae | *Achyrachaena mollis* | Blow wives | N |
| Asteraceae | *Agoseris grandiflora* | Agoseris | N |
| Asteraceae | *Anthemis cotula* | Mayweed | I |
| Asteraceae | *Artemisia douglasiana* | Mugwort | N |
| Asteraceae | *Baccharis pilularis* | Coyote brush | N |
| Asteraceae | *Carduus pycnocephalus* | Italian thistle | I |
| Asteraceae | *Centaurea calcitrapa* | Purple star-thistle | I |
| Asteraceae | *Centaurea solstitialis* | Yellow star-thistle | I |
| Asteraceae | *Chamomilla suaveolens* | Pineapple weed | I |
| Asteraceae | *Cirsium vulgare* | Bull thistle | I |
| Asteraceae | *Cotula coronopifolia* | Brass-buttons | N |
| Asteraceae | *Gnaphalium luteo-album* | Cudweed | I |
| Asteraceae | *Grindelia camporum* | Gumplant | N |
| Asteraceae | *Hemizonia congesta* var. *congesta* | Hayfield tarweed | N |
| Asteraceae | *Hesperevax sparsiflora* var. *sparsiflora* | Erect dwarf-cudweed | N |
| Asteraceae | *Hypochaeris radicata* | Hairy cat's ear | I |
| Asteraceae | *Lactuca serriola* | Prickly lettuce | I |
| Asteraceae | *Lasthenia californica* | California goldfields | N |
| Asteraceae | *Lasthenia glaberrima* | Smoth goldfields | N |
| Asteraceae | *Layia gaillardioides* | Tidy tips | N |
| Asteraceae | *Madia sativa* | Coast tarweed | N |
| Asteraceae | *Microseris douglasii* | Douglas microseris | N |
| Asteraceae | *Picris echioides* | Bristly ox-tongue | I |
| Asteraceae | *Senecio vulgaris* | Common groundsel | I |
| Asteraceae | *Silybum marianum* | Milk thistle | I |
| Asteraceae | *Soliva sessilis* | South American soliva | I |
| Asteraceae | *Sonchus oleraceus* | Common sow thistle | I |
| Asteraceae | *Taraxacum officinale* | Dandelion | I |
| Asteraceae | *Tragopogon porrifolius* | Oyster plant | I |
| Asteraceae | *Wyethia angustifolia* | Mule's ears | N |
| Asteraceae | *Xanthium spinosum* | Spiny clotbur | N |
| Asteraceae | *Xanthium strumarium* | Cocklebur | N |
| Boraginaceae | *Amsinckia menziesii* var. *menziesii* | Fiddleneck | N |
| Boraginaceae | *Heliotropium curassavicum* | Heliotrope | N |
| Boraginaceae | *Plagiobothrys nothofulvus* | Rusty popcornflower | N |
| Boraginaceae | *Plagiobothrys stipitatus* | Slender popcornflower | N |
| Brassicaceae | *Brassica nigra* | Black mustard | I |
| Brassicaceae | *Capsella bursa-pastoris* | Shepherd's purse | I |
| Brassicaceae | *Cardamine californica* var. *californica* | Toothwort | N |
| Brassicaceae | *Cardamine oligosperma* | Bitter-cress | N |

## Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

| Family | Scientific Name | Common Name | Origin* |
|---|---|---|---|
| Brassicaceae | *Lepidium nitidum* | Peppergrass | N |
| Brassicaceae | *Raphanus raphanistrum* | Jointed charlock | I |
| Brassicaceae | *Raphanus sativus* | Radish | I |
| Brassicaceae | *Rorippa curvisiliqua* | Winter cress | N |
| Brassicaceae | *Rorippa nasturtium-aquaticum* | Water cress | N |
| Brassicaceae | *Sinapis arvensis* | Charlock | I |
| Brassicaceae | *Sisymbrium officinale* | Hedge mustard | I |
| Callitrichaceae | *Callitriche sp.* | Water starwort | N |
| Caprifoliaceae | *Symphoricarpos mollis* | Creeping snowberry | N |
| Caryophyllaceae | *Cerastium fontanum* ssp.*vulgare* | Mouse-ear chickweed | I |
| Caryophyllaceae | *Cerastium glomeratum* | Mouse-ear chickweed | I |
| Caryophyllaceae | *Polycarpon tetraphyllum* | Four-leaved allseed | I |
| Caryophyllaceae | *Silene gallica* | Windmill pinks | I |
| Caryophyllaceae | *Spergularia rubra* | Sand-spurrey | I |
| Caryophyllaceae | *Stellaria media* | Common chickweed | I |
| Chenopodiaceae | *Atriplex triangularis* | Spearscale | N |
| Chenopodiaceae | *Chenopodium album* | Lamb's quarters | I |
| Convolvulaceae | *Calystegia subacaulis* | Morning-glory | N |
| Convolvulaceae | *Convolvulus arvensis* | Bindweed | I |
| Crassulaceae | *Crassula aquatica* | Pygmyweed | N |
| Crassulaceae | *Crassula connata* | Sand pygmyweed | N |
| Cucurbitaceae | *Marah fabaceus* | California man-root | N |
| Cuscutaceae | *Cuscuta* sp. | Dodder | N |
| Cyperaceae | *Carex* sp. | Sedge sp 1 | N |
| Cyperaceae | *Carex* sp. | Sedge sp 2 | N |
| Cyperaceae | *Cyperus eragrostis* | Nutsedge | N |
| Cyperaceae | *Eleocharis macrostachya* | Spikerush | N |
| Cyperaceae | *Scirpus acutus* var. *occidentalis* | Tule | N |
| Dipsacaceae | *Dipsacus fullonum* | Wild teasel | I |
| Driopteridiaceae | *Athyrium filix-femina* | Western lady-fern | N |
| Equisetaceae | *Equisetum arvense* | Common horsetail | N |
| Equisetaceae | *Equisetum laevigatum* | Narrow horsetail | N |
| Ericaceae | *Arbutus menziesii* | Madrone | N |
| Euphorbiaceae | *Chamaesyce* sp. | Rattlesnake weed | N |
| Euphorbiaceae | *Euphorbia peplus* | Petty spurge | I |
| Fabaceae | *Lathyrus* sp. | Wild pea | N |
| Fabaceae | *Lotus corniculatus* | Birdfoot trefoil | I |
| Fabaceae | *Lupinus nanus* | Sky lupine | N |
| Fabaceae | *Medicago polymorpha* | Californa burclover | I |
| Fabaceae | *Melilotus officinalis* | Yellow sweetclover | I |
| Fabaceae | *Melilotus indica* | Sourclover | I |
| Fabaceae | *Thermopsis macrophylla* | Yellow false lupine | N |
| Fabaceae | *Trifolium campestre* | Hop clover | I |
| Fabaceae | *Trifolium ciliolatum* | Tree clover | I |
| Fabaceae | *Trifolium depauperatum* | Dwarf sack clover | N |
| Fabaceae | *Trifolium dubium* | Little hop clover | I |
| Fabaceae | *Trifolium fragiferum* | Strawberry clover | I |
| Fabaceae | *Trifolium fucatum* | Sour clover | N |
| Fabaceae | *Trifolium hirtum* | Rose clover | I |
| Fabaceae | *Trifolium subterraneum* | Subterraneum clover | I |
| Fabaceae | *Trifolium variegatum* | Whitetip clover | N |
| Fabaceae | *Vicia sativa* ssp. *sativa* | Common vetch | I |
| Fagaceae | *Quercus agrifolia* var. *agrifolia* | Coast live oak | N |
| Fagaceae | *Quercus kelloggii* | Black oak | N |
| Gentianaceae | *Centaurium muehlenbergii* | Monterey centaury | N |

## Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

| Family | Scientific Name | Common Name | Origin* |
|---|---|---|---|
| Geraniaceae | *Erodium botrys* | Broad-leaf filaree | I |
| Geraniaceae | *Erodium cicutarium* | Red-stem filaree | I |
| Geraniaceae | *Erodium moschatum* | White-stem filaree | I |
| Geraniaceae | *Geranium dissectum* | Cut-leaf geranium | I |
| Geraniaceae | *Geranium molle* | Dove's foot geranium | I |
| Hippocastanaceae | *Aesculus californica* | California buckeye | N |
| Hydrophyllaceae | *Nemophila heterophylla* | Variable-leaf nemophila | N |
| Hydrophyllaceae | *Phacelia* sp. | Phacelia | N |
| Iridaceae | *Sisyrinchium bellum* | Blue-eyed-grass | N |
| Juncaceae | *Juncus balticus* | Baltic rush | N |
| Juncaceae | *Juncus bufonius* var. *bufonius* | Toad rush | N |
| Juncaceae | *Juncus effusus* | Soft rush | N |
| Juncaceae | *Juncus mexicanus* | Mexican rush | N |
| Juncaceae | *Juncus phaeocephalus* | Brown-headed rush | N |
| Juncaginaceae | *Lilaea scillioides* | Flowering quillwort | N |
| Lamiaceae | *Lamium purpureum* | Red dead-nettle | I |
| Lamiaceae | *Mentha pulegium* | Pennyroyal | I |
| Lamiaceae | *Stachys ajugoides* | Hedge nettle | N |
| Lauraceae | *Umbellularia californica* | California bay | N |
| Lemnaceae | *Lemna* sp. | Duckweed | N |
| Liliaceae | *Brodiaea elegans* | Harvest brodiaea | N |
| Liliaceae | *Chlorogalum pomeridianum* var. *pomeridianum* | Soap plant | N |
| Liliaceae | *Dichelostemma capitatum* | Blue dicks | N |
| Liliaceae | *Fritillaria liliacea* | Fragrant fritillary | N |
| Liliaceae | *Muilla maritima* | Common muilla | N |
| Liliaceae | *Triteleia hyacinthina* | Hyacinth brodiaea | N |
| Liliaceae | *Triteleia laxa* | Ithuriel's spear | N |
| Liliaceae | *Zigadenus fremontii* | Fremont's star lily | N |
| Limnanthaceae | *Limnanthes douglasii* | Meadowfoam | N |
| Lythraceae | *Ammannia coccinea* | Red ammannia | N |
| Lythraceae | *Lythrum hyssopifolium* | Hyssop loosestrife | I |
| Malvaceae | *Abutilon theophrastii* | Velvet-leaf | I |
| Malvaceae | *Malva nicaeensis* | Bull mallow | I |
| Malvaceae | *Sidalcea malvaeflora* | California checker mallow | I |
| Martyniaceae | *Proboscidea lutea* | Devil's claw | I |
| Moraceae | *Ficus carica* | Edible fig | I |
| Myrtaceae | *Eucalyptus globulus* | Blue gum eucalyptus | I |
| Onagraceae | *Camissonia ovata* | Sun cup | N |
| Onagraceae | *Clarkia* sp. | Fairyfan | N |
| Onagraceae | *Epilobium brachycarpum* | Willow herb | N |
| Onagraceae | *Ludwigia* sp. | Water-primrose | I |
| Papaveraceae | *Eschscholzia californica* | California poppy | N |
| Papaveraceae | *Platystemon californicus* | Creamcups | N |
| Plantaginaceae | *Plantago lanceolata* | English plantain | I |
| Plantaginaceae | *Plantago subnuda* | Naked plantain | I |
| Poaceae | *Avena barbata* | Slender wildoats | |
| Poaceae | *Avena fatua* | Wild oats | I |
| Poaceae | *Briza minor* | Little quaking grass | I |
| Poaceae | *Bromus diandrus* | Ripgut brome | I |
| Poaceae | *Bromus hordeaceus* | Soft chess brome | I |
| Poaceae | *Crypsis schoenoides* | Prickle grass | I |
| Poaceae | *Cynosurus echinatus* | Hedgehog dogtail | I |
| Poaceae | *Danthonia californica* | California oatgrass | N |
| Poaceae | *Elymus glaucus* | Blue wildrye | N |
| Poaceae | *Gastridium ventricosum* | Nit grass | I |

## Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

| Family | Scientific Name | Common Name | Origin* |
|---|---|---|---|
| Poaceae | *Holcus lanatus* | Common velvet grass | I |
| Poaceae | *Hordeum brachyantherum* | Meadow barley | N |
| Poaceae | *Hordeum marinum* var. *gussoneanum* | Mediterranian barley | I |
| Poaceae | *Hordeum murinum* ssp. *leporinum* | Hare barley | I |
| Poaceae | *Leymus triticoides* | Creeping wildrye | N |
| Poaceae | *Lolium multiflorum* | Italian ryegrass | I |
| Poaceae | *Nassella pulchra* | Purple needle-grass | N |
| Poaceae | *Paspalum dilatatum* | Dallis grass | I |
| Poaceae | *Phalaris aquatica* | Harding grass | I |
| Poaceae | *Phalaris paradoxa* | Canary grass | I |
| Poaceae | *Pleuropogon californicus* | Semaphore grass | N |
| Poaceae | *Poa annua* | Annual bluegrass | I |
| Poaceae | *Polypogon monspeliensis* | Annual beard grass | I |
| Poaceae | *Taeniatherum caput-medusae* | Medusa head | I |
| Poaceae | *Triticum aestivum* | Wheat | I |
| Poaceae | *Vulpia bromoides.* | Annual fescue | I |
| Poaceae | *Vulpia myuros* | Annual fescue | I |
| Polygonaceae | *Polygonum amphibium* ssp. *emersum* | Water smartweed | N |
| Polygonaceae | *Polygonum arenastrum* | Common knotweed | I |
| Polygonaceae | *Polygonum hydropiperoides* | Waterpepper | N |
| Polygonaceae | *Rumex acetosella* | Sheep sorrel | I |
| Polygonaceae | *Rumex conglomeratus* | Clustered dock | I |
| Polygonaceae | *Rumex crispus* | Curly dock | I |
| Polygonaceae | *Rumex pulcher* | Fiddle dock | I |
| Polypodiaceae | *Polypodium californicum* | California polypody | N |
| Portulacaceae | *Calandrinia ciliata* | Red maids | N |
| Portulacaceae | *Claytonia exigua* | Common montia | N |
| Portulacaceae | *Claytonia perfoliata* | Miner's lettuce | N |
| Portulacaceae | *Portulaca oleracea* | Common purslane | I |
| Primulaceae | *Anagalis arvensis* | Scarlet pimpernel | I |
| Primulaceae | *Centunculus minimus* | Chaffweed | N |
| Primulaceae | *Dodecatheon hendersonii* | Shooting star | N |
| Pteridiaceae | *Adiantum jordanii* | California maidenhair fern | N |
| Pteridiaceae | *Pentagramma triangularis* | Goldback fern | N |
| Ranunculaceae | *Ranunculus aquatilis* | Water buttercup | N |
| Ranunculaceae | *Ranunculus californicus* | California buttercup | N |
| Ranunculaceae | *Ranunculus lobbii* | Lobb's aquatic buttercup | N |
| Ranunculaceae | *Ranunculus muricatus* | Prickle-fruited buttercup | I |
| Ranunculaceae | *Ranunculus orthorhynchus* var.*bloomeri* | Strait-beaked buttercup | N |
| Rhamnaceae | *Rhamnus californica* | California coffeeberry | N |
| Rosaceae | *Aphanes occidentalis* | Western lady's mantle | N |
| Rosaceae | *Prunus* sp. | Ornamental plum | N |
| Rosaceae | *Rosa* sp. | Ornamental rose | N |
| Rosaceae | *Rubus discolor* | Himalayan blackberry | I |
| Rosaceae | *Rubus ursinus* | California blackberry | N |
| Rubiaceae | *Galium aparine* | Goose-grass | I |
| Rubiaceae | *Galium murale* | Tiny bedstraw | I |
| Rubiaceae | *Galium trifidum* | Sweet scented bedstraw | N |
| Rubiaceae | *Sherardia arvensis* | Field madder | I |
| Salicaceae | *Populus fremontii* ssp. *fremontii* | Fremont cottonwood | N |
| Salicaceae | *Salix exigua* | Narrow leaf willow | N |
| Salicaceae | *Salix laevigata* | Red willow | N |
| Salicaceae | *Salix lasiolepis* | Arroyo willow | N |
| Salicaceae | *Salix lucida* ssp. *lasiandra* | Yellow willow | N |
| Saxifragaceae | *Lithophragma* sp. | Woodland star | N |

## Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

| Family | Scientific Name | Common Name | Origin* |
|---|---|---|---|
| Scrophulariaceae | *Bellardia trixago* | Bellardia | I |
| Scrophulariaceae | *Castilleja attenuata* | Valley-tassels | N |
| Scrophulariaceae | *Castilleja exerta* | Purple owl's clover | N |
| Scrophulariaceae | *Kickxia elatine* | Fluellin | I |
| Scrophulariaceae | *Mimulus aurantiacus* | Bush monkeyflower | N |
| Scrophulariaceae | *Mimulus guttatus* | Common monkey-flower | N |
| Scrophulariaceae | *Parentucellia viscosa* | Parentucellia | I |
| Scrophulariaceae | *Scrophularia californica* ssp. *californica* | California figwort | N |
| Scrophulariaceae | *Triphysaria eriantha* ssp. *eriantha* | Butter-and-eggs | N |
| Scrophulariaceae | *Triphysaria pusilla* | Dwarf owl's clover | N |
| Scrophulariaceae | *Triphysaria versicolor* ssp. *faucibarbata* | Smooth owl's clover | N |
| Scrophulariaceae | *Veronica peregrina* | Purslane speedweed | N |
| Scrophulariaceae | *Veronica persica* | Persian speedwell | I |
| Typhaceae | *Typha* sp. | Cattail | N |
| Urticaceae | *Urtica dioica* ssp. *holosericea* | Hoary nettle | N |
| Urticaceae | *Urtica urens* | Dwarf nettle | I |
| Verbenaceae | *Phyla nodiflora* var. *nodiflora* | Garden lippia | N |
| Violaceae | *Viola pedunculata* | Wild pansy | N |
| Viscaceae | *Phoradendron villosum* | Mistletoe | N |

* Origin

N - Native Species

I - Introduced Species

**Table B: Animal Species Observed at Tolay Lake Regional Park in 2006***

| Common Name | Scientific Name |
|---|---|
| **AMPHIBIANS** | |
| Bullfrog | *Lithobates catesbeiana* |
| sierran treefrog | *Pseudacris sierra* |
| **REPTILES** | |
| Western fence lizard | *Sceloporus occidentalis* |
| Common garter snake | *Thamnophis sirtalis* |
| Ring-necked snake | *Diadophis punctatus* |
| **BIRDS** | |
| Canada goose | *Branta canadensis* |
| Gadwall | *Anas strepera* |
| American wigeon | *Anas americana* |
| Mallard | *Anas platyrhynchos* |
| Cinnamon teal | *Anas cyanoptera* |
| Northern shoveler | *Anas clypeata* |
| Northern pintail | *Anas acuta* |
| Green-winged teal | *Anas crecca* |
| Canvasback | *Aythya valisineria* |
| Greater scaup | *Aythya marila* |
| Bufflehead | *Bucephala albeola* |
| Ruddy duck | *Oxyura jamaicensis* |
| Wild turkey | *Meleagris gallopavo* |
| California quail | *Callipepla californica* |
| Pied-billed grebe | *Podilymbus podiceps* |
| Double-crested cormorant | *Phalacrocorax auritus* |
| Great blue heron | *Ardea herodias* |
| Great egret | *Ardea alba* |
| Snowy egret | *Egretta thula* |
| Turkey vulture | *Cathartes aura* |
| White-tailed kite | *Elanus leucurus* |
| Northern harrier | *Circus cyaneus* |
| Sharp-shinned hawk | *Accipiter striatus* |
| Cooper's hawk | *Accipiter cooperi* |
| Red-shouldered hawk | *Accipiter striatus* |
| Red-tailed hawk | *Buteo jamaicensis* |
| Golden eagle | *Aquila chrysaetos* |
| American kestrel | *Falco sparverius* |
| American coot | *Fulica americana* |
| Killdeer | *Charadrius vociferus* |

| Common Name | Scientific Name |
|---|---|
| Greater yellowlegs | *Tringa melanoleuca* |
| Western sandpiper | *Calidris mauri* |
| Least sandpiper | *Calidris minutilla* |
| Long-billed dowitcher | *Limnodromus scolopaceus* |
| Wilson's snipe | *Gallinago delicata* |
| Caspian tern | *Hydroprogne caspia* |
| Rock pigeon | *Columba livia* |
| Band-tailed pigeon | *Patagioenas fasciata* |
| Mourning dove | *Zenaida macroura* |
| Barn owl | *Tyto alba* |
| Great horned owl | *Bubo virginianus* |
| Burrowing owl | *Athene cunicularia* |
| Vaux's swift | *Chaetura vauxi* |
| Anna's hummingbird | *Calypte anna* |
| Rufous hummingbird | *Selasphorus rufus* |
| Allen's hummingbird | *Selasphorus sasin* |
| Nuttall's woodpecker | *Picoides nuttallii* |
| Downy woodpecker | *Picoides pubescens* |
| Northern flicker | *Colaptes auratus* |
| Willow flycatcher | *Empidonax traillii* |
| Black phoebe | *Sayornis nigricans* |
| Say's phoebe | *Sayornis saya* |
| Western kingbird | *Tyrannus verticalis* |
| Loggerhead shrike | *Lanius ludovicianus* |
| Hutton's vireo | *Vireo huttoni* |
| Warbling vireo | *Vireo gilvus* |
| Steller's jay | *Cyanocitta stelleri* |
| Western scrub-jay | *Aphelocoma californica* |
| American crow | *Corvus brachyrhynchos* |
| Common raven | *Corvus corax* |
| Horned lark | *Eremophila alpestris* |
| Tree swallow | *Tachycineta bicolor* |
| Violet-green swallow | *Tachycineta thalassina* |
| Northern rough-winged Swallow | *Stelgidopteryx serripennis* |
| Cliff swallow | *Petrochelidon pyrrhonata* |
| Barn swallow | *Hirundo rustica* |
| Chestnut-backed chickadee | *Poecile rufescens* |
| Oak titmouse | *Baeolophus inornatus* |
| Bushtit | *Psaltriparus minimus* |
| Brown creeper | *Certhia americana* |

| Common Name | Scientific Name |
|---|---|
| Bewick's wren | *Thryomanes bewickii* |
| House wren | *Troglodytes aedon* |
| Winter wren | *Troglodytes troglodytes* |
| Marsh wren | *Cistothorus palustris* |
| Ruby-crowned kinglet | *Regulus calendula* |
| Western bluebird | *Sialia mexicana* |
| Hermit thrush | *Catharus guttatus* |
| American robin | *Turdus migratorius* |
| Northern mockingbird | *Mimus polyglottos* |
| European starling | *Sturnus vulgaris* |
| Cedar waxwing | *Bombycilla cedrorum* |
| American pipit | *Anthus rubescens* |
| Orange-crowned warbler | *Vermivora celata* |
| Yellow warbler | *Dendroica petechia* |
| Yellow-rumped warbler | *Dendroica coronata* |
| Wilson's warbler | *Wilsonia pusilla* |
| Western tanager | *Piranga ludoviciana* |
| Spotted towhee | *Pipilo maculatus* |
| California towhee | *Pipilo crissalis* |
| Lark sparrow | *Chondestes grammacus* |
| Savannah sparrow | *Passerculus sandwichensis* |
| Grasshopper sparrow | *Ammodramus savannarum* |
| Fox sparrow | *Passerella iliaca* |
| Song sparrow | *Melospiza melodia* |
| Lincoln's sparrow | *Melospiza lincolnii* |
| White-throated sparrow | *Zonotrichia albicollis* |
| White-crowned sparrow | *Zonotrichia leucophrys* |
| Golden-crowned sparrow | *Zonotrichia atricapilla* |
| Dark-eyed junco | *Junco hyemalis* |
| Red-winged blackbird | *Agelaius phoeniceus* |
| Tricolored blackbird | *Agelaius tricolor* |
| Western meadowlark | *Sturnella neglecta* |
| Brewer's blackbird | *Euphagus cyanocephalus* |
| Brown-headed cowbird | *Molothrus ater* |
| Bullock's oriole | *Icterus bullockii* |
| House finch | *Carpodacus mexicanus* |
| Lesser goldfinch | *Carduelis psaltria* |
| American goldfinch | *Carduelis tristis* |
| House sparrow | *Passer domesticus* |
| **MAMMALS** | |

| Common Name | Scientific Name |
|---|---|
| Coyote | *Canis latrans* |
| Black-tailed deer | *Odocoileus hemionus* |
| California ground squirrel | *Spermophilis beecheyi* |
| California vole | *Microtus californicus* |
| Botta's pocket gopher | *Thomomys bottae* |
| Black-tailed jackrabbit | *Lepus californicus* |

* Observers = LSA Associates & Petaluma Wetlands Alliance

## Table C: Active Ingredients Subject to the Pesticide Injunction

2, 4-D
Acephate
Alachlor
Aldicarb
Atrazine
Azinphos-methyl
Bensulide
Bromacil
Captan
Carbaryl
Chloropicrin
Chlorothalonil
Chlorpyrifos
DCPA
DEF
Diazinon
Dicofol
Diflubenzuron
Dimethoate
Disulfoton
Diuron
Endosulfan
EPTC
Esfenvalerate
Fenamiphos
Glyphosate
Hexazinone
Imazapyr
Iprodione
Linuron
Malathion
Mancozeb
Maneb
Metam sodium
Methamidophos
Methidathion
Methomyl
Methoprene
Methyl parathion
Metolachlor
Molinate
Myclobutanil
Naled
Norflurazon
Oryzalin
Oxamyl
Oxydemeton-methyl
Oxyfluorfen
Paraquat dichloride
Pendimethalin
Permethrin
Phorate
Phosmet
Prometryn
Pronamide
Propanil
Propargite
Rotenone
Simazine
Strychnine
Telone (1,3-dichlorpropene)
Thiobencarb
Triclopyr
Trifluralin
Vinclozolin
Ziram

# APPENDIX 1

## BIRD SURVEY ANALYSIS, TOLAY LAKE REGIONAL PARK

## BIRD SURVEY ANALYSIS, TOLAY LAKE REGIONAL PARK

A dedicated and technically proficient group of about a dozen volunteer birders associated with Petaluma Wetland Alliance have regularly surveyed the Tolay Lake Regional Park for birds starting on April 15, 2006. They have conducted 28 surveys as of February 21, 2009, having made visits in every month of the year except August over the nearly three-year period. On each visit, the survey covers most of the property, but not all. All birds are identified to species and the number of individuals is tallied. Data are also recorded regarding weather conditions. Although there is some variation in the coverage of each survey, methodologically the visits are roughly comparable and scientifically valid.

The quality of the data is excellent. With a year or two more of surveys, the accumulated data should be used to develop a checklist of bird species with seasonal frequency of abundance information. The data are also extremely useful for park planning and conservation purposes. For example, introductions of new species can be tracked, such as the observation of Eurasian collared dove on September 23, 2007, and again on April 19, 2008. Special-status species such as grasshopper sparrow can be monitored. The data can also be mined to see what ordinarily common species, such as hermit thrush, are under-represented at the park due to marginal habitat conditions that could be enhanced, particularly bird species requiring mature trees or developed underbrush.

Table A compiles the results of these bird surveys. Number of species observed on each survey varied from 34 to 75. Number of individual birds counted on each survey varied from 419 to 5,204. Cumulatively, 149 species and 23,050 individuals have been observed.

Table B aggregates the data by species to give the frequency of abundance of birds observed. The five most frequently observed species in order of abundance were red-winged blackbird, European starling, western meadowlark, house finch, and Savannah sparrow. All of these species are birds that primarily forage in grasslands and marshlands, which are the two most abundant habitat types on Tolay Lake Regional Park.

Table C aggregates the data by relative seasonal abundance and by guilds. For the relative seasonal abundance analysis, the months of the year were joined in pairs; e.g., December with January and so forth. Then the number of birds counted in each monthly pair was added together and divided by the number of counts in that monthly pair to create an index of relative abundance. The six pairs of months roughly correspond to the following phenologies in the annual cycles of birds: April-May is the nesting season; June-July is the fledgling season; August-September is the post breeding season/migration season; October-November is the peak of migration for many non-resident birds; December-January is the beginning of the winter resident season; and February-March is end of the winter resident season and the beginning of the migratory season. Of course, the phenologies of some individuals and even species will differ in particulars from this generalized pattern.

Table C also groups the birds observed at Tolay Lake Regional Park by guilds, which are groupings of species using the same or similar habitats. Table D presents a summary of the data contained in Table C. The groups are necessarily broad but are designed to illustrate the relative seasonal abundances. The following guilds are delineated:

- The **forest, riparian, and brush guild** is generally composed of birds that are dependent on woody habitat from shrubs to mature trees for important phases of their life cycle, particularly for foraging and nesting.

- The **grassland guild** is generally composed of birds that forage primarily in grasslands. Some of these species also nest in grasslands. All the swallows were placed in this guild, even though some forage over forest and marsh as well; none of them nest in grass.
- The **raptor guild** is the most taxonomically parsimonious grouping, composed of hawks and falcons along with the turkey vulture.
- The **waterbird guild** is broken into marsh birds such herons and egrets, shorebirds such as sandpipers and plovers, and waterfowl and allies. The latter category includes ducks and geese along with gulls, a tern species, grebes, American coot, and belted kingfisher.

With the exception of marsh birds and shorebirds, each of the guilds is broken into two or three of the following seasonal categories: breeding/summer resident, migratory/winter resident, and year-round resident. These seasonal categorizations are based on the findings of the *Birds of Sonoma County California* (Bolander and Parmeter 2000) for the part of Sonoma County where Tolay Lake Regional Park is located. Some species, such as the European starling and the western meadowlark, are year-round residents, nesting in the park. But in the winter their numbers are greatly enhanced by migratory conspecifics. In the case of the starling and meadowlark, winter abundance is so disproportionately greater than in the breeding season that these birds were treated as migratory/winter residents.

Figures 1-4 graph the relative abundances of the four guilds. Among the forest, riparian, and brush guild birds, the most abundant are the year-round residents, although their numbers drop considerably in the nesting season (Figure 1). This drop suggests that suitable nesting habitat may be limited for some of these birds, many of which require mature trees or developed brush habitat. The breeding/summer resident birds, using forest, riparian, and brush habitat, have very low relative abundance in the winter, early spring, and fall as would be expected. But their breeding season numbers are not especially strong either, suggesting a paucity of suitable habitat for this group, which is composed mainly of neotropical migrants (i.e., bird species that winter in the neotropics).

Figure 2 illustrates the relative abundances of birds that comprise the grassland guilds. The largest group are the migratory/winter resident species with large numbers of migratory European starlings, western meadowlarks, and white-crowned and golden-crowned sparrows. The sparrow species may nest in Sonoma County, but mainly along the coast (Bolander and Parmeter 2000). Resident grassland birds, such as Savannah sparrow and Brewer's blackbird, are present year-round in moderate numbers with a slight depression in numbers during the breeding season. The grassland breeding/summer resident species, mainly swallows, peak as expected in the breeding season and into the summer. However, their numbers may be limited by the lack of suitable nesting habitat on-site.

Figure 3 illustrates the relative abundances of raptors. Tolay Lake Regional Park has an exceptionally healthy population of year-round resident raptors. Many forage in the grasslands and nest in the riparian and oak woodlands. Their numbers peak in the late summer/early fall augmented by migratory conspecifics coming down from the north. The more strictly migratory species are found on-site in relatively low numbers in the winter, early spring, and fall. The relatively low abundance of migratory raptors likely reflects mainly that these top predators occur at naturally low numbers, rather than lack of suitable habitat.

Figure 4 illustrates the relative abundances of birds that comprise the waterbird guilds. Both migratory and year-round resident waterfowl peak in February/March, but are virtually absent the rest of the year, reflecting the hydration period of Tolay Lake. Augmentation of the seasonal hydration of Tolay Lake could significantly increase waterfowl presence on-site. Shorebirds, which are primarily

migrants and winter residents, are present at low numbers primarily due to the limited amount of suitable habitat. The marsh bird group is dominated by the large number of red-winged blackbirds, especially in the fall and winter.

Figure 5 illustrates the relative abundance by season of all species and individuals. Both relative number of species and relative number of individuals track the same seasonal pattern at Tolay Lake Regional Park with high numbers in the winter, early spring, and fall and correspondingly low numbers in the latter part of the spring and through the summer, when the seasonal wetlands desiccate and many bird species migrate to the coast or to the north to breed.

Overall the data indicate a substantially rich avifauna at Tolay Lake Regional Park. Raptor populations are particularly strong. Waterfowl occur in large numbers when Tolay Lake is hydrated, but are limited by the seasonal nature of that waterbody. Enhancement of riparian, brush, and woody understory vegetation would likely increase the numbers of neotropical migrant breeding birds as well as year-round resident birds that use such habitat.

REFERENCE:

Bolander, G.L., and B.D. Parmeter. 2000. Birds of Sonoma County, California: An Annotated Checklist and Birding Gazetteer. Redwood Ornithological Society, Napa, CA. 155 pp.

**Table A: Bird Species Observed, Number of Individuals and Dates, Tolay Lake Regional Park, Sonoma County, California**

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Grebe, Horned | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | | |
| Grebe, Eared | | | | | | | | | | | | | | | | | 2 | 2 | | | | | | | | | | |
| Grebe, Pied-billed | 2 | 4 | | | | | | | 1 | 1 | | | | | | | 2 | 2 | | | | | | | | | | 1 |
| Pelican, Am. White | | | | | | | | | | | | | | 14 | 5 | | | | | | | | | | | | | |
| Cormorant, D.-cr. | | | | | | | | 3 | | 2 | | | | | | 2 | | 1 | | | | | | | 13 | | 3 | 1 |
| Heron, Great Blue | | 1 | 3 | 1 | | 2 | | | | | | 1 | 1 | 1 | | 4 | 1 | 1 | 1 | 1 | | 1 | | 2 | 2 | | 2 | 1 |
| Egret, Great | | | 1 | | 2 | 3 | 3 | 1 | | 5 | 2 | | | 1 | 3 | 1 | 1 | | 3 | 5 | 3 | 2 | 3 | 2 | 1 | | 1 | 2 |
| Heron, Green | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Heron, Bl.-cr. Night | | | | | | | | | | | | 1 | | | | | | | | | | 4 | 1 | 1 | | | | |
| Goose, Canada | 7 | 5 | 26 | 6 | | 238 | 10 | 10 | | 8 | | | | | 8 | 9 | 29 | 22 | | 4 | | | | | | 12 | 30 | 133 |
| Goose, Gr. White-fr. | | | | | | 2 | | | | | | | | | | | | | | | | | | | | | 4 | 8 |
| Duck, Wood | | | | | | | | | | | | | | | | 4 | | | | | | | | | | | | |
| Mallard | 9 | 12 | | 1 | | 5 | 18 | 11 | 4 | 14 | 1 | 7 | | 14 | | 6 | 12 | 22 | 14 | 18 | 1 | 5 | 5 | 5 | | 11 | 21 | 40 |
| Gadwall | 10 | 7 | | | | 5 | | 3 | 2 | 6 | | | | | | 4 | 18 | 3 | 3 | 4 | | | | | | | | 38 |
| Pintail, Northern | 2 | | | | | | | 1 | | | | | | | | | 241 | 9 | 1 | | | | | | | | 1 | 87 |
| Wigeon, American | 8 | | | | | | | | | | | | | | | | 60 | 83 | 2 | | | | | | | | 2 | 306 |
| Shoveler, Northern | 1 | 3 | | | | | | 126 | | 1 | | | | | | | 36 | 10 | | | | | | | | | | 4 |
| Teal, Cinnamon | 2 | 1 | | | | | | 4 | 3 | 4 | | | 1 | 1 | | | 3 | 13 | 6 | 8 | | | | | | | | 9 |
| Teal, Blue-winged | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Teal, Green-winged | 2 | | | | | | | 12 | | | | | | | | | 19 | 27 | 2 | | | | | | | | 1 | 38 |
| Canvasback | | | | | | | | | | | | | | | | | 40 | | | | | | | | | | 1 | 55 |
| Scaup, Greater | 2 | | | | | | | | | | | | | | | | 5 | 1 | | | | | | | | | 6 | |
| Scaup, Lesser | | | | | | | | | | | | | | 5 | | 10 | | | | | | | | | | | | |
| Bufflehead | 12 | 1 | | | | | | 2 | | | | | | | | 7 | 37 | 30 | | | | | | | | | 1 | 56 |
| Merganser, Com. | | | | | | | 1 | | | | | | | | | 4 | | | | | | | | | | | 2 | 2 |
| Duck, Ring-necked | | | | | | | | | | | | | | | | | 100 | 2 | | | | | | | | | | 21 |
| Duck,Ruddy | | | | | | | | | | | | | | | | | 76 | 41 | | | | | | | | | | 22 |
| Vulture, Turkey | 1 | 1 | 8 | 4 | 4 | 10 | | 9 | 5 | 16 | 4 | 3 | 8 | 4 | 6 | 2 | 19 | 3 | 7 | 10 | 1 | 6 | 11 | 13 | 1 | 2 | 10 | 6 |
| Harrier, Northern | 0 | 0 | 3 | 4 | 4 | 6 | 3 | 1 | 1 | | 1 | 3 | 10 | 8 | 8 | 8 | | | | | | | 3 | 3 | 5 | 4 | 7 | 2 |
| Kite, White-tailed | 0 | 0 | 2 | 7 | 4 | 5 | 7 | 5 | | 1 | | 12 | 25 | 7 | 17 | 5 | 4 | 3 | | | | 2 | 1 | 6 | 3 | 4 | 4 | 3 |
| Hawk, Sharp-shin. | | | 2 | | | | | | | | | | | | 2 | | | | | | | | | 1 | 2 | | | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Hawk, Cooper's | | | | | | | | | 1 | 1 | | | | | 3 | 1 | 1 | | | | 1 | | 2 | | 1 | 1 | 1 | 2 |
| Hawk, Red-sh. | 1 | 0 | | 4 | | 1 | | 1 | | | 1 | 2 | 9 | 1 | 3 | 3 | | 2 | | | 2 | | 2 | 3 | 1 | | 3 | 5 |
| Hawk, Swainson's | | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | |
| Hawk, Red-tailed | 2 | 1 | 7 | 3 | 9 | 6 | 3 | 4 | 4 | 11 | | 2 | 15 | 12 | 11 | 6 | 6 | 7 | 4 | 4 | 1 | 10 | 10 | 7 | 6 | 9 | 10 | 6 |
| Hawk, Ferruginous | | | | | 1 | | | | | | | | | | 1 | | | 1 | | | | | | | 1 | 2 | 1 | |
| Hawk, Rough-leg. | | | | | | 1 | | | | | | | | | 1 | 1 | | 1 | | | | | | | 2 | 2 | 2 | 1 |
| Eagle, Golden | | | | | | | | 1 | | | | 1 | | 3 | 2 | 2 | 2 | | | | 2 | | 1 | | 2 | | 1 | |
| Osprey | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Merlin | | | | | | | 1 | | | | | | | | | | | 2 | | | | | | | | | 1 | 1 |
| Kestrel, American | 1 | 2 | 6 | 6 | 7 | 6 | 9 | 1 | | | | 7 | 9 | 5 | 6 | 11 | 4 | 4 | 3 | | 1 | 4 | 7 | 5 | 5 | 8 | 9 | 4 |
| Falcon, Prairie | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | |
| Falcon, Peregrine | | | | | 1 | 1 | | | 1 | | | | | | | | | 1 | | | 1 | | | 2 | | | | |
| Quail, California | 0 | 9 | | 16 | 6 | | 8 | 19 | 20 | 15 | 12 | 14 | 26 | | 4 | | 8 | 13 | 11 | 20 | 18 | 15 | 2 | 20 | 66 | | 37 | 6 |
| Pheasant, Ring-n. | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Turkey, Wild | | 1 | | | 1 | | | | | | | | | | | | | | 7 | | | 3 | 15 | | 10 | | | |
| Moorhen, Common | | | | 1 | | | | | | 2 | | 3 | 2 | 1 | | | | | | | | 3 | | | | 1 | | |
| Coot, American | 14 | 34 | | | | 2 | | 28 | 5 | 3 | | 1 | 1 | 3 | | 4 | 150 | 225 | 18 | | | | | 1 | | | | 16 |
| Sora | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| Killdeer | 5 | 7 | 14 | 86 | 58 | 20 | 10 | 2 | 1 | 5 | 2 | 12 | 6 | 1 | 26 | 14 | 9 | 1 | 6 | 2 | 3 | 2 | 4 | 21 | 17 | 8 | 119 | 6 |
| Yellowlegs, Greater | 3 | 1 | | | | | | 2 | 1 | | | | | | | | 1 | 1 | 7 | | | | | | | | | |
| Curlew, Long-billed | | | | | | 1 | | 1 | 3 | | | | | | | 5 | | | | | | | | | | 16 | 10 | 10 |
| Sandpiper, West. | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sandpiper, Least | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dowitcher, Long-b. | 5 | 119 | | | | | | | | | | | | | | | 9 | | 15 | | | | | | | | | 14 |
| Snipe, Wilson's | | | | | | | | 9 | | | | | | | | | 1 | 4 | 5 | | | | | | | 1 | 2 | 3 |
| Gull, Glaucous-w. | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Gull, California | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | 1 | |
| Tern, Caspian | | 1 | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| Dove, Mourning | 4 | 0 | 3 | 4 | 14 | 2 | | | 7 | 18 | 19 | 18 | 1 | 1 | 2 | 2 | | | 7 | 19 | 16 | 16 | 4 | 5 | 11 | | 4 | 2 |
| Dove, Eurasian Co. | | | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | | | |
| Pigeon, Rock | 8 | 8 | 14 | 15 | 9 | 2 | | 12 | 7 | 3 | | | | 2 | | 1 | 14 | 4 | 3 | 7 | 7 | 1 | | 13 | 12 | 1 | 7 | 3 |
| Pigeon, Band-t. | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 1 | |
| Owl, Barn | 2 | 2 | 3 | 4 | 2 | 2 | 2 | | | 2 | 1 | 7 | 9 | 4 | 3 | 1 | 2 | 3 | 1 | | 2 | 2 | 2 | 1 | 2 | | 2 | 1 |
| Owl, Great Horned | 1 | | 2 | 1 | | | 2 | 1 | 1 | 1 | | 4 | | | | 1 | | 1 | | 2 | | 6 | 1 | 4 | 1 | 1 | 2 | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Swift, Vaux's | | | 2 | | | | | | | | | | | 10 | | | | | | | | | | | | | | |
| Humming., Allen's | 2 | 4 | | | | | | 5 | 3 | | 2 | 1 | | | | | | 1 | 7 | 4 | | 1 | | | | | | 1 |
| Humming., Rufous | 1 | | | | | | | 1 | 4 | 1 | | | | | | | 1 | 1 | | | | | | | | | | |
| Humming., Anna's | 7 | 12 | 2 | | 1 | 1 | 7 | 16 | 5 | 2 | 1 | 2 | 1 | 2 | 2 | | 5 | 3 | 7 | 1 | 2 | | 2 | 5 | 2 | 3 | 7 | 2 |
| *Selasphorus* sp. | | | | | | | | | | | | | | | | | | 4 | | | | | | | | | | |
| Kingfisher, Belted | | | | | | | | | | | | 1 | | | | | 1 | | | | | | 1 | | | | | |
| Woodpecker, Acorn | | | | | | 1 | | | | | | 1 | | | | | | 3 | 1 | | 4 | | 2 | | 4 | | 5 | 4 |
| Sapsucker, Red-br. | | | | | | | | | | | | | | | | | | | | | | | 1 | | 1 | | | 1 |
| Woodpeck., Downy | | | 1 | 4 | | | | | | | 1 | | 3 | 2 | | 1 | | | 1 | | 2 | 1 | 1 | 1 | | | | 1 |
| Woodpeck., Hairy | | | | | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | |
| Woodpeck., Nuttall's | 2 | 1 | | 1 | | | | | 1 | 3 | | 2 | 4 | 3 | 3 | 1 | 1 | 2 | 5 | 2 | 4 | 2 | 9 | 2 | 1 | 1 | 4 | 2 |
| Flicker, Northern | | | | | 4 | 11 | 3 | 1 | | | | 1 | | 1 | 7 | 10 | 8 | 19 | 1 | 1 | 1 | | 1 | 3 | 8 | 7 | 17 | 6 |
| Flycatcher, Olive-s. | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Wood-Pewee, W. | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | | | | | |
| Flycatcher, Pac. S. | | | | | | | | | | 1 | | | | 1 | | | | | | | 1 | | 3 | | | | | |
| Flycatcher, Willow | | | 1 | 1 | | | | | | | | | 1 | | | | | | | | | | 1 | | | | | |
| Flycatcher, Least | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| Phoebe, Black | 3 | 2 | 11 | 10 | 6 | 6 | 2 | 6 | 4 | 2 | 12 | 6 | 16 | 5 | 14 | 9 | 1 | 1 | 5 | 4 | 4 | 29 | 10 | 22 | 7 | 2 | 10 | 3 |
| Phoebe, Say's | | | 10 | 10 | 11 | 4 | 2 | | | | | | | 9 | 8 | 10 | 5 | 1 | | | | | 3 | 12 | 5 | 4 | 7 | 2 |
| Flycatcher, Ash-thr. | | | | | | | | | | | | 2 | | | | | | | 4 | | 1 | 3 | | | | | | |
| Kingbird, Western | 2 | 1 | | | | | | 3 | | 1 | 2 | 7 | 1 | | | | | | 5 | 11 | 3 | 2 | | | | | | |
| Shrike, Loggerhead | | | | 5 | 1 | 2 | | | 1 | 2 | | 2 | 2 | | 1 | 3 | 2 | 1 | 2 | | 2 | 4 | 1 | 3 | 4 | 4 | 2 | 2 |
| Vireo, Warbling | | | 1 | | | | | | | | | | | 1 | | | | | | | | 2 | 1 | | | | | |
| Vireo, Hutton's | | | 1 | | 1 | | | | | | | | 2 | | 1 | 1 | | | | | | | | | 1 | 1 | | |
| Jay, Steller's | | | | | | 5 | | | | 5 | | 8 | | 2 | | 3 | 3 | 3 | 2 | | 2 | | 5 | | 5 | | 12 | 4 |
| Scrub-Jay, Western | | | 2 | | 5 | 8 | 5 | | | | 4 | 5 | 9 | 1 | 3 | 9 | 3 | 3 | | 4 | 5 | 5 | 3 | 4 | 3 | 2 | 6 | 2 |
| Raven, Common | 4 | 4 | 4 | 10 | 21 | 10 | 11 | 3 | 5 | 10 | 4 | 7 | 8 | 2 | 25 | 12 | 5 | 11 | 5 | 9 | 7 | 9 | 4 | 19 | 6 | 13 | 18 | 4 |
| Crow, American | 2 | 1 | 1 | 1 | 5 | 5 | 1 | 1 | | 2 | | 3 | | 6 | 12 | 2 | | 6 | 3 | 18 | 3 | | | 3 | 1 | 9 | 11 | 5 |
| Lark, Horned | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Swallow, N. R.-w. | 1 | 4 | | | | | | | | | | | | 2 | | | | | | | | | | | | | | |
| Swallow, Violet-gr. | 23 | 5 | 54 | 2 | | | | 10 | 3 | 31 | 3 | 24 | | 24 | | | 1 | | 35 | | 17 | 1 | 23 | 14 | | | | |
| Swallow, Tree | 9 | 40 | 20 | | | 12 | | 8 | 30 | 2 | 3 | 11 | | | | | 2 | 24 | 29 | 55 | 19 | 43 | 8 | | | 2 | | 1 |
| Swallow, Cliff | 70 | 80 | | | | | | | 52 | 70 | 25 | 66 | | | | | | | 72 | 75 | 60 | 4 | | | | | | |
| Swallow, Barn | | 241 | 5 | 3 | 1 | | | 72 | 20 | 19 | 19 | 41 | 18 | 5 | | | | | 18 | 90 | 35 | 31 | 13 | | | | | |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Titmouse, Oak | | | | | | | | | | | | 4 | | 3 | | 2 | 2 | 1 | 3 | | 7 | | | | 2 | | 8 | 1 |
| Chickadee, Ch.-b. | | | | | | | | | | 2 | | | 3 | | | | 2 | | 2 | | 4 | 1 | 1 | | 3 | | | |
| Bushtit | 1 | | | 15 | 45 | 3 | | | 5 | 4 | 7 | 5 | | | | 20 | 21 | 2 | 3 | 16 | 1 | 3 | 20 | 25 | 24 | 7 | 59 | 5 |
| Nuthatch, Wh.-br. | | | | | | 1 | | | | | | | | | | 1 | 2 | 3 | 3 | | 2 | | 4 | | 2 | | 2 | 1 |
| Creeper, Brown | | | | | | | | | | | | | | 1 | | | | | | | | | | | 2 | 2 | 4 | 1 |
| Wren, Bewick's | | | | 1 | 3 | | | | | 1 | | | 2 | 1 | | 1 | 2 | 2 | 4 | | 2 | | | | | | 4 | 2 |
| Wren, House | | | 1 | 2 | | | | 1 | | 2 | | 12 | | | 1 | | | 1 | 3 | 3 | 3 | | | | | 2 | | |
| Wren, Marsh | | | | 2 | | | | | | | | 1 | | | 1 | | | | | | | | | | | | 1 | |
| Kinglet, Golden-cr. | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| Kinglet, Ruby-cr. | | | | | 6 | 6 | | | | | | | | 1 | 2 | | | 3 | | | | | | | 6 | 2 | 1 | 2 |
| Bluebird, Western | 9 | 5 | 2 | 2 | 14 | 19 | 15 | | 1 | 1 | | 10 | 19 | 17 | 5 | | 6 | 13 | 12 | 20 | 12 | 5 | 14 | 28 | 24 | 7 | 9 | 18 |
| Robin, American | 3 | 3 | | | | 5 | 26 | | 3 | | | 2 | 1 | | 1 | 2 | 4 | 6 | 11 | 8 | 6 | 8 | | | 16 | 3 | 3 | 12 |
| Varied Thrush | | | | | | | | | | | | | | | | | | | | | | | | | | | 30 | 22 |
| Thrush, Hermit | | | | | | | 2 | | | | | | | | | 1 | 1 | 2 | | | | | | | 1 | 1 | | |
| Mockingbird, N. | 1 | 1 | 3 | 2 | 4 | | | 2 | | 1 | | 6 | 4 | | 2 | | | 1 | | 1 | | | 2 | 6 | | | 1 | |
| Starling, European | 15 | 12 | 9 | 63 | 64 | 978 | 169 | 27 | 12 | 15 | 24 | 6 | 21 | 47 | 4249 | 3 | 20 | 25 | 24 | 15 | 21 | 15 | 605 | 51 | 101 | 16 | 73 | 102 |
| Pipit, American | | | | | 1 | 1 | | | | | | | | | 94 | 7 | | | | | | | | | 25 | | 5 | |
| Waxwing, Cedar | | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Warbler, Or.-cr. | | | | 1 | | | | | 1 | 1 | | | | | | | | | 5 | | | | | | | | | |
| Warbler, Yellow | | | 3 | 2 | | | | | | | | | | 1 | | | | | | | | | 3 | 1 | | | | |
| Warbler, Yellow-r. | 6 | | | | 11 | 6 | 4 | | | | | | | | 12 | 3 | 3 | 11 | 3 | | | | 3 | 1 | 12 | 2 | 5 | 11 |
| Warbler, Towns. | | | | | | 1 | | | | | | | | 3 | | | | | | | | | | | 1 | | | |
| Warbler, MacGilliv. | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Yellowthroat, C. | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Warbler, Wilson's | | | 1 | 2 | | | | | | 3 | | | 1 | | | | | | | | | | | | | | | |
| Grosbeak, Black-h. | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | |
| Tanager, Western | | | 1 | | | | | | | | | | | | | | | | | | | | 11 | | | | | |
| Bunting, Lazuli | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Towhee, Spotted | | | 1 | | 3 | | 1 | | 1 | 6 | | 2 | | 2 | | 2 | 3 | 2 | 6 | | 6 | 2 | 4 | | 8 | 1 | 11 | 8 |
| Towhee, California | 7 | 4 | 10 | 4 | 3 | 1 | 6 | 10 | 5 | 3 | 7 | 15 | 8 | 3 | 10 | 5 | 3 | 7 | 9 | 7 | 8 | 12 | 5 | 8 | 3 | 7 | 13 | 3 |
| Sparrow, Grasshop. | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| Sparrow, Savannah | | | 13 | 99 | 82 | 69 | 87 | 7 | 16 | 6 | 5 | 4 | 10 | 65 | 69 | 58 | 13 | 11 | 10 | 1 | | | 4 | 158 | 37 | 13 | 35 | 6 |
| Sparrow, Lark | | | 1 | 2 | | | | | | 8 | | 10 | | 1 | | | | | 4 | | 2 | | | | | | | |
| Sparrow, Golden-cr. | 2 | 1 | | | 21 | 22 | 77 | 21 | 5 | | | | | 1 | 5 | 21 | 4 | 22 | 14 | | | | | | 8 | 21 | 47 | 37 |

| Species | Date of survey and number of birds observed by species | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4/15/06 | 4/29/06 | 10/17/2006 | 10/24/2006 | 11/6/2006 | 12/2/2006 | 1/27/2007 | 4/7/2007 | 4/21/2007 | 5/7/2007 | 6/9/07 | 7/7/07 | 9/1/07 | 9/23/07 | 11/3/07 | 12/8/07 | 02/20/08 | 03/15/08 | 04/19/08 | 05/24/08 | 06/21/08 | 07/19/08 | 9/13/2008 | 10/5/2008 | 11/15/2008 | 12/14/2008 | 1/2/2009 | 02/21/09 |
| Sparrow, White-thr. | 1 | | | | | | 35 | 1 | | | | | | | | | | | | | | | | | | | | |
| Sparrow, White-cr. | 14 | | 6 | 30 | 11 | 19 | | 59 | 7 | | | | | 46 | 88 | 84 | 102 | 82 | 3 | | | | | 18 | 8 | 88 | 157 | 19 |
| Sparrow, Fox | | | | | | | | | | | | | | | 1 | | | | | | | | | | | 2 | 1 | |
| Sparrow, Song | 7 | 4 | 6 | 23 | 2 | | 2 | 9 | 6 | 1 | 16 | 16 | 8 | 21 | 3 | 2 | 2 | 4 | 2 | 10 | 3 | 7 | 6 | 7 | 8 | 3 | 5 | 5 |
| Sparrow, Lincoln's | | | 3 | 4 | 5 | | 1 | 7 | | | | | | 2 | | | 2 | 4 | 3 | | | | | 7 | | 5 | | 1 |
| Junco, Dark-eyed | 5 | 8 | | | 5 | 69 | 54 | 5 | | 12 | | 6 | | 10 | 31 | 22 | 75 | 24 | 6 | 1 | 42 | | 21 | | 59 | 25 | 199 | 79 |
| Meadowlark, West. | | 1 | 29 | 62 | 81 | 110 | 211 | 6 | 15 | 29 | 8 | 47 | 26 | 20 | 176 | 150 | 65 | 193 | 17 | 40 | 2 | 17 | 26 | 53 | 37 | 96 | 150 | 43 |
| Cowbird, Brown-h. | 1 | 1 | | | | | | 1 | 1 | | 1 | | | | | | | | 4 | 4 | 1 | | | 1 | | | | |
| Blackbird, Red-w. | 152 | 243 | 285 | 296 | 3000 | 2034 | 153 | 137 | 113 | 269 | 263 | 164 | 45 | 214 | 157 | 167 | 67 | 258 | 182 | 490 | 59 | 25 | 950 | 522 | 110 | 235 | 120 | 125 |
| Blackbird, Brewer's | 25 | 23 | 1 | 6 | 14 | 2 | 20 | 13 | 15 | 11 | 5 | 17 | 12 | 25 | 59 | 7 | | 41 | 16 | 23 | 17 | 13 | 14 | 13 | 10 | 116 | 31 | 15 |
| Oriole, Bullock's | 1 | 1 | | | | | | 1 | | 5 | 3 | 4 | | | | | | | 9 | 6 | 1 | | | | | | | |
| Finch, Purple | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| Finch, House | 11 | 64 | 24 | 21 | 1 | 22 | | 10 | 12 | 19 | 22 | 32 | 49 | 62 | 19 | 9 | 18 | 17 | 22 | 40 | 41 | 108 | 94 | 106 | 31 | 6 | 16 | 6 |
| Goldfinch, Lesser | | | | | 4 | | | | | 5 | | 5 | 19 | 4 | 3 | 25 | | 44 | 16 | 4 | 2 | 2 | 3 | 64 | | | 19 | |
| Goldfinch, American | | 2 | 7 | 25 | 3 | 64 | | 4 | 6 | 15 | 8 | 26 | 86 | 16 | 28 | 7 | 50 | 30 | 16 | 21 | 26 | 54 | 9 | 57 | 30 | 6 | 16 | 16 |
| Sparrow, House | 7 | 2 | 2 | 2 | 2 | 4 | | 9 | | 1 | 6 | 2 | 3 | | 1 | | | | | 1 | 5 | 2 | | | | | | |
| Total No. Counted | 498 | 1,039 | 617 | 876 | 3,564 | 3,821 | 973 | 728 | 419 | 692 | 495 | 688 | 507 | 733 | 5,204 | 779 | 1,417 | 1,437 | 745 | 1,090 | 504 | 494 | 1,966 | 1,330 | 781 | 799 | 1,435 | 1,495 |
| Number of Species | 56 | 55 | 48 | 48 | 48 | 51 | 38 | 56 | 45 | 59 | 34 | 61 | 44 | 61 | 51 | 60 | 66 | 73 | 70 | 45 | 55 | 46 | 57 | 49 | 60 | 51 | 75 | 75 |

**Table B: Birds Observed in Order of Frequency of Observation, 4/15/06 to 02/21/09**
**Tolay Lake Regional Park, Sonoma County, California**

| Species | Number |
|---|---|
| Blackbird, Red-winged | 10,835 |
| Starling, European | 6,782 |
| Meadowlark, Western | 1,710 |
| Finch, House | 882 |
| Sparrow, Savannah | 878 |
| Sparrow, White-crowned | 841 |
| Junco, Dark-eyed | 758 |
| Swallow, Barn | 631 |
| Goldfinch, American | 628 |
| Swallow, Cliff | 574 |
| Blackbird, Brewer's | 564 |
| Goose, Canada | 557 |
| Coot, American | 505 |
| Killdeer | 467 |
| Wigeon, American | 461 |
| Quail, California | 365 |
| Pintail, Northern | 342 |
| Sparrow, Golden-crowned | 329 |
| Swallow, Tree | 318 |
| Bushtit | 291 |
| Bluebird, Western | 287 |
| Swallow, Violet-green | 270 |
| Mallard | 256 |
| Raven, Common | 250 |
| Goldfinch, Lesser | 219 |
| Phoebe, Black | 212 |
| Sparrow, Song | 188 |
| Towhee, California | 186 |
| Shoveler, Northern | 181 |
| Dove, Mourning | 179 |
| Hawk, Red-tailed | 176 |
| Vulture, Turkey | 174 |
| Dowitcher, Long-billed | 162 |
| Pigeon, Rock | 153 |
| Bufflehead | 146 |
| Duck, Ruddy | 139 |
| Pipit, American | 133 |
| Kestrel, American | 130 |
| Kite, White-tailed | 127 |
| Duck, Ring-necked | 123 |
| Robin, American | 123 |
| Flicker, Northern | 110 |
| Gadwall | 103 |
| Phoebe, Say's | 103 |
| Teal, Green-winged | 101 |
| Crow, American | 101 |
| Hummingbird, Anna's | 100 |
| Canvasback | 96 |

| Species | Number |
|---|---|
| Warbler, Yellow-rumped | 93 |
| Scrub-Jay, Western | 91 |
| Harrier, Northern | 84 |
| Towhee, Spotted | 69 |
| Owl, Barn | 62 |
| Jay, Steller's | 59 |
| Woodpecker, Nuttall's | 56 |
| Teal, Cinnamon | 55 |
| Thrush, Varied | 52 |
| Sparrow, House | 49 |
| Curlew, Long-billed | 46 |
| Shrike, Loggerhead | 46 |
| Egret, Great | 45 |
| Hawk, Red-shouldered | 44 |
| Sparrow, Lincoln's | 44 |
| Kingbird, Western | 38 |
| Turkey, Wild | 37 |
| Mockingbird, Northern | 37 |
| Sparrow, White-throated | 37 |
| Titmouse, Oak | 33 |
| Owl, Great Horned | 32 |
| Hummingbird, Allen's | 31 |
| Wren, House | 31 |
| Oriole, Bullock's | 31 |
| Sandpiper, Least | 30 |
| Kinglet, Ruby-crowned | 29 |
| Sparrow, Lark | 28 |
| Heron, Great Blue | 26 |
| Cormorant, Double-crested | 25 |
| Snipe, Wilson's (Common) | 25 |
| Woodpecker, Acorn | 25 |
| Wren, Bewick's | 25 |
| Nuthatch, White-breasted | 21 |
| Pelican, American White | 19 |
| Woodpecker, Downy | 19 |
| Chickadee, Chestnut-backed | 18 |
| Eagle, Golden | 17 |
| Yellowlegs, Greater | 16 |
| Waxwing, Cedar | 16 |
| Scaup, Lesser | 15 |
| Hawk, Cooper's | 15 |
| Cowbird, Brown-headed | 15 |
| Goose, Greater White-fronted | 14 |
| Scaup, Greater | 14 |
| Grebe, Pied-billed | 13 |
| Moorhen, Common | 13 |
| Swift, Vaux's | 12 |
| Tanager, Western | 12 |

| Species | Number |
|---|---|
| Hawk, Rough-legged | 11 |
| Flycatcher, Ash-throated | 10 |
| Creeper, Brown | 10 |
| Warbler, Yellow | 10 |
| Merganser, Common | 9 |
| Hummingbird, Rufous | 9 |
| Vireo, Hutton's | 8 |
| Thrush, Hermit | 8 |
| Warbler, Orange-crowned | 8 |
| Heron, Black-crowned Night | 7 |
| Hawk, Sharp-shinned | 7 |
| Hawk, Ferruginous | 7 |
| Falcon, Peregrine | 7 |
| Swallow, N. Rough-winged | 7 |
| Warbler, Wilson's | 7 |
| Flycatcher, Pacific Slope | 6 |
| Merlin | 5 |
| Vireo, Warbling | 5 |
| Wren, Marsh | 5 |
| Warbler, Townsend's | 5 |
| Grebe, Eared | 4 |
| Duck, Wood | 4 |
| *Selasphorus* sp. | 4 |
| Flycatcher, Willow | 4 |
| Sparrow, Fox | 4 |
| Grebe, Horned | 3 |
| Sandpiper, Western | 3 |
| Gull, California | 3 |
| Kingfisher, Belted | 3 |
| Sapsucker, Red-breasted | 3 |
| Hawk, Swainson's | 2 |
| Falcon, Prairie | 2 |
| Tern, Caspian | 2 |
| Dove, Eurasian Collared | 2 |
| Pigeon, Band-tailed | 2 |
| Woodpecker, Hairy | 2 |
| Wood-Pewee, Western | 2 |
| Heron, Green | 1 |
| Teal, Blue-winged | 1 |
| Osprey | 1 |
| Pheasant, Ring-necked | 1 |
| Sora | 1 |
| Gull, Glaucous-winged | 1 |
| Flycatcher, Olive-sided | 1 |
| Flycatcher, Least | 1 |
| Lark, Horned | 1 |
| Kinglet, Golden-crowned | 1 |
| Warbler, McGillivray's | 1 |
| Yellowthroat, Common | 1 |
| Grosbeak, Black-headed | 1 |
| Bunting, Lazuli | 1 |
| Sparrow, Grasshopper | 1 |
| Finch, Purple | 1 |
| Total no. individuals | 23,050 |

**Table C: Seasonal Occurrence, Relative Abundance of Bird Species Observed**
**Tolay Lake Regional Park, Sonoma County, California**

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Forest, Riparian, and Brush - breeding/summer resident | | | | | | |
| Hummingbird, Allen's | 0.0 | 0.7 | 3.6 | 1.0 | 0.0 | 0.0 |
| Flycatcher, Olive-sided | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Wood-Pewee, Western | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 |
| Flycatcher, Pacific Slope | 0.0 | 0.0 | 0.1 | 0.3 | 1.3 | 0.0 |
| Flycatcher, Ash-throated | 0.0 | 0.0 | 0.6 | 1.5 | 0.0 | 0.0 |
| Wren, House | 0.4 | 0.3 | 1.3 | 3.8 | 0.0 | 0.7 |
| Kingbird, Western | 0.0 | 0.0 | 3.3 | 3.5 | 0.3 | 0.0 |
| Vireo, Warbling | 0.0 | 0.0 | 0.0 | 0.5 | 0.7 | 0.2 |
| Warbler, Orange-crowned | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.2 |
| Warbler, Wilson's | 0.0 | 0.0 | 0.4 | 0.0 | 0.3 | 0.5 |
| Warbler, Yellow | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.0 |
| Grosbeak, Black-headed | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Tanager, Western | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 0.2 |
| Bunting, Lazuli | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Oriole, Bullock's | 0.0 | 0.0 | 3.3 | 2.0 | 0.0 | 0.0 |
| Total | 0.4 | 1.0 | 13.9 | 12.8 | 8.3 | 2.7 |
| Forest, Riparian, and Brush - migratory/winter resident | | | | | | |
| Flycatcher, Willow | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 |
| Flycatcher, Least | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Warbler, Yellow-rumped | 4.0 | 8.3 | 1.3 | 0.0 | 1.0 | 6.0 |
| Warbler, MacGillivray's | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Swift, Vaux's | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 0.3 |
| Hummingbird, Rufous | 0.0 | 0.7 | 1.0 | 0.0 | 0.0 | 0.0 |
| *Selasphorus* sp. | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Phoebe, Say's | 5.4 | 2.7 | 0.0 | 0.0 | 4.0 | 9.3 |
| Kinglet, Ruby-crowned | 1.8 | 1.7 | 0.0 | 0.0 | 0.3 | 2.3 |
| Thrush, Varied | 6.0 | 7.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Waxwing, Cedar | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 |
| Warbler, Townsend's | 0.2 | 0.0 | 0.0 | 0.0 | 1.0 | 0.2 |
| Sparrow, Fox | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Total | 18.0 | 22.0 | 4.6 | 0.0 | 10.7 | 18.8 |
| Forest, Riparian, and Brush - year-round resident | | | | | | |
| Turkey, Wild | 0.0 | 0.0 | 1.1 | 0.8 | 5.0 | 1.8 |
| Dove, Mourning | 1.6 | 0.7 | 7.9 | 17.3 | 2.0 | 6.5 |
| Dove, Eurasian Collared | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 |
| Pigeon, Rock | 2.2 | 7.0 | 6.9 | 2.0 | 0.7 | 10.5 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Pigeon, Band-tailed | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Hummingbird, Anna's | 3.6 | 3.3 | 7.1 | 1.3 | 1.7 | 2.0 |
| Phoebe, Black | 5.8 | 1.7 | 3.7 | 12.8 | 10.3 | 11.7 |
| Jay, Steller's | 4.0 | 3.3 | 1.0 | 2.5 | 2.3 | 0.8 |
| Scrub-Jay, Western | 6.0 | 2.7 | 0.6 | 4.8 | 4.3 | 2.8 |
| Titmouse, Oak | 2.0 | 1.3 | 0.4 | 2.8 | 1.0 | 0.3 |
| Chickadee, Chestnut-backed | 0.0 | 0.7 | 0.6 | 1.3 | 1.3 | 0.5 |
| Bushtit | 17.8 | 9.3 | 4.1 | 4.0 | 6.7 | 18.2 |
| Nuthatch, White-breasted | 0.8 | 2.0 | 0.4 | 0.5 | 1.3 | 0.3 |
| Creeper, Brown | 1.2 | 0.3 | 0.0 | 0.0 | 0.3 | 0.3 |
| Wren, Bewick's | 1.0 | 2.0 | 0.7 | 0.5 | 1.0 | 0.7 |
| Robin, American | 7.8 | 7.3 | 4.0 | 4.0 | 0.3 | 2.8 |
| Thrush, Hermit | 0.8 | 1.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Mockingbird, Northern | 0.2 | 0.3 | 0.9 | 1.5 | 2.0 | 2.8 |
| Kinglet, Golden-crowned | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Towhee, Spotted | 3.0 | 4.3 | 1.9 | 2.5 | 2.0 | 2.0 |
| Towhee, California | 6.4 | 4.3 | 6.4 | 10.5 | 5.3 | 6.3 |
| Junco, Dark-eyed | 73.8 | 59.3 | 5.3 | 12.0 | 10.3 | 15.8 |
| Finch, Purple | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Finch, House | 10.6 | 13.7 | 25.4 | 50.8 | 68.3 | 33.7 |
| Sparrow, House | 0.8 | 0.0 | 2.9 | 3.8 | 1.0 | 1.2 |
| Owl, Barn | 1.4 | 2.0 | 1.0 | 3.0 | 5.0 | 2.5 |
| Owl, Great Horned | 1.2 | 0.3 | 0.9 | 2.5 | 0.3 | 1.3 |
| Woodpecker, Acorn | 1.2 | 2.3 | 0.1 | 1.3 | 0.7 | 0.7 |
| Sapsucker, Red-breasted | 0.0 | 0.3 | 0.0 | 0.0 | 0.3 | 0.2 |
| Woodpecker, Downy | 0.2 | 0.3 | 0.1 | 1.0 | 2.0 | 1.0 |
| Woodpecker, Hairy | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Woodpecker, Nuttall's | 1.2 | 1.7 | 2.0 | 2.0 | 5.3 | 1.2 |
| Flicker, Northern | 9.6 | 11.0 | 0.4 | 0.5 | 0.7 | 3.7 |
| Total | 165.0 | 142.7 | 86.1 | 146.0 | 142.7 | 132.7 |
| Grassland - breeding/summer resident | | | | | | |
| Swallow, Northern Rough-winged | 0.0 | 0.0 | 0.7 | 0.0 | 0.7 | 0.0 |
| Swallow, Violet-green | 0.0 | 0.3 | 15.3 | 11.3 | 15.7 | 11.7 |
| Swallow, Tree | 2.8 | 9.0 | 24.7 | 19.0 | 2.7 | 3.3 |
| Swallow, Cliff | 0.0 | 0.0 | 59.9 | 38.8 | 0.0 | 0.0 |
| Swallow, Barn | 0.0 | 0.0 | 65.7 | 31.5 | 12.0 | 1.5 |
| Cowbird, Brown-headed | 0.0 | 0.0 | 1.7 | 0.5 | 0.0 | 0.2 |
| Sparrow, Grasshopper | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Total | 2.8 | 9.3 | 168.0 | 101.3 | 31.0 | 16.7 |
| Grassland - migratory/winter resident | | | | | | |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Starling, European | 247.8 | 49.0 | 17.1 | 16.5 | 224.3 | 756.2 |
| Pipit, American | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 |
| Meadowlark, Western | 143.4 | 100.3 | 15.4 | 18.5 | 24.0 | 73.0 |
| Sparrow, Golden-crowned | 37.6 | 21.0 | 6.1 | 0.0 | 0.3 | 5.7 |
| Sparrow, White-throated | 7.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Sparrow, White-crowned | 69.6 | 67.7 | 11.9 | 0.0 | 15.3 | 26.8 |
| Sparrow, Lincoln's | 1.2 | 2.3 | 1.4 | 0.0 | 0.7 | 3.2 |
| Total | 509.2 | 240.3 | 52.3 | 35.0 | 264.7 | 884.8 |
| Grassland - year-round resident | | | | | | |
| Quail, California | 9.0 | 9.0 | 13.4 | 14.8 | 9.3 | 18.7 |
| Pheasant, Ring-necked | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| Lark, Horned | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Bluebird, Western | 10.0 | 12.3 | 6.9 | 6.8 | 16.7 | 12.5 |
| Shrike, Loggerhead | 2.2 | 1.7 | 0.7 | 2.0 | 1.0 | 2.3 |
| Raven, Common | 12.8 | 6.7 | 5.7 | 6.8 | 4.7 | 14.2 |
| Crow, American | 5.6 | 3.7 | 3.9 | 1.5 | 2.0 | 3.8 |
| Sparrow, Savannah | 52.4 | 10.0 | 5.7 | 2.3 | 26.3 | 76.3 |
| Sparrow, Song | 2.4 | 3.7 | 5.6 | 10.5 | 11.7 | 8.2 |
| Sparrow, Lark | 0.0 | 0.0 | 1.7 | 3.0 | 0.3 | 0.5 |
| Blackbird, Brewer's | 35.2 | 18.7 | 18.0 | 13.0 | 17.0 | 17.2 |
| Goldfinch, Lesser | 8.8 | 14.7 | 3.6 | 2.3 | 8.7 | 11.8 |
| Goldfinch, American | 18.6 | 32.0 | 9.1 | 28.5 | 37.0 | 25.0 |
| Total | 157.0 | 112.3 | 74.4 | 91.5 | 134.7 | 190.5 |
| Marsh Birds | | | | | | |
| Heron, Great Blue | 1.6 | 1.0 | 0.4 | 0.5 | 0.7 | 1.3 |
| Egret, Great | 1.6 | 1.0 | 2.0 | 1.8 | 1.3 | 1.5 |
| Heron, Green | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Heron, Black-crowned Night | 0.0 | 0.0 | 0.0 | 1.3 | 0.3 | 0.2 |
| Wren, Marsh | 0.2 | 0.0 | 0.0 | 0.3 | 0.0 | 0.5 |
| Yellowthroat, Common | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Blackbird, Red-winged | 541.8 | 150.0 | 226.6 | 127.8 | 403.0 | 728.3 |
| Sora | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 545.4 | 152.0 | 229.0 | 131.8 | 405.7 | 731.8 |
| Raptors - migratory/winter resident | | | | | | |
| Hawk, Sharp-shinned | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 |
| Hawk, Cooper's | 0.6 | 1.0 | 0.3 | 0.3 | 0.7 | 0.7 |
| Hawk, Swainson's | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Hawk, Ferruginous | 0.6 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 |
| Hawk, Rough-legged | 1.2 | 0.7 | 0.0 | 0.0 | 0.0 | 0.5 |
| Merlin | 0.4 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Falcon, Prairie | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Falcon, Peregrine | 0.2 | 0.3 | 0.1 | 0.3 | 0.0 | 0.5 |
| Total | 3.2 | 3.3 | 0.7 | 0.5 | 0.7 | 3.5 |
| Raptors - year-round resident | | | | | | |
| Vulture, Turkey | 4.8 | 9.3 | 7.0 | 3.5 | 7.7 | 6.0 |
| Harrier, Northern | 5.6 | 0.7 | 0.3 | 1.0 | 7.0 | 4.5 |
| Kite, White-tailed | 5.0 | 3.3 | 0.9 | 3.5 | 11.0 | 6.5 |
| Hawk, Red-shouldered | 1.4 | 2.3 | 0.3 | 1.3 | 4.0 | 1.8 |
| Hawk, Red-tailed | 6.8 | 6.3 | 4.3 | 3.3 | 12.3 | 7.2 |
| Eagle, Golden | 0.6 | 0.7 | 0.1 | 0.8 | 1.3 | 0.7 |
| Osprey | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Kestrel, American | 8.6 | 4.0 | 1.0 | 3.0 | 7.0 | 5.8 |
| Total | 33.0 | 26.7 | 13.9 | 16.3 | 50.3 | 32.5 |
| Shorebirds - migratory/winter resident | | | | | | |
| Yellowlegs, Greater | 0.0 | 0.7 | 2.0 | 0.0 | 0.0 | 0.0 |
| Curlew, Long-billed | 6.4 | 3.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Sandpiper, Western | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| Sandpiper, Least | 0.0 | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 |
| Dowitcher, Long-billed | 0.0 | 7.7 | 19.9 | 0.0 | 0.0 | 0.0 |
| Snipe, Wilson's | 0.6 | 2.7 | 2.0 | 0.0 | 0.0 | 0.0 |
| Killdeer | 34.2 | 5.3 | 4.0 | 4.8 | 3.7 | 37.0 |
| Total | 41.2 | 19.7 | 33.1 | 4.8 | 3.7 | 37.0 |
| Waterfowl and Allies - migratory/winter resident | | | | | | |
| Grebe, Horned | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| Grebe, Eared | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pelican, American White | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 0.8 |
| Cormorant, Double-crested. | 1.0 | 0.7 | 0.7 | 0.0 | 0.0 | 2.2 |
| Goose, Gr. White-fronted | 1.2 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Teal, Blue-winged | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Pintail, Northern | 0.2 | 112.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Wigeon, American | 0.4 | 149.7 | 1.4 | 0.0 | 0.0 | 0.0 |
| Shoveler, Northern | 0.0 | 16.7 | 18.7 | 0.0 | 0.0 | 0.0 |
| Teal, Green-winged | 0.2 | 28.0 | 2.3 | 0.0 | 0.0 | 0.0 |
| Duck, Ruddy | 0.0 | 46.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Canvasback | 0.2 | 31.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scaup, Greater | 1.2 | 2.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Scaup, Lesser | 2.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 |
| Bufflehead | 1.6 | 41.0 | 2.1 | 0.0 | 0.0 | 0.0 |
| Merganser, Common | 1.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Duck, Ring-necked | 0.0 | 41.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Guilds/Species | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Gull, Glaucous-winged | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gull, California | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Tern, Caspian | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| Total | 10.2 | 474.0 | 26.9 | 0.0 | 6.7 | 3.0 |
| Waterfowl and Allies - year-round resident | | | | | | |
| Grebe, Pied-billed | 0.0 | 1.7 | 1.1 | 0.0 | 0.0 | 0.0 |
| Goose, Canada | 59.8 | 61.3 | 4.9 | 0.0 | 0.0 | 6.7 |
| Duck, Wood | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mallard | 12.2 | 24.7 | 11.7 | 3.5 | 6.3 | 1.0 |
| Gadwall | 1.8 | 19.7 | 5.0 | 0.0 | 0.0 | 0.0 |
| Teal, Cinnamon | 0.0 | 8.3 | 4.0 | 0.0 | 0.7 | 0.0 |
| Moorhen, Common | 0.2 | 0.0 | 0.3 | 1.5 | 1.0 | 0.2 |
| Coot, American | 1.2 | 130.3 | 14.6 | 0.3 | 1.3 | 0.2 |
| Kingfisher, Belted | 0.0 | 0.3 | 0.0 | 0.3 | 0.3 | 0.0 |
| Total | 76.0 | 246.3 | 41.6 | 5.5 | 9.7 | 8.0 |
| Total No. Counted | 1,561 | 1,450 | 744 | 545 | 1,069 | 2,062 |
| Number of Species | 55 | 71 | 55 | 49 | 54 | 51 |

**Table D: Seasonal Occurrence of Bird Guilds**
**Tolay Lake Regional Park, Sonoma County, California**
(Numbers represent relative abundance)

| Guilds | Season of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Dec-Jan | Feb-Mar | Apr-May | Jun-Jul | Aug-Sep | Oct-Nov |
| Forest, Riparian, and Brush | | | | | | |
| Forest, Riparian, and Brush - breeding/summer resident | 0.4 | 1.0 | 13.9 | 12.8 | 8.3 | 2.7 |
| Forest, Riparian, and Brush - migratory/winter resident | 18.0 | 22.0 | 4.6 | 0.0 | 10.7 | 18.8 |
| Forest, Riparian, and Brush - year-round resident | 165.0 | 142.7 | 86.1 | 146.0 | 142.7 | 132.7 |
| Grassland | | | | | | |
| Grassland - breeding/summer resident | 2.8 | 9.3 | 168.0 | 101.3 | 31.0 | 16.7 |
| Grassland - migratory/winter resident | 509.2 | 240.3 | 52.3 | 35.0 | 264.7 | 884.8 |
| Grassland - year-round resident | 157.0 | 112.3 | 74.4 | 91.5 | 134.7 | 190.5 |
| Raptors | | | | | | |
| Raptors - migratory/winter resident | 3.2 | 3.3 | 0.7 | 0.5 | 0.7 | 3.5 |
| Raptors - year-round resident | 33.0 | 26.7 | 13.9 | 16.3 | 50.3 | 32.5 |
| Waterbirds | | | | | | |
| Marsh Birds | 545.4 | 152.0 | 229.0 | 131.8 | 405.7 | 731.8 |
| Shorebirds | 41.2 | 19.7 | 33.1 | 4.8 | 3.7 | 37.0 |
| Waterfowl and Allies - migratory/winter resident | 10.2 | 474.0 | 26.9 | 0.0 | 6.7 | 3.0 |
| Waterfowl and Allies - year-round resident | 76.0 | 246.3 | 41.6 | 5.5 | 9.7 | 8.0 |
| Relative numbers of individual birds | 1,561 | 1,450 | 744 | 545 | 1,069 | 2,062 |
| Relative number of Species | 55 | 71 | 55 | 49 | 54 | 51 |

**Figure 1: Forest, Riparian, and Brush Guild, Birds of Tolay Lake Regional Park**

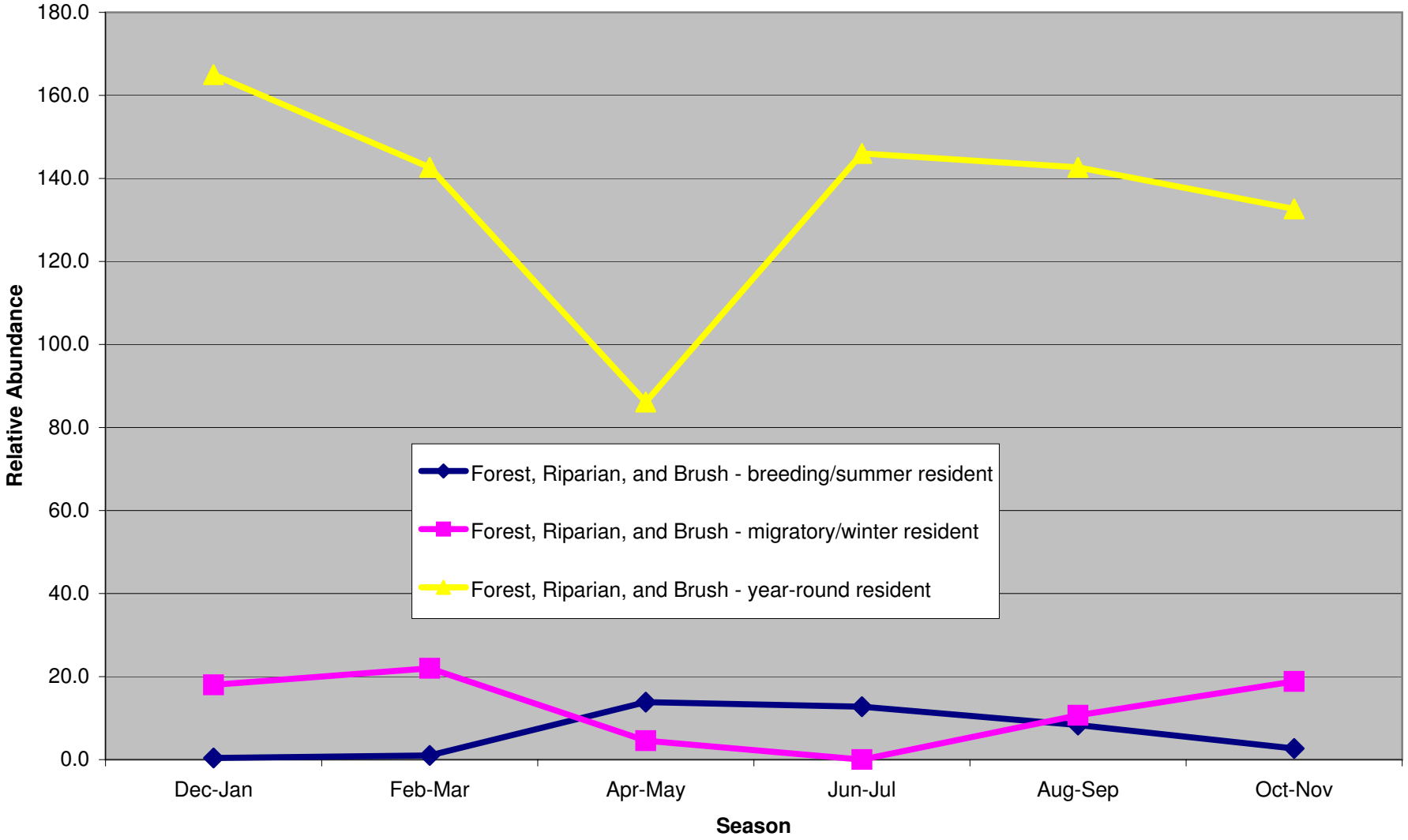


**Figure 2: Grassland Guild, Birds of Tolay Lake Regional Park**

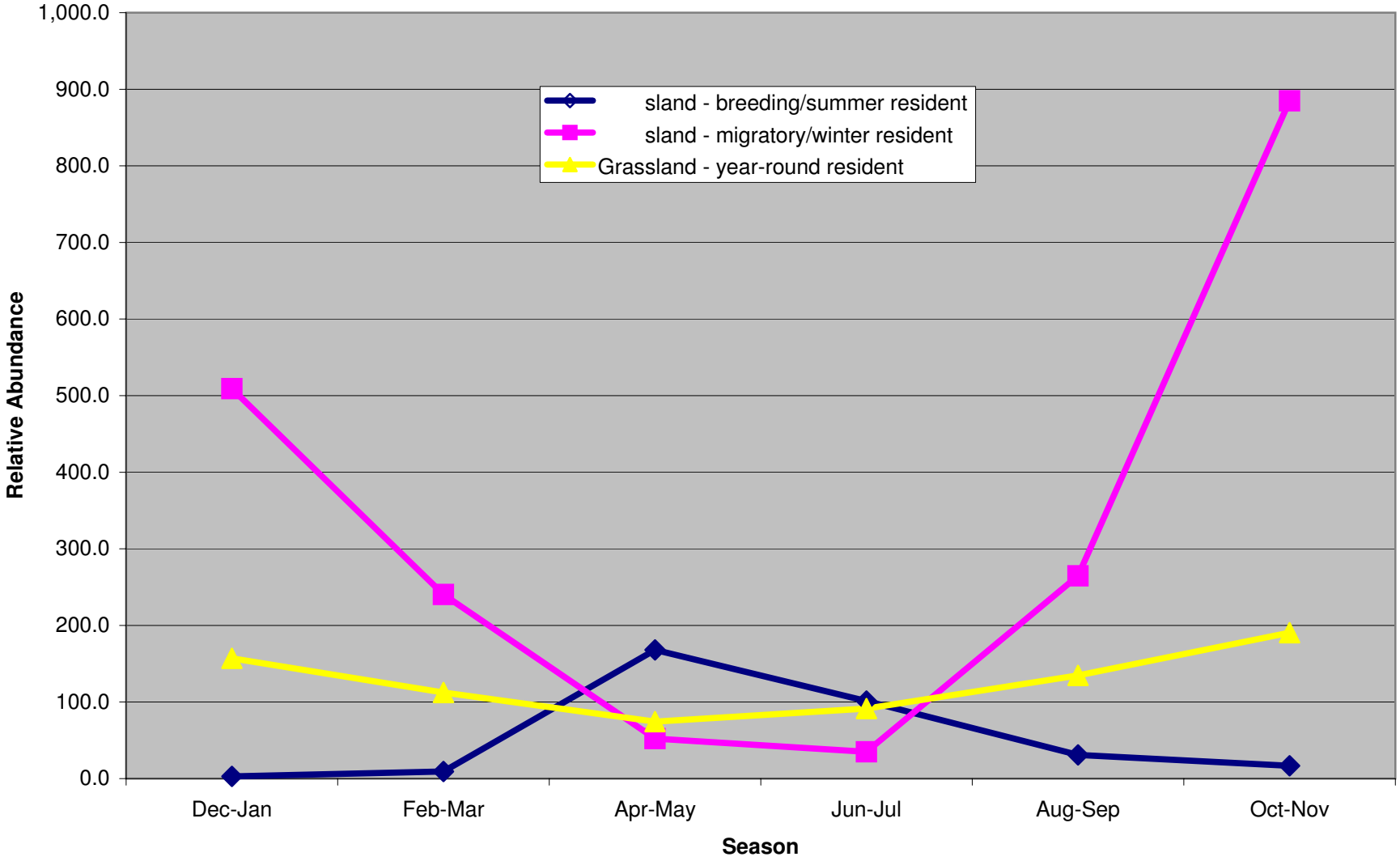


**Figure 3: Raptors, Birds of Tolay Lake Regional Park**

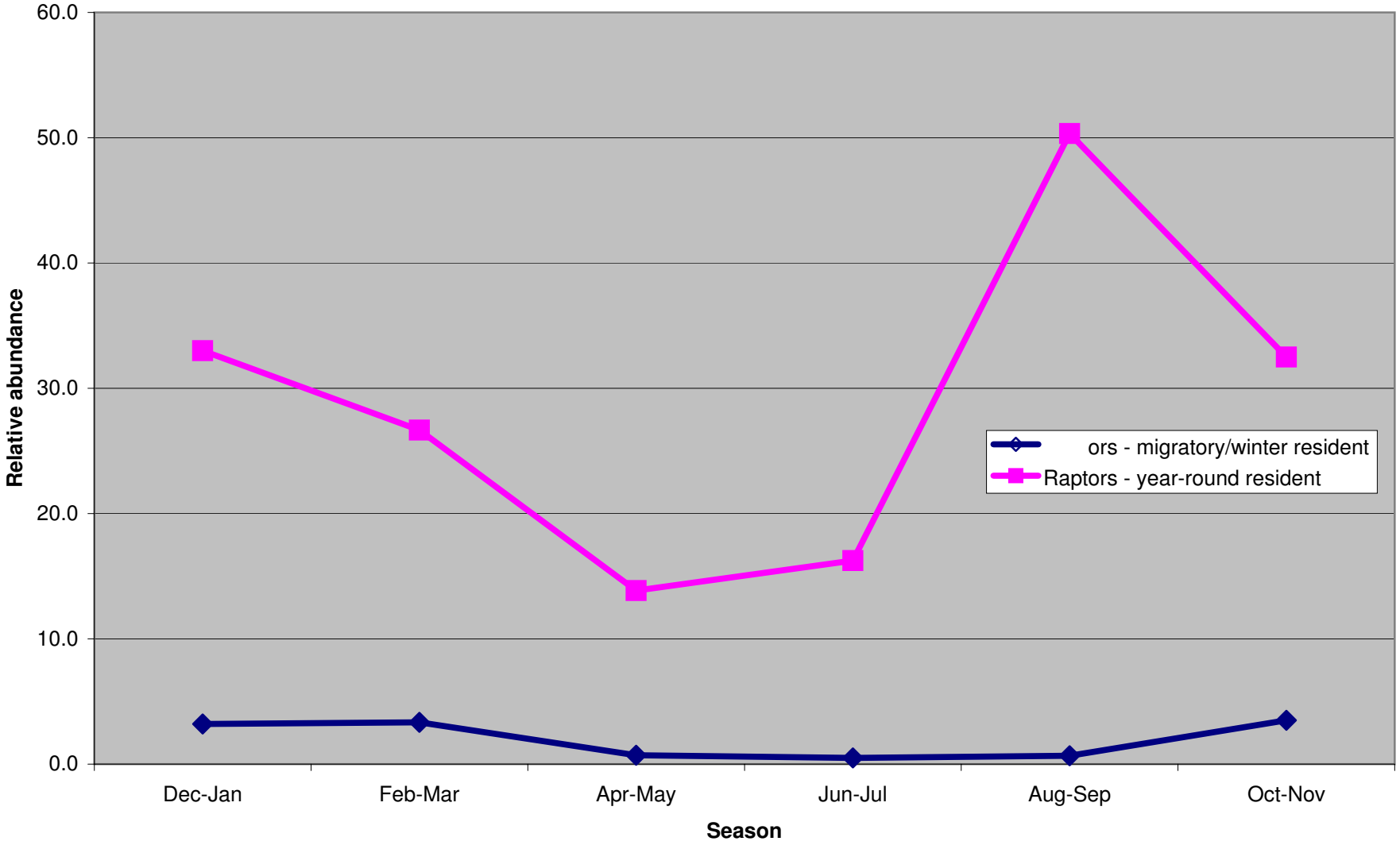


**Figure 4: Waterbirds, Birds of Tolay Lake Regional Park**

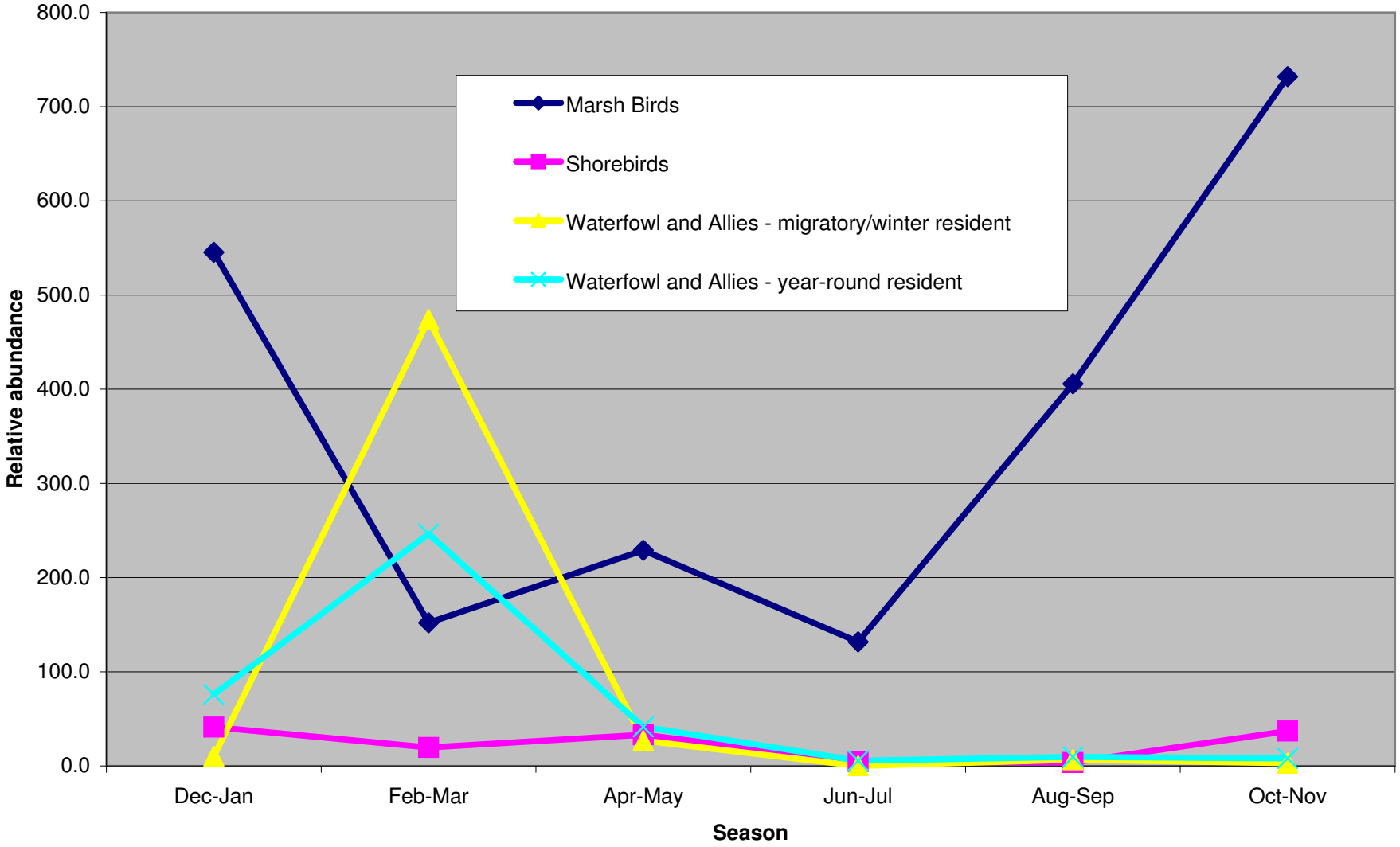
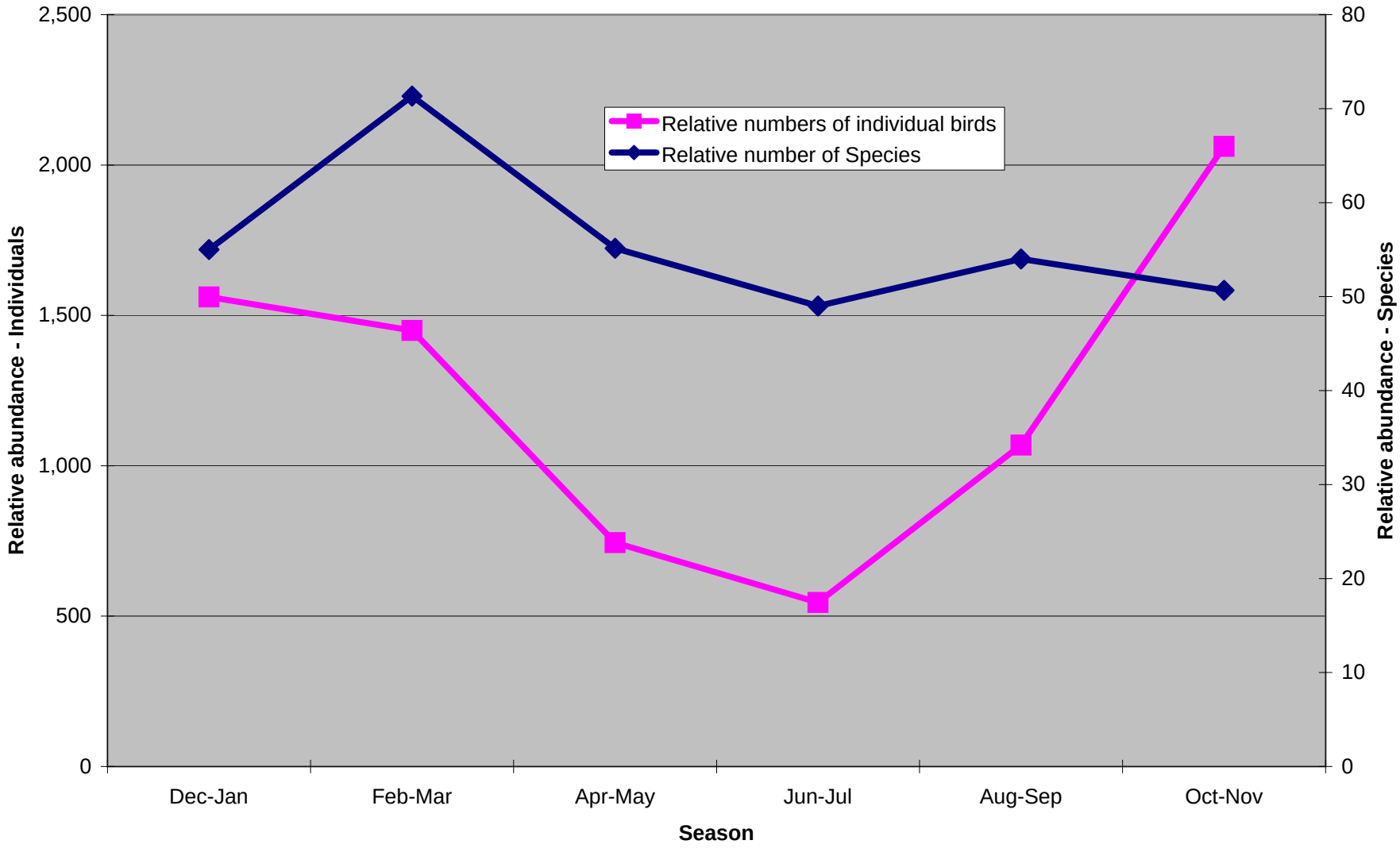


**Figure 5: Relative Abundance by Season, Birds of Tolay Lake Regional Park**



appendix k

# Biological Resources Study for Tolay Creek Ranch

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# BIOLOGICAL RESOURCES STUDY
# TOLAY CREEK RANCH
## SONOMA COUNTY, CALIFORNIA

Submitted to:

Sonoma Land Trust
2300 County Center Drive #120A
Santa Rosa, California 95403

Prepared by:

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LSA Project No. SOZ0801

LSA

May 20, 2009

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**FIGURES** (at end of report)



**TABLES** (at end of report, after figures)

# 1.0 INTRODUCTION

## 1.1 PURPOSE

Tolay Creek Ranch is 1,657 acres and provides a connection between the Cougar Mountain Open Space Easement and Tolay Lake Regional Park. The Sonoma Land Trust commissioned LSA Associates Inc. (LSA) to provide a description of the biological resources of Tolay Creek Ranch. This report provides a detailed discussion and mapping of the vegetation and wildlife values. Management strategies, including weed removal and restoration, are also discussed. The report begins by discussing the setting of Tolay Creek Ranch including its physical characteristics such as topography, geology, soils, and hydrology. LSA also prepared a parallel study of the cultural resources of Tolay Creek Ranch (LSA 2009).

## 1.2 LOCATION

Tolay Creek Ranch is located on the west side of California State Highway 121, approximately 8 miles south of the city of Sonoma, 7 miles southeast of the city of Petaluma, and 6 miles northeast of the city of Novato, in unincorporated southern Sonoma County, California (Figure 1). Infineon Raceway is immediately to the south of the eastern portion of Tolay Creek Ranch. Direct access to Tolay Creek Ranch is from a gated dirt ranch road (Access Road) intersecting with Highway 121. Other access is available from the Sears Point to Lakeville Road (Mangel Ranch Road) off Highway 121 (Figure 2). Access is also available, with prior permission, through Tolay Lake Regional Park.

## 1.3 BACKGROUND

Tolay Creek Ranch was acquired from the Roche family in 2008 because of its biological and cultural values and because it provides a key connecting parcel among the adjacent protected lands (SCAPOSD 2006, 2007). Tolay Creek Ranch protects natural and cultural resources, provides important open space, public recreational, and educational opportunities, and preserves the scenic viewshed along Highway 121 (John Bouyea & Associates 2007). Acquisition of Tolay Creek Ranch realized goals and recommendations of thirteen local, regional, state, and federal plans (SCAPOSD 2006). It provides connectivity with the recently acquired 1,737-acre Tolay Lake Regional Park and through the Cougar Mountain open space easement, Sonoma Land Trust' Sears Point Restoration Project (Figure 3). Tolay Creek Ranch is part of the interconnected preserved open space that includes the California Department of Fish and Game's (CDFG) lands including the Napa-Sonoma Marshes Wildlife Area and the U.S. Fish and Wildlife Service's San Pablo Bay National Wildlife Refuge. These parcels contribute significantly to the sustainability of adjacent conservation efforts (Sonoma Land Trust 2007). Together, the protected land makes up a mosaic of over 21,000 acres, including the following nearby properties: Flocchini Ranch, Sleepy Hollow Dairy, Dickson Ranch, Cougar Mountain (open space easement held by Sonoma County), Tolay Lake Regional Park, Sonoma Land Trust's 2,327-acre Sears Point Restoration Project, and the San Pablo Bay National Wildlife Refuge. The entire watershed of the lower portion of Tolay Creek downstream of Tolay

Lake Regional Park is protected in one form or another by public agencies or private conservation organizations (Figure 3).

Tolay Creek Ranch is visible from Highway 121 which was designated a scenic corridor in the 1989 Sonoma County General Plan. The viewsheds of the Tolay Creek Ranch property from its 575-foot tall hilltops can be spectacular on clear days, providing views of San Pablo Bay, Mt. Tamalpais, the Petaluma River basin, the lower portion of the Valley of the Moon, San Francisco, Oakland, Mt. Diablo, and Mt. St. Helena.

The adjacent Tolay Lake Regional Park is nationally recognized as an important prehistoric gathering, foraging, and settlement site and contains many important archaeological resources including charmstones, midden mounds, and burial sites (Pulcheon et al 2008).

Tolay Creek Ranch contains approximately 2.5 miles of creek and riparian corridor. Combined with Tolay Lake Regional Park, it comprises over 50 percent of the entire watershed of Tolay Creek. Tolay Creek drains into San Pablo Bay, a part of the San Francisco Bay Estuary.

The Sonoma Land Trust expects to hold fee title for a period of 2-4 years before transferring title to Sonoma County Regional Parks for annexation to the adjacent Tolay Lake Regional Park. The Sonoma County Agricultural Preservation and Open Space District will retain a perpetual conservation easement over the property to preserve its important biotic and scenic values.

## 1.4 LAND USE AND HISTORY

Tolay Creek Ranch lies in the ethnographic territory of the Coast Miwok, who are believed to have entered the region about 3,500 years ago. Prior to Coast Miwok habitation of the area, Yukian and Hokan language groups inhabited the region. The Miwok culture utilized wetland areas and expanded more rapidly than the earlier groups (Archeological Resource Services 2003). Nearby Tolay Lake is also known as “Charmstone Lake” due to the large number of prehistoric artifacts recovered from the lakebed after it was drained for farming in the 1870s. The Tolay lakebed is considered one of the most prolific sources of charmstones in the United States. The charmstones are carved rock objects thought to have served ceremonial and/or practical purposes. The stones may have been used to induce favorable fishing and hunting in various ceremonial activities, they may have been used in slingshots to hunt waterfowl, or they may have served as fishing weights or lures. The presence of thousands of charmstones, three prehistoric village sites, numerous middens and other prehistoric sites indicate short- and long-term occupation of the Tolay Lake basin by humans for at least the past 5000 years (Pulcheon et al. 2008).

In 1996, a total of 19 prehistoric sites were recorded within the Tolay Valley. The plethora of sites, many of which are in relatively undisturbed condition and some of which contain human remains, constitute an area which would qualify for listing on the National Register of Historic Places (Pulcheon et al 2008).

When early European settlers arrived in the area in the early to mid 1800s, the Roche property was immediately adjacent to San Pablo Bay. The setting was ideal for settlers as there was ample fresh water and plentiful food supply from nearby Tolay Lake and the tidal marshes along San Pablo Bay. There may be up to four historic home sites at Tolay Creek Ranch, as well as a historic stone wall (B.

J. Roche, pers. comm., 2007). The remains of an old hunting cabin are located just east of Tolay Creek near the northern boundary of Tolay Creek Ranch. The Sears Point to Lakeville Road provides access to Tolay Creek Ranch and to Tolay Lake Regional Park to the northwest. It was historically lined with eucalyptus (*Eucalyptus* sp.) and cypress (*Cupressus* sp.) trees until an extended freeze in the 1950s killed many of them (B. J. Roche, pers. comm., 2007).

Tolay Creek Ranch was likely originally a part of the Petaluma Rancho, which at its largest covered 66,000 acres between Petaluma River and Sonoma Creek from the edge of the Bay northward to about where Glen Ellen is located today (EBA Engineering 2004). The rancho began to be divided into smaller holdings in the mid 1860s. The Roche family purchased their holding in 1978 and has developed vineyards on the eastern most parcels that remain under their ownership. The Tolay Creek Ranch portion, which was purchased by the Sonoma Land Trust, has been leased for cattle grazing to the same operator for at least 25 years. The Tolay Creek Ranch has probably been grazed since the advent of the European colonists.

## 1.5 REGULATORY CONTEXT

Biological resources on the site may fall under the jurisdiction of various regulatory agencies and be subject to regulations, as described below. In general, the greatest legal protections are provided for formally listed species. Informally listed species and habitats receive lesser legal protection.

### 1.5.1 Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over federally listed threatened and endangered plant and animal species. The Federal Endangered Species Act (FESA) protects listed species from harm or "take," broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Any such activity can be defined as a "take" even if it is unintentional or accidental.

Section 9 of the FESA and its applicable regulations restrict certain activities with respect to endangered and threatened plants. Nevertheless, these restrictions are less stringent than those applicable to animal species. The provisions of the FESA prohibit the removal of, malicious damage to, or destruction of any listed plant species "from areas under federal jurisdiction." Furthermore, listed plants may not be cut, dug up, damaged or destroyed in, or removed from any other area (including private lands) in known violation of a state law or regulation.

An endangered species is one that is considered in danger of becoming extinct throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future. Federal agencies involved in permitting projects that may result in take of federally listed species (e.g., U.S. Army Corps of Engineers) are required under Section 7 of the FESA to consult with the USFWS prior to issuing such permits. Any activity that could result in the take of a federally listed species and is not authorized as part of a Section 7 consultation, requires an FESA Section 10 take permit from the USFWS.

In addition to endangered and threatened species, which are legally protected under the FESA, the USFWS has a list of proposed and candidate species. Proposed species are those for which a proposed

rule to list them as endangered or threatened has been published in the Federal Register. A candidate species is one for which the USFWS currently has enough information to support a proposal to list it as a threatened or endangered species. Proposed species could be listed at any time, and many federal agencies protect them as if they already are listed. Candidate species are not afforded legal protection under the FESA. A federally-listed plant species occurs and a federally-listed animal species potentially occurs at Tolay Creek Ranch.

### 1.5.2 Clean Water Act

The U.S. Army Corps of Engineers (Corps) is responsible under Section 404 of the Clean Water Act to regulate the discharge of fill material into waters of the United States. Waters of the United States and their lateral limits are defined in 33 CFR Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the Ordinary High Water Mark (OHWM) (33 CFR Part 328.3[e]) or the limit of adjacent wetlands (33 CFR Part 328.3[b]). Any permanent extension of the limits of an existing water of the United States, whether natural or constructed, results in a similar extension of Corps jurisdiction (33 CFR Part 328.5).

Waters of the United States fall into two broad categories: wetlands and other waters. Other waters include waterbodies and watercourses such as rivers, streams, lakes, springs, ponds, coastal waters, and estuaries. Wetlands include marshes, wet meadows, seeps, floodplains, basins, and other areas experiencing extended seasonal or permanent soil saturation. Seasonally or intermittently inundated features, such as seasonal ponds, ephemeral streams, and tidal marshes, are categorized as wetlands if they have hydric soils and support wetland plant communities. Seasonally inundated waterbodies or watercourses that do not exhibit wetland characteristics are classified as other waters of the United States.

Wetlands and other waters that cannot trace a continuous hydrologic connection to a navigable water of the United States are not tributary to waters of the United States. These are termed “isolated” wetlands and waters. Isolated wetlands and waters are jurisdictional when their destruction or degradation can affect interstate or foreign commerce (33 CFR Part 328.3[a]). The Corps may or may not take jurisdiction over isolated wetlands, depending on the specific circumstances.

In general, a Section 404 permit must be obtained from the Corps before filling or grading wetlands or other waters of the United States. Certain projects may qualify for authorization under a Nationwide Permit (NWP). The purpose of the NWP program is to streamline the evaluation and approval process throughout the nation for certain types of activities that have only minimal impacts to the aquatic environment. Many NWPs are only authorized after the applicant has submitted a pre-construction notification (PCN) to the appropriate Corps office. The Corps is required to consult with the USFWS and/or NOAA-Fisheries under Section 7 of the ESA if the permitted activity may result in the take of federally listed species.

All Corps permits require state water quality certification under Section 401 of the Clean Water Act. This regulatory program for the property is administered by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Projects that propose to fill wetlands or other waters of the United States must apply for water quality certification from the RWQCB. The RWQCB has adopted a

policy requiring mitigation for any loss of wetland, streambed, or other waters of the United States. Tolay Creek, its tributaries, and adjacent wetlands would be considered waters of the United States.

### 1.5.3 Porter-Cologne Water Quality Control Act

Under this Act (California Water Code Sections 13000–14920), the RWQCB is authorized to regulate the discharge of waste that could affect the quality of the State's waters. Therefore, even if a project does not require a federal permit, it may still require review and approval by the RWQCB (e.g., for impacts to isolated wetlands and other waters). Most projects in waters of the state require permits. Examples of projects include installation of culverts, check dams, construction of in-stream stock ponds, and repair of eroding banks, etc. When reviewing applications, the RWQCB focuses on ensuring that projects do not adversely affect the "beneficial uses" associated with waters of the State. Such beneficial uses can include maintenance of water quality, ground water recharge, wildlife habitat, etc. In most cases, the RWQCB seeks to protect these beneficial uses by requiring the integration of water quality control measures into projects that will require discharge into waters of the State. For most construction projects, the RWQCB requires the use of construction and post-construction Best Management Practices (BMPs). Tolay Creek, its tributaries, and adjacent wetlands would be considered waters of the State. Isolated waters may not occur at Tolay Creek Ranch, but they would also be considered waters of the State.

### 1.5.4 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) prohibits the taking, hunting, killing, selling, purchasing, etc. of migratory birds, parts of migratory birds, or their eggs and nests. As used in the MBTA, the term "take" is defined as "to pursue, hunt, shoot, capture, collect, kill, or attempt to pursue, hunt, shoot, capture, collect, or kill, unless the context otherwise requires." Most bird species native to North America are covered by this act including those birds that occur at Tolay Creek Ranch with the exception of the non-native European starling, house sparrow, and any other non-native species.

### 1.5.5 California Endangered Species Act

The California Department of Fish and Game (CDFG) has jurisdiction over threatened or endangered species that are formally listed by the State under the California Endangered Species Act (CESA). The CESA is similar to the FESA both in process and substance; it is intended to provide additional protection to threatened and endangered species in California. The CESA does not supersede the FESA, but operates in conjunction with it. Species may be listed as threatened or endangered under both acts (in which case the provisions of both state and federal laws apply) or under only one act. A candidate species is one that the Fish and Game Commission has formally noticed as being under review by CDFG for addition to the State list. Candidate species are protected by the provisions of the CESA.

If a proposed project would result in impacts to a State-listed species, an "incidental take" permit pursuant to section 2081 of the Fish and Game Code would be necessary. CDFG will issue an incidental take permit only if:

1) The authorized take is incidental to an otherwise lawful activity;

2) the impacts of the authorized take are minimized and fully mitigated;
3) the measures required to minimize and fully mitigate the impacts of the authorized take:
a) are roughly proportional in extent to the impact of the taking on the species;
b) maintain the project applicant's objectives to the greatest extent possible; and,
c) capable of successful implementation; and,
4) adequate funding is provided to implement the required minimization and mitigation measures and to monitor compliance with, and the effectiveness of, the measures. Such a process would be required for effects to the state-listed plant species that occurs occurs at Tolay Creek Ranch.

### 1.5.6 California Fish and Game Code

The CDFG is also responsible for enforcing the California Fish and Game Code, which contains several provisions potentially relevant to construction projects. For example, Section 1602 of the Fish and Game Code governs the issuance of Lake and Streambed Alteration Agreements by the CDFG. Lake and Streambed Alteration Agreements are required whenever project activities substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated as such by the CDFG. Tolay Creek and its tributaries would be subject to section 1600 of the Fish and Game Code.

The Fish and Game Code also lists animal species designated as Fully Protected, which may not be taken or possessed. The Fully Protected designation does not allow "incidental take" and is thus more restrictive than the CESA. Fully Protected species are listed in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the Fish and Game Code, and section 500-5002 protects desert tortoise. Fully Protected species occur on Tolay Creek Ranch.

Section 3503 of the Fish and Game Code prohibits the take, possession, or needless destruction of the nest or eggs of any bird. Subsection 3503.5 specifically prohibits the take, possession, or destruction of any birds in the orders Falconiformes (hawks and eagles) or Strigiformes (owls) and their nests. These provisions, along with the federal MBTA, essentially serve to protect nesting native birds. Non-native species, including European starling and house sparrow, are not afforded any protection under the MBTA or California Fish and Game Code. As with the MBTA, the other bird species that occur at Tolay Creek Ranch would be protected by the California Fish and Game code.

### 1.5.7 California Environmental Quality Act

The California Environmental Quality Act (CEQA) applies to "projects" proposed to be undertaken or requiring approval by State or local governmental agencies. Projects are defined as having the potential to have a physical impact on the environment. Such projects that would be undertaken by the Sonoma Land Trust or the Sonoma County Regional Parks Department would be subject to CEQA. Under Section 15380 of CEQA, a species not included on any formal list "shall nevertheless be considered rare or endangered if the species can be shown by a local agency to meet the criteria" for listing. With sufficient documentation, a species could be shown to meet the definition of rare or endangered under CEQA, which would lower the threshold of significance for project impacts. Section 15380 of CEQA may apply to some of the species that occur at Tolay Creek Ranch, but are not formally listed. These species are *species of special concern*, species on the *List of Special*

*Animals* or species on the California Native Plant Society's lists.Being on these lists does not automatically qualify a species for coverage under CEQA; they must meet the criteria for listing.

### 1.5.8 State Species of Special Concern

The CDFG maintains an informal list of *species of special concern* (Jennings and Hayes 1994, Shuford and Gardali 2008, Williams 1986), *list of special vascular plants, bryophytes, and lichens* (CDFG 2007a), and *list of special animals* (CDFG 2007b). These are broadly defined as species that are of concern to the CDFG because of population declines and restricted distributions, and/or they are associated with habitats that are declining in California. These species are inventoried in the California Natural Diversity Data Base (CNDDB) regardless of their legal status. Impacts to *Species of special concern* may be considered significant under CEQA. *Species of Special Concern* potentially occur on Tolay Creek Ranch.

### 1.5.9 Special Animals List

The animals on the special animals list are those species that the California Department of Fish and Game considers to be of greatest conservation need and are considered special-status species. These species are either listed or candidates for listing under the federal or state endangered species acts, species that meet the criteria for listing, species that are state species of special concern, taxa that are biologically rare, very restricted in distribution, declining throughout their range, or have a vulnerable stage in their life cycle that warrents monitoring, or taxa that are on the periphery of their range and are threatened with their extirpation in Califoria. This list of special animals is at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/spanimals.pdf. Species that are on the List of Special animals and potentially occur at Tolay Creek Ranch are discussed in section 5 *Special-status Species*.

### 1.5.10 California Native Plant Society

The non-governmental California Native Plant Society (CNPS) has developed lists of plants of concern in California (CNPS 2008). A CNPS List 1A plant is a species, subspecies, or variety that is considered to be extinct. A List 1B plant is considered rare, threatened, or endangered in California and elsewhere. A List 2 plant is considered rare, threatened, or endangered in California but is more common elsewhere. A List 3 plant is potentially endangered but additional information on taxonomy, rarity, and endangerment is needed. A List 4 plant has a limited distribution but is presently not endangered. Impacts to List 1B and List 2 plants are frequently considered significant under CEQA, depending on the lead agency. Plants on Lists 3 and 4 may be evaluated on a case-by-case basis to determine significance thresholds under CEQA. A CNPS list 4 species occurs at Tolay Creek Ranch and other species on the CNPS lists may also occur there.

# 2.0 METHODS

LSA reviewed the CDFG's California Natural Diversity Data Base (CNDDB 2008), LSA's draft biological report on Tolay Lake Regional Park (LSA 2008a) and other relevant environmental documents (Parsons 1996) for records of special-status species in the area of Tolay Creek Ranch. The CNDDB query included both plants and animals in the Cotati, Glen Ellen, Novato, Petaluma, Petaluma River, San Geronimo, Sears Point, and Sonoma USGS quadrangles. Based on this review, a list of 34 special-status plant species was compiled for focusing survey efforts. This list was used to help focus survey efforts by documenting blooming periods and habitat affinities of special-status plant species. Aerial photos and global positioning (GPS) technology were used for mapping vegetation types, habitats, and special-status species occurrences.

The survey area encompassed the entire Tolay Creek Ranch site. The surveys were conducted by walking 100 to 200-foot-wide transects in the focus areas of the site and in areas that provided potentially suitable habitat for special-status species. Areas outside of focus areas were less intensively surveyed. These focus areas are the existing ranch roads, the entry points to Tolay Creek Ranch, Roche Domestic Springs, and Lower Tolay Valley.

## 2.1 PLANT SURVEYS

Four LSA botanists (Clint Kellner, Greg Gallaugher, Steve Cochrane, and Zoya Akulova) participated in the botanical surveys of Tolay Creek Ranch. Early season surveys (March 28, April 1, 5, 11, May 10, 16. 19, 21, 22, 23, 26, and 27) were conducted by a team of two or three botanists and late season surveys (June 18, 19, and October 24, 2008) were conducted by one or two botanists. Late season surveys were conducted by checking the habitats of late blooming special-status plant species such pappose tarweed (*Centromadia parryi* ssp. *parryi*) and other species associated with seeps or wetlands.

The special-status fragrant fritillary (*Fritillaria liliacea*) often grows in association with the common Fremont's star lily (*Zigadenus fremontii*), and populations of the star lily were examined for fragrant fritillary.

Plants were identified using dichotomous keys in the Jepson Manual (Hickman 1993), and the Flora of Sonoma County (Best et al.1996). Plants collected in the field were also identified by comparing them to images from Calphotos and Google Images and to pressed specimens housed at the UC Berkeley and Jepson Herbaria. Botanical nomenclature is according to the Jepson Manual (Hickman 1993).

Tolay Creek Ranch is a rich site with respect to biological resources. Emphasis during the surveys was placed on searching for special-status plants and mapping wetland, native grassland, and weeds, especially on serpentine substrates. Because of the large size of the property, the mapping provides an indication of the richness of Tolay Creek Ranch with the focus areas more completely covered than others. Each of the areas of Tolay Creek Ranch was visited but not necessarily thoroughly sampled.

The goal of the sampling was to determine species and vegetation types in sufficient detail to guide the management of Tolay Creek Ranch.

## 2.2 WETLANDS

### 2.2.1 Wetland Identification Methodology

Field investigations of potential wetlands occurring on the property were conducted by surveying areas for hydrophytic vegetation. Hydrophytic plant species are listed by the USFWS in *National List of Plant Species that Occur in Wetlands* (Reed 1988). The *National List* identifies five categories of plants according to their frequency of occurrence in wetlands. The categories are:

| | |
|---|---|
| Obligate wetland plants (OBL) | Plants that occur almost always in wetlands. |
| Facultative wetland plants (FACW) | Plants that usually occur in wetlands. |
| Facultative plants (FAC) | Plants that are equally likely to occur in wetlands or non-wetlands. |
| Facultative upland plants (FACU) | Plants that usually occur in uplands. |
| Obligate upland plants (UPL) | Plants that occur almost always in non-wetlands. |

An area is considered to meet the hydrophytic vegetation criterion when more than 50 percent of the dominant species in each stratum (e.g., tree, shrub, and herb) present are in the obligate wetland, facultative wetland, or facultative categories.

### 2.2.2 Field Methodology

LSA surveyed wetlands in conjunction with conducting the botanical surveys. Potential wetland boundaries were mapped using three different methods: 1) by following vegetation and land forms; 2) tracing features on the aerial ortho-photo; and/or 3) using the GPS. A scale of 1-inch equals 400 feet aerial ortho-photo map of Tolay Creek Ranch and GPS units were used in the field for mapping purposes. Some of the GPS units were accurate to within 1 meter (39 inches) while other GPS units were accurate to within 3-5 meters.

Wetlands and other waters potentially subject to regulation were identified predominantly by the presence of basins, ditches or other depressed topographic features, and by the presence of hydrophytic vegetation. Drainage features were considered to be potentially jurisdictional if they contained water at the time of the survey, exhibited scour, shelving, a low-flow channel, debris deposits at the side of the channel, or otherwise showed evidence of prolonged flow.

## 2.3 ANIMAL SURVEYS

Surveys consisted of traversing selected areas of the site by foot while recording animal observations in field notes and noting areas of particular habitat value on aerial photos. These selected areas included representative examples of the existing habitats (e.g., Tolay Creek, oak woodland, grassland, riparian woodland) of Tolay Creek Ranch. Survey dates are the same as the botanical survey dates. Portions of Tolay Creek were surveyed on April 1and October 24, 2008.

Nomenclature used in this report for amphibians and reptiles conforms to Crother et al. (2000, 2003), while nomenclature for mammals conforms to Baker et al. (2003). Nomenclature for special-status species conforms to the CNDDB (2008). Scientific names of bird species are not provided in the text because English vernacular names are standardized in the American Ornithologists' Union (AOU) *Check-list of North American Birds* and supplements through the 49th (AOU 2008 and Banks et al 2008).

# 3.0 PHYSICAL SETTING

## 3.1 TERRAIN AND HYDROLOGY

Tolay Creek Ranch is comprised of flat, rolling, and moderately steep terrain and is largely bounded by two ridges: the East Ridge and the West Ridge. These ridges separate the Petaluma River Valley and Sonoma Creek. The relatively level areas of Tolay Creek Ranch are located in the Lower Tolay Valley and along Highway 121. Nichols and Wright (1971) have mapped the presumed edge of San Pablo Bay just south of Highway 121 in the vicinity of Tolay Creek Ranch. An examination of the vegetation immediately south of Highway 121 surrounding Tolay Creek and a small watercourse to the east of Tolay Creek indicates that the elevation appears to be too high for salt marsh. Tolay Creek and the other watercourse are not tidal at Highway 121 and the vegetation is not salt marsh at the edges of these watercourses indicating that this portion of Tolay Creek Ranch was most likely grassland and seasonal wetland historically.

Tolay Creek, flowing from northwest to southeast, transects the center of Tolay Creek Ranch, before forming the approximate property boundary in the southeast portion of the Ranch (Figure 2). The majority of Tolay Creek Ranch drains into Tolay Creek, which is primarily a dry creek bed with a few isolated pools by early fall (during dry years). A small area of the northern portion of the West Ridge drains to the Petaluma River. Numerous seasonal creeks, springs and seeps are located on the relatively steep slopes of the Tolay Creek Ranch on either side of Tolay Creek. Elevations range from approximately 20 feet above sea level on the floor of Lower Tolay Valley at the Hwy 121 bridge to approximately 560 feet on the ridges on either side of Tolay Creek. The highest elevation on Tolay Creek Ranch is 575 feet at a rock outcrop along the southwestern property line.

The Tolay Lake basin is located just upstream of Tolay Creek Ranch to the northwest. The natural hydrology of the lake basin was altered in the mid 1800s by removing the natural dam and constructing drainage ditches for the purpose of farming the lakebed. Historically, the lake was seasonally variable and could have sustained a lake 14 feet deep before spilling over into Tolay Creek (Kamman Hydrology andEngineering 2003). During most years, Tolay Lake likely functioned as a large seasonal, semi-permanent marsh. During years of heavy rainfall, Tolay Lake likely existed as a permanent wetland. The lake was probably an important source of freshwater for human populations and wildlife well into the dry summer months. During the wet season of recent years, Tolay Lake typically reaches 4 to 8 feet in the deepest locations, although much of it ranges from 2 to 3 feet deep. The lake has historically been pumped dry during the spring to accommodate farming operations. Sonoma County Regional Parks is currently developing a master plan for Tolay Lake Regional Park, which will include restoration of Tolay Lake to a portion of its historic extent.

## 3.2 SOILS AND EROSION

The Sonoma County Soil Survey (USDA 1972) classifies soils on Tolay Creek Ranch into four soil map types: Clear Lake Clay Loam (CcA), Diablo Series (DbC, DbD, DbE, and DbE2), Goulding Series (GlD and GoF), Montara loam (MoE), and gullied land (GuF) (Figure 4).

Clear Lake Clay Loam occurs in the relatively level area along Tolay Creek and is formed under poorly drained conditions. It has a clay loam surface layer, 10 –15 inches in depth, underlain by clay. Vegetation is primarily annual and perennial grasses and forbs. The Diablo series occupies most of the slopes at Tolay Creek Ranch. It typically has low permeability, high runoff potential, and high shrink-swell potential.

The Diablo series has high erosion potential that increases with steepness. The Goulding-Toomes Complex soil consists of clay and rocky loam on varying slope with moderate permeability and medium or high runoff and erosion potential.

Land use is primarily rangeland. Gullied land consists of gently sloping to steep, rounded hills that have been damaged by erosion. It typically occurs where excess runoff, caused by overgrazing by livestock or unusually heavy storms, has cut into natural water courses on hillsides (USDA 1972). It is mapped in the southern portion of the West Ridge by the USDA (1972), but LSA also mapped some gullied land on the East Ridge (Figure 4). Gullies occur elsewhere on Tolay Creek Ranch, but are not as large as those mapped on Figure 4.

The Montara cobbly clay loam is located within the southwest portion of Tolay Creek Ranch. These soils are well drained and underlain by weathered serpentine. Some segments of Tolay Creek are severely eroded, with exposed, nearly vertical banks and gullying is occurring on many of the tributaries of Tolay Creek. The New Years Day 2006 flood event in the area caused extensive erosion on the site as well as other watersheds in the area (B. J. Roche, pers. comm., 2007).

## 3.3 GEOLOGY

The geology within the area is complex, consisting of several geologic formations, landslides and faults (California Department of Conservation, California Geologic Survey. 2002). The northeast portion of Tolay Creek Ranch is predominantly made up of Donnell Ranch Volcanics, consisting of rhyolite, basalt and basaltic andesite lava flows, breccias, and scoria. The southeastern portion of Tolay Creek Ranch consists of the Petaluma Formation which is predominantly a lacustrine and fluvial deposit consisting of siltstone, sandstone, shale, and conglomerate with minor amounts of tuff, chert, lignite, and limestone. The southwest portion of Tolay Creek Ranch consists of serpentinized ultramafic rock. The Franciscan Complex mélange makes up the northwestern portion of Tolay Creek Ranch. The Franciscan complex is a tectonic mixture of resistant rock including sandstone, greenstone, chert, gabbro, and exotic metamorphic rock. The Lower Tolay Valley consists primarily of alluvial deposits.

Numerous Quaternary landslides are located on the steeper slopes throughout Tolay Creek Ranch (Koenig 1963). The Roche-Cardoza fault transects the northern portion of Tolay Creek Ranch. The Tolay Fault Zone ia a 600 meter wide area of imbricate thrust faults. The Rogers Creek Fault is roughly parallel to Tolay Creek and is located in the vicinity of the East Ridge through the length of Tolay Creek Ranch.

## 3.4 CLIMATE

Sonoma County has a Mediterranean climate with typically dry summers and mild, wet winters. The climate near San Pablo Bay is heavily influenced by the Pacific Ocean and is characterized by mild seasonal temperatures, prevailing west to northwest winds, and frequent heavy fog. Temperatures tend to be more extreme further away from the mitigating effects of the Bay. Local southerly winds may also develop seasonally due to differential heating between Tolay Lake, Sonoma Creek valley, Petaluma River valley, and San Pablo Bay. Median annual precipitation is approximately 22.5 inches, but this amount varies widely with a maximum of 49.8 inches and a minimum of 9.7 inches over the period from 1914 to 1997 (Kamman Hydrology and Engineering, Inc. 2003).

## 3.5 EXISTING INFRASTRUCTURE

Improvements on Tolay Creek Ranch are primarily associated with ranch operations. Both perimeter and interior fencing are in various states of repair, and a network of unimproved seasonal ranch roads is in various states of condition. There are two at grade crossings of Tolay Creek that are currently used. One crossing is beneath the entrance road and another one is at the gate just south of the former crossing at the old bridge at the boundary with Tolay Lake Regional Park. This former crossing at the Sears Point to Lakeville Road is overgrown with willow trees and is in disrepair. Several culverts are under the Sears Point to Lakeville Road along the northeast side of Tolay Creek. There are no structures on Tolay Creek Ranch with the exception of a small shed near the southern-most Tolay Creek crossing and the remains of a hunting shack constructed by a previous ranch owner near the northern-most Tolay Creek crossing. Numerous developed springs occur throughout Tolay Creek Ranch that provide water for livestock and supply water to the reservoir (through the 6-inch pipe) on the adjoining property retained by the Roche's for vineyard use. The 4-inch pipes serve the water tanks for the house at the Roche's property. There is no power on Tolay Creek Ranch; the water is gravity-fed through pipes to the off-site reservoir.

# 4.0 VEGETATION AND WILDLIFE VALUES

This section describes the vegetation and wildlife values of Tolay Creek Ranch. The characteristics of the vegetation are mentioned such as dominant and associated species, height and cover and size of trees. The animal species that are most likely to occur in those vegetation types are also discussed. Table A provides a list of the plant species observed within Tolay Creek Ranch and Table B provides a list of the animal species observed within Tolay Creek Ranch.

## 4.1 WOODLAND

The native woodland vegetation consists of coast live oak woodland (coast live oak, California bay, California buckeye), valley oak woodland (valley oak), riparian woodland (arroyo willow, sandbar willow, and/or red willow) or quite often, a combination of these vegetation types. Separating these woodland types on Figures 5a and b would be a time-consuming process because of the small size of the stands of these vegetation types and the frequency of their occurrence together. Non-native trees consist of blue gum (*Eucalyptus globulus*), black acacia (*Acacia melanoxylon*), and Monterey cypress (*Cupressus macrocarpa*).

### 4.1.1 Botanical Values

**4.1.1.1 Oak Woodland.** Oak woodland occurs mostly in small stands along Tolay Creek and its tributaries although a relatively large stand occurs along a bench of a slope of the West Ridge (Figure 5a). The West Ridge supports more oak woodland than the East Ridge (Figure 5a). This plant community is dominated by coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*) with scattered California buckeye (*Aesculus californica*). The coast live oak trees are large with trunk diameters averaging or exceeding 2 feet diameter at breast height (dbh) as measured 4.5 feet from the ground surface. Tree height averages 30 feet or less. Many factors can affect the size of trees including amount of water stress, nutrient availability, and disease. Age of similar sized or larger trees at Olompali State Historic Park is less than 70 years.

Shrubby species of the understory of oak woodland include poison oak (*Toxicoendron diversilobum*), snowberry (*Symphoricarpos album*), and occasionally California rose (*Rosa californica*). Herbaceous species of the understory of oak woodland include miner's lettuce (*Claytonia perfoliata*), hedge nettle (*Stachys* sp.), Dutchman's pipe (*Aristilochia californica*), and Pacific sanicle (*Sanicula crassicaule*). Table A provides a comprehensive list of the plant species observed within Tolay Creek Ranch.

Valley oak (*Quercus lobata*) trees grow in small stands along Tolay Creek. These trees are large, 2 – 4 feet dbh, and approximately 40 feet tall. They grow in single species stands or in association with coast live oak and/or willow (*Salix* spp.) trees. Understory is composed of non-native grassland. Mistletoe (*Phoradendron villosum*) occurs on the branches of some trees.

**4.1.1.2 Blue Gum Trees.** Small stands of non-native blue gum grow on the West Ridge and along a tributary to Tolay Creek (Figures 6a and b). A few blue gum trees grow at the southern end of the East Ridge with ornamental shrubs (Figure 6a). These trees are large and provide a complete canopy cover.

**4.1.1.3 Monterey Cypress.** Monterey cypress is only native to the Monterey Peninsula, but has been planted ornamentally throughout California. It grows in a row in one location beside Tolay Creek. These trees are quite large; are greater than 2 feet in diameter and taller than 40 feet (Figure 6a).

### 4.1.2 Wildlife Values

Oak woodlands are one of the most species-rich wildlife habitats in California, primarily due to their production of acorns, which are an important food source for a variety of wildlife (CalPIF 2002). The ecological relationship between birds and oaks can often be reciprocal when species such as western scrub-jay and Steller's jay disperse acorns. Large oak trees also provide cover and nest sites for both cup-nesting and cavity-nesting birds, and are used as caching sites for the storage of acorns by acorn woodpeckers (CalPIF 2002). Such trees also provide nest sites for raptors. Bullock's oriole was observed in a valley oak in the spring and presumably nested on-site.

Mature trees and snags provide potential roost sites for bat species known to occur in the region. Although not detected by LSA, Yuma myotis (*Myotis yumanensis*), little brown myotis (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and pallid bat (*Antrozous pallidus*) could potentially occur in the oak woodlands on-site. Black-tailed deer (*Odocoileus hemionus*), while not restricted to oak woodlands, browse upon the foliage provided by the lower tree branches and take shelter there. Other mammal species likely to use this habitat include northern raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), gray fox (*Urocyon cinereoargenteus*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*).

Oak woodlands typically occur on north-facing and east-facing slopes, where precipitation is concentrated and moisture is lost less rapidly to evaporation. As a result of these relatively dense and moist conditions, salamanders often occur in oak woodlands on north-facing slopes. Although not detected by LSA, salamander species typically observed in oak woodlands within this region include California slender salamander (*Batrachoseps attenuatus*) and arboreal salamander (*Aneides lugubris*). Common reptiles expected within oak woodland include the western skink (*Plastiodon skiltonianus*), southern alligator lizard (*Elgaria multicarinata*), ring-necked snake (*Diadophis punctatus*) and sharp tailed snake (*Contia tenuis*). Down branches and rock outcrops provide cover for the animals inhabiting the oak woodland.

## 4.2 RIPARIAN VEGETATION

### 4.2.1 Botanical Values

Tolay Creek supports small stands of riparian woodland and often the riparian woodland grows adjacent to coast live oak woodland. Both of these types are mapped as woodland on Figures 5a and b. Other watercourses support single willows or small stands composed of a few trees. The riparian woodland is dominated by various combinations of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and sandbar willow (*Salix exigua*). Some stands of the riparian woodland are quite mature

with red willow trees exceeding 12 inches in diameter. The larger trees grow at the top of the bank of an incised channel that can be as much as 8 to 10 feet deep. Occasional willow trees that colonize the bottom of the channel are smaller than the willow trees growing at the top of the bank. The absence of large willow trees in the bottom of the channel of Tolay Creek indicates that the channel has recently incised 8 to 10 feet.

Native shrubs are largely absent from the understory of the riparian woodland owing to the bushy nature of the growth of the willow trees and the grazing experienced by Tolay Creek Ranch. Nevertheless, the following shrubs were observed growing in patches either in the open or beneath the canopy of trees: non-native Himalayan blackberry (*Rubus discolor*) and the native California blackberry (*Rubus ursinus*), snowberry, poison oak, and California rose.

### 4.2.2 Wildlife Values

Riparian areas are generally recognized as an important wildlife habitat (Faber 2003) and have been identified as the most important habitats for landbirds in California (Manley and Davidson 1993, cited in RHJV 2004). Several species depend on riparian habitats for their entire breeding cycle (e.g., yellow warbler), while many others use them for roosting and foraging during the winter (e.g. yellow-rumped warblers), or during migration (e.g., western tanager).

The following bird species are likely to use both the riparian and oak woodland at Tolay Creek Ranch: mourning dove, Anna's hummingbird, downy woodpecker, northern flicker, black phoebe, tree swallow, bushtit, Bewick's wren, ruby-crowned kinglet (winter), hermit thrush (winter), American robin, yellow-rumped warbler (winter), spotted towhee, California towhee, white-crowned sparrow (winter), golden-crowned sparrow (winter), and house finch. The dense foliage of these vegetation types provides particularly good habitat. Most of these species are not restricted to the woodland habitats and will forage in the adjacent grassland.

## 4.3 GRASSLANDS AND NATIVE FORBS

### 4.3.1 Botanical Values

**4.3.1.1 Native Grasslands.** Native grasslands are sensitive biological resources because little of the original native California grassland remains in low elevation areas of California, including Tolay Creek Ranch. Communities dominated by native grasses and graminoids that occur at Tolay Creek Ranch (Figures 5a and b) include needlegrass grasslands and creeping wildrye grasslands.

Purple needlegrass (*Nassella pulchra*) grows on slopes where soils are relatively shallow at Tolay Creek Ranch. They occur in relatively small stands and occur with native forbs and non-native grasses (Figures 5a and b). The shallow soils allow the purple needlegrass to compete more favorably with the non-native grass. The sloping areas of the ridges are more likely to support needlegrass dominated grasslands than the deep soils of the Lower Tolay Valley and the West Ridge supports more native grass than does the East Ridge. Hayfield tarweed (*Hemizonia congesta* ssp. *luzulaefolia*) grew in extensive stands throughout the West Ridge of Tolay Creek Ranch and often grew with purple needlegrass.

Creeping wild rye (*Leymus triticoides*) grows in areas of relative deep and moist soil. It spreads rhizomatously and grows in dense or sparse stands. At Tolay Creek Ranch, it grows in patches throughout the level areas and some of the slopes of the West Ridge. When growing in a dense stand it is the dominant species and other species are largely absent. In sparse stands, it occurs with the non-native medusahead (*Taeniantherum caput-medusae*), Italian rye grass (*Lolium multiflorum*), and soft chess (*Bromus hordeaceus*) and the native meadow barley (*Hordeum brachyantherum*) and harvest brodiaea (*Brodiaea elegans*).

**4.3.1.2 Native Forbs.** Native forbs commonly grow in dense stands particularly on the West Ridge and Lower Tolay Valley (Figures 5a and b). These species were the dominant vegetation along with purple needlegrass in some areas. They grow in a variety of combinations with the most common associations mentioned below.

Fremont star lily grows with miniature lupine (*Lupinus bicolor*) and California buttercup (*Rannculus californica*) in patches in the Lower Tolay Valley. Minature lupine is also common in the grassland areas where it also grows with a variety of other plants species. Large stands of narrow-leaved mule ears (*Wyethia angustifolia*) and Kellogg's yampah (*Perideridia kelloggii*) occur in the grassland. Purple needlegrass, hill morning-glory (*Calystegia subacaulis*), and yarrow (*Achillea millefolium*) were also observed growing on the West Ridge.

Large and small stands of Johnny jump-up (*Viola pedunculata*) grow in sparse to dense aggregations on portions of the West Ridge. A large stand of dense blue-eyed grass (*Sisyrinchium bellum*) also grows on the West Ridge. Blue-eyed grass also grows with other species of forbs and grasses such as meadow barley, California buttercup, and lotus (*Lotus wranglianus*).

Figures 5a and b show the location of mapped stands of native forbs on the West Ridge. These stands often form a mosaic with native grassland and non-native grassland. The East Ridge did not appear to support as many and as large of stands of native forb communities. Because of the variety of forb vegetation types and the high frequency of their occurrence with or beside native grasslands, the different forb types were combined into a native forb grouping for mapping purposes.

**4.3.1.3 Non-Native Grasslands.** Non-native grassland grows throughout Tolay Creek Ranch. The cover of this grassland is high and approaches 100 percent. The height of the grassland depends on soil depth and moisture content and averages 1 to 1.5 feet tall. This past year (2008) was very dry and the cattle had consumed the majority of the grass by autumn. Hoof prints pockmarked the entire grassland area at Tolay Creek Ranch such that the ground was difficult to walk over.

The non-native species that are commonly observed include: ripgut brome (*Bromus diandrus*), soft chess, wild oats (*Avena fatua, Avena barbata*), hare barley (*Hordeum murinum* ssp. *leporinum*), which grow in various combinations in dry areas. Relatively moist areas support Mediterranean barley and Italian ryegrass. Medusahead grows in small stands throughout Tolay Creek Ranch.

Non-native grasslands include many other weedy species including broad-leaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), common vetch (*Vicia sativa*), geranium (*Geranium molle*), Shepherd's needle (*Scandix pecten-veneris*), rose clover (*Trifolium hirtum*), and subterranean clover (*Trifolium subterraneum*). These species do not form large stands but grow sparsely among the grasses.

Tolay Creek Ranch is notable for the extensive stands of the native hayfield tarweed which grow in the native and non-native grasslands. Other native forbs of the non-native grasslands include Ithuriel's spear (*Triteleia laxa*), Fremont's star lily, blue-eyed grass, California poppy (*Eschscholzia californica*), soap plant (*Chlorogalum pomeridianum*), California checker mallow (*Sidalcea malvaeflora*.), Johnny jump-up, and hill morning-glory.

**4.3.1.4 Invasive Plant Species.** Medusahead, Italian thistle (*Carduus pycnocephalus*), bristly ox-tongue (*Picris echioides*), and yellow star-thistle (*Centaurea solstitialis*) are the most common non-native invasive plants at Tolay Creek Ranch (Figures 6a and b). Yellow star-thistle is particularly common throughout Tolay Creek Ranch in sparse stands. Medusahead and Italian thistle occur in small stands throughout the site and bristly ox-tongue is particularly abundant in the seeps and moist areas. Purple star-thistle (*Centaurea calcitrapa*) and milk thistle (*Silybum marianum*) are less common at Tolay Creek Ranch and occur in a relatively few places. Other non-native weed species that are less invasive and grow relatively sparsely within the study area include bull thistle (*Cirsium vulgare*), jointed charlock (*Raphanus raphanistrum*), black mustard (*Brassica nigra*), and smooth cat's ear (*Hypochaeris radicata*). Narrow-leaved plantain (*Plantago lanceolata*) was a common non-native species in some areas of the grassland.

### 4.3.2 Wildlife Values

Grasslands constitute the most widespread habitat type at Tolay Creek Ranch. In addition to common bird species such as western meadowlark, grasslands on the site are likely to support breeding grasshopper sparrows and horned larks judging by the observation of horned larks and singing or calling grasshopper sparrows at Tolay Creek Ranch. Both of these species are more restricted in their distribution and together indicate high-quality, diverse grasslands with horned larks preferring short grass and bare areas while grasshopper sparrows preferring comparatively tall grass habitats. Grasslands also provide foraging habitat for raptor species such as red-tailed hawk, northern harrier, white-tailed kite, American kestrel, great horned owl, and barn owl, which feed on the small mammals that occur in grasslands (see below). Other local bird species that spend a large portion of their life cycle within or adjacent to grasslands include turkey vulture, loggerhead shrike, western kingbird, Say's phoebe, American crow, Savannah sparrow, and red-winged blackbird

The grasslands of Tolay Creek Ranch are likely to support several species of small mammals such as deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californica*), Botta's pocket gopher (*Thomomys bottae*), and western harvest mouse (*Reithrodontomys megalotis*). Grasslands also provide suitable foraging habitat for bat species, northern raccoon, and striped skunk. Skunks forage in the grasslands, while raccoons forage in the ponds, seeps, streams and other wet areas of Tolay Creek Ranch.

Black-tailed jackrabbit (*Lepus californicus*) and coyote (*Canis latrans*) are known to occur on the site, and spend the majority of their time foraging or resting in grasslands. The jackrabbit comprises a major prey item for the carnivores that occur at Tolay Creek Ranch. Brush rabbits (*Sylvilagus bachmani*) were not observed at the ranch. With additional shrubby cover, rabbits and other small mammals could occur on-site in greater numbers than currently and provide a greater prey base for the carnivores.

California ground squirrel (*Spermophilus beecheyi*) creates burrows that are used by a wide variety of animals including reptiles, amphibians, insects, arachnids, and snails. Because of this and their importance as prey for foxes, coyotes, golden eagles, and other raptors, California ground squirrel has a positive influence on the diversity of animal species in grasslands.

California ground squirrels experience natural fluctuations in their population numbers at Tolay Lake Regional Park and the adjacent ranches according to Jenette Cardoza, the former owner of the Cardoza Ranch (Ehret pers. comm.). California ground squirrels were rarely observed at Tolay Creek Ranch (and Tolay Lake Regional Park). Given the extensive suitable habitat for ground squirrels and the past favorable land management regime of intensive grazing, the scarcity of ground squirrels on the site could be the result of a low point of a natural population fluctuation and/or intense predation by a suite of predators.

Common reptiles typically found in grasslands in this region include western fence lizards (*Sceloporus occidentalis*), gophersnakes (*Pituophis catenifer*), and northern American racers (*Coluber constrictor*). Grassland areas adjacent to seasonal wetlands in this area could also support northern Pacific treefrog (*Pseudacris regilla*) and western toad (*Anaxryus boreas*).

## 4.4 SEEPS AND SPRINGS

### 4.4.1 Botanical Values

Well developed seeps and springs are located on slopes both east and west of Tolay Creek. The larger seeps contained water until summer and dried by November 2008. Species present included Pacific rush (*Juncus effuses*), spreading rush (*Juncus patens*), brown-headed rush (*Juncus phaeocephalus*), California semaphore grass (*Pleuropogon californicum*), and tall fescue (*Festuca arundinacea*). Broad-leaved species that grow in some of these seeps include Bloomer's buttercup (*Ranunculus orthorhynchus* ssp. *bloomei*), prickle-seeded buttercup (*Ranunculus muricatus*), strawberry clover (*Trifolium fragiferum*), and the seep-spring monkey flower (*Mimulus guttatus*). All of these species are native except prickle-seeded buttercup, strawberry clover, and tall fescue.

The Roche Domestic Springs have been altered to provide water to the Roche Farm. Usually a productive spring that supplies water over a long duration occurs in a round or oval configuration with saturation to the surface throughout. The Roche Domestic Springs contain several spring boxes and the topography has been altered to channel the run-off from the springs (Figure 5b). The rainfall of 2008 was much below average. In a wet year the configuration of the wetland vegetation may appear in a more well-developed oval shape, much like an undeveloped spring.

### 4.4.2 Wildlife Values

Birds, mammals, and reptiles would all be expected to frequent the seeps for drinking water. Cover would be provided within the dense growth of rushes and other vegetation. Shrews (*Sorex* spp.) would be expected to occur within the seeps where they would conduct the majority of their foraging. Bird species such as killdeer, great egret, and Wilson’s snipe are more likely to forage within the wet areas of seeps and springs than in the drier adjacent grassland habitats.

The use of seeps and springs by amphibians largely depends on the seasonal duration of the seep. Seasonal seeps that have a relatively short wet season hydrology may aid in the dispersal of adult frogs. Nevertheless, permanent seeps and springs are more useful to amphibians during the summer months and common amphibian species such as northern Pacific treefrogs and western toads are likely to use these areas in the summer. Northern Pacific treefrog tadpoles occurred at a small shallow pond at the Roche Domestic Springs (Figure 5b). The red-sided garter snake (*Thamnophis sirtalis infernalis*.) and the southern alligator lizard were observed there as well.

## 4.5 SEASONAL WETLANDS

### 4.5.1 Botanical Values

Seasonal wetlands occur throughout Tolay Creek Ranch (Figures 5a and b). Hydrology of these features is provided by direct rainfall and run-off. The seasonal wetlands of the Lower Tolay Valley occur on level, dense clay soils. Seasonal wetlands also occur in swales at Tolay Creek Ranch. These seasonal wetlands rarely pond water and are at the drier end of the wetland continuum. Some of these seasonal wetlands, such as the Baltic Rush Meadow, which is described below, may not not be jurisdictional because of the absence of sufficient water to result in observable indicators of the Corps wetland hydrology criterion.

Baltic rush (*Juncus balticus*) and brown-headed rush grow with native and non-native grass in relatively moist patches in grassland. Fremont's star lily and California buttercup are common associates of these rushes. This vegetation occurs in the level areas of the Lower Tolay Valley. Although these features were fairly common in the dense clay, the sparseness of the rush indicates relatively dry conditions and this vegetation may not qualify as jurisdictional waters of the United States.

### 4.5.2 Wildlife Values

The wildlife value of the seasonal wetlands varies with the hydrology. The relatively dry seasonal wetlands would be used the same as grassland habitat by wildlife. The wetter seasonal wetlands would be used for hydration habitat and the values would be similar to those of seeps and springs.

## 4.6 VERNAL POOLS AND SMALL SEASONAL PONDS

### 4.6.1 Botanical Values

A large shallow vernal pool occurs on a bench on the West Ridge southwest of Tolay Creek and west of a large wetland (Figure 5a). Both the vernal pool and the large wetland drain into tributaries of Tolay Creek. Three shallow seasonal ponds were created by heavy equipment east of the Roche Domestic Springs (Figure 5b). These ponds are located in an area that had slumped, but the steepness of the mounding adjacent to the ponds is gives the impression of creation by heavy equipment. These ponds support small and sparse stands of spikerush (*Eleocharis* sp.). Lobb's aquatic buttercup (*Ranunculus lobbii*), a CNPS list 4 species, also grows in these features. Because of their small size and proximity to each other, they are mapped as a single feature on Figure 5b near 4 small wetland features.

### 4.6.2 Wildlife Values

The wildlife values discussed in the section of *Seeps and Springs* are also relevant for the vernal pool and small seasonal ponds. Although these features provide suitable breeding habitat for northern Pacific treefrogs and western toads, ponding does not last long for these features. Red-sided garter snakes (*Thamnophis sirtalis*) and terrestrial garter snakes (*Thamnophis elegans*) would also be expected to occur in and adjacent to seasonal wetlands. Garter snakes predominantly feed on fish, toads, frogs, salamanders, and their larvae.

## 4.7 CREATED POND

A pond was created near one of the Roache Domestic Springs and is south of a large polygon of native grassland (Figure 5b). This pond is surrounded by fencing to prevent cattle from entering.

### 4.7.1 Botanical Values

This pond supports stands of emergent wetland vegetation (cattails and/or bulrush) and spikerush growing at the edge with open water in the center.

### 4.7.2 Wildlife Values

The wildlife values discussed in the section of *Seeps and Springs* and *Vernal Pools and Small Seasonal Ponds* are also relevant for the the created pond. The created pond provides suitable breeding habitat for the sierran treefrog and western toads. The pond appears perennial and is likely to support breeding habitat for California red-legged frogs and American bullfrogs. Red-sided garter snakes and terrestrial garter snakes would also be expected to occur in and adjacent to seasonal wetlands. Garter snakes predominantly feed on fish, toads, frogs, salamanders, and their larvae.

## 4.8 LARGE SEASONAL POND

A large seasonal pond occurs in the panhandle portion of Tolay Creek Ranch adjacent to Highway 121 (Figure 5b). This pond remains inundated into early May of most years and it was dry on May 21 of 2008 and remained dry through at least mid January of 2009. The pond is formed by an intermittent watercourse that flows beneath Highway 121. The majority of this pond extends upstream and off-site onto the adjacent property.

### 4.8.1 Botanical Values

Vegetation of the seasonal pond consists of native and non-native species. Dominant species include curly dock (*Rumex crispus*) and narrow-leaved bird's-foot trefoil (*Lotus tenuis*), both non-native species, and California semaphore grass, brown-headed rush, and coyote thistle (*Eryngium* sp.) all native species. Other species that occurred in the seasonal pond include popcorn flower (*Plagiobothrys* sp.), common water-plantain (*Alisma lanceolatum*), downingia (*Downingia* sp.), smooth lasthenia (*Lasthenia glaberrima*), and cream sacs (*Castilleja rubicundula* ssp.

*lithospermoides*), all native species. Cocklebur (*Xantium strumarium*) and brass buttons, both non-native species also grow in the pond.

The seasonal pond is slightly alkaline or salty judging from the occurrence of species adapted to salty environments. These species are alkali heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), salt heliotrope (*Heliotropium curassavicum*), alkali mallow (*Malvella leprosa*), all native species, and rabbit's foot grass (*Polypogon monspeliense*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and bird's foot trefoil, all non-native species. The watercourse that forms the pond supports water plantain, water buttercup (*Ranunculus aquatilis*), and prairie bulrush (*Bolboschoenus maritimus*). A CNPS list 4 species Lobb's aquatic buttercup also grows in this seasonal pond in an area next to Highway 121 (Figure 7b).

### 4.8.2 Wildlife Values

This pond is a valuable wildlife feature because it supports a variety of water birds while inundated. Species of waterfowl observed on the pond include Canada goose, mallard, American widgeon, and cinnamon teal. Shore birds present at this pond include killdeer, black-necked stilt, Wilson's snipe, and greater yellowlegs. Great egrets, snowy egrets, and probably great blue herons forage in this pond as well.

This pond is likely to provide breeding habitat for native northern Pacific treefrogs and western toads, which also makes it likely habitat for common garter snakes and terrestrial garter snakes. Habitat for California red-legged frog (*Rana draytonii*) and western pond turtles (*Actinemys marmorata*) also occurs at the pond although they have not been observed there.

## 4.9 STREAMS

### 4.9.1 Tolay Creek

Tolay Creek extends approximately 2.7-2.8 miles downstream of the northern boundary of Tolay Creek Ranch with Tolay Lake Regional Park (Figures 5a and b). Tolay Creek varies from about 8 to 15 feet wide. The channel is incised an estimated 1 to 10 (or perhaps more in places) feet from the top of the bank to the channel bottom throughout much of the site. The deeper portions occur in the middle reaches of Tolay Creek. Terraces indicating the former channel of Tolay Creek occur 1 to 4 feet above portions of the channel of Tolay Creek. The substrate of Tolay Creek consists of silt and sand in low velocity segments of the creek, while gravel and cobbles occur where the current flows faster. The deeper pools within the channel contained standing water into October 2008, while the majority of the creek dried by summer. Presumably the pools that contained water are perennial considering that this is the second dry year in a row.

The vegetation of Tolay Creek consists of both woody and herbaceous species. The woody species were described above in the section on *Riparian Woodland*. The following discussion pertains to the vegetation of the channel of Tolay Creek. Some reaches support cattails (*Typha* sp.), bulrush (*Scirpus* sp.), and spikerush. These species grow within the channel of the creek in small patches 10 to 20 feet long and 3 to 6 feet wide. Smaller stands of the non-native water cress (*Rorippa nasturtium-aquaticum*), cocklebur, and pennyroyle (*Mentha pulegium*) and the native common water-plantain, knotweed (*Polygonum* sp.), and water pennywort (*Hydrocotyle ranunculoides*) also grow in the creek.

The terraces and bank beside the creek support native species including Baltic rush, mugwort (*Artemesia douglansiana*), nettle (*Urtica dioica*), and horsetail (*Equisetum* sp.). Some terraces support saltgrass, a native species adapted to grow in moist salty areas. Non-native species such as teasel (*Dipsacus* sp.), yellow star-thistle, Italian thistle, and non-native grass also grow on the terraces.

Tolay Creek is important for wildlife use due to the presence of year-round water and cover. The occurrence of water in the creek allows wildlife to remain at Tolay Creek Ranch without traveling to the stock ponds that are on adjacent parcels. It is also important for providing breeding habitat for amphibians. The relatively high amount of plant cover allows Tolay Creek and its tributaries to function as movement corridors which allows wildlife to travel unobserved throughout the site and to off-site areas. The combination of cover, water, and dense foliage also provides foraging habitat for wildlife.

### 4.9.2 Tributaries to Tolay Creek

A number of tributaries discharge into Tolay Creek. These tributaries drain both the East and West ridges and are not as wide or deep as Tolay Creek (Figures 5a and b). Most of these tributaries are incised and the banks of some of these tributaries are eroding. Some may contain pools that remain into the summer. The larger tributaries generally support woody vegetation along at least a portion of their reaches while the upper reaches usually support herbaceous vegetation, not woody.

## 4.10 ROCK OUTCROPS

Rock outcrops provide habitat for native plants and animals. Some of the mapped rock outcrops consist of cobble fields in which cobbles and small boulders occur on shallow soil. Other rock outcrops consist of large boulders protruding from either deep or shallow soil. The historic rock walls, although not a natural feature, also provide habitat for small mammals and function as rock outcrops. Figures 5a and b show the location of the rock outcrops.

At Tolay Creek Ranch, rock outcrops occur along the west bank of Tolay Creek and on the East and West ridges. Rock outcrops are often surrounded by shallow soils that support a higher proportion of native plant species than adjacent grasslands. Some of the rock outcrops, however, are heavily used by cattle for rubbing and support ruderal plants typical of disturbed areas. The rock outcrops along Tolay Creek are often located below coast live oak trees and support poison oak, snowberry, California rose, wild cucumber, and Duchman's pipe. Species include the non-native yellow star-thistle and Italian thistle and the native fiddleneck (*Amsinckia menziesii* var. *intermedia*). Wildlife species are likely to use rock outcrops for dens or observation posts. California ground squirrels often construct their burrows at rock outcrops.

# 5.0 SPECIAL-STATUS SPECIES

A variety of special-status species and sensitive habitat types occur at Tolay Creek Ranch. Special-status species observed during field work or otherwise known to occur on-site include Marin western flax (*Hesperolinon congestum*), Lobb's aquatic buttercup, marsh zigadene (*Zigadenus micranthus* var. *fontanus*), California red-legged frog, western pond turtle, golden eagle, burrowing owl, California horned lark, grasshopper sparrow, and Opler' longhorn moth (*Adela oplerella*).

Locations of special-status species and their habitats are mapped on Figures 7a and b. Sensitive habitats that occur at Tolay Creek Ranch are oak woodlands, riparian woodlands, native grasslands including serpentine areas, wetlands, and rock outcrops (Figures 5a and b).

The CNDDB query provides a list of special-status species that are known to occur in the vicinity of Tolay Creek Ranch and therefore could potentially occur on the ranch. The CNDDB query covers a relatively large area surrounding Tolay Creek Ranch and as such includes species that occur in habitats that are not present (such as salt marsh) or species that are restricted to a particular geographic area such as Mt. Tamalpais. Only those species whose known distribution could encompass Tolay Creek Ranch or whose habitats occur on Tolay Creek Ranch are addressed in this report as potentially occurring on the ranch.

## 5.1 PLANTS

### 5.1.1 Known Occurrences of Special-status Plants

Three special-status plant species, Marin western flax, Lobb's aquatic buttercup, and marsh zigadene are described below and have been observed at Tolay Creek Ranch

**5.1.1.1 Marin Western Flax.** Marin western flax, federally and state threatened and CNPS List 1B, occurs in serpentine barrens and serpentine grassland and chaparral at an elevation between 100 and 1,200 feet. Extensive stands were observed growing in the serpentine of the southwestern portion of Tolay Creek Ranch (Figure 7b). This is the only known location of this species in Sonoma County. It grows on shallow rocky soils and on deeper soils. It often grew with the white-flowered hayfield tarweed.

**5.1.1.2 Lobb's Aquatic Buttercup.** Lobb's aquatic buttercup, a CNPS list 4 species, grows in shallow pools in the spring. Their white flowers and leaves float on the surface of the water. It occurs in a vernal pool on the West Ridge, in some ponds that appeared to be created incidentally as part of some former earth-moving activity by heavy equipment, and in the large seasonal pond adjacent to Highway 121 (Figures 7a and b).

**5.1.1.2 Marsh Zigadene.** Marsh zigadene, A CNPS list 4 species, grows in serpentine areas that are usually wet. It can be distinguished from the Fremont's star lily by its summer flowering period and habitat preference for wet serpentine areas although the Fremont's star lily may occasionally occur in

wet areas. A few marsh zigadene plants grow along a tributary to Tolay Creek (Figure 7b) just outside of the serpentine areas mapped on Figure 5b.

### 5.1.2 Potential Occurrences of Special-status Plants

The following plant species are not known to occur within Tolay Creek Ranch, but are known from the vicinity. They were not found during surveys and they are unlikely to occur at Tolay Creek Ranch. Nevertheless, the occurrence of some of these species, especially those of small size, cannot be completely ruled out because small stands could have been overlooked during the surveys.

**5.1.2.1 Franciscan Onion.** Franciscan onion (*Allium peninsulare* var. *franciscanum*), CNPS List 1B, occurs on clay soils, often on serpentine, and on dry hillsides at an elevation between 330 and 1,000 feet. Although not encountered during surveys, small stands of the Franciscan onion potentially occur in the serpentine area of Tolay Creek Ranch.

**5.1.2.2 Sonoma Alopecurus.** Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), CNPS List 1B, occurs in wet areas, vernal pools, marshes and riparian banks. There are a number of wet seeps at Tolay Creek Ranch and although unlikely, small numbers of Sonoma alopecurus growing in a large seep could have been missed during surveys. Although unlikely, the occurrence of Sonoma alopecurus cannot be ruled out from Tolay Creek Ranch.

**5.1.2.3 Napa False Indigo.** Napa false indigo (*Amorpha californica* var. *napensis*), CNPS List 1B, occurs in openings in forest, or woodland, and/or chaparral vegetation at an elevation between 500 and 6,500 feet. It is not likely to occur in the site because it was not found during surveys of openings within woodland habitats.

**5.1.2.4 Bent-flowered Fiddleneck.** Bent-flowered fiddleneck (*Amsinckia lunaris*), CNPS List 1B, occurs in woodland and grassland habitats. Bent-flowered fiddleneck was not encountered during surveys of Tolay Creek Ranch. Although unlikely, small stands of bent-flowered fiddleneck could have been missed during the surveys conducted in the extensive area of grassland. Its occurrence therefore cannot be ruled out from Tolay Creek Ranch.

**5.1.2.5 Alkali Milk-vetch.** Alkali milk-vetch (*Astragalus tener* var. *tener*), CNPS List 1B, occurs on alkali flats, flooded areas of annual grassland, in playas, or in vernal pools at an elevation between 1 and 550 feet. Alkaline or salty soils occur in the seasonally ponded area along Highway 121. Alkali milk-vetch is not likely to occur within Tolay Creek Ranch because it was not found during surveys.

**5.1.2.6 Sonoma Sunshine.** Sonoma sunshine (*Blennosperma bakeri*), CNPS List 1B, occurs in vernal pools and swales at an elevation between 30 and 330 feet. It is not likely to occur at Tolay Creek Ranch because it was not found during surveys.

**5.1.2.7 Narrow-anthered California Brodiaea.** Narrow-anthered California brodiaea (*Brodiaea californica* var. *leptandra*), CNPS List 1B, occurs in broad-leaved upland forest, chaparral, and lower montane coniferous forest at an elevation between 360 and 3,000 feet. Most of the observations were from areas beside scrub or chaparral (CNDDB 2008). Habitat for the narrow-anthered California brodiaea occurs in the rocky area that supports some shrubs at the western border of Tolay Creek

Ranch. It is not likely to occur in the site because it was not found during surveys within suitable habitats.

**5.1.2.8 Round-leaved filaree.** Round-leaved filaree (*California macrophyllum*), CNPS List 2, occurs in grasslands on clay soil between an elevation of 50 and 4,000 feet. Although not encountered during surveys, the grassland habitat is extensive and round-leaved filaree potentially occurs in grassland on Tolay Creek Ranch.

**5.1.2.9 Tiburon Paintbrush.** Tiburon paintbrush (*Castilleja affinis* ssp. *neglicta*), Federally endangered and State threatened, occurs in serpentine grassy areas, mostly in Marin County but has been observed in Napa and Santa Clara counties. It is not likely to occur on Tolay Creek Ranch because it was not observed during surveys.

**5.1.2.10 Pappose tarplant.** Pappose tarplant (*Centromadia parryi* ssp. *parryi*), CNPS List 1B, occurs in vernally mesic, often alkaline sites at an elevation between 6 and 1,400 feet. It is not likely to occur within Tolay Creek Ranch because it was not found during surveys of suitable habitats.

**5.1.2.11 Sonoma spineflower.** Sonoma spineflower (*Chorizanthe valida*), CNPS List 1B, occurs in sandy soil at an elevation between 30 and 160 feet. It is not likely to occur in the site because sandy soils are absent.

**5.1.2.12 Yellow larkspur.** Yellow larkspur (*Delphinium luteum*), CNPS List 1B, occurs on north-facing rocky slopes at an elevation up to 330 feet. It has been observed in western Marin County in moist scrubby and rocky habitats. It is not likely to occur at Tolay Creek Ranch because suitable habitat appears to be missing.

**5.1.2.13 Western leatherwood.** Western leatherwood (*Dirca occidentalis*), CNPS List 1B, occurs on brushy slopes and mesic sites; mostly in mixed evergreen and foothill woodland communities at an elevation between 100 and 1,800 feet. It is not likely to occur in the site because its mesic scrub habitat is absent.

**5.1.2.14 Dwarf downingia.** Dwarf downingia (*Downingia pusilla*), CNPS List 2, occurs in vernal lake and pool margins at an elevation between 1 and 1,600 feet. It is not likely to occur in the site because it was not found during surveys of vernal pools or other seasonally ponded areas.

**5.1.2.15 Tiburon buckwheat.** Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*), CNPS List 1B, occurs on serpentine substrates. It apparently is only known from the Tiburon Peninsula although the other variety (*Eriogonum luteolum* var. *luteolum* occurs widely throughout the San Francisco Bay Area. Tiburon buckwheat is not likely to occur at Tolay Creek Ranch.

**5.1.2.16 Fragrant Fritillary.** Fragrant fritillary, a CNPS list 1B species, occurs to the north in Tolay Lake Regional Park on the east-facing portion of the West Ridge. It grows among Fremont's star lily where they both are one of the first wildflowers to bloom in the spring (February-April). Because soils of the West Ridge of both Tolay Creek Ranch and Tolay Lake Regional Park are largely composed of Diablo Clay, other reasons account for the absence of fragrant fritillary from Tolay Creek Ranch. There were extensive stands of Fremont's star lily at Tolay Creek Ranch growing in Diablo Clay, but the fragrant fritillary was not observed growing among them. It often grows in small

stands and would not be easily observed among the extensive stands of the Fremont's star lily, because they both have white flowers. Although unlikely, fragrant fritillary could occur in small stands at Tolay Creek Ranch.

**5.1.2.17 Burke's Goldfields.** Burke's goldfields (*Lastenia burkei*), CNPS List 1B, occurs in vernal pools and swales at an elevation between 50 and 1,900 feet. It is not likely to occur on the site because it was not found during surveys of ponded areas or the saturated soil of wetlands.

**5.1.2.18 Contra Costa Goldfields.** Contra Costa goldfields (*Lastenia conjugens*), CNPS List 1B, occurs in vernal pools, swales, low depressions, and open grassy areas at an elevation between 1 and 1,500 feet. It is not likely to occur at Tolay Creek Ranch because it was not found during surveys of ponded areas or the saturated soils of wetlands.

**5.1.2.19 Legenere.** Legenere (*Legenere limosa*), CNPS List 1B, occurs in the beds of vernal pools at an elevation between 1 and 3,000 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas.

**5.1.2.20 Jepson's Leptosiphon.** Jepson's leptosiphon (*Leptosiphon jepsonii*), CNPS List 1B, occurs on grassy slopes of volcanic or serpentine substrates at an elevation between 300 and 1,600 feet. It was not observed during the survey of the serpentine areas. If present at Tolay Creek Ranch, Jepson's leptosiphon would occur in small colonies.

**5.1.2.21 Sebastopol meadowfoam.** Sebastopol meadowfoam (*Limnanthes vinculans*), CNPS List 1B, occurs in swales, wet meadows, vernal pools, and marshy areas in valley oak savanna. Soil types include poorly drained soil of clay and sandy loam at an elevation between 50 and 400 feet. It is not likely to occur at Tolay Creek Ranch because it was not observed during surveys of the vernal pools and other wet areas of the site.

**5.1.2.22 Marsh microseris.** Marsh microseris (*Microseris paludosa*), CNPS List 1B, occurs in grassland areas between an elevation of 15 and 1,000 feet. Although not encountered during surveys, the grassland habitat is extensive and the marsh microseris potentially occurs in grassland on Tolay Creek Ranch.

**5.1.2.23 Baker's navarretia.** Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), CNPS List 1B, occurs in vernal pools and swales on adobe or alkaline soils at an elevation between 15 and 3,000 feet. It is not likely to occur at Tolay Creek Ranch because it was not found during surveys of vernal pools or other ponded and wet areas.

**5.1.2.24 Marin County navarretia.** Marin County navarretia (*Navarretia rosulata*), CNPS List 1B, occurs in dry open rocky places and sometimes on serpentine at an elevation between 600 and 2,000 feet. It is not likely to occur at Tolay Creek Ranch because it was not observed during surveys of rocky areas. In addition, rocky areas were often trampled by cows and supported a weedy flora. Although unlikely, small stands may occur on the serpentine area at Tolay Creek Ranch.

**5.1.2.25 Yampah.** Extensive stands of Kellogg's yampah (*Perideridia kelloggii*), a common species, were observed on the West Ridge. Plants of the rare Gairdner's yampah, (*Perideridia gairdneri* ssp. *gairdneri*), a CNPS List 4 species could potentially grow among the stands of Kellogg's yampah.

Gairdner's yampah grows in moist grassland areas, adobe flats, and grassland areas beneath pine trees (Best et al. 1996). In Sonoma County, Gairdner's yampah occurs much west and north of Tolay Creek Ranch mostly from the Laguna de Santa Rosa westward to the coast. Kellogg's yampah is common and grows in grassland including adobe flats and serpentine (Best et al. 1996). Gairdner's yampah is therefore not very likely to occur at Tolay Creek Ranch because it was not observed during surveys and grows in the western portion of Sonoma County.

**5.1.2.26 Petaluma popcorn-flower.** Petaluma popcorn-flower (*Plagiobotrys mollis* var. *vestitus*), CNPS List 1A, is known from a single specimen collected in the late 1800s from Petaluma. It is thought to occur in wet sites in grasslands or the edges of coastal marshes at a probable elevation between 30 and 150 feet. It is not likely to occur because it was not found during surveys of wet areas of Tolay Creek Ranch.

**5.1.2.27 North Coast semaphore grass.** North Coast semaphore grass (*Pleuropogon hooverianus*), CNPS List 1B, occurs in wet, grassy, and usually shady areas, and sometimes in freshwater marshes at an elevation between 30 and 4,000 feet. It is not likely to occur on the site because it was not found during surveys of wet and ponded areas. A similar species, California semaphore grass was observed in a number of seeps of Tolay Creek Ranch.

**5.1.2.28 Point Reyes checkerbloom.** Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*), CNPS List 1B, occurs in freshwater marshes near the coast usually at an elevation between 15 and 240 feet. It is not likely to occur in the site because it was not observed during surveys of wet areas.

**5.1.2.29 Marin checkerbloom.** Marin checkerbloom (*Sidalcea hickmanii* ssp. *viridis*), CNPS List 1B, occurs on serpentine or volcanic soils and sometimes appears after burns. Its elevational range varies between sea level and 1,400 feet. It is not likely to occur on the site because it was not observed during surveys.

**5.1.2.30 Two-fork Clover.** Two-fork clover (*Trifolium amoenum*), Federally endangered and CNPS List 1B, occurs on relatively deep and probably slightly moist soils. Its height made it susceptible to loss from grazing and weed maintenance along roads. As a result, it was considered extirpated until it was observed at a site of recent disturbance in the 1990s. Due to the continually heavy grazing at Tolay Creek Ranch, two-fork clover is not likely to occur there.

**5.1.2.31 Saline Clover.** Saline clover (*Trifolium depauperatum* var. *hydrophilum*), CNPS List 1B, occurs in saline or alkaline areas. It was not observed at the edge of the seasonal pond adjacent to Highway 121 and is therefore not likely to occur at Tolay Creek Ranch.

**5.1.2.32 Oval-leaved viburnum.** Oval-leaved viburnum (*Viburnum ellipticum*), CNPS List 2, occurs in chaparral, cismontane woodland, and lower montane coniferous forest at an elevation between 700 and 4,600 feet. It was not found during surveys and is therefore not likely to occur at Tolay Creek Ranch.

## 5.2 INVERTEBRATES

### 5.2.1 Opler's Longhorn Moth

Opler's longhorn moth is on the special animals list and feeds on the flowers of cream cups, and the adult moths are usually observed resting on the petals of cream cups. One individual of Opler's longhorn moth was observed on the serpentine area of Tolay Creek Ranch (Figure 7b). The only information available from the CNDDB (2008) is that a population was observed in serpentine grassland in 1990-91. The serpentine area supported a large number of stands of cream cups. The size of the stands of the cream cups ranged from a few plants to hundreds of plants.

### 5.2.2 Blennosperma Bee

The blennosperma bee (*Andrena blennospermatis*) is on the special animals list and collects pollen from species of blennosperma. It has been recorded on the common blennosperma (*Blennosperma nanum*) and Sonoma sunshine. The common blennosperma was not very abundant at Tolay Creek Ranch. Nevertheless, this was a dry year, and it is possible that the blennosperma would be more abundant during a year of average rainfall. The blennosperma bee may have the ability to remain in a dormant state through dry years and emerge the following year when rainfall and blennosperma populations are more normal. If blennosperma occurs in relatively large stands at Tolay Creek Ranch, then the blennosperma bee could potentially occur there.

### 5.2.3 Rare Arachnids

Rare arachnids are known from serpentine areas where they occur at the interface between serpentine rocks and serpentine soil. They are most often observed during wintertime. Three genera of harvestman (daddy long-legs) occur on serpentine in the San Francisco Bay Area (*Calcina, Microcina,* and *Sitalcina*). The Marin blind harvestman (*Calcina dimuna*) occurs only on Mt. Burdell, across the Petaluma River from Tolay Creek Ranch. The Tiburon micro blind harvestman (*Microcina tiburonensis*) only occurs on the Tiburon Peninsula. Another rare arachnid, ubick's gnaphsodid spider (*Talanites ubicki*) also is only known from Mt. Burdell. Because these species appear to be very restricted, other species of rare arachnids could potentially occur in the serpentine of Tolay Creek Ranch. All three of these species are on the special animals list.

### 5.2.4 Tomales Isopod

The Tomales isopod (*Caecidotea tomalensis*) is on the list of special animals. It occurs in freshwater pools and is known from a site on Sonoma Mountain east of Rohnert Park. On Sonoma Mountain, it also occurs in a stream adjacent to the pond but otherwise is not known from streams. One of the ponds on Sonoma Mountain frequently dries at the end of the season, indicating that the isopods either remain in mud or otherwise are able to withstand short dry periods. The absence of ponds that retain water for long durations indicates that it is unlikely that Tomales isopods occur at Tolay Creek Ranch. A few ponds in Tolay Creek appear to retain water year round, but the ability of a population of the Tomales isopod to survive in a creek habitat without the presence of a perennial pond is not known. It is unlikely that the Tomales isopod occurs at Tolay Creek Ranch.

### 5.2.5 Zerene Silverspot Subspecies

An un-named subspecies of the zerene silverspot butterfly (*Speyeria zerene*) occurs on the adjacent Cougar Mountain property (Figure 3) and potentially occurs on Tolay Creek Ranch. Because it has not yet been described as a species and named in the taxonomic literature, it is not on any list of special-status species. Once it is taxonomically described, it will most likely be on the list of special animals. The larvae of the zerene silverspot feed upon violets. Large stands of Johnny jump-up grow on the West Ridge of Tolay Creek Ranch and are the likely food plant of the un-named silverspot butterfly. This un-named subspecies of silverspot butterfly is likely to be very restricted in its geographic distribution because it apparently is only known from the Cougar Mountain property and has not been observed nearby in similar habitats. Because the subspecies of the zerene silverspot butterfly appears to be restricted in distribution, it and its food plants should be protected.

### 5.2.6 Ricksecker's Water Scavenger Beetle

Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*) is on the list of special animals. It is an aquatic insect that is known from only a few localities in the San Francisco Bay Area. The closest known locality to Tolay Creek Ranch is approximately12 miles further north on Sonoma Mountain. Ricksecker's water scavenger beetles occur in ponds where their predaceous larvae remain on vegetation near the shore. Little else is known regarding Ricksecker's water scavenger beetles. Habitat for Ricksecker's water scavenger beetles occurs in the seasonal pond adjacent to Highway 121 and potentially in the ponds in Tolay Creek. The other ponds and vernal pool at Tolay Creek Ranch do not pond water long enough for the larvae to mature.

### 5.2.7 Marin Hesperian

The Marin Hesperian (*Vespericola marinensis*) is on the list of special animals and is a terrestrial snail that occurs in moist areas. It is only known from central Marin County. It has been observed under leaves of cow parsnip, in leaf mold, in alder woods and mixed evergreen forest, around springs and seeps, and along streams. The Marin Hesperian is unlikely to occur at Tolay Creek Ranch because it appears to be dryer than within its central Marin County habitats.

## 5.3 AMPHIBIANS

### 5.3.1 California Red-Legged Frog

The California red-legged frog was federally listed as threatened on May 23, 1996 (USFWS 1996) and is currently a CDFG species of special concern[1]. The habitat types that this species occupies are diverse and include ephemeral ponds, intermittent streams, seasonal wetlands, springs, seeps, permanent ponds, perennial creeks, constructed aquatic features, marshes, lagoons, riparian corridors, blackberry thickets, non-native annual grasslands, and oak savannas (USFWS 2002). Breeding occurs within ponds in streams, stock ponds, or other types of ponds that contain water into May at a minimum, but usually June or July..

[1] The state status of the California red-legged frog will likely be elevated to candidate due to recent court decisions.

The USFWS published a recovery plan (USFWS 2002) identifying core areas and priority watersheds for focused recovery efforts. Tolay Creek Ranch falls within the Petaluma Creek-Sonoma Creek Core Recovery Area, which was designated because it currently supports frogs, may serve as a source of frogs that colonize adjacent areas, and provides connectivity to core recovery areas to the east and west. The conservation needs identified for this area include protecting existing populations, reducing impacts of urban development, and protecting, restoring, and creating breeding and dispersal habitat.

California red-legged frogs have been observed on and adjacent to Tolay Creek Ranch (Parsons 1996 and Bacchini pers. comm.). They were observed at the pool in Tolay Creek that formed at the boundary with Tolay Lake Regional Park. This pool appears to be perennial because it contained water during the second of two drought years during a visit on October 24, 2008. California red-legged frogs have also been noted within a stock pond and tributary to Tolay Creek within a half mile up-stream of the northern boundary of Tolay Lake Regional Park (CNDDB 2008) and in a stock pond beyond the western boundary of Tolay Lake Regional Park (Parsons 1996).

Breeding habitat for California red-legged frogs also appears to occur in other locations of Tolay Creek on Tolay Creek Ranch. Large pools (Figures 7a and b), some of which contained water during the October 2008 survey, were observed in Tolay Creek. At least some of these pools should provide potential habitat for breeding. Nevertheless, many of these pools lacked cover and may not be used for breeding for that reason.Mapping shows these pools upstream of the entrance road crossing of Tolay Creek. Suitable deep pools may occur downstream of the crossing, but that area had not been surveyed.

No California red-legged frogs were observed during LSA's field visits. The surveys were conducted during the day when there was less chance of success of encountering California red-legged frogs, as compared to night-time surveys (Fellers and Kleeman 2006). Although California red-legged frogs were not observed during surveys by LSA, they possibly occur at Tolay Creek Ranch at a low density. They have been known from Tolay Creek Ranch in the past and because habitat has not appeared to have changed, they could possibly continue to occur there.

The occurrence of introduced American bullfrogs (*Lithobates catesbiana*) limits the suitability of aquatic habitat for the California red-legged frog. Several researchers have attributed the decline and extirpation of California red-legged frogs throughout their range to the introduction of American bullfrogs and predatory fishes (Hayes and Jennings 1986). The presence of California red-legged frogs has been negatively correlated with the presence of American bullfrogs (Fisher and Shaffer 1996), and American bullfrog adults have been observed preying on tadpole, juvenile, and adult California red-legged frogs.

American bullfrogs were not observed at Tolay Creek Ranch but are likely to occur at low densities or occur temporarily as they travel across the ranch. Large bodies of permanent water are absent from Tolay Creek Ranch and breeding populations of American bullfrogs are probably absent. Large American bullfrog populations occur to the north of Tolay Creek Ranch at Tolay Lake Regional Park and adjacent properties. Because of the tendency of American bullfrogs to disperse long distances and because of the adjacent large population, American bullfrogs probably enter Tolay Creek Ranch on a regular basis. The effect of American bullfrogs on the possibly-occurring California red-legged frog is not known.

### 5.3.2 Foothill Yellow-Legged Frog

Foothill yellow-legged frog (*Rana boylii*) is a California species of special concern. They occur in partly shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Foothill yellow-legged frogs need at least some cobble-sized stones as a substrate for egg-laying. The tadpoles require at least 15 weeks to metamorphose into the juvenile form.

Foothill yellow-legged frogs were not observed in Tolay Creek despite the occurrence of potentially suitable substrate and the occurrence of water in pools into the summer. Foothill yellow-legged frogs potentially occur in Tolay Creek and its tributaries at Tolay Creek Ranch.

## 5.4 REPTILES

### 5.4.1 Western Pond Turtle

Western pond turtle is a California species of special concern. Western pond turtles have been observed in a pool in Tolay Creek downstream of the northern boundary (LSA observations) and either the same individual or an additional turtle was observed in the pool at the boundary with Tolay Lake Regional Park (Neale pers. comm.). They have also been observed in Tolay Lake (Parsons 1996). They occur along the shore of waterbodies and on floating debris. Egg laying occurs in soft or sandy soil, often a considerable distance from any body of water. The limiting resources for the species are the aquatic and the egg-laying habitats.

## 5.5 BIRDS

### 5.5.1 White-tailed Kite

White-tailed kite is a state fully protected species. This species requires open habitats (e.g., grasslands, agricultural fields, marshes) for foraging and dense trees or shrubs for nesting. The diet of white-tailed kites consists almost entirely of mice and voles (Peeters and Peeters 2005). Although no nests were found during our 2008 surveys, suitable nesting habitat is present and white-tailed kites have been observed foraging to the north on Tolay Lake Regional Park (LSA obs.). White-tailed kite is a likely nesting species at Tolay Creek Ranch.

### 5.5.2 Golden Eagle

Golden eagles are a state fully protected species. They nest in trees or cliffs and forage in grasslands. Major food items consist of the California ground squirrel and a variety of rabbit species. Golden eagles have been observed (Bob Neale and LSA field observations) flying over and perching on the West Ridge, and they are regularly observed at Tolay Creek Ranch (Neale pers. comm.).

Nesting is thought to occur in the large blue gum eucalyptus trees at the homestead near where the Sears Point to Lakeville Road enters Tolay Creek Ranch (Figure 7a). A nest structure was observed in this eucalyptus (Neale pers. comm.), although during field work in April 2008 no eagle was observed at this location. Suitable nesting habitat is also present in the eucalyptus and Monterey cypress growing beside Tolay Creek and perhaps in the coast live oak trees at Tolay Creek Ranch.

Golden eagles usually build or repair a few nests prior to choosing one nest to use (Peeters and Peeters 2005). They may not use the same nest every year and will alternate use of several nests. Some pairs of golden eagles may not nest every year (Peeters and Peeters 2005). Golden eagles are also thought to nest elsewhere in the vicinity (Ehret pers. comm) and this nest may be from the same pair as those on Tolay Creek Ranch.

Golden eagle is a possible nesting species at Tolay Creek Ranch. The ranch also likely encompasses foraging territory of golden eagles nesting elsewhere.

### 5.5.3 Burrowing Owl

Burrowing owls are a state species of special concern and have been observed in a rock outcrop near a ranch road on the West Ridge (Neale pers. comm.) (Figure 5a). They are also known from rock outcrops at Tolay Lake Regional Park (Ehret pers. comm. and LSA obs.) and the Sonoma Land Trust's Sears Point property (Neale pers. comm.). The use of these areas is typically by single individuals during the winter and spring indicating dispersing juvenile or over-wintering birds, although several were observed in concrete rubble on the Sears Point property. The owls prefer short grass and respond well to areas that are regularly grazed. This species is dependent on burrows as nest sites and as year-round shelter. The owls typically use burrows created by small mammals, although the owls may subsequently modify the burrows for their own uses. The owls also readily occupy constructed burrows, debris piles, concrete rubble, and other types of shelter.

Burrowing owls appear to be a transitory species at Tolay Creek Ranch and some may occasionally overwinter on the ranch. Due to a climate of cool spring and summer nights, which probably reduces insect prey, the ranch is not optimal breeding habitat.

### 5.5.4 California Horned Lark

California horned larks are on the list of special animals. They were formerly on the list of state species of special concern but were recently removed form that list (Shuford and Gardali 2008). They were observed on the top of the West Ridge during the spring and they most likely nest in grasslands at Tolay Creek Ranch. Because California horned larks can occur in any portion of the grassland at Tolay Creek Ranch, specific observations are not indicated on Figures 7a and b.

### 5.5.5 Grasshopper Sparrow

Grasshopper sparrows are a state species of special concern (Unitt 2008) and are a rather uncommon sparrow of grasslands. Grasshopper sparrows were heard calling at Tolay Creek Ranch and are presumed to nest in the grasslands supporting dense grass growing taller than 12 or 18 inches. Grasshopper sparrows were also observed at Tolay Lake Regional Park and are presumed to nest there as well.

### 5.5.6 Tricolored Blackbird

Tricolored blackbird is a California species of special concern. They nest in large colonies in cattails and tules, or Himalayan blackberry associated with creeks or ponds, or in grain fields. Their nesting colonies can range from 100 birds to tens of thousands of birds. Himalayan blackberry occurs in the understory of the woodland along Tolay Creek or in small stands in grassland and was therefore not suitable to support colonies of nesting tricolored blackbirds. Tricolored blackbirds are unlikely to occur at Tolay Creek Ranch as a breeding species, although wintering flocks may visit the ranch.

### 5.5.7 Nesting Birds

Although they are not considered special-status species, almost all native birds and their active nests are protected by the federal MBTA and the California Fish and Game Code.

## 5.6 MAMMALS

### 5.6.1 American Badger

American badger is a state species of special concern that occurs in open areas, including dry grasslands. Because of its semifossorial habits, it requires friable soils in open, uncultivated ground suitable for burrowing. It also requires healthy populations of ground squirrels and pocket gophers, its two primary prey items (Jameson and Peeters 2004). Although there are no records of this species in the immediate vicinity of Tolay Creek Ranch, suitable habitat conditions are present along the East and West ridges and in the Lower Tolay Valley.

### 5.6.2 Townsend's Big-Eared Bat

Townsend's big-eared bats (*Corynorhinus townsendii*) are a state species of special concern. Although this species occurs in a wide variety of habitats throughout California (CNDDB 2008), it is extremely sensitive to human disturbance as it roosts in the open (i.e., from walls or ceilings of old buildings). Nursery colonies have been found in caves, mine shafts, and buildings (Jameson and Peeters 2004). No roosts of this species are known from the immediate vicinity of Tolay Creek Ranch, but a shack on the site represents potential habitat. In addition, Townsend's big-eared bats roosting in the region may forage over the site at night.

### 5.6.3 Pallid Bat

Pallid bat (*Antrozous pallidus*) is a state species of special concern. It is somewhat more common than other special-status bats, occurring throughout most of California at elevations below 6,500 feet (Jameson and Peeters 2004). The pallid bat feeds mostly on flightless arthropods. Pallid bats have been observed flying low (6 to 36 inches) to the ground searching for prey. After locating its prey, it will drop to the ground, grab the prey in its mouth, and fly to a feeding roost to consume the prey. (Texas Parks and Wildlife 1997). Roosting occurs in fissures in cliffs, abandoned buildings, bird boxes, and under bridges (Jameson and Peeters 2004). Several roosts of this species are known from the general vicinity of Tolay Lake (CNDDB 2008), and suitable roosting habitat in the shack is present on site. As such, this species has moderate potential to occur within the study area.

# 6.0 POTENTIAL CONSTRAINTS

Tolay Creek Ranch will eventually become part of Tolay Lake Regional Park with trails and potentially other visitor-serving amenities. In addition, existing management activities such as fence installation and road repair, could also affect biological resources. The special-status species and the sensitive plant communities that occur at Tolay Creek Ranch pose constraints for trails, fences, road repair and other infrastructure that may be proposed for the ranch to accommodate the public and existing management activities. There is likely to be flexibility in siting the trails, fences, and other proposed features. Impacts, if any, are likely to be small. Enhancing the sensitive plant communities through management is likely to off-set any impacts.

Recreational facilities should be located to avoid impacts to sensitive habitats such as serpentine areas, wetlands, native grasslands, riparian woodland, buckeye woodland, and oak woodland where possible. Trail crossings of these habitats should be designed to minimize impacts. Picnic and vista areas should be located away from sensitive resources, if possible, or should be reduced in size to lessen impacts. Unavoidable losses of acreage of native grasslands, riparian habitats, woodlands, and wetlands should be replaced at a specified ratio. There is no universally established ratio for impacts to these resources. Mitigation ratios are often based on the sensitivity of a resource with greater ratios applying to the more sensitive resources. Ratios are also based on the ability of the mitigation to replace the functions and values of the affected resource. For example, it may require decades to replace the functions and values of mature trees and thereby justifying a greater mitigation ratio. A minimum mitigation ratio of 1:1 is recommended (with the exception of wetlands) at Tolay Creek Ranch because all habitat is valuable and implementing mitigation will result in conversion of one type of habitat to another. Until we know more about the ecology of Tolay Creek Ranch, it is best to maintain the vegetation in roughly its current state (although enhancement and weed control are recommended). Wetland mitigation ratios are established at 2:1 by the RWQCB.

## 6.1 SENSITIVE PLANT COMMUNITIES AND HABITATS

### 6.1.1 Serpentine Areas

Serpentine occurs in the south western portion of Tolay Creek Ranch (Figure 5b). The serpentine area at Tolay Creek Ranch is a valuable habitat because it is dominated by native species, non-native species are scarce, and it represents vegetation that occurred prior to the colonization of California by the Spanish. The serpentine at Tolay Creek Ranch is dominated by native species including purple needlegrass, California barley, hayfield tarweed, Marin western flax, California goldfields, and other wildflowers. This area should remain intact with as little disturbance as possible. The existing ranch road could also serve as a trail thereby minimizing impacts from trails to this area. This would minimize impacts to the special plant communities that occur on serpentine soils and could reduce impacts to the rare species that occur in the serpentine area (Opler's longhorn moth and Marin western flax). Impacts are not known to Marin western flax from visitors walking the trails at the Ring Mountain Preserve on the Tiburon Peninsula.

### 6.1.2 Native Grasslands

Native grasslands occur mostly on the West Ridge but a few, mostly small, stands also occur on the East Ridge (Figure 5a). Native grasslands are composed of native grass and forbs. This plant community is special because much of the native grassland in lowland California has been developed for urban or cultivated agricultural purposes. Improper grazing has also resulted in the destruction of native grasslands. As with the serpentine area, impacts to the native grasslands should be reduced to the minimum amount possible.

### 6.1.3 Wetlands and Watercourses

Wetlands and watercourses are biologically valuable habitats because 1) they provide hatibat that is required by a large number of wildlife species; 2) their absence can limit the occurrence of wildlife; and 3) they have experienced a tremendous decline due to urban and agricultural development and are not as abundant as formerly. Because of their habitat value, impacts to them are regulated by the Corps, RWQCB, and CDFG. Some of the features discussed below may be jurisdictional and alteration of them may be regulated activities requiring permits. Establishing riparian vegetation along watercourses is a generally beneficial activity if done such that a variety of habitat types remains along the watercourses. Areas dominated by cattails, bulrush, and/or spikerush are valueable and some of these areas should remain along Tolay Creek and its tributaries. Similarly, establishing riparian vegetation in wetlands that support a large diversity of native species would eventually create shade that results in a reduction of species diversity of the wetland, and should be avoided.

**6.1.3.1 Seeps and Seasonal Wetlands.** Seeps and seasonal wetlands occur throughout Tolay Creek Ranch and should be avoided by park infrastructure (Figures 5a and b). Trail crossings of sensitive habitats should be designed to minimize impacts. Infrastructure should be located away from sensitive resources, if possible, or should be reduced in size to lessen impacts. Unavoidable losses of acreage of wetlands should be replaced on a 2:1 basis through habitat creation. The proposed restoration program would most likely result in a large increase in native grasslands and wetlands, which would more than compensate for impacts from park facilities.

**6.1.3.2 Large Seasonal Pond.** A seasonal pond develops during the rainy season at the edge of Highway 121 (Figure 5b). This seasonal pond is a jurisdictional wetland and impacts to it should generally be avoided. Lobb's aquatic buttercup, a CNPS list 4 (watch list) species also grows in the pond. Many non-native species, such as curly dock, bird's foot trefoil, and cocklebur, occur in the seasonal pond and their removal would enhance the biological value of the pond.

**6.1.3.3 Vernal Pool and Seasonal Ponds.** A vernal pool (Figure 5a) and 3 small seasonal ponds (mapped as a single feature) on Figure 5b occur at Tolay Creek Ranch. These ponds support plant species that occur in seasonally ponded areas, including the rare Lobb's aquatic buttercup (Figure 7b). They are likely to be considered to be jurisdictional features. Because they are fairly small, they can be avoided. The seasonal ponds are the result of work by heavy equipment and they could be enhanced by deepening and enlarging. These features are affected by trampling from cattle and fencing should be considered. Prior to fencing, the vegetation should be measured to ensure that any changes to vegetation from the fencing are beneficial.

**6.1.3.4 Tolay Creek and Other Watercourses.** Tolay Creek and the other watercourses at Tolay Creek Ranch are likely to be jurisdictional features and should be avoided to the extent possible by infrastructure with the exception of restoration projects. Any crossing of these features by a trail or road should occur with the least impact. Cattle trample the bed and banks of the watercourses and fencing should be considered.

### 6.1.4 Woodland

Any trails in oak woodlands should be located outside of the root zone in a manner that avoids as much damage as possible. Trails within oak woodlands should also be designed without excavation to the extent possible to avoid damage to roots. Trails should be minimized in riparian woodland in order to reduce impacts to breeding birds by human visitation.

Many species of wildlife are sensitive to the presence of humans. Locating trails and other facilities along riparian areas and other areas where cover is used by wildlife could adversely affect wildlife use of those areas. Repeated use of trails or other park facilities in a particular area may reduce use of those areas by wildlife. Proposed establishment of a dense cover of shrubs would facilitate wildlife movement throughout the ranch, provide additional refuges for wildlife, increase wildlife use of the ranch, and increase the diversity of wildlife.

Riparian areas are known for their habitat value for migratory songbirds including use as nesting areas. Locating a trail within a songbird nesting area may result in disruption of breeding activity, and a reduction of the habitat value of the riparian woodlands. Impacts of trails in riparian habitat could be mitigated by habitat restoration. Widening and lengthening existing riparian habitat containing trails would further mitigate impacts.

## 6.2 SPECIAL-STATUS SPECIES

A number of laws and regulatory agencies protect special-status species. Marin western flax is protected by the federal and state endangered species acts. CEQA addresses other species that can be shown to meet the criteria for listing but are not currently listed. These species could include those listed by the CNPS, those designated as California Species of Special Concern, others that are informally-listed, and those species that are tracked by the CNDDB as special animals. Marin western flax, Lobb's aquatic buttercup, and marsh zigadene are all listed by the CNPS. The golden eagle is protected by the Bald Eagle Protection Act. The California Fish and Game Code and the Migratory Bird Treaty Act protect nesting birds including golden eagle and burrowing owl. The California red-legged frog is federally listed as threatened and is a state species of special concern while the western pond turtle is a state species of special concern. Opler's longhorn moth is on the list of special animals. The zerene silverspot butterfly should be considered in project planning because it is currently only known from the Tolay Creek/Sears Point area.

### 6.2.1 Marin Western Flax

Extensive stands of the Marin western flax occur in the serpentine areas on Tolay Creek Ranch (Figure 7b). These stands should be avoided to the extent possible. A ranch road passes through some

of these stands. Maintenance of this road should occur in a manner that does not substantially affect the adjacent Marin western flax.

### 6.2.2 Lobb's Aquatic Buttercup

Lobb's aquatic buttercup grows in seasonally ponded areas (Figures 7a and b). These seasonal ponds are most likely jurisdictional wetlands and should be avoided.

### 6.2.3 Marsh Zigadene

Marsh zigadene grows in one or two locations near a tributary to Tolay Creek (Figure 7b). The tributary is eroding. Any erosion control measures should avoid the marsh zigadene. If any necessary earth moving is required, where marsh zigadene is present, then marsh zigadine should be established in another area of suitable habitat as mitigation. One manner of implementing the mitigation is to collect marsh zigadine bulbs, propagate them in a nursery, then transplant to suitable habitat.

### 6.2.4 Golden Eagle

Nesting golden eagles can be particularly sensitive to human activity within ¼ mile of the nest. Nesting can occur between February and August but generally occurs some time between March and June or July. A potential nest tree is approximately 1,100 – 1,200 feet from the Sears Point to Lakeville Road (Figure 7a). The sensitivity of the nesting pair of golden eagles to traffic and people in the vicinity of the nest should be examined. If this pair of eagles is sensitive to the presence of people, then a seasonal closure of this road may be appropriate. The specifics of this closure would depend on the distance of humans to the nest, the sensitivity of this particular pair of golden eagles to humans, and the presence of any cover or natural vegetation screen between the nest and humans.

### 6.2.5 Burrowing Owl

The sensitivity of burrowing owls to humans varies; some owls are able to occur in burrows next to a large amount of human activity while others are more sensitive to human presence. Burrowing owls occur in a rock outcrop that is beside an existing ranch road on the West Ridge of Tolay Creek Ranch (Figure 7a). If this ranch road were converted to a trail and if the owls were particularly sensitive, hikers along the trail may disturb them and the burrowing owls may leave. CDFG Guidelines (CDFG 1995) call for buffer widths of 250 feet during the breeding season and 160 feet during the non-breeding season between disturbance and burrowing owl nests. If possible, a hiking trail should avoid this outcrop by 250 feet.

Although no breeding activities by burrowing owls were observed during this season, breeding could occur in the future. Prior to constructing trails, pre-construction surveys would be necessary to preclude impacts to burrowing owls and design mitigation measures. The sensitive period for burrowing owls is between February and September 1.

### 6.2.6 Nesting Birds

California horned larks, grasshopper sparrows, and other ground nesting birds could nest virtually anywhere in the grassland areas of Tolay Creek Ranch. Prior to constructing trails during the nesting season (between February and July 31), preconstruction surveys should be conducted to ensure that nests are not damaged. If nesting birds are observed within 50 to 100 feet of the proposed trail or park feature, then construction should be diverted to areas beyond the buffer until the young birds have fledged. The width of this buffer could vary based on recommendations by a qualified wildlife biologist depending on the circumstances at the nest. These conditions would also apply to trails constructed through woodland and any other habitat occurring at Tolay Creek Ranch.

Nesting raptors would require greater buffers than the 50- to 100-foot buffers often recommended for song birds. Construction and use of trails, roads, or other facilities within 300 feet of a raptor nest could potentially cause stress and nest abandonment. An appropriate buffer should be established around raptor nests and once young have fledged, construction can begin within the boundary of the buffer.

### 6.2.7 California Red-Legged Frog and Western Pond Turtle

California red-legged frogs and western pond turtles potentially use the deeper ponds in Tolay Creek (Figures 7a and b). Trails should avoid the vicinity of these ponds by at least 25 feet, or these ponds should be screened from view by shrubby vegetation, such as California rose, California blackberry, snowberry or taller vegetation such as trees depending on the visibility of the pond from a proposed trail or other feature. Avoidance of wetlands, to the extent possible, elsewhere in Tolay Creek Ranch is also recommended to protect potential frog and turtle habitat. Turtles are more likely to occur in ponded areas, than wetlands where ponding is absent. California red-legged frogs could potentially occur in any wetland while moist or wet. Trail crossings should be designed to minimize disturbance to wetlands and watercourses. Enhancement activities planned for the habitat of the California red-legged frog should occur given the general procedures mentioned below.

Preconstruction surveys, by a qualified biologist, should be conducted prior to trail construction in suitable California red-legged frog and western pond turtle habitat. Depending on the regulatory context and the potential for impacts to California red-legged frogs, consultation with the USFWS may be advised. Additional mitigation may require buffers, monitoring, fencing, and/or replacement of affected habitat.

### 6.2.8 Opler's Longhorn Moth and the Zerene Silverspot Butterfly

Cream cups (food plant of Opler’s longhorn moth) and the Johnny jump-up (food plant of a rare subspecies of zerene fritillary butterfly) could also be affected by the installation of park facilities. Trails and other park facilities should be planned to avoid occurrences of cream cups and Johnny jump-up to the extent possible to avoid impacts to the caterpillars of these two lepidopteran species.

## 6.3 EARTH-MOVING ACTIVITY

Any earth-moving activity would remove vegetation and expose the surface of the soil, which could result in an increase of sediment entering Tolay Creek or its tributaries. This would create a temporary adverse impact until vegetation covers the exposed soil surface. Best management practices should be implemented to reduce the amount of sediment generated. If more than a minor amount of sediment would be generated, based on the size and location of the construction, appropriate erosion control BMPs should be utilized to contain the sediment within the construction area.

## 6.4 PUBLIC USE

Tolay Creek Ranch is a relatively large property with a number of sensitive resources. In general, the sensitive biological resources would not be affected by public use because the large size of the ranch allows for flexibility in placement of facilities and public use. The stands of Marin western flax are extensive and are not likely to be harmed by visitation during guided tours and scientific study. The stands of Johnny jump-up food plant of the zerene silverspot butterfly are numerous and similarly are not likely to be affected by visitation. The Lobb's aquatic buttercup grows in ponded areas that are not likely to be directly affected by human visitation. Scientists interesting in studying the ponds should be made aware of the occurrence of Lobb's aquatic buttercup in order for effects to be avoided. The marsh zigadene grows in a small area that should be avoided by any facilities.

The serpentine areas are valuable due to high plant and insect diversity and the sensitivity of small species to a large amount of trampling. This area has withstood the trampling of cattle since the arrival of the Spanish. The occasional group of 30 hikers participating on a guided hike is unlikely to damage the serpentine flora. Unrestricted visitation should be relegated to established trails through the serpentine areas. The existing ranch road through the serpentine area should also serve as a trail, if possible. Nevertheless, if a more appropriate alignment for the road/trail is determined, the existing road should be decommissioned and restored.

Sensitive resources that should be avoided are nesting burrowing owls and the pools of Tolay Creek that provide habitat for the California red-legged frog and western pond turtle. Visitation is likely to have substantial effects on these resources. If burrowing owls were to nest at Tolay Creek Ranch, any scientific study could be safely carried out from a distance to avoid stressing the owls. Approaching the nest burrow, in order to collect pellets or for other reasons, should be done to minimize stressing the owls such as when the owls are within their burrow or are away from the burrow.

There are relatively few pools that are sufficiently deep in Tolay Creek that are suitable for California red-legged frogs and western pond turtles (Figure 7a and b). Some of these pools may support breeding of the California red-legged frog. Frequent visitation to these pools is likely to drive away these species. Study of these pools, if at all should be controlled.

A dilapidated bridge on the Sears Point to Lakeville Road occurs at the boundary with Tolay Lake Regional Park. California red-legged frogs and a western pond turtle were observed within the pool beneath the bridge. This bridge is located at one of the access points that connect Tolay Creek Ranch with Tolay Lake Regional Park. If this area is to be developed as a major connector and trail, then habitat for the California red-legged frog and western pond turtle should be enhanced in Tolay Creek

and other areas of Tolay Creek Ranch. Although greater opportunities may occur for mitigation at Tolay Lake Regional Park, the apparent absence of breeding American bullfrogs at Tolay Creek Ranch makes Tolay Creek Ranch a superior habitat area.

# 7.0 MANAGEMENT GUIDELINES AND RESTORATION RECOMMENDATIONS

The specific condition of the vegetation present at Tolay Creek Ranch prior to the arrival of Europeans is not known. Kuchler (1977) depicts the study area as grassland on the map of the *Natural Vegetation of California*. The current limited shrub and tree cover and the absence of stumps or logs in the study area supports Kuchler (1977). In addition, Diablo Clay (underlain by calcareous fine-grained sandstone, clayey shale, and weathered siltstone) and Clearlake Clay (underlain by alluvium) are common soils of Tolay Creek Ranch and primarily support grassland vegetation (USDA 1972). The Goulding-Toomes complex (underlain by metamorphosed basic igneous and weathered andesitic basalt for Goulding and andesitic basalt and volcanic breccia for Toomes) is less common than the Diablo soils, but also supports grassland (USDA 1972).

The woodland at Tolay Creek Ranch was probably never well developed and primarily, but not entirely, restricted to the drainages and rocky outcrop areas. For areas in the vicinity of Tolay Creek Ranch that formerly supported woodland, the loss of trees is likely the result of cutting and the subsequent grazing that reduce recruitment of new trees. Upon cessation of grazing, portions of the grasslands of Tolay Creek Ranch may become woodland as have portions of the East Bay hills.

Shrub cover in particular was most likely higher before the introcuction of cattle. Likewise, the breath of the riparian corridors were likely to have been substantially broader and with a more developed multi-layered canopy. The locations and extent of wetlands, native grassland, oak woodland and other native plant communities were highly altered by historic ranching and farming operations, and opportunities thus exist for ecological restoration. In particular, woody vegetation is restricted to portions of watercourses perhaps due to the historic land use practices of grazing or due to incompatible soils where woodland is absent.

Some of the restoration actions that are discussed below involve ground-disturbing activities be they use of earth-moving equipment to fix head-cuts of erosional areas or use of a trowel to plant acorns. Any ground-disturbing activity could potentially affect cultural resources and the cultural resource study (LSA 2009) provides recommendations to avoid or minimize impacts. Ground-disturbing activities should be avoided on sites known to contain sensitive cultural resources.

Ground-disturbing activities may also promote the colonization of an area by non-native plant species. A challenge for the success of restoration is maintaining non-natives at a low density. Control of invasive species should be a part of the restoration activities.

## 7.1 RESTORATION OF SELECTED HABITATS

### 7.1.1 Oak Woodland

Oak woodland currently provides cover along Tolay Creek and its tributaries on the East and West ridges. A variety of age classes of oak trees were observed on site and the role that wildlife and cattle

play in reducing oak regeneration is not clear at Tolay Creek Ranch. Coast live oak has been documented as not adequately regenerating in some areas because of a combination of factors including livestock and wildlife herbivory and competition with dense stands of non-native grasses (McCreary 2001). In addition, oaks may establish seedlings and saplings only during years with unusual weather conditions of summer moisture.

It is likely that oak woodland was never very abundant at Tolay Creek Ranch based on the the presence of Diablo, Clear Lake, and Goulding-Toomes complex soil types that usually support grassland. The Langier soils are underlain by rhyolite or rhyolitic tuff and often support oak woodlands just east of Tolay Creek Ranch and on the East Ridge of Tolay Lake Regional Park. Establishing oak woodland at Tolay Creek Ranch should therefore be done on a very limited scale.

The shrubby understory of the oak woodland provides cover for wildlife. At Tolay Creek Ranch, the understory of oak woodland is patchy with the most well developed understory beneath coast live oak trees. The understory of the deciduous valley oak trees is usually dominated by grassland.

The coast live oak and valley oak woodland could be slightly expanded along selected tributaries to form a more complete movement corridor for the larger species of wildlife (Figure 8a). A combination of fencing cattle from the selected drainages and planting oak trees could be used to accomplish this goal.

Regeneration of oak woodland, including the shrubby understory, should be monitored in fenced areas and oaks planted if monitoring shows an absence of natural regeneration. Oak trees may be planted on slopes above watercourses, such as the upper reaches of the major tributary flowing from the east (Figure 8a). Establishing woody vegetation on the over-steepened slopes of this watercourse would reduce slope failure and reduce sedimentation. The entire reaches of other watercourses were not selected for oak woodland restoration in order to provide open creek side habitat or to avoid adjacent grassland or serpentine habitat, which is also valuable. Seeps occur at some of the upper reaches of the watercourses and these should be preserved as herbaceous vegetation as opposed to converting them to woody vegetation.

Planting could be done using container plants or acorns. The grazing of livestock should be managed to encourage oak regeneration and the establishment of a shrubby understory. The grazing concept applied at Tolay Lake Regional Park (LSA 2008b) is to graze the areas with watercourses and seeps in the winter and spring, when water is not limiting and thereby reduce degradation of these valuable habitats. Nevertheless, cattle use of these areas should be monitored to ensure that damage remains at an acceptable level. The cattle would be moved to other pastures not supporting watercourses and seeps for late spring, summer, and fall grazing.

Sudden oak death (*Phytophthora ramorum*) is known from southern Sonoma County. Two dead coast live oak trees along Tolay Creek appeared to have sudden oak death. If the coast live oaks were to become infected by sudden oak death, restoration should include establishing single-species stands of coast live oak, without an understory. Current research indicates that coast live oaks acquire sudden oak death from other species of plants (M. Garbelletto, pers. comm.). Sudden oak death may result in woodlands dominated by California bay trees because the bay trees are more resistant and they also serve as a vector for the pathogen to infect oaks. The sudden oak death pathogen does not appear to

be able to infect coast live oak trees from nearby coast live oak trees. Other species of nearby trees and shrubs are required for the pathogen to infect coast live oak.

### 7.1.2 Watercourses and Riparian Woodlands

Willow, coast live oak, valley oak, California buckeye, blue elderberry, and big-leaf maple currently grow along Tolay Creek. Prior to the arrival of Europeans, the woodland along Tolay Creek probably supported a greater number of trees and a more complete cover over the creek. Large patches of willow trees, consisting of hundreds of trees, were likely to have grown along the channel of Tolay Creek based on the occurrence of old willow trees currently growing at the top of the bank. Since Tolay Creek has incised, smaller willow trees have occasionally colonized the bed of Tolay Creek.

Where Tolay Creek flows through rolling topography in the Tolay Creek Canyon, big-leaf maples grow among the coast live oaks in the oak woodland that occurs on the banks. In the Lower Tolay Valley (Figure 8b), Tolay Creek is fairly deeply incised for much of its length. Here valley oaks grow at the top of the bank above the incised channel and an occasional willow tree grows in the bed of Tolay Creek.

Restoration of the woodland along Tolay Creek should mimic the existing pattern of vegetation along its banks. The upstream portion of Tolay Creek could support a mosaic of willow and oak trees growing along the bank. Selected areas of the creek bed could support willow vegetation and some areas should be left bare for herbaceous habitat. The coast live oak – big-leaf maple vegetation should be expanded along the middle portions of Tolay Creek in areas where there are large sloping banks above the creek. In the Lower Tolay Valley, clumps of valley oak should be planted on the terrace above the bank and willows should be added to selected areas of the creek bed that retain water for a long duration. Portions of the creek bed should also remain open for herbaceous habitat.

The entire length of Tolay Creek should be fenced. Cattle enter the creek and feed upon the herbaceous vegetation and create hoof prints in the substrate and trample the vegetation. Fencing would preclude this damage of the vegetation of Tolay Creek. Monitoring of the vegetation within Tolay Creek may indicate that cattails and bulrush may become so dense as to grow throughout the pools within the creek. Occassional short-term grazing may be necessary to maintain the habitat diversity of Tolay Creek.

This fencing could occur in phases because of the expense in involved in fencing the several miles of of Tolay Creek within the study area. The first phase of this fencing should include both downstream reaches and upstream reaches of Tolay Creek. It is important to fence the downstream reaches because of the reduced amount of woody vegetation. Such fencing should result in an increase in woody vegetation. Selected upstream areas that contain deep pools or are otherwise habitat of the California red-legged frog and western pond turtle should also be fenced to increase the cover surrounding potential breeding habitat.

### 7.1.3 Native Bunchgrass Grassland

Purple needlegrass and California barley are the most common native bunchgrasses at Tolay Creek Ranch. Purple needlegrass grows in stands on and off of serpentine substrates. The year 2008 was a

very dry year and in some areas the native grass was difficult to observe because the intense grazing kept it at a low stature. Selected stands on and off of serpentine should be fenced to see the effect of grazing on purple needlegrass and associated species. Figures 8a and 8b map candidate areas for fencing. These areas are selected such that native grassland, non-native grassland, and native forbs are chosen to be near each other to reduce the variability among the fenced areas. California barley was mostly observed on the serpentine substrates. Stands of California barley should also be fenced to determine the effect of grazing on it and its associated species.

### 7.1.4 Fragrant Fritillary

Fragrant fritillary grows from a bulb that forms lobes. Each lobe when separated from the bulb, will produce a new fragrant fritillary plant. The fragrant fritillary can be propagated in a nursery setting and then out-planted at selected locations of Tolay Creek Ranch. This propagation for establishment of the fragrant fritillary on Tolay Creek Ranch should only be implemented after exhaustive surveys have been completed. It may be detrimental to a scientific study of fragrant fritillary at Tolay Creek Ranch if genetic stock from a different population were mixed with the genetic stock that naturally occurred at Tolay Creek Ranch.

Such a program to establish fragrant fritillary should not be taken lightly because it results in the "alteration" or human manipulation of an aspect of the ecology of Tolay Creek Ranch. Fragrant fritillary may never have occurred at Tolay Creek Ranch or if not occurring as a population of plants, it may occur as seeds lying dormant in the soil. Nevertheless, undertaking a program to translocate a small number of fragrant fritillary plants to a small area of Tolay Creek Ranch, may provide a great deal of scientific information with minimal detrimental ecolocial ramifications.

### 7.1.5 Seeps

A number of very wet seeps occur at Tolay Creek Ranch. These include the Roche Developed Springs, well developed springs or seeps north of the Roche Developed Springs, and other springs on the East and West ridges (Figure 5b). These wet springs support stands of Pacific rush that can provide cover for wildlife if not grazed. In 2008 they were grazed to a short height. These seeps also support a number of non-native species including tall fescue and bristly ox-tongue.

The effects of grazing should be examined by establishing fenced grazing enclosures in selected areas. It appears that the cattle are having a profound effect on the seeps. Cattle are trampling the vegetation and consuming virtually all the above ground foliage of the plants growing in the seeps. Each selected seep could be partially fenced to compare grazed areas with ungrazed areas of the same seep. The vegetation of each area should be sampled in plots prior to fencing. In this manner, the change in the vegetation of grazed and ungrazed plots can be compared. Monitoring of the grazing regime will help inform management strategies. Grassland monitoring and adaptive management concepts are described in greater detail in the Rangeland Resources Study for Tolay Lake Regional Park (LSA 2008b). If cattle are having a deleterious effect on the vegetation of the seeps, then the seeps can be fenced and water piped to a trough for use by cattle outside of the fence.

If restoration of any seep is needed, the wettest areas could be restored to semaphore grass, rushes, and sedges. Drier areas could be restored to creeping wildrye, meadow barley, and California oat

grass. The non-native species should be removed from these seeps, although it will be very difficult to remove the tall fescue, bristly ox-tongue, and other established weeds because they are growing among the native plants.

### 7.1.6 Rocky Knoll

A rocky knoll is located on the western property line near the serpentine area. This knoll is conical shaped and supports a small tree at the summit (Figure 8b). The plant species that grow here are a combination of scrub and grassland resulting in a diverse assemblage of plants consisting of ocean spray (*Holodiscus discolor*), poison oak, bush monkey flower (*Mimulus aurantiacus*), Chinese houses (*Collinsia heterophylla*), phacelia (*Phacelia* sp.), foothill needlegrass (*Nassella lepida*), Ithuriel's spear, sweet pea (*Lathrys vestitus*), and lomatium (*Lomatium* sp.). Cattle have access to this area and it was heavily grazed in 2008.

This area should be monitored to determine the intensity of grazing and it should be fenced if intense grazing continues. Intense grazing is probably beneficial in some years to prevent the shrubs from increasing in density and out-competing the grassland species.

## 7.2 WILDLIFE ENHANCEMENT

### 7.2.1 California Red-legged Frog

**7.2.1.1 Habitat Enhancement.** California red-legged frogs can breed in seasonal or perennial waterbodies whereas American bullfrogs require perennial waterbodies. Ideal breeding ponds for California red-legged frogs should be deep enough to contain water through June or July but dry by the end of the year to prevent colonization by American bullfrogs. The existing perennial ponds at Tolay Creek Ranch are small and lack cover. California red-legged frogs and their tadpoles would be subjected to predation in these ponds, nevertheless, these ponds may support breeding.

Fencing reaches of Tolay Creek that support breeding habitat for California red-legged frogs is likely to result in increased cover and a resulting increase in suitability for breeding. This would be the most rapid enhancement measure that could be implemented for the California red-legged frog. Surveys should probably be conducted for the California red-legged frog to assess the effectiveness of the enhancement measures.

If fencing does not result in an increase in suitability of habitat for the California red-legged frog, then surveys should be conducted to determine reasons for the absence of successful breeding. Additional enhancement measures could be implemented depending on the results of the surveys.

If the studies indicate that Tolay Creek does not provide good breeding habitat and California red-legged frogs occur on Tolay Creek Ranch, then ponds outside of the channel could be considered to enhance breeding. The drawback of creating ponds is that they are a created habitat that is not natural to Tolay Creek Ranch and they often support dominance of non-native plant species. These non-native species could include curly dock, bird's foot trefoil, Italian ryegrass, rabbit's foot grass, and swamp timothy (*Crypsis schoenoides*). American bullfrogs, may also use these ponds while they contain water. Nevertheless, a special-status species, Lobb's aquatic buttercup, CNPS List 4, has

colonized un-natural seasonal ponds at Tolay Creek Ranch and is likely to colonize additional created ponds.

Ponds could be created by constructing small dams in suitable areas of some of the smaller tributaries to Tolay Creek, by excavating depressions in the floor of the Lower Tolay Valley and/or by diverting a small amount of water from one of the large seeps to a created depression at the edge of the seep. If these ponds were to be created, then spike rush and other shoreline vegetation should be established within any created pond to provide cover for the frogs and their larvae.

Once cover has been established at the breeding ponds, grazing could be used to manage the extent of the cover. Year-round heavy grazing can virtually eliminate freshwater marsh and riparian vegetation reducing cover for frogs and increasing the likelihood of predation. Elimination of grazing, on the other hand, can result in dense stands of cattails that reduce habitat diversity. The optimal condition for red-legged frogs is a mosaic of open water, freshwater marsh, and riparian vegetation. This condition can be created by managing the timing and intensity of livestock grazing. Fencing portions of the ponds could also accomplish this objective.

**7.2.1.2 Control of American Bullfrogs.** Because permanent ponds within Tolay Creek are small, suitability for breeding American bullfrogs is low and the need for control of American bullfrogs is likely to be low in any given year.

### 7.2.2 Western Pond Turtle

Western pond turtles occur in Tolay Creek. Providing habitat for the California red-legged frog would also provide habitat for the western pond turtle.

### 7.2.3 Burrowing Owl

A few burrowing owls are regularly observed at Tolay Creek Ranch in the vicinity of rock outcrops suitable for refuge. The site is probably not optimal breeding habitat due to climatic factors. Burrows suitable for nesting by burrowing owls are limited in extent at the park, in part due to the small numbers of California ground squirrels. Burrowing owls can use the burrows of other types of animals besides ground squirrels (such as foxes), and they have been observed using holes in rock outcrops at Tolay Creek Ranch. Creation of artificial burrows suitable for nesting by burrowing owls could be considered in the short-term. In the long-term, proper range management may encourage an increase in the number of ground squirrels, which would create burrows that could be used by burrowing owls.

### 7.2.4 Mammals

Woody cover for mammals could be expanded at Tolay Creek Ranch as discussed in the section on *Restoration of Selected Habitats*. This would allow mammals to utilize a greater portion of Tolay Creek Ranch and provide cover for mammals traveling through the ranch. Increasing cover would likely increase mammalian diversity and the abundance of northern raccoon, striped skunk, Virginia opossum, gray fox, and coyote. An increase of rabbits could also increase the numbers and diversity of predators at Tolay Creek Ranch.

Tolay Creek Ranch should also be managed to allow the colonies of California ground squirrels to expand. This will increase the diversity of the grassland fauna that uses the squirrel burrows for refuge. California ground squirrels are also important prey species and, as such, may be important in maintaining predator diversity.

## 7.3 NON-NATIVE PLANT SPECIES CONTROL

A number of invasive non-native species occur in sufficient density at Tolay Creek Ranch to warrant control (Figures 6a and b). The most numerous weeds are yellow star-thistle and Medusahead. Other species present in lesser numbers are bristly ox-tongue, purple star-thistle, Italian thistle, milk thistle, black mustard, wild radish, teasel, and Himalayan blackberry. Curly dock and cocklebur should be removed from the large seasonal pond next to Highway 121. In addition, acacia, tamarisk (*Tamarisk* sp.), Monterey Cypress, and blue gum should be managed.

Invasive plants are defined as those that can spread into wildland ecosystems and displace desirable native species, hybridize with native plants, and alter biological communities and ecosystem processes (Cal-IPC 2006). Without control, invasive plants can spread to encompass areas much larger than several acres and become the dominate plant species. This is of particular concern at Tolay Creek Ranch because of the large areas of grassland that are dominated be native species, including the serpentine area. These native grasslands are a very valuable resource because of their scarcity in California. Furthermore, the grasslands support cream cups, the food plant of Opler's longhorn moth (on serpentine soil) and Johnny jump-up, the food plant of an un-named subspecies of zerene silverspot butterfly. Invasive weeds could out-compete these species and threaten these rare insect species. These invasive species correspond with those species listed in Table A of the California Invasive Plant Inventory (Cal-IPC 2006).

The extent and location of weedy species within Tolay Creek Ranch should be monitored annually and appropriate control activities should be implemented. Control/eradication activities such as through physical means (grazing, mowing, hand-pulling), chemical/herbicide means, and/or controlled burning should be implemented in an integrated pest management approach as deemed appropriate for the species and circumstances of the infestation,. Such work should be monitored for effectiveness.

Herbicides should be applied by a Licensed Applicator in accordance with recommendations by the manufacturer to control some weedy plant species. Timing of application would depend on the phenology of the weeds and any restrictions due to seasonal grazing activity or other constraints posed by wildlife on a seasonal basis.

Mowing should be timed carefully to remove weed flowers prior to seed ripening. After initial treatments during the first 2 years, mowing schedules should be adjusted using adaptive management based on the results of monitoring. Mowing height should typically not exceed 3-4 inches. To minimize build-up of thatch and to remove non-native seed-heads before they shatter, the mowing regime should use a haying and baling approach with the bales removed from the property to an appropriate location where weed introduction would not pose a threat.

Weed management through training goats and cows to select invasive species should be evaluated for use on this site (Voth 2006). Depending on the density of weeds, areas where weeds have been controlled may need to be seeded or planted with native perennial grasses to discourage re-establishment of the weeds.

Controlled burning can be an effective manner to reduce weed infestations and enhance grassland areas by reducing thatch and increasing wildflowers. The local fire department may support controlled burning for practice purposes. Timing should occur after rare plants have dropped their seed.

Specific treatments for target invasive species are discussed below in order of perceived threat to native species. It should be noted that as target species prioritized for control become less abundant, other species may fill the void. Additionally, new introductions of invasive species could occur in the future. For these reasons, the invasive plant control program should maintain flexibility based on monitoring to adapt to new challenges and opportunities.

### 7.3.1 Medusahead

Medusahead is one of the most common weeds at Tolay Creek Ranch. It occurs in patches mostly in the lower Tolay Valley with a few small stands on the West Ridge. It does not appear to dominate extensive areas at Tolay Creek Ranch (Figures 6a and b). Medusahead is of concern because it grows very densely and over time can exclude other species including native grasses and forbs. Medusahead has the ability to spread to other areas in the fur of animals and without some type of control, has the ability to grow throughout large areas of Tolay Creek Ranch. It is ranked highly because of its ability to exclude other species and its ability to spread.

A carefully managed combination of prescribed fire, grazing, herbicide treatments, and reseeding with native perennial grasses may be the most effective combination of treatments of medusahead (McKell et al. 1962) and should be considered if feasible. In addition to the intensive grazing program discussed above, the following treatments should be implemented. Mowing during the boot stage is an option, but the straw would have to be baled and removed to prevent seed-heads from shattering and avoid thatch build-up. Treatment with glyphosate between mid-March and mid-May may also be effective in controlling medusahead. Care must be used to avoid herbicide drift onto native species.

Control can be attained through intensive grazing to force livestock to graze medusahead. This high density grazing results in severe competition for forage between animals, forcing them to graze less selectively and more uniformly. Medusahead can be reduced by up to 90% in 2 years of carefully timed grazing treatments (George 1992, George et al. 1989, Wildland Solutions 2005). In addition, Doran (2007) found that over 95% control of medusahead can be attained by very high intensity, short-duration (from a few days to two weeks) livestock grazing in the late spring.

This treatment is successful only when intensive grazing coincides with the period when medusahead is in the "boot" stage (before the seed head emerges from the uppermost leaf). This intensive grazing treatment should be timed (based on frequent observations) to coincide with the boot-stage of the phenology of medusahead, which can vary from late April to early May depending on yearly weather fluctuations (Young et al. 1970). This timing is critical because if livestock grazing ceases prior to the boot stage, the plants will re-grow and produce new seed heads. If grazing occurs after the seed head

emerges from the boot, the livestock will avoid it because of the sharp awns, and there is a high risk of spreading the infestation by livestock after the seed is ripe. Livestock should be removed when grazing has reached the "heavy" level of use, with residual dry matter levels below 500 pounds per acre. Residual dry matter is the amount of vegetation remaining in an area.

### 7.3.2 Yellow Star-thistle

Yellow star-thistle, along with medusahead, is a common weed at Tolay Creek Ranch. It grows throughout Tolay Creek Ranch in patches (Figures 6a and b). A large mapped polygon on the East Ridge consists of a mosaic of smaller patches of yellow star-thistle and grassland (Figure 6).

Yellow star-thistle forms a rosette in late spring and begins to flower in fall. A dense growth of rosettes has the potential to exclude native forbs that grow in the late spring and summer because of shading by the rosette or competition for water. Yellow star-thistle is ranked highly because of its ability to dominate large areas.

Yellow star-thistle is rated as a high priority invasive species by the Cal-IPC (2006). A combination of techniques is most effective in controlling this annual invasive species, including grazing, mowing, burning, herbicide use, and biological controls. Mid to late- spring grazing (May-June), before the plant has produced spines but after bolting, may control seed production and spread to a limited degree (Thomsen et al. 1996).

The following approach may be used to control yellow star-thistle where infestations are extremely dense and other methods cannot be used for some reason. Under this approach, grazing would be initiated within a temporarily fenced enclosure after the growth and elongation of the grasses and yellow star-thistle occurred. High intensity grazing would be applied during the period when yellow star-thistle begins to emerge from the rosette and flower. Repeated treatments would be required to maintain that control. Extra livestock management would be required to keep animals at the site past the normal grazing period, maintain the fencing, and manage the animals. If the resource manager deems it appropriate, sheep or goats may be used instead of cattle for intensively managed grazing treatment of invasive species. In small areas where grazing is not feasible, mowing or herbicides during the same period should be used to control yellow star-thistle.

### 7.3.3 Purple Star-thistle

Purple star-thistle is rated as a moderate priority invasive weed (List B) by the Cal-IPC (2006). This species, unlike yellow star-thistle, is unpalatable to livestock at all life stages and dense stands of this weed can preclude cattle from grazing (Witham 2006). Therefore, this species causes significant losses of forage and is not effectively controlled by grazing. It is often a biennial or perennial species, with rosettes forming the first year followed by flowering the second and subsequent years. It was observed in one area at Tolay Creek Ranch (Figure 6b).

Purple star-thistle has the ability to spread to disturbed areas, including the ranch roads, at Tolay Creek Ranch. A dense growth of purple star-thistle excludes all other species, native or non-native. Purple star-thistle is of a moderate priority for control because it is not very abundant at Tolay Creek Ranch. Nevertheless, it should be monitored to ensure that it does not increase in abundance.

Application of glyphosate in the late spring-early summer on the rosettes and early blooming plants after adjacent desirable annual species have set seed is an effective control (Amme 1985). Care must be taken to limit this treatment to areas devoid of native perennials because this herbicide is non-selective. Selective herbicides that are effective in these cases include 2,4,D; Dicamba; or Garlon 3A. Areas to be treated should be mowed in the early spring prior to seed set to remove standing purple star-thistle flowers and to open the treated areas to grazing (DiTomaso pers. com., reported in Witham 2006). Hand pulling or using a shovel to cut off the purple star-thistle plant, an inch or more below the soil surface, is effective for small patches and individuals of purple star-thistle.

### 7.3.4 Italian Thistle

Italian thistle grows in mostly small stands above the bank of Tolay Creek and in disturbed areas of the non-native grassland and woodland. Its occurrence is spotty throughout Tolay Creek Ranch and is therefore of moderate priority for control. Dense stands of Italian thistle often occur in the same area year after year and they can exclude all other species. It is rated statewide as a moderate threat (Cal-IPC 2006). It reproduces only by seed, which have a high germination rate and can remain viable in the soil as long as 8 years.

Grazing by sheep, goats, and horses can be effective in controlling Italian thistle, but cattle need to be trained to graze it (Voth 2006). Application of selective herbicides (Picloram and 2,4,-D) have shown limited success in controlling this species (ESNERS 2000).

### 7.3.5 Bristly Ox-tongue

Bristly ox-tongue is considered a limited threat throughout California (Cal-IPC 2006). Precise locations were not mapped because it grows in many of the seeps and moist areas and occasionally in grassland at Tolay Creek Ranch. Small infestations may be controlled by hand pulling or hoeing 2-inches below the surface when soils are moist (ESNERS 2000) or by spot spraying. Livestock can also be trained to eat bristly ox-tongue.

Bristly ox-tongue grows in disturbed areas and in moist areas where it is a domint species of the seeps. The rosettes of bristly ox-tongue are quite dense in the seeps and can exclude native plants. Bristly ox-tongue is also a dominant weed at Tolay Lake Regional Park in the fallow fields. This weed is extremely dense in these fields and its wind-blown seeds disperse widely throughout the area. Bristly ox-tongue is of moderate priority for control because it is very abundant and control would necessitate considerable effort.

### 7.3.6 Black Mustard

This species is rated as a moderate invasive species by the Cal-IPC (2008). It grows in localized areas on Tolay Creek Ranch (Figures 6b) and should be at least monitored if it is not controlled. Some ungrazed grasslands support large stands of black mustard that have out-competed the grassland species. These stands of black mustard return in the same location in succeeding years and support few, if any, native species. Black mustard is of moderate priority for control because it is not abundant at Tolay Creek Ranch.

Control methods have not been specifically developed for black mustard, but Cal-IPC suggests hand removal of small stands. Their research indicates that mowing does not result in control. Spot spraying of herbicide (1% solution of glyphosate was suggested for wild radish (*Raphanus sativus*) which is applicable to black mustard (Cal-IPC 2008). Experimental treatments could include intensive grazing followed up by hand control or herbicides.

### 7.3.7 Curly Dock, Bird's Foot Trefoil, and Cocklebur

Curly dock, bird's foot trefoil, and cocklebur grow in the large seasonal pond beside Highway 121 (Figure 8b). They are present throughout the entire seasonal pond both within and outside the boundaries of the Tolay Creek Ranch property. The cocklebur is an annual species while bird's foot trefoil and curly dock are perennial species.

Any control measures should be instituted throughout the entire pond necessitating cooperation with the adjacent landowner. Control would be a large effort and would necessitate much hand weeding or herbicide use. If herbicides are used during the dry season, they should avoid the native species growing among the curly dock, bird's foot trefoil, and cocklebur.

The pond continues to provide wildlife habitat and the non-natives do not appear to be excluding any native wildlife species. Nevertheless, removal experiments may be interesting to implement to determine if the density of native species increases upon removal of these non-native species. Considering the effort necessary to remove these non-native species and considering that they also grow in the off-site portion of the pond, control efforts should be a lower priority. Nevertheless, these species should be monitored to ensure that native plant species continue to persist in the large seasonal pond.

### 7.3.8 Teasel

Teasel is rated as a moderate invasive species by the Cal-IPC (2008). It tends to grow in disturbed areas and at Tolay Creek Ranch it grows along the banks of Tolay Creek in moist areas. Teasel currently grows in a relatively few small stands but has the potential to grow over a much larger area. The rosettes of teasel form a siginificant amount of cover in these moist areas and are likely to exclude native species. Control of teasel would be low priority because it is not very abundant and control efforts would likely require a significant amount of time if done by hand.

Control options are not addressed in Cal-IPC (2008) but could include hand removal using tools and/or herbicide. It is a biennial species indicating that usually requires 2 years to grow to flowering and then it dies after flowering. Removal of seed stalks late in the season prior to dispersing seed may be tried on an experimental basis to determine whether teasel will grow another flowering stalk prior to dying.

### 7.3.9 Himalayan Blackberry

Himalayan blackberry grows most often in the understory of riparian areas where it forms an impenetrable stand among the lower branches and trunks of willow and oak trees (Figure 6b). It also

grows as compact stands in a few grassland areas, and at the head of unvegetated watercourses. When in riparian situations, it dominates the understory, appears to spread, and may exclude other species. Himalayan blackberry, however, provides excellent cover for wildlife such as California quail.

Control could be by either hand removal or use of goats. Control should be phased such that alternative understory plant species would be established nearby prior to removal of a stand or portion of a stand of Himalayan blackberry. In this manner, cover would be maintained for wildlife. We recommend that control of Himalayan blackberry be given a low priority.

### 7.3.10 Blue Gum Eucalyptus, Tamarisk, and Black Acacia

Blue gum eucalyptus and black acacia grow in a few small clumps at Tolay Creek Ranch (Figures 6a and b). These trees should be monitored and seedlings and saplings removed to ensure that these trees do not expand and colonize native habitat. A potential golden eagle nest occurs in the blue gum at the former homestead near the crossing of Tolay Creek by the Sears Point to Lakeville Road (Figure 6a). Tamarisk, a species that is highly invasive to watercourses, also occurs at this historic homestead. Tamarisk should be monitored to ensure that it does not colonize the adjacent seep and tributary to Tolay Creek. If left unchecked, these three species have the potential to cover significant areas of the seeps, watercourses, and grasslands of Tolay Creek Ranch. Valuable wetland and watercourse habitat could be converted to a non-native woodland with a resulting reduction in species diversity. Control of these species would be low priority but removal of seedlings and saplings would be a high priority to prevent spreading.

### 7.3.11 Water Primrose

A speciesof water primrose (*Ludwegia* sp.) occurs within a couple of ponds at Tolay Lake Regional Park. The potential exists for the water primrose to disperse to Tolay Creek or other waterbodies within the general area. If it were to colonize Tolay Creek, it would be very difficult to eradicate because it would have the opportunity to colonize the entire downstream reach of Tolay Creek from Tolay Lake. Tolay Creek and other semi-pemanent waterbodies should be monitored for the occurrence of water primrose.

## 7.4 EROSION

Many of the slopes of Tolay Creek Ranch, especially those on the West Ridge contain landslides that occurred during the Quaternary period. In addition, the East Ridge is susceptible to debris flows (Florsheim 2009). Erosion is occurring at Tolay Creek Ranch in areas where head-cuts occur in watercourses and swales (Figures 8a and b). These head-cuts result in channel incision and the deposition of sediment downstream. They can also result in unstable slopes due to slope steepness. Particularly steep slopes are located along a tributary to Tolay Creek that flows through the “blue soil” area” of the East Ridge which is mapped as gullied land on Figure 4. This unstable “blue soil” also occurs in the West Ridge along a tributary to Tolay Creek (gullied land of Figure 4). Although mapped over an extensive area by the USDA (1972) the erosion occurs within a smaller area than that on the East Ridge.

A slumping and eroding area, slightly less than 0.5 acre, occurs on the northern part of the West Ridge in the Petaluma River watershed (Figure 8a). This area consists of several adjoining large gullies that appear to be expanding. The actively eroding portions of the head-cuts and any actively eroding portions at the top of the slope of the gullies should be smoothed and some type of geotextile applied to prevent further erosion.

Most of the other head-cuts occur in small watercourses or swales and are small themselves. The need to treat head-cuts in watercourses would depend on the size of the head-cut, the amount of sediment deposited by the continuing erosion, and the reduction of slope stability as the head-cut progresses upstream or upslope. Figures 8a and b show the location of some of the head-cuts at Tolay Creek Ranch. Not all of the head-cuts were mapped because they are fairly numerous in each of the watercourses and swales.

Portions of some of the ranch roads are rutted. These portions will continue to erode without repair and could create deep gullies. Many of these rutted areas are located at quite some distance from Tolay Creek and would not appear to directly affect sedimentation of the creek. Nevertheless, there is a fair amount of erosion directly adjacent to the Mengels Ranch road where it runs right next to Tolay Creek, in the upper watershed. These eroded portions of the roads should be repaired.

Erosion at Tolay Creek Ranch can potentially degrade large areas of upland due to the formation of large rills within ranch roads, head-cuts in swales, and the down-cutting of tributaries to Tolay Creek. Furthermore, this erosion may contribute sediment to Tolay Creek. In addition, the Florsheim (2009) study indicates that Tolay Creek has experienced periodic erosion and down-cutting since 1990.

Additional thought and additional study are required to develop priorities in a systematic fashion to address the repair of erosion at Tolay Creek Ranch. To develop these priorities, the Sonoma Land Trust may consider the importance of the deposition of sediment within Tolay Creek, formation of gullies within swales, down-cutting of tributaries to Tolay Creek, and down-cutting of Tolay Creek. Studies may need to occur for each of the topics mentioned above in order to quantify the need for erosion control. Each of these topic areas is briefly addressed below.

Determining the significance of sediment entering Tolay Creek is important since salmonid fish do not spawn in Tolay Creek. Neverthesless there would be the need to determine if there is a significant adverse impact to other aquatic life from sediment. Addressing those areas that contribute the most sediment, may be considered a high priority for erosion control. Areas of swales and tributaries that are experiencing down-cutting may be considered a high priority for erosion control if they are likely to become unstable over time because of the formation of steep slopes and the result of continued erosion and generation of sediment.

Tolay Creek experienced a tremendous amount of down-cutting since `1990 (Florsheim 2009). This down-cutting has left riparian vegetation at the top of the bank, 10 feet or more in some cases. This reduces the ability to develop large areas of riparian vegetation because the water table has likely dropped with the downcutting. For this reason, preventing further down-cutting of Tolay Creek and restoring its riparian vegetation may be the highest priority.

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## 8.3 PERSONAL COMMUNICATIONS

Sam Bacchini, Biological Consultant, EIP Associates, Sacramento, Conducted field work for Parson (1996)

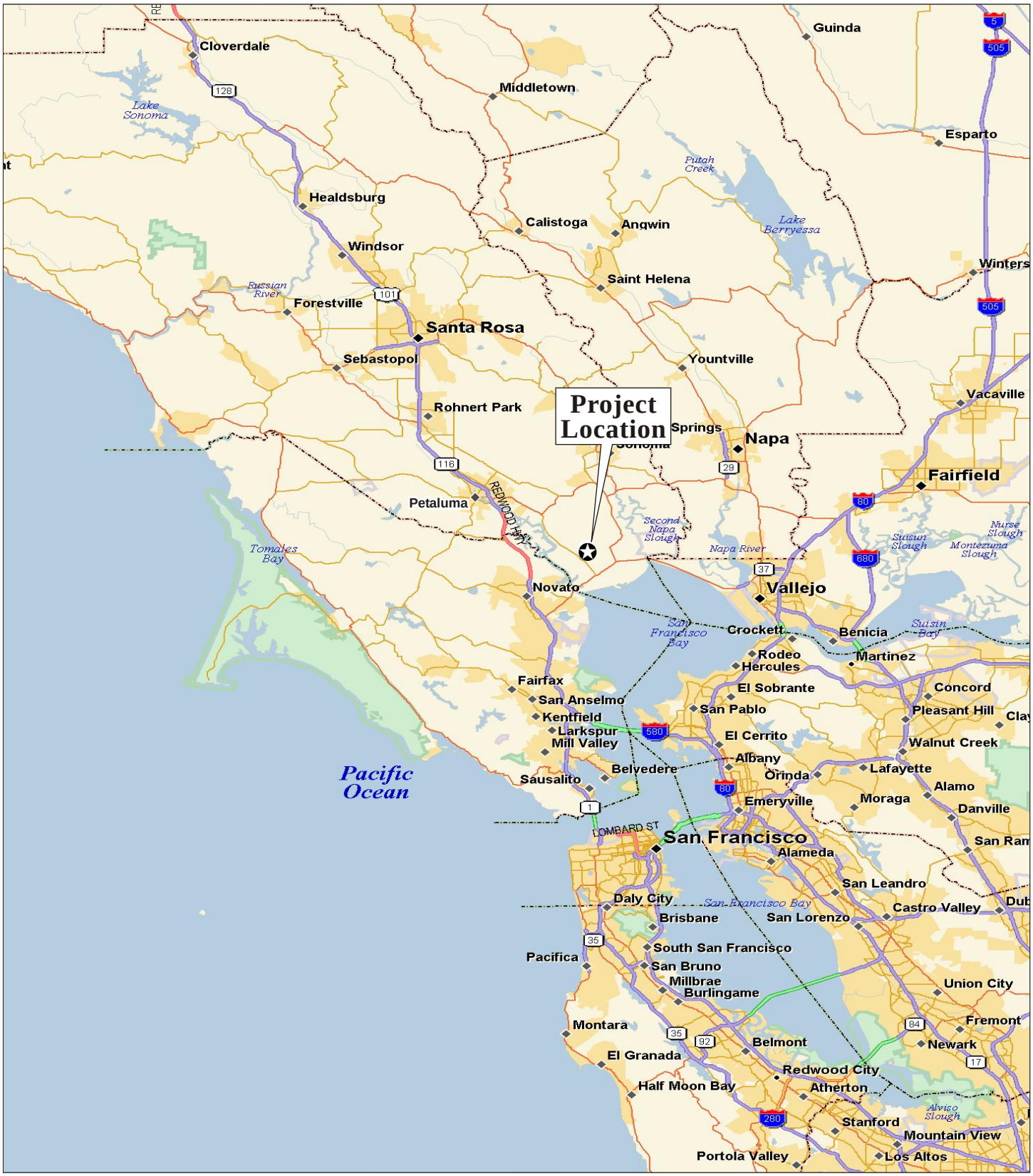
Steve Ehret, Park Planner, Sonoma County Regional Parks, Santa Rosa, California

Matteo Garbelotto, Plant Pathologist, expert on Sudden Oak Death, University of California, Berkeley

Robert Neale, Stewardship Director, Sonoma Land Trust, Santa Rosa, California

B.J. Roche, 2007. Roche Ranch Representative

# FIGURES

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SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

FIGURE 1

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Project Location and Vicinity

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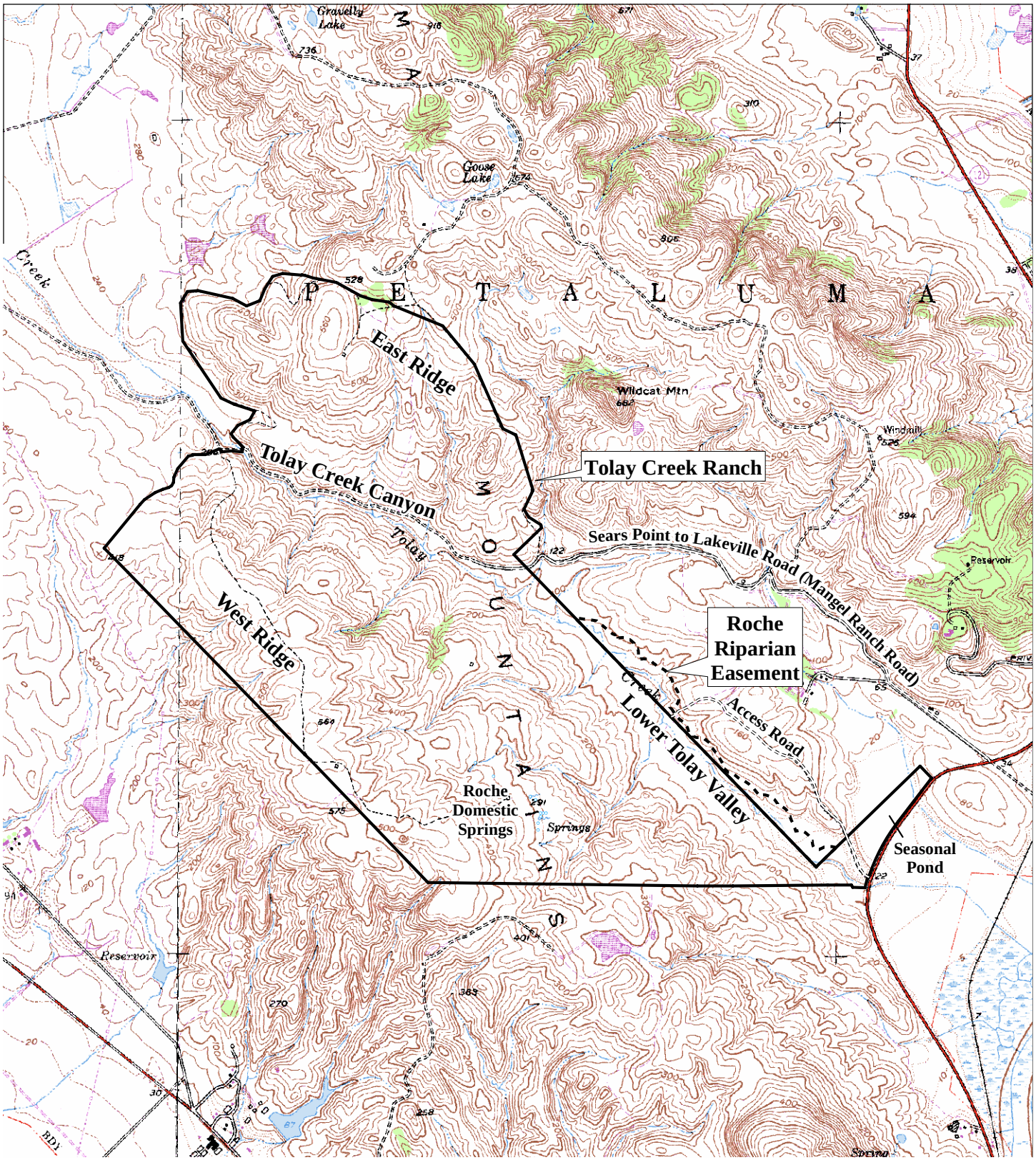


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— Tolay Creek Ranch Boundary

- - - Roche Riparian Easement Boundary

Study Area Includes Both Tolay Creek Ranch and the Roche Riparian Easement

FIGURE 2

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Study Area

Source: USGS 7.5' topographic quadrangles: *Petaluma River, Calif.* 1980; *Sears Point, Calif.* 1968

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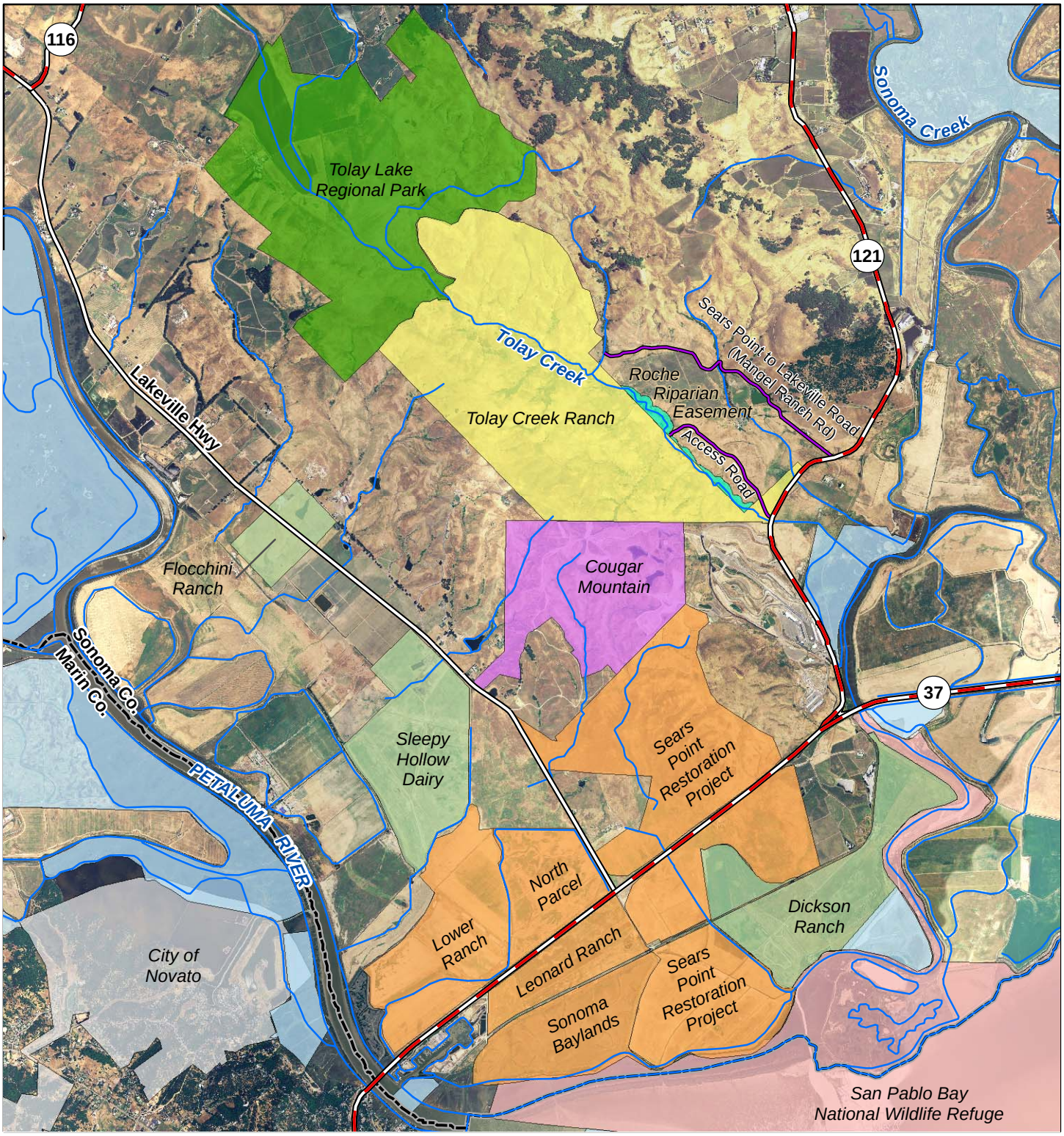


LSA

- Highways
- Major Roads
- Roche Access Roads
- Streams

- Tolay Creek Ranch Property
- Roche Riparian Easement
- Sonoma County Regional Park Dept.
- Sonoma County Ag. Preservation and Open Space District
- Sonoma County Open Space Easement
- Sonoma Land Trust Protected Lands
- Calif. Dept. of Fish and Game Lands
- Other Public Lands

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FEET

Source: Ray Carlson & Assoc.; Sonoma County Ag Pres. & OS District; Sonoma Land Trust. USDA NAIP 2005.
Adapted from Circuit Rider Productions, Inc.

FIGURE 3

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Adjacent Properties

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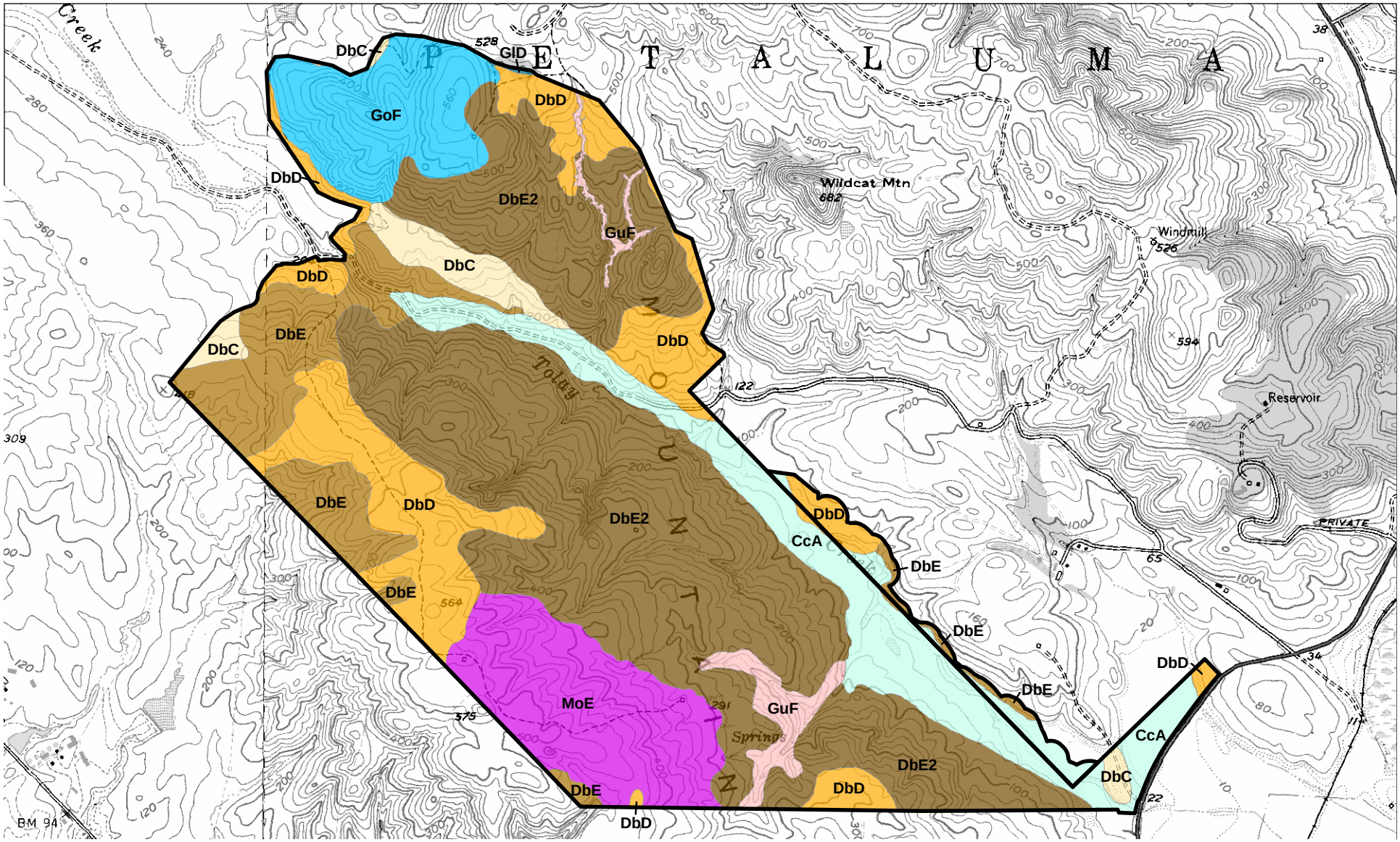


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| | | | |
|---|---|---|---|
| CcA | Clear Lake Clay Loam, 0-2% Slopes | GlD | Goulding Cobbly Clay Loam, 5-15% Slopes |
| DbC | Diablo Clay, 2-9% Slopes | GoF | Goulding-Toomes Complex, 9-40% Slopes |
| DbD | Diablo Clay, 9-15% Slopes | GuF | Gullied Lands |
| DbE | Diablo Clay, 15-30% Slopes | MoE | Montara Cobbly Clay Loam, 2-30% Slopes |
| DbE2 | Diablo Clay, 15-30% Slopes, Eroded | | |

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FIGURE 4

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Soils

Source: USDA, NRCS 2000; USGS 7.5' topographic quadrangles: *Petaluma River, Calif.* 1980; *Sears Point, Calif.* 1968

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Match Line

LSA

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FEET

- Grassland with Native Forbs
- Native Grassland
- Non-Native Grassland
- Woodland
- Rock Outcrops
- Rock Wall
- Serpentine Soils (Montara Cobbly Clay Loam)
- Vernal Pool and Large Seasonal Pond
- Small Seasonal Ponds and Created Pond
- Wetland
- Roche Domestic Springs
- Drainage
- Study Area Boundary

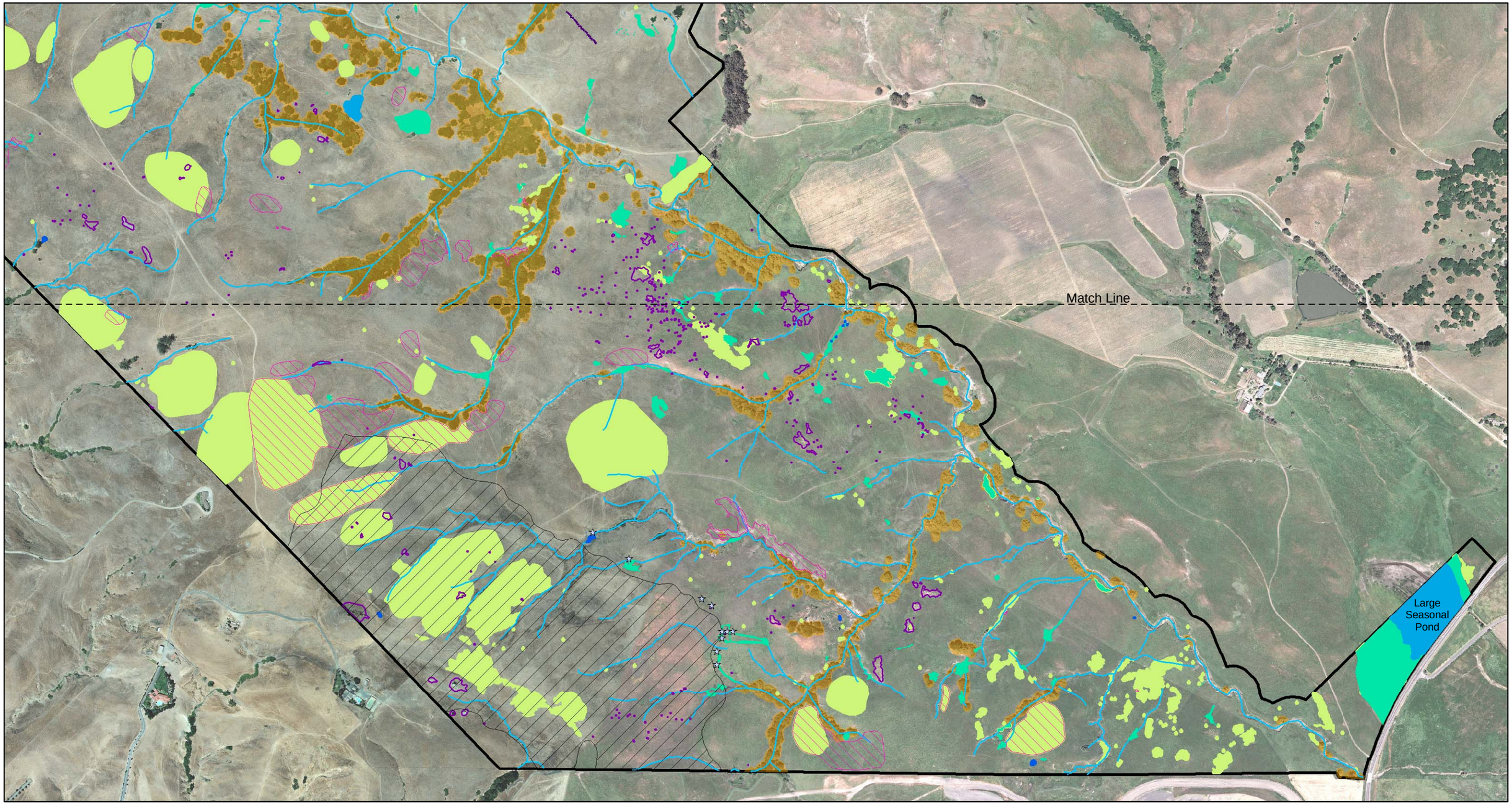
FIGURE 5a

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Vegetation and Habitat Map

I:\SOZ0801\GIS\Maps\Biological Resources Study\Figure5_Vegetation and Habitat Map.mxd (04/22/2009)

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- Grassland with Native Forbs
- Native Grassland
- Non-Native Grassland
- Woodland
- Rock Outcrops
- Rock Wall
- Serpentine Soils (Montara Cobbly Clay Loam)
- Vernal Pool and Large Seasonal Pond
- Small Seasonal Ponds and Created Pond
- Wetland
- Roche Domestic Springs
- Drainage
- Study Area Boundary

FIGURE 5b

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Vegetation and Habitat Map

I:\SOZ0801\GIS\Maps\Biological Resources Study\Figure5_Vegetation and Habitat Map.mxd (04/22/2009)

Match Line

LSA

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- Yellow Star-Thistle (*Centaurea solstitialis*)
- Medusahead (*Taeniatherum caput-medusae*)
- Medusahead (*Taeniatherum caput-medusae*) and Yellow Star-Thistle (*Centaurea solstitialis*)
- Himalayan Blackberry (*Rubus discolor*)
- Purple Star-Thistle (*Centaurea calcitrapa*)
- Black Mustard (*Brassica nigra*)
- Blue Gum (*Eucalyptus globulus*)
- Tamarisk (*Tamarix* sp.)
- Black Acacia (*Acacia melanoxylon*)
- Monterey Cypress (*Cupressus macrocarpa*)
- Other Invasive Non-native Species
- Drainage
- Study Area Boundary

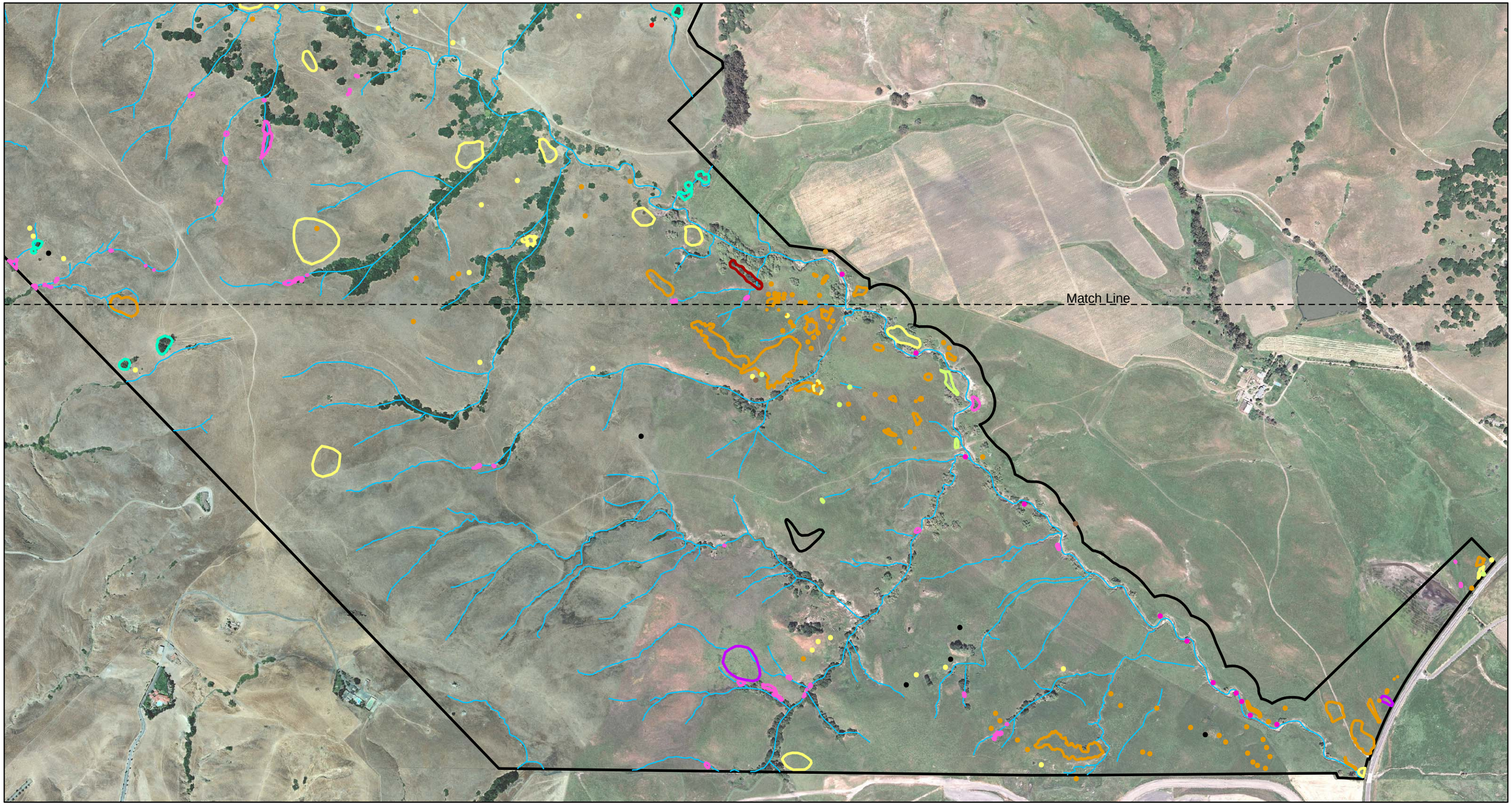
FIGURE 6a

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Non-native Species

I:\SOZ0801\GIS\Maps\Biological Resources Study\Figure6_Non-native Species.mxd (01/14/2009)

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- Yellow Star-Thistle (*Centaurea solstitialis*)
- Medusahead (*Taeniatherum caput-medusae*)
- Medusahead (*Taeniatherum caput-medusae*) and Yellow Star-Thistle (*Centaurea solstitialis*)
- Himalayan Blackberry (*Rubus discolor*)
- Purple Star-Thistle (*Centaurea calcitrapa*)
- Black Mustard (*Brassica nigra*)
- Blue Gum (*Eucalyptus globulus*)
- Tamarisk (*Tamarix* sp.)
- Black Acacia (*Acacia melanoxylon*)
- Monterey Cypress (*Cupressus macrocarpa*)
- Other Invasive Non-native Species
- Drainage
- Study Area Boundary

FIGURE 6b

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Non-native Species

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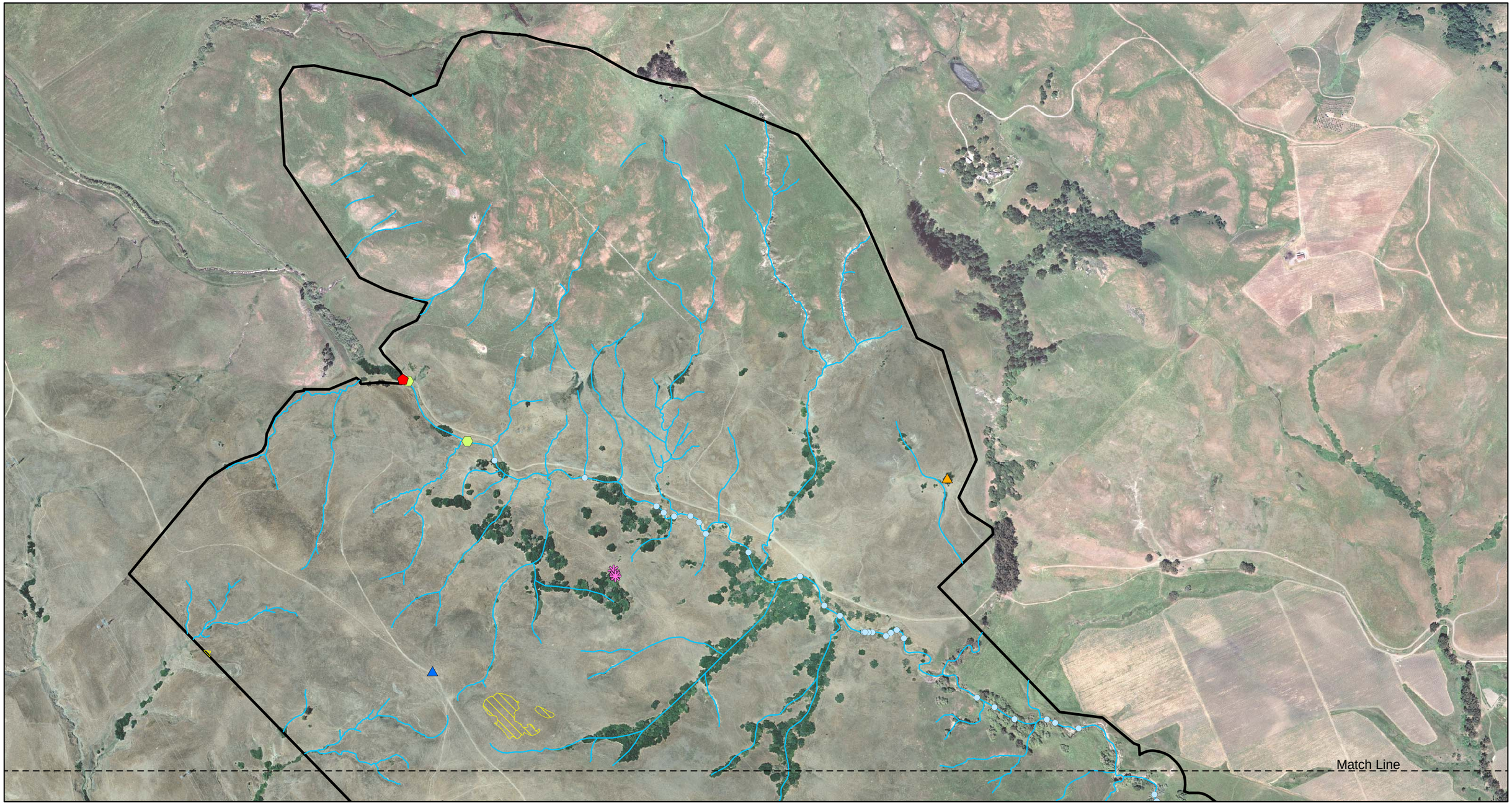


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- Marin Western Flax (*Hesperolinon congestum*)
- Lobb's Aquatic Buttercup (*Ranunculus lobbii*)
- Marsh Zigadene (*Zigadenus micranthus* var. *fontanus*)
- Cream Cups (*Platystemon californicus*), Larval Food Plant for Opler's Longhorn Moth
- Johnny Jump-up (*Viola pedunculata*), Larval Food Plant for Zerene Silverspot Butterfly
- Potential Golden Eagle Nest Tree
- Burrowing Owl
- California Red-legged Frog
- Western Pond Turtle
- Pools in Tolay Creek (field work only completed in upper reaches of Tolay Creek)
- Drainage
- Study Area Boundary

FIGURE 7a

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Location of Special-status Species and Habitat

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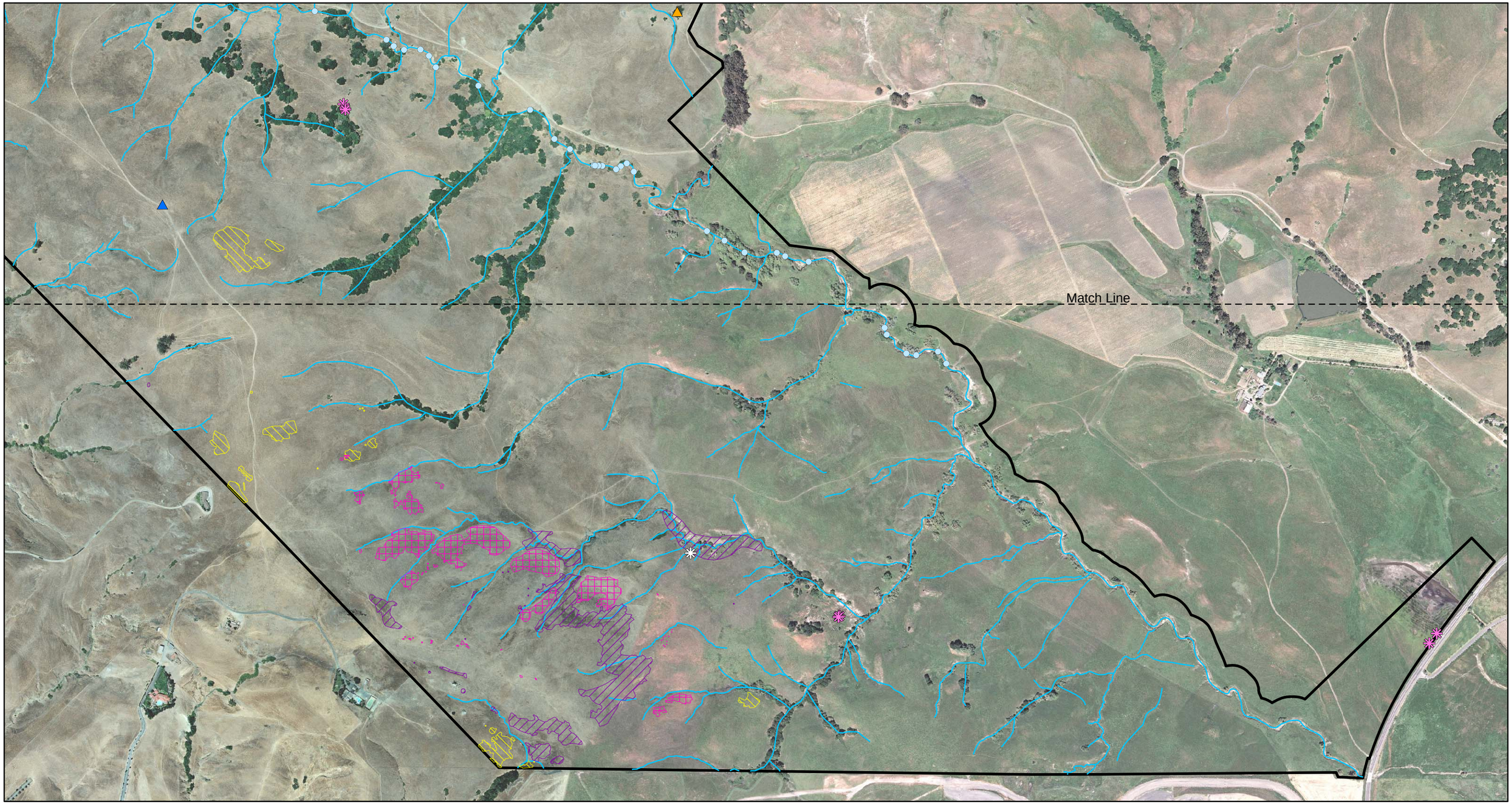


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- Cream Cups (*Platystemon californicus*), Larval Food Plant for Opler's Longhorn Moth
- Johnny Jump-up (*Viola pedunculata*), Larval Food Plant for Zerene Silverspot Butterfly
- Potential Golden Eagle Nest Tree
- Burrowing Owl
- California Red-legged Frog
- Western Pond Turtle
- Pools in Tolay Creek (field work only completed in upper reaches of Tolay Creek)
- Drainage
- Study Area Boundary

FIGURE 7b

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Location of Special-status Species and Habitat

I:\SOZ0801\GIS\Maps\Biological Resources Study\Figure7_Location of Special-status Species and Habitat.mxd (04/21/2009)

LSA

0 450 900
FEET

Candidate Oak Woodland Restoration Area
Grazing Management Area
Erosion Management Area
Seasonal Pond Management Area

Grazing Exclusion Areas
Native Forbs
Native Grassland
Native Grassland/Forbs
Non-native Grassland

Drainage
Study Area Boundary

FIGURE 8a

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Restoration and Management Areas

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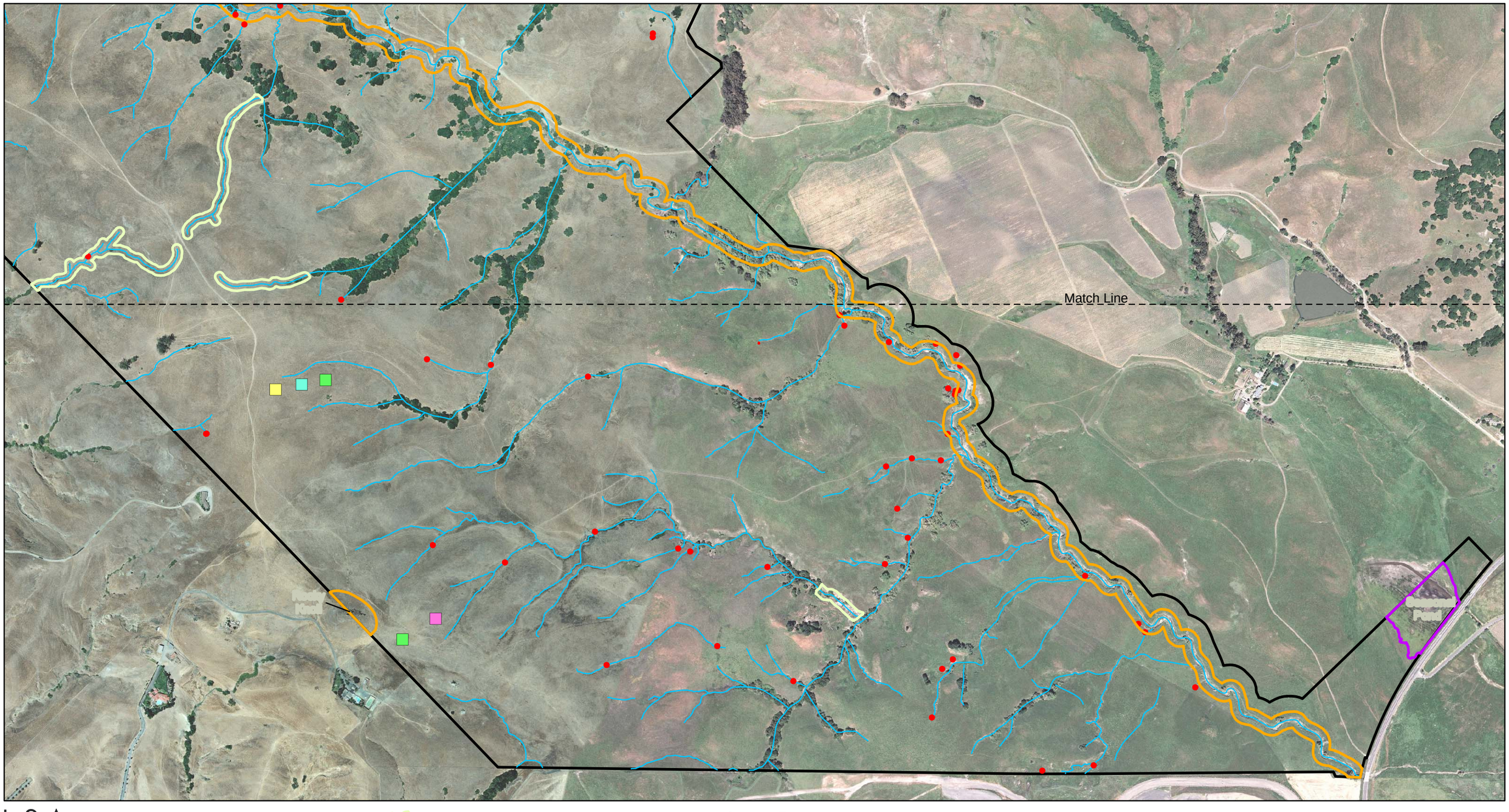


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FEET

Candidate Oak Woodland Restoration Area
Grazing Management Area
Erosion Management Area
Seasonal Pond Management Area

Grazing Exclusion Areas
Native Forbs
Native Grassland
Native Grassland/Forbs
Non-native Grassland

Drainage
Study Area Boundary

FIGURE 8b

*Biological Resources Study*

*Tolay Creek Ranch*
*Sonoma County, California*

Restoration and Management Areas

I:\SOZ0801\GIS\Maps\Biological Resources Study\Figure8_Restoration and Management Areas.mxd (04/21/2009)

# TABLES

## Table A: Plant Species Observed, Tolay Creek Ranch 2008

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| Aceraceae | *Acer macrophyllum* | big-leaf maple | yes |
| Alismataceae | *Alisma lanceolatum* | water plantain | no |
| Anacardiaceae | *Toxicodendron diversilobum* | poison oak | yes |
| Apiaceae | *Conium maculatum* | poison hemlock | no |
| | *Daucus pusillus* | American wild carrot | yes |
| | *Eryngium aristulatum* | coyote thistle | yes |
| | *Foeniculum vulgare* | sweet fennel | no |
| | *Hydrocotyle ranunculoides* | water pennywort | yes |
| | *Lomatium utriculatum* | spring-gold | yes |
| | *Perideridia kelloggii*. | yampah | yes |
| | *Sanicula bipinnata* | poison sanicle | yes |
| | *Sanicula bipinnatifida* | purple sanicle | yes |
| | *Sanicula crassicaulis* | Pacific sanicle | yes |
| | *Scandix pectin-veneris* | Venus needle | no |
| | *Torilis arvensis* | field hedge parsley | no |
| | *Torilis nodosa* | knotted hedge parsley | no |
| Aristolochiaceae | *Aristolochia californica* | Dutchman's pipe | yes |
| Asclepiadaceae | *Asclepias fascicularis* | narrowleaf milkweed | yes |
| Asteraceae | *Achillea millefolium* | yarrow | yes |
| | *Agoseris grandiflora* | grand mountain dandelion | yes |
| | *Artemisia douglasiana* | mugwort | yes |
| | *Aster radulinus* | broad leaf aster | yes |
| | *Baccharis pilularis* | coyote brush | yes |
| | *Baccharis salicifolia* | mule fat | yes |
| | *Blennosperma nanum* var. *nanum* | common blennosperma | yes |
| | *Carduus pycnocephalus* | Italian thistle | no |
| | *Centaurea calcitrapa* | purple star-thistle | no |
| | *Centaurea melitensis* | Maltese star-thistle | no |
| | *Centaurea solstitialis* | yellow star-thistle | no |
| | *Cirsium vulgare* | bull thistle | no |
| | *Cotula coronopifolia* | brass buttons | yes |
| | *Erigeron philadelphicus* | Philadelphia daisy | yes |
| | *Gnaphalium stramineum* | cotton-batting plant | yes |
| | *Hemizonia congesta* ssp. *congesta* | hayfield tarweed | yes |
| | *Hemizonia congesta* ssp. *luzulaefolia* | hayfield tarweed | yes |
| | *Hesperevax sparsiflora* var. *sparsiflora* | erect hespserevax | yes |
| | *Hypochaeris glabra* | smooth cat's ears | no |
| | *Lactuca saligna* | willowleaf lettuce | no |
| | *Lactuca serriola* | prickly lettuce | no |
| | *Lasthenia californica* | California goldfields | yes |
| | *Lasthenia glaberrima* | rayless goldfields | yes |
| | *Layia chrysanthemoides* ssp. *chrysanthemoides* | tidy-tips | yes |
| | *Layia platyglossa* | tidy tips | yes |
| | *Madia gracilis* | slender tarweed | yes |
| | *Madia sativa* | coast tarweed | yes |
| | *Microseris douglasii* ssp. *tenella* | Douglas microseris | yes |

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| | *Picris echioides* | bristly ox-tongue | no |
| | *Senecio vulgaris* | common groundsel | no |
| | *Silybum marianum* | milk thistle | no |
| | *Sonchus asper* | prickly sow-thistle | no |
| | *Taraxacum officinale* | dandelion | no |
| | *Tragopogon porrifolius* | oyster plant | no |
| | *Wyethia angustifolia* | mule's ears | yes |
| | *Xanthium spinosum* | spiny cochlebur | no |
| | *Xanthium strumarium* | cochlebur | no |
| Boraginaceae | *Amsinskia menziesii* var. *menziesii* | Menzies' fiddleneck | yes |
| | *Amsinckia menziesii* var. *intermedia* | intermediate fiddleneck | yes |
| | *Heliotropium curassavicum* | heliotrope | yes |
| | *Plagiobotrys notofulvus* | common popcorn flower | yes |
| | *Plagiobotrys stipitatus* | valley popcorn flower | yes |
| Brassicaceae | *Brassica nigra* | black mustard | no |
| | *Capsella bursa-pastoris* | shepherd's purse | no |
| | *Cardamine californica* | California toothwort | yes |
| | *Cardamine oligosperma* | little western bitter-cress | yes |
| | *Guillenia lasiophylla* | California mustard | yes |
| | *Lepidium nitidum* | peppergrass | yes |
| | *Raphanus raphanistrum* | jointed charlock | no |
| | *Raphanus sativus* | wild radish | no |
| | *Rorippa nasturtium-aquaticum* | water cress | yes |
| | *Sisymbrium officinale* | hedge mustard | no |
| | *Sinapis arvensis* | charlock | no |
| Campanulaceae | *Downingia pulchella* | valley downingia | yes |
| Caprifoliaceae | *Symphoricarpos albus* var. *laevigatus* | common snowberry | yes |
| Caryophyllaceae | *Cerastium glomeratum* | mouse ear chickweed | no |
| | *Minuartia douglasii* | Douglas sandwort | yes |
| | *Sagina* sp. | pearlwort | yes |
| | *Silene gallica* | windmill pinks | no |
| | *Stellaria media* | common chickweed | no |
| Chenopodiaceae | *Atriplex triangularis* | spearscale | yes |
| Convolvulaceae | *Calystegia subacaulis* | stemless morning glory | yes |
| | *Convolvulus arvensis* | bindweed | no |
| | *Cressa truxillensis* | alkali weed | yes |
| Crassulaceae | *Crassula connata* | sand pygmyweed | yes |
| Cucurbitaceae | *Marah fabaceus* | California man-root | yes |
| Cyperaceae | *Bolboschoenus maritimus* | prairie bulrush | yes |
| | *Carex* sp1 | sedge | yes |
| | *Carex* sp2 | sedge | yes |
| | *Cyperus eragrostis* | nutsedge | yes |
| | *Eleocharis macrostachya* | spikerush | yes |
| | *Scirpus acutus* var. *occidentalis* | bulrush | yes |
| | *Scirpus americanus* | three square | yes |
| Dipsacaceae | *Dipsacus* sp. | wild teasel | no |
| Dryopteridaceae | *Dryopterus arguta* | wood fern | yes |
| Equisetaceae | *Equisetum laevigatum* | smooth scouring rush | yes |
| | *Equisetum telmateia* ssp. *braunii* | giant horsetail | yes |

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| Euphorbiaceae | *Chamaesyce* sp. | sandmat | ? |
| | *Euphorbia crenulata* | Chinese cups | yes |
| Fabaceae | *Acacia melanoxylon* | blackwood acacia | no |
| | *Astragalus gambellianus* | Gambel's milk-vetch | yes |
| | *Glycyrrhiza lepidota* | American licorice | yes |
| | *Lathyrus vestitus* | sweet pea | yes |
| | *Lotus purshianus* var. *purshianus* | Spanish clover | yes |
| | *Lotus tenuis* | narrow-leaf bird's-foot trefoil | no |
| | *Lotus wrangelianus* | California lotus | yes |
| | *Lupinus bicolor* | miniature lupine | yes |
| | *Lupinus formosus* var. *formosus* | summer lupine | yes |
| | *Lupinus microcarpus* var. *densiflorus* | chick lupine | yes |
| | *Lupinus succulentus* | arroyo lupine | yes |
| | *Medicago polymorpha* | California burclover | no |
| | *Melilotus indica* | yellow sweetclover | no |
| | *Thermopsis macrophylla* | false lupine | yes |
| | *Trifolium albopurpureum* | rancheria clover | yes |
| | *Trifolium bifidum* | notchleaf clover | yes |
| | *Trifolium campestre* | hop clover | no |
| | *Trifolium dubium* | little hop clover | no |
| | *Trifolium fragiferum* | strawberry clover | no |
| | *Trifolium fucatum* | bull clover | yes |
| | *Trifolium gracilentum* | pinpoint clover | yes |
| | *Trifolium hirtum* | rose clover | no |
| | *Trifolium incarnatum* | crimson clover | no |
| | *Trifolium microdon* | thimble clover | yes |
| | *Trifolium olyganthum* | fewflower clover | yes |
| | *Trifolium subterraneum* | subterraneum clover | no |
| | *Trifolium variegatum* | whitetip clover | yes |
| | *Vicia benghalensis* | reddish tufted vetch | no |
| | *Vicia sativa* | common vetch | no |
| Fagaceae | *Quercus agrifolia* | coast live oak | yes |
| | *Quercus lobata* | valley oak | yes |
| Frankeniaceae | *Frankenia salina* | alkali heath | yes |
| Gentianaceae | *Centaurium muehlenbergii* | Muelenberg's centaury | yes |
| Geranicaeae | *Erodium botrys* | long beaked filaree | no |
| | *Erodium cicutarium* | redstem filaree | no |
| | *Erodium moschatum* | white-stem filaree | no |
| | *Geranium dissectum* | geranium | no |
| | *Geranium molle* | dove's foot geranium | no |
| Hyppocastanaceae | *Aesculus californica* | California buckeye | yes |
| Hydrophyllaceae | *Nemophila heterophylla* | variable-leaf baby-blue-eyes | yes |
| | *Phacelia* sp. | phacelia | yes |
| Iridaceae | *Sisyrinchium bellum* | blue-eyed grass | yes |
| Juncaceae | *Juncus balticus* | Baltic rush | yes |
| | *Juncus bufonius* | toad rush | yes |
| | *Juncus effusus* | common rush | yes |
| | *Juncus patens* | spreading rush | yes |
| | *Juncus phaeocephalus* | brown-headed rush | yes |

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| Lamiaceae | *Mentha pulegium* | pennyroyal | no |
| | *Stachys ajugoides* | ajuga hedge nettle | yes |
| Lauraceae | *Umbellularia californica* | California bay | yes |
| Liliaceae | *Brodiaea elegans* | harvest brodiaea | yes |
| | *Calochortus luteus* | gold nuggets | yes |
| | *Calochortus venustus* | butterfly mariposa lily | yes |
| | *Chlorogalum pomeridianum* var. *pomeridianum* | soap plant | yes |
| | *Dichelostemma capitatum* | blue dicks | yes |
| | *Triteleja laxa* | Ithuriel's spear | yes |
| | *Zigadenus fremontii* | death camas | yes |
| | *Zigadenus micranthus* var. *fontanus* | death camas | yes |
| Linaceae | *Hesperolinon congestum* | Marin western flax | yes |
| Lythraceae | *Lythrum hyssopifolia* | loosestrife | no |
| Malvaceae | *Malvella leprosa* | alkali mallow | yes |
| | *Sidalcea malvaeflora* | California checker bloom | yes |
| Myrtaceae | *Eucalyptus globulus* | blue gum eucalyptus | no |
| Onagraceae | *Camissonia ovata* | suncups | yes |
| | *Clarkia purpurea* | winecup clarkia | yes |
| | *Epilobium brachycarpum* | willowherb | yes |
| Papaveraceae | *Eschscholzia californica* | California poppy | yes |
| | *Platystemon californicus* | creamcups | yes |
| Plantaginaceae | *Plantago erecta* | California plantain | yes |
| | *Plantago lanceolata* | English plantain | no |
| | *Plantago major* | common plantain | no |
| | *Plantago subnuda* | coast plantain | yes |
| Poaceae | *Agrostis exarata* | spike bentgrass | yes |
| | *Agrostis viridis var. scabrida* | water bent grass | no |
| | *Avena barbata* | slender wildoats | no |
| | *Avena fatua* | wild oats | no |
| | *Brachypodium distachyon* | false brome | no |
| | *Bromus diandrus* | ripgut brome | no |
| | *Bromus hordeaceus* | soft chess | no |
| | *Crypsis schoenoides* | swamp-timothy | no |
| | *Cynodon dactylon* | Bermuda grass | no |
| | *Cynosurus echinatus* | hedgehog dogtail | no |
| | *Danthonia californica* | California oatgrass | yes |
| | *Distichlis spicata* | saltgrass | yes |
| | *Elymus multisetus* | big squirreltail grass | yes |
| | *Elymus glaucus* | blue wildrye | yes |
| | *Festuca arundinacea* | tall fesque | no |
| | *Glyceria* sp. | glyceria | no |
| | *Holcus lanatus* | velvet grass | no |
| | *Hordeum brachyantherum* ssp. *brachyantherum* | meadow barley | yes |
| | *Hordeum brachyantherum* ssp. *californicum* | California barley | yes |
| | *Hordeum murinum* ssp. *leporinum* | hare barley | no |
| | *Hordeum marinum* ssp. *gussoneanum* | Mediterranean barley | no |
| | *Lolium multiflorum* | Itaian ryegrass | no |
| | *Melica californica* | California melic | yes |
| | *Nassella lepida* | foothill needle grass | yes |

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| | *Nassella pulchra* | purple needle grass | yes |
| | *Phalaris aquatica* | harding grass | no |
| | *Phalaris paradoxa* | hood canarygrass | no |
| | *Pleuropogon californicus* | California semaphore grass | yes |
| | *Poa annua* | annual bluegrass | no |
| | *Polypogon australis* | Chilean rabbitfoot grass | no |
| | *Polypogon monspeliensis* | rabbitfoot grass | no |
| | *Taeniatherum caput-medusae* | medusahead | no |
| | *Vulpia myuros* | annual fescue | no |
| Polemoniaceae | *Gilia capitata* | globe gilia | yes |
| | *Linanthus bicolor* | bi-colored linanthus | yes |
| | *Linanthus parviflorus* | common linanthus | yes |
| Polygonaceae | *Polygonum arenastrum* | common knotweed | no |
| | *Polygonum* sp. | aquatic knotweed | ? |
| | *Rumex acetosella* | sheep sorrel | no |
| | *Rumex crispus* | curly dock | no |
| | *Rumex pulcher* | fiddle dock | no |
| Polypodiaceae | *Polypodium californicum* | California polypody | yes |
| Portulacaceae | *Calandrinia ciliata* | red maids | yes |
| | *Claytonia perfoliata* | miner's lettuce | yes |
| Primulaceae | *Anagallis arvensis* | scarlet pimpernel | no |
| | *Dodecatheon hendersonii* | shooting star | yes |
| Pteridiaceae | *Adiantum jordanii* | California maidenhair fern | yes |
| | *Pellaea andromedifolia* | coffee fern | yes |
| | *Pentagramma triangularis* | goldback fern | yes |
| Ranunculaceae | *Delphinium variagatum* | royal larkspur | yes |
| | *Ranunculus aquatilis* | water buttercup | yes |
| | *Ranunculus californicus* | California buttercup | yes |
| | *Ranunculus lobbii* | Lobb's aquatic buttercup | yes |
| | *Ranunculus muricatus* | prickly-fruited buttercup | no |
| | *Ranunculus occidentalis* | western buttercup | yes |
| | *Ranunculus orthorhynchus* var. *bloomeri* | straight-beaked buttercup | yes |
| Rhamnaceae | *Rhamnus californica* | California coffeeberry | yes |
| Rosaceae | *Aphanes occidentalis* | western lady's mantle | yes |
| | *Holodiscus discolor* | ocean spray | yes |
| | *Rosa californica* | California rose | yes |
| | *Rubus discolor* | Himalayan blackberry | no |
| | *Rubus ursinus* | California blackberry | yes |
| Rubiaceae | *Galium aparine* | goose-grass | no |
| | *Galium* sp. | bedstraw | yes |
| Salicaceae | *Populus fremontii* ssp. *fremontii* | Fremont cottonwood | yes |
| | *Salix exigua* | narrowleaf willow | yes |
| | *Salix laevigatus* | red willow | yes |
| | *Salix lasiolepis* | arroyo willow | yes |
| Saxifragaceae | *Lithophragma affine* | woodland star | yes |
| Scrophulariaceae | *Bellardia trixago* | bellardia | no |
| | *Castilleja densiflora* | Purple owl's clover | yes |
| | *Castilleja exserta* | Purple owl's clover | yes |
| | *Castilleja rubicunda ssp. lithospermoides* | cream sacs | yes |

| Family | Scientific Name | Common Name | Native |
|---|---|---|---|
| | *Collinsia heterophylla* | Chinese houses | yes |
| | *Mimulus auraniacus* | bush monkey flower | yes |
| | *Mimulus guttatus* | common monkey flower | yes |
| | *Parentucellia viscosa* | yellow parentucellia | no |
| | *Scrophularia californica* ssp. *californica* | California figwort | yes |
| | *Triphysaria pusilla* | dwarf owl's clover | yes |
| Solanaceae | *Solanum americanum* | small-flowered nightshade | yes |
| Tamaricaceae | *Tamarix* sp. | tamarisk | no |
| Typhaceae | *Typha angustifolia* | narrow-leaved cattail | yes |
| Urticaceae | *Urtica dioica* | stinging nettle | yes |
| Valerianaceae | *Plectritis macrocera* | long-spur plectritis | yes |
| Verbenaceae | *Phyla nodiflora* | common lippia | yes |
| | *Verbena lasiostachys* | western vervain | yes |
| Violaceae | *Viola pedunculata* | Johnny jump-up | yes |
| Viscaceae | *Phoradendron macrophyllum* | big-leaf mistletoe | yes |

? Native status cannot be determined because species unknown

## Table B: Animal Species Observed at Tolay Creek Ranch in 2008

| Common Name | Scientific Name |
|---|---|
| **AMPHIBIANS** | |
| sierran treefrog | *Pseudacris sierra* |
| **REPTILES** | |
| western fence lizard | *Sceloporus occidentalis* |
| southern alligator lizard | *Elgaria multicarinata* |
| red-sided garter snake | *Thamnophis sirtalis* |
| common king snake | *Lampropeltis getula californiae* |
| gopher snake | *Pituophiscatenifer* |
| **BIRDS** | |
| Canada goose | *Branta canadensis* |
| American wigeon | *Anas americana* |
| mallard | *Anas platyrhynchos* |
| cinnamon teal | *Anas cyanoptera* |
| northern shoveler | *Anas clypeata* |
| green-winged teal | *Anas crecca* |
| wild turkey | *Meleagris gallopavo* |
| California quail | *Callipepla californica* |
| great egret | *Ardea alba* |
| snowy egret | *Egretta thula* |
| turkey vulture | *Cathartes aura* |
| white-tailed kite | *Elanus leucurus* |
| northern harrier | *Circus cyaneus* |
| red-shouldered hawk | *Accipiter striatus* |
| red-tailed hawk | *Buteo jamaicensis* |
| golden eagle | *Aquila chrysaetos* |
| American kestrel | *Falco sparverius* |
| killdeer | *Charadrius vociferus* |
| black-necked stilt | *Himantropus mexicanus* |
| greater yellowlegs | *Tringa melanoleuca* |
| Wilson's snipe | *Gallinago delicata* |
| mourning dove | *Zenaida macroura* |
| Nuttall's woodpecker | *Picoides nuttallii* |
| acorn woodpecker | *Melanerpes formicivorus* |
| northern flicker | *Colaptes auratus* |
| black phoebe | *Sayornis nigricans* |
| Say's phoebe | *Sayornis saya* |

| Common Name | Scientific Name |
|---|---|
| western scrub-jay | *Aphelocoma californica* |
| American crow | *Corvus brachyrhynchos* |
| common raven | *Corvus corax* |
| horned lark | *Eremophila alpestris* |
| violet-green swallow | *Tachycineta thalassina* |
| white-breasted nuthatch | *Sitta carolinensis* |
| rock wren | *Salpinctes obsoletus* |
| western bluebird | *Sialia mexicana* |
| American robin | *Turdus migratorius* |
| northern mockingbird | *Mimus polyglottos* |
| spotted towhee | *Pipilo maculatus* |
| California towhee | *Pipilo crissalis* |
| lark sparrow | *Chondestes grammacus* |
| Savannah sparrow | *Passerculus sandwichensis* |
| grasshopper sparrow | *Ammodramus savannarum* |
| song sparrow | *Melospiza melodia* |
| golden-crowned sparrow | *Zonotrichia atricapilla* |
| dark-eyed junco | *Junco hyemalis* |
| red-winged blackbird | *Agelaius phoeniceus* |
| western meadowlark | *Sturnella neglecta* |
| Brewer's blackbird | *Euphagus cyanocephalus* |
| Bullock's oriole | *Icterus bullockii* |
| house finch | *Carpodacus mexicanus* |
| American goldfinch | *Carduelis tristis* |
| **MAMMALS** | |
| skunk (sp.) | *Mephitis* or *Spilogale* |
| coyote | *Canis latrans* |
| black-tailed deer | *Odocoileus hemionus* |
| California ground squirrel | *Spermophilis beecheyi* |
| California vole | *Microtus californicus* |
| deer mouse (sp.) | *Peromyscus* sp. |
| Botta's pocket gopher | *Thomomys bottae* |
| black-tailed jackrabbit | *Lepus californicus* |

appendix I

# Rangeland Resources Study for Tolay Lake Regional Park

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# TOLAY LAKE REGIONAL PARK
# RANGELAND RESOURCES STUDY

Submitted to:

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LSA Project No. SOG0601 Task 8

LSA

March 13, 2009

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## FIGURES

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## TABLES

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# 1.0 INTRODUCTION

This report presents the results of a study of the rangeland resources of Tolay Lake Regional Park (Park). It describes the vegetation and other sensitive resources of the Park. This study was prepared in conjunction with the Biological Resources Study (LSA 2008), and both documents address erosion and non-native species control and recommend restoration of sensitive habitats such as wetlands, native grasslands, and riparian areas. This rangeland resources report specifically addresses those land management activities related to grazing and range management, particularly control of noxious non-native weeds, and both reports should be considered for purposes of habitat enhancement.

Sonoma County Regional Parks (Regional Parks) has acquired and is in the process of improving the 1,737-acre Park southeast of Petaluma, Sonoma County, California to allow for public access (Figure 1). The information and conclusions of this study are designed to be used in support of the Park's Conceptual Master Plan, the related environmental documents, required permit applications, the Park Management Plan, and interpretive information.

## 1.1 PARK LOCATION AND PROPOSED DEVELOPMENT

The Park property includes rangeland used for cattle grazing, unpaved roads, reservoirs, residences, and agricultural structures. The Park falls within Township 4 north, Ranges 6 and 7 West, on the *Petaluma River, California* and the *Sears Point, California* 7.5-minute series U.S.G.S. quadrangles (Figure 2). The Park is bordered by mostly undeveloped rangeland, vineyards, and private ranches.

The purpose of the project is to provide residents and visitors to southern Sonoma County with recreation opportunities balanced with stewardship of natural and cultural resources. The project consists of improvements to the Cannon Lane access and park entrance driveway, including signage, road widening, driveway realignment, a vehicle turnaround, an entrance gate, and possibly a park kiosk; construction of parking areas, trails, restrooms, equestrian facilities, and picnic facilities; reuse of existing structures for park operations and park employee housing at the Cardoza Ranch complex; restoration of Tolay Lake to its approximate historical condition and an associated water rights application; and construction of boardwalks and viewing platforms along the lake and its margins.

## 1.2 PURPOSE OF THE RANGELAND RESOURCES STUDY

The purpose of this study is to provide direction for determining rangeland resource goals, strategies to attain those goals, and a monitoring plan to measure their attainment (Bush 2006). It is important to recognize that the effects of livestock grazing on California grassland are highly variable and often masked by extreme yearly fluctuations in rainfall (Huntsinger et al. 2007). Furthermore, grazing responses are dependent upon complex interactions between topography, elevation, soils, species pool, and land use history (Heady 1988). Accordingly, no single grazing regime (including non-use) is optimal for all native species.

This study therefore takes the approach of varying timing and intensity of grazing on a landscape scale to enhance overall species and structural diversity (Huntsinger et al. 2007). This plan is not intended to be rigidly interpreted, it must allow for flexibility to make adjustments over time as results indicate, and to allow for input from grazing lessees to ensure that livestock operations remain economically viable. The approach is based on adaptive management, where monitoring results are used to modify goals and strategies as objectives are met and more information becomes available.

This study is based on the professional judgment of a Certified Rangeland Manager, licensed by the State Board of Forestry (Board). The Board (Policy Number 12) recognizes that boundaries between forests and rangelands and associated professional practices often overlap and that regardless of vegetation cover type the expertise of a Certified Rangeland Manager is desirable and recommended for all rangeland activities.

This study also addresses non-grazing approaches to rangeland management. In a number of management areas, grazing is either precluded because it is incompatible with other management objectives or because non-grazing approaches are more effective in achieving management objectives.

## 1.3 METHODS

**Field Investigations.** LSA conducted a review of pertinent literature and conducted interviews with the former ranch owner regarding past livestock operations, recent actual livestock use, and range improvement conditions and needs. Site visits were conducted on March 23, August 8, October 10, and October 30, 2006 to observe rangeland forage composition and productivity, grazing utilization and distribution, and the condition and location of range improvements. See Appendix A for definitions of rangeland management terms. A grazing use map was prepared (Figure 3) by visually using photo standards in the field to estimate residual dry matter (RDM) levels for the entire ranch and mapping areas of light, moderate, and heavy grazing. See Section 5.1.1 for more details on the RDM technique, which is used to measure production.

**Range Analysis.** A range analysis was conducted to determine preliminary livestock carrying capacity levels (see Appendix A for definitions). Rangeland forage production estimates (pounds of dry matter per acre) were obtained from the appropriate soil survey (Miller 1972), based on the soil types and extent on the Park (Figure 3). An Excel spreadsheet was then used to calculate carrying capacity based on total forage production for each soil type and accounting for target RDM levels (ranging from 750 to 1250 lbs/ac ) and consumption of 780 lbs of dry matter per animal unit month.

**Ecological Sites.** Ecological sites (formerly called range sites) are areas with similar soils, topography, and vegetation. They are classified for purposes of calculating wildlife and livestock forage production and carrying capacity (see Appendix A for definitions). The Sonoma County Soil Survey (Miller 1972) identifies soil types, aggregates them into ecological sites, and provides estimates for dry-weight forage production for each. These dry-weight production estimates were then used in this study to calculate available forage (Appendices B and C). This study makes the assumption that approximately 780 lbs of dry forage are required to support one cow-calf pair or equivalent for one month, an amount of forage referred to as an animal unit/month (AUM).

The following ecological sites have been identified as present at the Park:

- Because of similar qualities, Clear Lake clay was placed in the **Clayey Hills** ecological site based on the preparer's professional judgment. The fine textured clay and clay loam soils on flats and relatively gentle and uneroded slopes (Clear Lake clay loam 0–2 percent slopes, Diablo clay 2-9 percent slopes, Diablo clay 9–15 percent slopes, Diablo clay 15–30 percent slopes) are highly productive because of high water holding capacity and deep rooting depth. This ecological site produces up to 3600 lbs/ac of dry forage in a favorable (wet) rainfall year, 2700 lbs/ac in an average rainfall year, and 1800 lbs/ac in an unfavorable (dry) rainfall year (see tables in Appendix B).
- Productivity is less on steep and/or eroded slopes of the **Steep Clayey** ecological site consisting of Diablo clay 15–30 percent slopes, eroded and Diablo clay 15–30 percent slopes, eroded. This ecological site produces 3300 lbs/ac of dry forage in a favorable year, 1800 lbs/ac in an average year, and 800 lbs/ac in an unfavorable year.
- The **Shallow Loamy Uplands** ecological site consisting of Goulding clay loam, Laniger loam 9–15 percent slopes, and Laniger loam 9–15 percent slopes, produces 2400 lbs/ac of dry forage in a favorable year, 1800 lbs/ac in an average year, and 1200 lbs/ac in an unfavorable year.
- The **Claypan** ecological site (Haire clay loam) produces 2800 lbs/ac of dry forage in a favorable year, 2200 lbs/ac in an average year, and 1600 lbs/ac in an unfavorable year.
- The **Shallow Rocky** ecological site (Toomes rocky loam) produces 1800 lbs/ac of dry forage in a favorable year, 1300 lbs/ac in an average year, and 800 lbs/ac in an unfavorable year.
- Because the **Toomes and Goulding** soils are mapped as a complex and not separately, this analysis assumes an intermediate productivity for that mapping unit as if composed of each ecological site equally.

**Stocking Rate Calculations.** A grazing impact analysis was conducted using a model (2005 Wildland Solutions), which determines the optimum grazing regime for achieving each objective. The regime includes season of use and stocking rates (including non-use), which is directly correlated with grazing use levels. A light stocking rate removes about 25 percent of the forage each year, leaving the equivalent of 1250 lbs/ac of RDM. Conservative stocking removes no more than 50 percent of the forage, leaving about 1000 lbs/ac , moderate stocking removes 50 to 75 percent of the forage (750 lbs/ac RDM), and heavy stocking removes more than 75 percent the forage (leaving less than 500 lbs/ac or less). This analysis helps provide specifics on how resource objectives can be achieved through grazing, and describes the grazing regimes best suited to achieving those objectives.

# 2.0 EXISTING CONDITIONS

Existing conditions are summarized here to provide a framework for formulation of management goals and approaches for preserving and enhancing rangeland resources at the Park.

## 2.1 PHYSICAL FACTORS

### 2.1.1 Topography

The Park is situated in the Coast Ranges geomorphic province, an approximately 600-mile stretch of mountain ranges and valleys that extends from the Oregon border south to the Santa Ynez River in Santa Barbara County, California. The Coast Ranges are divided into north and south subprovinces, with San Francisco Bay marking the division between the two. The Park, consisting of 1,737 ac, is in southern Sonoma County within a northwest-southeast oriented valley with gentle-to-steep sloping hills. The valley is drained by Tolay Creek, which flows southerly into San Pablo Bay (the northern arm of San Francisco Bay). To the west of the Park is the Petaluma River Basin, to the east and north rolling hills and low mountains, and to the south is the southern end of Tolay Valley which opens to the tidal marshes of northern San Pablo Bay.

### 2.1.2 Soils

The Park encompasses several soil map units as described in the USDA Soil Survey of Sonoma County, California (Miller 1972). The Tolay Lake bed and lower terraces area are mapped as Clear Lake clay loam, 0 to 2 percent slopes (Figure 3). The area mapped as Clear Lake clay loam roughly corresponds to the extent of former lake inundation before it was drained in the mid-nineteenth century. Clear Lake soils are formed in poorly drained alluvial sediments, have slow permeability, high water holding capacity and a deep rooting zone.

Much of the foothill land northeast of Tolay Lake and Tolay Creek is mapped as Diablo clay, 2 to 9 percent slopes, and Diablo clay, 9 to 15 percent slopes. The hill slopes southwest of Tolay Lake and Tolay Creek are mapped as Diablo clay, 9 to 15 percent slopes. Most of the adjacent West Ridge is mapped as Diablo clay, 2 to 9 percent slopes, and the southwest facing slopes beyond are mostly mapped as Diablo clay, 9 to 15 percent slopes; Diablo clay, 15 to 30 percent slopes; and Diablo clay, 30 to 50 percent slopes, eroded. Diablo clays are formed on sandstone, siltstone, and shale bedrock and are well drained with rooting depths of 40 to 60 inches.

The lower elevation hill slopes to the northeast are mapped as Goulding–Toomes complex, 9 to 50 percent slopes, and the upper slopes and ridge are mapped mostly as Laniger loam, 15 to 30 percent slopes, eroded. The Goulding-Toomes complex soil is formed on volcanic rocks and is well drained. The Laniger soils are formed on rhyolite and are well drained. An area north of the lake is mapped as Haire clay loam, 9 to 15 percent slopes. The Haire clay loam formed on mixed alluvium and is moderately drained.

### 2.1.3 Hydrology

The Park receives an average annual rainfall of approximately 28 inches, most of it falling between November and March. Tolay Creek flows southeastward through the central portion of the site. The upstream portion of Tolay Creek on the project site is a large, shallow basin, named Tolay Lake, which ponds water seasonally. The lake has been ditched and drained for farming within its bed. The Tolay Creek channel downstream of Tolay Lake has been partially channelized and deepened to facilitate draining the lake. Hill slopes southwest of Tolay Creek rise to West Ridge, which parallels Tolay Creek. The northeast face of this ridge is drained toward Tolay Creek by multiple small, roughly parallel channels and swales, some of which contain seeps. The southwest facing slope of West Ridge drains toward the Petaluma River in a complex channel pattern. Portions of this slope contain slumps and seeps.

Much of the land immediately northeast of Tolay Lake and Tolay Creek is relatively flat or gently sloped and is drained toward Tolay Creek in constructed agricultural ditches. Most of these ditches contain perennial wetland vegetation and appear to contain water much of the year. This area contains seasonally wet or ponded features.

The hill slopes and ridge in the northeast portion of the site, known as East Ridge, contain multiple drainage swales and channels, which all drain to Tolay Creek. These hill slopes contain seeps and channels with wetland characteristics. Soil slumping has created hummocky topography and large gullies. Two large reservoirs, named Pond 1 and Pond 2, were constructed to capture runoff and flow from multiple nearby springs and seeps for stockwater and irrigation purposes. These reservoirs drain to Cardoza Creek, which joins Tolay Creek near the southeast project site boundary.

## 2.2 BIOLOGICAL RESOURCES

The biological resources of the Park are documented in the Biological Resources Study (LSA 2008). This brief summary focuses on resources most relevant to livestock grazing and conservation goals. Figure 4 illustrates locations of the major weed infestations and eroded areas on the Park. Figure 5 illustrates locations of sensitive biological resources on the Park such as wetlands, special-status plant species, and sensitive vegetation types.

### 2.2.1 Non-Native Weeds

**Non-Native Grasslands.** Non-native perennial grasslands throughout California were converted to non-native annual grasslands during the early settlement period of the late 1700s and early 1800s. This vegetation type conversion resulted from introduction and spread of vigorous Mediterranean annual grasses by European settlers and livestock, which replaced the native perennial grasses already weakened by prolonged overgrazing, other human disturbances, and extended drought (Heady 1988). The introduced annual grasses have several adaptations to compete successfully against the native perennials, including the capability to produce seed under adverse grazing pressures and weather regimes (Menke 1992).

Accordingly, the most common plant community of the Park is non-native grassland dominated by Italian ryegrass (*Lolium multiflorum*) and medusahead (*Taeniatherum caput-medusae*). Medusahead is an unpalatable and invasive grass that dominates large areas on the West Ridge. Other non-native

grass species include wild oats (*Avena fatua, Avena barbata*), hare barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome (*Bromus diandrus*), and soft chess (*Bromus hordeaceous*).

Annual grasses (except medusahead) provide high quality and nutritious livestock forage when they are green during the rainy season, generally after late fall or winter (October-December). The grasses "cure" (dry) in the late spring or early summer (April-May), after which nutrition levels drop rapidly.

Non-native grasslands include many weedy species including broad-leaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), common vetch (*Vicia sativa* ssp. *nigra*), geranium (*Geranium molle*), shepherd's needle (*Scandix pecten-veneris*), rose clover (*Trifolium hirtum*), subterranean clover (*Trifolium subterraneum*), and milk thistle (*Silybum marianum*). Non-native grasslands on the site also support numerous native wildflowers including Ithuriel's spears (*Triteleia laxa*), white brodiaea (*Triteleia hyacinthina*), Fremont's star lily (*Zigadenous fremontii*), blue-eyed grass (*Sisyrinchum bellum*), California poppy (*Eschscholzia californica*), cream cups (*Platystemon californicus*), sun cups (*Camissonia ovata*), soap plant (*Chlorogalum pomeridianum*), California checker mallow (*Sidalcea malvaeflora*), Johnny jump-up (*Viola pedunculata*), morning-glory (*Calystegia subacaulis*), false lupine (*Thermopsis macrophylla*), mule ears (*Wyethia angustifolia*), and yampah (*Perideridia* sp.).

**Other Non-native Upland Weeds.** In addition to medusahead, Italian thistle *(Carduus pycnocephalus)*, bristly ox-tongue (*Picris echioides*), yellow star-thistle *(Centaurea solstitialis)*, and purple star-thistle (*Centaurea calcitrapa*) are the most common non-native invasive plants on the upland portions of the Park. Large stands of these weeds occur throughout the project site, especially in the central part (Figure 4). Bristly ox-tongue covers large areas in the central part of the project site, especially in the cultivated areas east of Tolay Lake. From these formerly cultivated areas, bristly ox-tongue has colonized the adjacent grasslands. Milk thistle, another invasive species, is less common at the Park. Other non-native weed species that are less invasive and grow relatively sparsely on the Park include bull thistle (*Cirsium vulgare*), jointed charlock (*Raphanus raphanistrum*), and dandelion (*Taraxacum officinale*).

**Water Smartweed.** Both Tolay Lake and portions of Tolay Creek are currently closed to grazing and support dense monocultures of water smartweed (*Polygonum amphibium* ssp. *emersum*) sp.), an invasive weed. The Tolay Lake bottom is bare of vegetation while ponded and was dominated by cultivated vegetation when it was farmed. Under present fallow conditions it supports a variety of plant species as it dries. In the summer weedy species emerge in the dry bottom of the lake.

A dense monoculture of water smartweed is established in Tolay Lake south of the causeway. North of the causeway, water smartweed grows mixed with other wetland plants. Water smartweed and small stands of native cattails (*Typha* sp.) and tules (*Scirpus* sp.) form a complete cover over the creek between Tolay Lake and the Farm Bridge, which is 700 feet downstream of the lake. Non-native poison hemlock (*Conium maculatum*) grows on the upper edge of the banks. Downstream of the bridge, where cattle graze in the channel of Tolay Creek, is a more diverse and open vegetation, including cattails and tules.

**Water Primrose.** Water primrose (*Ludwigia* sp.) is a perennial species, which has been found in the Park only in the Duck Pond (Figure 3). This highly aggressive species covers all but a small area in the center of the pond by summer. Water primrose is an emergent species with much of its biomass

growing above the surface of the water. This invasive species has a high potential to spread beyond the Duck Pond and cause inestimable environmental damage, especially in Tolay Creek.

### 2.2.2 Native Grasslands

Native grasslands are considered sensitive biological resources because little of the original native California grassland remains in low elevation areas of California, including the Park. Communities dominated by native grasses and graminoids that occur in the Park include moist grasslands and needlegrass grasslands (Figure 5). The wettest grasslands support California semaphore grass (*Pleuropogon californicus*), sedges (*Carex* spp.), and rushes. Other moist grasslands support native grass species that require relatively high summer moisture levels such as creeping wildrye (*Leymus triticoides*), meadow barley (*Hordeum brachyantherum*), and California oatgrass (*Danthonia californica*). Needlegrass grasslands, occurs in small stands on drier slopes throughout the Park, but more commonly in the southeastern portion (Figure 5). This community is dominated by purple needlegrass (*Nassella pulchra*), often in association with California oat grass.

### 2.2.3 Oak Woodland

Oak woodland occurs in a relatively large stand on the top of the ridge in the east part of the Park and in smaller stands in the draws (gullies) on the ridge (Figure 5). This community is dominated by coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*) with scattered madrone (*Arbutus menziesii*) and black oak (*Quercus kellogii*). The coast live oak trees on the East Ridge are very large with many trunk diameters averaging or exceeding 4 feet diameter at breast height (4.5 feet from the ground). There is little evidence of regeneration in the form of oak seedlings or saplings. Factors limiting coast live oak regeneration are many, complex, and interactive. Most notable among these are rainfall, competition with non-native grasses, and herbivory by small mammals (Tyler et al. 2002). Livestock browsing damage to green seedlings and saplings may be a factor in oak mortality, especially in the dry season (Wildland Solutions 2005).

Understory of oak woodland is predominantly non-native grassland with few woody plants. Herbaceous species in the understory include miner's lettuce (*Montia fontana*), bedstraw (*Galium aparine*), Pacific sanicle (*Sanicula crassicaulis*), and nemophila (*Nemophila heterophylla*). Western lady-fern (*Athyrium filix-femina*) grows in the oak woodland on the shady slope of the north exposure. Oak woodlands are considered to be biologically important plant communities because of high wildlife values, providing food, cover, and nesting habitat.

### 2.2.4 Riparian Woodland

Tolay Creek and Cardoza Creek support the most developed stands of riparian woodland at the Park with the largest stands at the southern portion of the park along Tolay Creek (Figure 5). Other watercourses support single willows (*Salix* sp.) or small stands composed of a few trees.

Riparian woodland is dominated by various combinations of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), yellow willow (*Salix lucida* ssp. *lasiandra*), and sandbar willow (*Salix exigua*), with scattered cottonwood (*Populus fremontii* ssp. *fremontii*), coast live oak, California bay, California buckeye and non-native wild plums (*Prunus* sp).

Native shrubs are largely absent from the riparian woodland apparently due to historical heavy year-round browsing by cattle. Himalayan blackberry (*Rubus discolor*) is an invasive non-native shrubby vine, which is resistant to cattle browsing and occurs in some riparian areas.

### 2.2.5 Wetlands

Wetlands on the study site are composed of seeps, springs, and seasonal wetlands. Seasonal and perennial wetland seeps and springs occur on many of the slopes within the Park. The hydrology of these seeps and springs appears to be the result of groundwater flowing from cracks in the underlying bedrock. Some of these seeps and springs are extensive, especially those that occur near Pond 2 (Figure 5). Permanent springs produce flowing surface water and support wetland vegetation including soft rush (*Juncus effusus*), iris-leaf rush, common monkey-flower, water cress (*Rorippa nasturtium-aquaticum*), spiny-fruit buttercup (*Ranunculus muricatus*), straight-beaked buttercup (*Ranunculus orthorhynchus* var. *bloomeri*), brown-headed rush (*Juncus phaeocephalus*), common monkey-flower (*Mimulus guttatus*), and pennyroyal (*Mentha pulegium*).

Certain seeps have created conditions resulting in rotational land slumps. Soil water, along with some surface runoff, collects in seasonal ponds above these rotational land slumps. These seasonal ponds are dominated by rabbit's-foot grass, brown-headed rush, creeping spike rush (*Eleocharis macrostachya*), smooth rush, white water buttercup (*Ranunculus aquatilis*), Lobb's aquatic buttercup (*Ranunculus lobbii*), and flowering quillwort (*Lilaea scilloides*). Annual miner's lettuce and spiny-fruit buttercup also occur in these seasonal ponds in the spring.

Seasonal wetlands occur on the flat top of the West Ridge and on shallow slopes and swales of the East Ridge (Figure 5). Hydrology of these features is provided by direct rainfall and run-off. The seasonal wetlands of the West Ridge occur on level, impermeable soils or a shallow soil over impermeable bedrock. Small seasonally wet areas above these impermeable substrates are dominated by armed coyote thistle (*Eryngium armatum*).

Two small and shallow seasonal wetlands occur on the crest of the ridge near the southwestern boundary of the park (Figure 5). Because they are shallow, they would be expected to dry sometime between March and May on any given year. Plant species include Mediterranean barley, armed coyote thistle, Lobb's aquatic buttercup, and water-starwort *(Callitriche heterophylla)*.

### 2.2.6 Special-Status Plants

Two special-status plant species described below have been observed at the Park.

**Fragrant Fritillary.** Fragrant fritillary *(Fritillaria liliacea)*, a California Native Plant Society (CNPS) list 1B species, occurs in two locations on the east-facing portion of the ridge that runs along the western axis of the Park. Approximately fifteen plants grew with Fremont's star lily (*Zygadenous fremontii*) at a northern location (designated by two dots on Figure 5) and a single plant grew with non-native annual grasses at a southern location (designated by one dot on Figure 5). Fragrant fritillary grows from a bulb and, along with Fremont's star lily, is one of the first wildflowers to bloom in the spring (February-March).

**Lobb's Aquatic Buttercup.** Lobb's aquatic buttercups, a CNPS list 4 species, grows in shallow pools in the spring. Their white flowers and leaves float on the surface of the water. It was found in a seasonal pool at the base of a slump and a vernal pool on the top of the ridge along the western axis of the Park (Figure 5). This plant is an annual.

### 2.2.7 Special-Status Animals

An un-named subspecies of the zerene silverspot (*Speyeria zerene*) occurs on the Baylands Property just south of the Park. This butterfly could occur at the Park because it is adjacent to a known population and supports populations of the butterfly larval food plant. The larvae of the zerene silverspot feed upon violets such as Johnny jump-up which commonly grows on both the east and west ridges of the Park (Figure 5). This un-named subspecies of silverspot butterfly is likely to be very uncommon, and is a resource that should be protected. For that reason, management activities that are beneficial to the food plant Johnny-jump-up should be considered.

The larvae of Opler's longhorn moth (*Adela oplerella*), another special-status insect, feed on cream cups. This native wildflower is found at the Park (Figure 5). Although the moth has not been identified on the Park property, it is potentially present. For that reason, management activities that are beneficial to the food plant should be considered.

## 2.3 LAND USE

### 2.3.1 Historical Grazing and Agricultural Use

The ranching era in Sonoma County began with a grant of 44,000 acres from the Mexican government to Mariano G. Vallejo to form Rancho Petaluma, which included the Tolay Lake property. This grant was confirmed in 1843, when an additional 22,000 acres was added to Rancho Petaluma. As part of Rancho Petaluma, the Tolay Lake margins and foothills would have served as rangeland for the large herds of cattle, horses, and sheep owned by Vallejo. Cattle ranching in coastal California during this period was based on the sale of hides and tallow. Meat was only used on a subsistence level and much was wasted due to low demand and absence of refrigeration. Cattle were allowed to roam freely over the unfenced range, and were only concentrated twice per year; during the spring rodeo when calves were branded and castrated and the late summer matanza when older cattle (four years minimum) were slaughtered. Records show that Rancho Petaluma supported 15,000 cattle in 1841 (Stilliman 2004). This number probably underestimates the grazing pressure during this period as large herds of wild cattle and horses competed for forage with domesticated livestock. The rapid increases of domestic and feral livestock herds during the Rancho period resulted in localized overstocking, with ranchers often complaining about lack of feed.

Once one of the wealthiest men in the state, Vallejo lost most of his land and livestock due to legal challenges in the aftermath of the Gold Rush and California Statehood. Squatters forced him to sell his Rancho (including the Tolay Lake holdings) in 1857. The Tolay Lake Ranch was operated between 1857 and 1943 by a succession of owners who raised livestock (sheep, dairy cattle, beef cattle, and horses) and grew hay, wheat, and grapes on the property. The fact that the lakebed and lower terraces of the Tolay Lake ranch were historically tilled and cropped is important to the understanding of current biotic conditions, especially the scarcity of native vegetation and high weed cover in those areas.

Although details are lacking, historical livestock grazing operations during this period on the Tolay Lake ranch likely mimicked trends throughout the San Francisco Bay Region. Because of a pronounced increase in the demand for beef after the Gold Rush, livestock production boomed throughout the region. Soon after livestock numbers peaked in 1860, two successive years of extreme drought (1862-1863) resulted in severe overgrazing and eventual starvation of millions of livestock. It was during this period that most of the degradation of California rangelands occurred (Burcham 1957). The drought devastated the livestock industry and taught ranchers that they could not rely solely on range feed, and they began to raise grain, alfalfa and other supplemental forage. Beef cattle numbers increased again beginning in the 1880s and continuing into the 20th century on northern California's rangelands. As a result, overstocking and further degradation of rangelands continued. Overstocking was probably not deliberate but resulted from the fact that most ranchers were from the midwest and east and lacked knowledge of California's vegetation and climate (especially summer drought).

### 2.3.2 Recent Grazing and Agricultural Use

**Cardoza Family Ranch.** The Tolay Lake property was purchased by the Cardoza family in 1943 and remained in their family until they sold it to Sonoma County in 2005. The family grew crops, hay and grain, and raised dairy cattle, sheep, and beef cattle. By 2005, livestock production was limited to an Angus and Hereford beef cow-calf operation. The ranch supported about 150 cow-calf pairs when the lakebed and lower terrace fields were farmed and not grazed, and from 200 to 250 cow-calf pairs after farming on the lower terrace fields ceased and they were available to grazing (Cardoza pers. com. 2006). This equates to about 8 acres per animal-unit (one cow-calf pair) per year or 0.7 animal unit months (AUM) per acre. After the ranch was sold to the Regional Parks, the Cardoza family removed the cattle earlier than usual. Cattle were removed from the ranch by mid-summer in 2006. As a result much of the area was not grazed or lightly grazed; moderate grazing levels were limited to a few "loafing" areas on windy hilltops (for refuge from heat and flies); heavy grazing levels were surrounded by moderate grazing at one salting location, a seep and water trough in the Eastern Hills, and a portion of lower Tolay Creek (Figure 3).

In recent times, livestock grazing has become a marginal economic enterprise in the San Francisco Bay region due to elevated land prices and land use pressures. In addition, low beef prices and highly variable forage production due to rainfall extremes combine to make cattle ranching a borderline industry (Bush 2006). For example, to sustain their business the Cardoza family raised grain crops, vegetables, grapes, and fruit, and charged the public for a popular annual pumpkin festival. The economic marginality of rangeland livestock operations is important for park planning purposes to ensure that livestock grazing remains economically viable, especially given the Sonoma Regional Park mission of maintaining biological diversity and agricultural land uses.

**Current Lessee.** Since the Cardoza family sold their ranch and the Regional Parks has assumed management of the Park, the Cardoza's cattle have been removed from the property. For the last year, Glen Mohring of H & L Mohring Ranch is in Pinole has used the Park for cattle grazing. Last year Mr. Mohring (2007) grazed approximately 200 animal units (cow-calf pairs) at the Park under a license with the Regional Parks. That license allows for up to 225 animal units to be grazed on the Park.

### 2.3.3 Livestock Infrastructure

As discussed above, the Tolay Lake property, formerly the Cardoza Ranch, has a long history of livestock use resulting in development of fences, water sources, and other infrastructure. It is currently leased from the Regional Parks for cattle grazing by an adjacent private rancher who is responsible for maintaining these facilities. The perimeter of the Park is surrounded by a fence consisting of welded wire topped by three strands of barbed wire (designed for sheep grazing but also effective in containing cattle). A swinging tubular steel vehicular gate provides access for vehicles from Cannon Road. Several informal barbed wire gates provide for ingress and egress of livestock from adjacent private ranches (Figure 6).

A series of interior barbed wire fences divides the Park into seven pastures (Figure 6). These do not include Tolay Lake and adjacent terraces that are to be excluded from livestock grazing under a grant agreement with the State Wildlife Conservation Board (WCB). Pasture 1 (Northwest Hills) includes Cannon Road, barns, residences, and a separately fenced 4-acre bullpen. The western hills are divided into Pasture 2 (Central West Hills) and Pasture 3 (Southwest Hills). Pasture 4, designated as the Tolay Creek Pasture, includes Pond 2 and the portion of Tolay Creek downstream from the Tolay Lake exclusion (Figure 3). Two pastures occur on a gently sloping terrace along the east shore of Tolay Lake; a North Terrace Pasture and a South Terrace Pasture. The Eastern Hills Pasture is enclosed by the perimeter fence and the interior fences along the two Terrace Pastures. The interior fence between pastures 2 and 3 includes a swinging tubular vehicular gate to provide access along the PG&E power lines. Several informal barbed wire gates have been installed over the years between pastures to allow vehicular and pedestrian access and ingress/egress of livestock between pastures (Figure 6).

Permanent year-long drinking water for livestock is provided by two impoundments on Cardoza Creek (Ponds 1 and 2), the Duck Pond, and the Willow Pond. In addition, water troughs have been installed that are fed by groundwater piped from developed spring boxes (Figure 6).

### 2.3.4 Non-Grazing Areas

**Tolay Lake Special Management Zone.** This area (Figure 6) has been excluded from grazing under the terms of a grant from the State Wildlife Conservation Board in order to protect the conservation values of the property. The Conservation Values are defined as wildlife and habitat values (Article B in Conservation Easement Deed). However, grazing is permissible by this conservation easement if it is part of a California Department of Fish and Game management plan. The Federated Indians of Graton Rancheria (FIGR) have expressed concerns about grazing impacts on cultural resources in this area. Accordingly, per the recommendations in the Tolay Lake Regional Park Cultural Resources Plan (LSA 2007), the Regional Parks will coordinate with FIGR prior to initiating conservation grazing activities in the Tolay Lake Special Management Zone. T

Tolay Lake is a seasonal waterbody, which dries out in the summer. Historically the lakebed has been intensively cultivated and planted in agricultural row crops. Since the Regional Parks has acquired the property, the lakebed has been fallow. Dense and extensive stands of noxious weeds have subsequently become established in the highly perturbed soils. Even in the wet season, the infestation of weeds in some places is so extensive as to drastically limit the value of the lake to visiting waterfowl and other wildlife (LSA 2008).

**Vineyard.** A vineyard has been excluded from grazing during the Cardoza period of ownership of the property (Figure 6). The Regional Parks has continued this land use under contract.

**STRAW Exclosures.** The non-governmental organization Bay Institute sponsored the Students and Teachers Restoring a Watershed (STRAW) Project. STRAW has installed grazing exclosure fences to protect revegetation projects. A STRAW exclosure is located on the ridge in the Southwest Hills Pasture, and another exclosure is located above Tolay Creek in the Tolay Creek Pasture (Figure 6).

## 2.4 CULTURAL RESOURCES

The Park contains significant historical and prehistoric cultural resources (LSA 2007). Because of the confidential nature of these resources, locations of sites are not included in this public-disclosure report. However, the recommendations of the rangeland study considers these resources.

# 3.0 LIVESTOCK GRAZING IMPACTS AND MITIGATION

## 3.1 BACKGROUND

Grazing ungulates, including wildlife, can cause several interrelated beneficial and adverse impacts on native vegetation, water quality, and other resources. The adverse impacts of livestock grazing are well documented. Grazing animals defoliate plants, change nutrient dynamics, and cause mechanical trampling damage. Removal of plant tissue by grazing reduces photosynthetic and reproductive capacity and affects roots to various degrees depending on the plant species and growth habitat. Grazing animals are also highly selective. Rangeland plant species composition is affected by upon the frequency, intensity, and seasonality of grazing (Bush 2006). In addition, trampling damage from livestock concentrations can damage vegetation and cultural resources, compact soils, and increase erosion and sedimentation. Runoff from livestock manure can decrease water quality by increasing levels of turbidity and sedimentation, nutrients, and coliform bacteria (SWRCB 1995).

The beneficial impacts of livestock grazing on biological diversity have also been recognized. Many ecologists and rangeland managers suggest that livestock-grazing, if *properly managed*, can play an important role in the conservation and restoration of California's grasslands and associated seasonal wetlands (Barry 1996, Robins and Vollmar 2002, Marty 2005). Livestock grazing has shaped the hydrology and ecology of coastal and valley grasslands in California. For example, cessation of grazing favors non-native annual species around the margin of seasonal wetlands and may alter their hydrology by increasing RDM, thereby reducing runoff and infiltration (Robins and Vollmar 2002, Marty 2005). A study in South Sacramento County showed that removal of cattle grazing from seasonal wetlands significantly reduced ponding duration and native plant and animal abundance (Marty 2005, Pyke and Marty 2005). Plant diversity was not affected by different levels of livestock grazing in and around springs, but diversity increased in small creeks flowing from those springs under moderate grazing levels (Huntsinger et al. 2007).

A recently published guide for resource managers in coastal California (Bush 2006) and other sources cite beneficial impacts of livestock grazing for fire hazard management, forage production, native grassland restoration, weed management, and wildlife management. Livestock exclusion tends to convert grasslands to a dominance of tall annual grasses such as soft chess, ripgut brome, and wild oats (Heady 1988, Huntsinger et al. 2007). Annual ryegrass commonly becomes a problem grass when not grazed, building up particularly thick thatch layers. This grass is also becoming more abundant in grassland habitats subject to excessive nitrogen deposition associated with air pollution plumes near highways and downwind of urban and industrial areas (Fenn et al. 2003, Weiss 1999). These tall, fast growing grasses shade out native grasses and forbs (wildflowers) with thatch. Grazing or other removal of plant material reduces the accumulation of dead residual matter in the dry seasons, and increases nutrient recycling. Opening up the herbaceous canopy increases light penetration and limited disruption of the soil surface by ungulate hoofs allows for good soil-seed contact which in turn increases seed germination and seedling establishment. Appropriately timed grazing or other methods of vegetation removal such as mowing, cutting, or burning can also be used to promote increases in native perennial grass and forb populations and to reduce the proportions of the nonnative annual grasses (Menke 1992).

Livestock exclusion in coastal California, in combination with fire suppression, eventually leads to invasion of the grasslands by coyote brush *(Baccharis pilularis)* and associated shrub species. This has been documented to result in replacement of grassland with coyote brush scrub greatly increasing vegetation fuel loads and associated fire hazards (McBride 1974). Ungrazed grasslands also provide much higher easily ignited fine herbaceous fuel loads ("flash fuels") in the form of dead standing grass and litter ("thatch"). Accumulations of herbaceous fuels in these grasslands are highly flammable during the dry season and can carry a wildfire quickly to buildings and inhabited places and to the woody fuels of scrub and woodlands. Ungrazed grasslands producing 2,000 lbs/ac of dry fuel can have flame lengths exceeding 50 feet, while moderately grazed grasslands with 1,000 lbs/ac have flame lengths of 4 to 10-feet-long, and heavily grazed grasslands (500 lbs/ac) fires typically burn only in isolated patches (Wildland Solutions 2005). The fire hazard reduction benefit alone is enough incentive for many grassland managers to employ grazing on their lands. Grazing by cattle or horses (which prefer grass over forbs) at moderate stocking rates in the early season (November-March) or yearlong is the best strategy for reducing non-native annual grass competition and thatch levels and for resisting brush encroachment.

## 3.2 BENEFICIAL IMPACTS

Based on the factors discussed above, the following beneficial impacts of livestock grazing on the Park have been identified. These impacts do not require mitigation measures, but flexible management strategies as adapted by monitoring results should be implemented to ensure their efficacy. Goals, strategies, and monitoring techniques and schedules are discussed in the Management Plan section.

**Beneficial Impact 1: Preservation of the Agricultural Working Landscape.** Sustainable livestock grazing operations preserve the rural atmosphere, enhance historical landscape values, benefit the local economy, and provide a cost-efficient tool for achieving other beneficial impacts.

**Beneficial Impact 2: Fire Hazard Reduction.** Livestock grazing provides a cost-efficient tool for reducing wildland herbaceous fuel loads and resisting brush encroachment. However, brush reduction needs to be placed in the context of overall Park management goals. The existing habitat needs to have the shrub component dramatically enhanced. Due to years of range overuse, the woody and even herbaceous understory component is largely missing. Restoration of this component has been identified as a key goal for the biological improvement of the Park.

**Beneficial Impact 3: Native Grassland Preservation and Enhancement.** Although subject to many variables, properly managed moderate levels of livestock grazing are compatible with preservation of native grasslands, and specific grazing regimes may help to enhance native grasslands by suppressing competition with non-native annuals and reducing thatch.

**Beneficial Impact 4: Preservation and Enhancement of Native Wildflowers.** Although subject to many variables, properly managed and monitored moderate levels of livestock grazing are compatible with preservation of native wildflowers, and specific grazing regimes may help to enhance wildflowers by suppressing competition with non-native annuals and reducing thatch.

**Beneficial Impact 5: Preservation and Enhancement of Seasonal Wetlands.** Although subject to many variables, properly managed levels of livestock grazing may be compatible with preservation

and possible enhancement of seasonal wetlands, seeps, and intermittent streams. However, under most management regimes where intensive monitoring is not practical, it is often necessary to fence sensitive wetlands resources off from grazing or at least severely limit the intensity and duration of grazing pressure.

**Beneficial Impact 6: Control of Invasive Non-Native Plants.** The spread of invasive non-native plants can be controlled by proper moderate levels of grazing. Invasive plant populations can also be controlled or diminished in density and cover by carefully prescribed grazing treatments in combination with other control methods (manual, chemical, mechanical, biological) in an Integrated Pest Management (IPM) approach.

**Beneficial Impact 7: Preservation and Enhancement of Wildlife Habitat.** Livestock grazing can be compatible with maintaining wildlife habitat for many species and may help enhance habitat for wildlife species that prefer shorter grass heights and disturbed habitat.

## 3.3 ADVERSE IMPACTS AND MITIGATION MEASURES

Based on the factors described in the background discussion and regional guidelines (Bush 2006), the following potential adverse impacts of livestock grazing on the Park have been identified. These impacts are followed by mitigation measures recommended to minimize impacts. Most of these mitigation measures require implementation of flexible management strategies as adapted by monitoring results as discussed in the Rangeland Management Plan (below).

**Adverse Impact 1: Undesirable Vegetation Changes.** Grazing levels that are too heavy (overgrazing), inappropriate seasons of use, or prolonged duration of grazing can degrade native plant communities. Heavy prolonged grazing, especially in the dry season, can damage or kill native woody plant seedlings. This can result in degradation of desirable native communities such as oak and riparian woodland. Heavy, poorly timed grazing can also exacerbate infestation of invasive plants that thrive in disturbed situations including Italian thistle, purple star-thistle, yellow star-thistle, and medusahead.

> **Mitigation Measure 1: Moderate Managed Grazing.** Grazing should not exceed moderate levels except for short duration grazing to achieve specific management objectives. Prolonged grazing in the dry season should be alternated with rest from year to year in areas where woody native vegetation is being impacted. Livestock distribution should be improved and concentrations around water and supplement sources minimized to avoid heavy disturbance. Other grazing regimes may be prescribed to achieve specific vegetation objectives based on monitoring results and adaptive management.

**Adverse Impact 2: Erosion and Water Quality Impacts.** Overgrazing, especially during the wet season, may cause streambank erosion and direct deposition into waterways. Heavy livestock concentrations on steep slopes, especially on clay soils during the wet season, can cause upland erosion with indirect sedimentation from runoff.

> **Mitigation Measure 2: Managed Livestock Distribution.** Grazing management should be implemented to improve livestock distribution and minimize trailing up and down slopes. Grazing should be managed carefully in wetlands, waterways, and riparian zones to minimize

livestock concentrations when soils are saturated (although this may conflict somewhat with Mitigation Measure 1 to minimize use of riparian areas during the dry season). Prolonged livestock confinement (such as in barns or corrals) should be avoided to minimize manure concentrations that can be conveyed in runoff to waterways.

Measures to improve livestock distribution recommended in this plan include development of additional water sources, strategic placement of supplemental feeds and minerals, additional fencing, and construction of shade structures. Additional water sources placed at ½ to 1 mile intervals will reduce concentrations around existing water sources. Salt, mineral, and feed supplements should be placed in strategic locations at least 1,000 feet from water sources where practical and relocated periodically as needed to prevent use levels from exceeding the recommend target levels discussed below. Where trailing is causing erosion or trampling damage, temporary drift fences can be installed to redirect livestock movements. Additional fencing to create smaller pastures and rotational grazing to place more livestock on smaller areas for short-term periods will also improve livestock distribution. In areas devoid of trees such as the western hills, installation of shade structures may be considered in consultation with the Sonoma County Natural Resources Conservation Service.

**Adverse Impact 3: Negative Impacts to Wildlife.** Heavy, improperly timed, and prolonged continuous grazing can adversely impact many wildlife species. Especially vulnerable are birds that nest in the understory or herbaceous ground layer of riparian vegetation. Heavy grazing can also create shifts in small mammal populations, favoring species that prefer short grasses over those preferring tall grasses. Fencing required to facilitate livestock operations could also impact wildlife by creating barriers to movement of large mammals and by causing injury to them when jumping over or crawling under barbed wire.

**Mitigation Measure 3: Seasonally Managed Grazing.** Grazing use of riparian areas should be minimized during the dry season when cattle tend to concentrate in moist areas adversely impacting sensitive biological resources such as willow regeneration. A controlled level of grazing that leaves a mosaic of short and tall grasses should be implemented where appropriate. Different levels and seasons of grazing should be varied each year between pastures to allow for maximum structural diversity. Given the identified need to restore woody and herbaceous understory vegetation at the Park, some areas should be removed from grazing at least long enough for vegetation to become well established (2 to 5 years). Wildlife-friendly cattle fencing will be used for new or replacement fence. Such fencing has five wire strands with the top and bottom wires smooth for wildlife and the middle three wires barbed for cattle. The lowest wire is 12 to 16 inches from the ground.

**Adverse Impact 4: Recreational User Conflicts.** Although incidents resulting in injury to recreational users from cattle are rare, complaints from the public and liability issues are of concern. Most incidents occur when unleashed dogs approach cows with calves, or when people separate calves from their mothers. Bulls can be aggressive towards people who approach too closely. Recreational users may also consider cattle as nuisances due to manure and flies near hiking trails or other recreation areas, and perceptions of damage to natural resources. Livestock operations, on the other hand, may be adversely impacted by hikers leaving gates open that should be closed, or by closing gates that should be left open. Aggressive, unleashed dogs may harm or stress livestock, resulting in economic losses.

**Mitigation Measure 4: Education and Restrictions.** Concerns from the public should be best addressed through educational displays and signage. The public should be informed to avoid separating cows from calves. Interpretive education should also be offered to explain the benefits of grazing and the Park's dedication to proper management. Displays and educational handouts informing the public about the importance of working landscapes and the agricultural historical landscape should be offered. The public should be asked to keep gates as they found them (open or closed), and hiking stiles may be installed where recreational trails cross livestock fences. Gates should be self closing where possible. Dogs should not be allowed off-leash in actively grazed pastures and leash restrictions enforced. To reduce the potential for injury to people from cattle (which is unlikely), the public should be encouraged to report aggressive animals, and the grazing license terms should require the livestock operator to remove any animal with a complaint as soon as possible (S. Barry pers. com. 2009). Bulls should be kept in recreational areas only as long as necessary for breeding. Livestock concentration areas around water sources, feed stations, and mineral licks should be located away from trails when feasible. Rangeland safety issues (actual or perceived) such as fear of aggressive animals and safety risks from people separating cows from their calves should be addressed in public education programs at the Park.

**Adverse Impact 5: Adverse Impacts on Cultural Resources.** Livestock grazing may impact cultural resources by directly damaging cultural materials through trampling or by increasing the visibility of such materials to collectors by reducing vegetation cover. As discussed in the Cultural Resources Report (LSA 2007), physical damage to artifacts, features, or midden chemistry can be caused by cattle trampling. Site deterioration, including erosion, can be caused by cattle wallows and trails. These effects are most damaging during wet months when the ground is soft and more susceptible to displacement. The ground disturbance caused by cattle trails, wallows, and trampling, as well as the disturbance needed for the installation of grazing appurtenances such as fences and water sources, could result in a direct adverse effect as defined at 36 CFR 800.5(a)(2)(i) to prehistoric archaeological deposits, historical archaeological deposits, human remains, and minor landscape features. For the purposes of this Study, these features are classified as moderate and high sensitivity cultural resources sites. Moderate sensitivity sites are defined as archaeological sites that displayed minimal signs of disturbance and were not known to contain human remains. High sensitivity sites were essentially the same as moderate sensitivity sites, but with the confirmed presence of human remains. Moderate sensitivity sites could be grazed by livestock if grazing was managed properly to avoid trampling and erosion impacts. FIGR expressed concerns about any grazing by livestock in high sensitivity sites because they consider that the presence of domestic animals over human remains degrades cultural values.

**Mitigation Measure 5: Grazing Management and Program Level Mitigation.** Grazing management should be implemented to avoid grazing in areas supporting cultural resources that are sensitive to trampling damage during the wet season. High sensitivity sites, should be excluded from grazing except as agreed upon as an alternative vegetation management tool by FIGR. The Regional Park District will coordinate with FIGR to determine acceptable vegetation management techniques for sensitive cultural sites. Program level mitigation measures recommended in the Cultural Resources Study (LSA 2007) should be implemented including the measure to conform to any project-specific standards, guidelines, or procedures developed in consultation with FIGR. Monitoring of moderate and high sensitivity cultural sites should be conducted to detect if livestock grazing is significantly impacting the sites, and corrective measures implemented to avoid or minimize impacts.

# 4.0 RANGELAND MANAGEMENT PLAN

This rangeland management plan (RMP) describes adaptive management strategies, resource management responsibilities, and rangeland resource goals based on the impact and mitigation criteria provided in the previous section. The RMP includes a grazing management plan that describes general criteria that apply to the entire ranch regardless of pasture configurations, such as livestock lease criteria, recommended kind of animal, and forage supplementation.

An interim grazing management plan is presented that can be implemented with existing pasture configurations as soon as grazing exclosures are installed for highly sensitive cultural resources. This RMP recommends specific resource objectives for each pasture, initial stocking rates, and grazing seasons.

A long-term grazing management plan is presented, which recommends proposed range improvements consisting of alterations in fence locations and water sources to divide the Park into different pasture configurations that are more consistent with resource objectives. Fence lines are reconfigured to form riparian and wetland pastures that could be managed separately from upland pastures. The long-term grazing management plan proposes initial stocking rates and seasons of use for each newly configured pasture.

The RMP concludes with recommendations for management actions for weed control, fuelbreaks, and grassland restoration. Some of these recommendations involve use of grazing as a management tool, while others recommend other means.

## 4.1 ADAPTIVE MANAGEMENT

Because this plan is intended to provide a long-term framework for resource management of habitat, it is designed to allow for flexibility in response to future technical and scientific advances and changes in species and habitat trends. The RMP provides guidelines and a framework for long-term management. It allows for adoption of new management actions, technologies or practices through coordination among Park management, grazing lessee, and any applicable permitting agencies. The RMP should be considered a “living” document that allows for changes in management actions in response to monitoring results.

## 4.2 RESOURCE MANAGEMENT

A critical element of successful resource management implementation is oversight by qualified resource management professionals. This RMP recommends that the Regional Parks identify staff positions (assisted as needed by outside contractors) to provide such oversight on a full or part-time basis. The Park Manager and Supervising Ranger III will insure the implementation of the resource management responsibilities that would include:

- Maintaining fencing, livestock water facilities, and signage.
- Coordinating and overseeing trash removal.
- Coordinating and overseeing thatch (RDM) removal and non-native plant species documentation and control (in coordination with the Sonoma County Agricultural Commissioner).
- Reviewing biological/rangeland monitoring data.
- Maintaining records of RMP activities, correspondence, and decisions.
- General inspections of the Park.
- Coordinating and overseeing a yearly biological inspection.
- Recommending and implementing corrective actions to attain the goals of the RMP.
- Coordination with the Sonoma County Mosquito Abatement District to expedite mosquito control measures.
- Ensuring compliance with rules and regulations protecting resource values and coordinating enforcement activities with park rangers and/or the Sonoma County Sheriffs Department.
- Assessing hydrological integrity and erosion.
- Documenting levels of RDM and grazing use patterns.
- Recommending and implementing volunteer educational or habitat restoration programs.

## 4.3 RANGELAND MANAGEMENT GOALS

The goals of this RMP are the following:

- To maintain an optimal mosaic of vegetation associations (grassland, riparian woodland, oak woodland) to **promote biodiversity**.
    - To maintain and enhance a healthy productive grassland ecosystem with a diversity of native grasses and native wildflowers.
    - To protect and enhance seasonal wetland habitat (including seeps and intermittent streams).
    - To protect and enhance riparian woodland habitat.
    - To protect oak woodland habitat and improve oak regeneration.
    - To control invasive non-native pest rangeland plants (primarily medusahead, Italian thistle, purple star-thistle, yellow star-thistle, and bristly ox-tongue).
    - To maintain and enhance habitat values for native wildlife.
- To **manage wildfire fuel levels** in the open space area's grasslands consistent with County requirements and with other goals of this RMP.
- To allow for viable, **sustainable livestock grazing operations** compatible with overall public recreational usages.

- To minimize conflicts with recreational users and provide interpretive educational opportunities to inform the public about resource management and cultural resource issues including the historical agricultural heritage.
- To avoid or minimize impacts on significant cultural resources.
- To promote a long-term improvement in watershed conditions through minimization of soil compaction, erosion, and sedimentation.

The goals should be examined on a site-specific basis to ensure that they are attainable through sustainable grazing practices. If goals are unrealistic and cannot be achieved economically by livestock grazing operations, such goals may not be attained. One of the challenges of achieving multiple goals is that some goals may conflict with others. For example the best way to achieve the goal of reducing fire hazards is through heavy grazing, but this would conflict with the goals of oak regeneration, riparian woodland enhancement, and water quality which are best achieved through light to conservative grazing. One strategy to achieve multiple conflicting goals includes using effective but sub-optimal approaches (such as moderate instead of heavy grazing to reduce fire severity).

Another strategy is to prioritize goals on a site-specific basis based on geographical locations of resources. The strategies discussed below have been designed to allow for a sustainable economic livestock grazing operation by allowing for a yearlong cow-calf grazing (the current practice). Because management objectives vary somewhat between pastures depending on the location of specific resources and recreational uses, initial grazing use levels and seasons of use will vary. The focus is to select certain areas for initial enhancement while deferring enhancement of other areas to provide for yearlong livestock production. In general, this approach focuses on intensive grazing management initially for enhancement of the more visible and more impacted western portions of the Park while deferring enhancement of the more remote (and less impacted) eastern portions of the ranch. This strategy will not only help achieve resource objectives on a site specific basis, it will provide for the general goal of maintaining species and structural diversity on a landscape level.

## 4.4 GRAZING MANAGEMENT PLAN - GENERAL CRITERIA

The following provides general criteria that apply to the Park regardless of type and location of range improvements and the configuration of pastures and special management units. These recommendations are not site-specific and are generally appropriate for developing a conservation grazing program for public open space anywhere in the region.

### 4.4.1 Grazing Lease Criteria

The terms of grazing leases and the lessee selection process can substantially affect progress towards attainment of the rangeland resource goals. The lessee selection process and lease terms should favor a livestock operator who is motivated to help attain the plan goals and will provide incentives towards their attainment. The following criteria, based on standard guidelines for grazing leases on open space lands (EBRPD 2001, EBMUD 2001), have been used to develop a lease program that provides conservation incentives:

- *The lessee selection process will be based on an appraisal method rather than an economic bid system*. Appraisal methods evaluate relevant criteria to select grazing tenants that are qualified and motivated to enhance grassland biodiversity values. Conversely, the economic bid system can encourage economic short cuts and improper grazing practices such as overstocking. Grazing tenant selection for new leases should be based on a proposal and interview process conducted by Regional Parks staff as appropriate. Proposal evaluation criteria for selection of a grazing lessee will include accuracy and responsiveness of the proposal, financial stability, adjacency of existing grazing operations, experience with invasive non-native weed control and revegetation activities, ability to respond quickly to problems, and relevant experience with rangeland conservation practices. The proposal process would not be necessary if the present grazing tenant on the Tolay Regional Park property who has a proven track record for conservation grazing practices wishes to renew the lease.
- *Leases will be awarded for long-terms (at least 5 years)*. Long-term leases provide grazing tenants with incentives against deferring maintenance and management activities. Grazing history interviews for the Greater Jepson Prairie Ecosystem Regional Management Plan (Witham 2006) indicate that livestock operators are more likely to overstock the range when they are uncertain about continuing operations in the following year. Tenure on the land, conversely, motivates the lessee to develop a sustainable operation conducive to attaining resource objectives.
- *Lease fee structures will be based on animal unit months (AUMs), not on acreage*. Because ecological sites vary significantly in forage production, the monetary value of a given area for grazing also varies. Grazing leases based purely on acreage are unfair and encourage overstocking. The lease fee structure will set stocking rates in AUMs and show how they are calculated.
- *Grazing leases will provide incentives for lessees to participate in resource management activities*. The lease fee structure will provide a framework for the lessee to be compensated for labor and materials expended in installing or maintaining range improvements and in conducting biodiversity enhancement activities such as weed control and native plant seeding under direction of the Regional Parks staff. It will also define utilization levels using RDM levels as targets in pounds per acre.
- *The grazing lease will require that the lessee and Regional Parks staff prepare an annual grazing plan (AGP) that is developed to incrementally attain the goals of the GMP.* The lessee will work with Regional Parks staff to develop an AGP each year prior to introduction of livestock. The AGP will identify invasive non-native plant control and native revegetation activities, grazing schedules (including AUMs and pasture rotation schedules), RDM targets, range improvement installation and maintenance activities, and monitoring schedules.
- *The grazing lease will require that the lessee and Regional Parks staff document actual use.* Records will be kept and documented each year in the AGP on the previous year's livestock use including animal types, numbers, and schedules.
- *The grazing lease should incorporate the terms of this Grazing Management Plan.* These terms should be incorporated by reference into the lease so that all parties are aware of their roles and accountable for their responsibilities.

### 4.4.2 Kind of Animal

Beef cattle (or young dairy cattle) are preferred for grazing the Park for the following reasons: 1) cattle prefer to graze grass rather than forbs (broadleaved plants), so would be more effective in reducing non-native grass thatch and would have less impact on native wildflowers as compared with sheep or goats; 2) there is more demand for beef cattle forage than for sheep or goat forage, allowing more income from leases that could be available for range improvements or ecological restoration (S. Barry. pers. com. 2009); and 3) mature dairy cattle do not spread out or wander as far as beef cattle and must be returned to a barn twice daily for milking.

As an alternative, horses could be allowed to graze as they also prefer grass and there could be enough demand for forage to generate income from leases. Sheep may be accepted; however, grazing seasons may need to be altered and additional infrastructure installed such as woven wire fencing. (lambs can easily pass through barbed wire fencing). Although possibly requiring a subsidy in the future, goat grazing may be useful and cost effective for small scale site-specific weed control treatments by confining goats to infested areas using temporary fencing and water trailers. The Regional Parks may have access to goats and may be able to use them for weed control without having to rent them. Sheep and goats may be an acceptable alternative vegetation management tool for grazing sensitive cultural sites in consultation with FIGR because they weigh less than cattle and thus create less trampling damage.

### 4.4.3 Supplemental Feeding

Supplemental feeding of livestock with alfalfa or hay can introduce invasive non-native plants and should be closely monitored the following year to detect and control any newly introduced weeds. Mineral supplements, salt licks, or concentrated low moisture molasses/protein supplements are recommended, but locations should be moved periodically and placed away from water sources (at least 1,000 feet where possible) to avoid overuse and provide for more even livestock distribution. Grazing use pattern maps will be used to determine optimal supplement locations (see Figure 3 for an example and Section 5.5.1 for a description).

### 4.4.4 Range Analysis

A range analysis was conducted to estimate forage production and appropriate stocking rates, based on forage production estimates by range sites from the soil survey and target RDM levels (see Appendix B). The stocking rates calculated by the range analyses are used as a benchmark to establish initial stocking rates for average, favorable (wet), and unfavorable (dry) rainfall years. They can be achieved either by adjusting the grazing season (shorter for dry years) or the number of animals. These stocking rates may then be adjusted (up or down) based upon monitoring results.

The average stocking rates are determined by the number of pounds of forage available in each pasture in an average rainfall year. These base stocking rates are estimates subject to variability due to slope and other factors and may be revised in accordance with periodic monitoring throughout the grazing year. Forage production can be estimated visually based on biomass and grass height data, which would be collected periodically during the grazing season (see Section 5.1 Utilization Assessments).

### 4.4.5 Flexible Approach

With both the interim and long-term grazing management plans, recommendations should be discussed with the grazing lessee to determine feasibility and should be implemented with flexibility. Grazing use levels are approximate, and should be interpreted accordingly. An actual use level within 250 lbs/ac of the target is acceptable. The seasons of use are also approximate and should be adjusted from year to year based vegetation response to rainfall patterns. These recommendations may also be varied each year; it may be desirable in some cases that the same pasture is not grazed during the same season every year.

## 4.5 INTERIM GRAZING MANAGEMENT PLAN

This interim plan is designed to allow for implementation with existing fencing (see Section 4.5.1 below for exceptions) and water sources so that proper grazing management is not delayed waiting funding and installation of facilities. It allows for different management strategies (grazing use levels based on stocking rate and season of use) for each pasture depending on specific resource objectives. This plan should be implemented as soon as grazing exclosures are installed to protect sensitive cultural resources (see below).

The grazing lessee is the entity identified to be responsible for adjusting the number of cattle on a feasible schedule to achieve management objectives for RDM. To ensure that the grazing lessee is making those adjustments in a timely manner, oversight should be provided by Regional Parks staff. This section presents the resource and land use priorities for each pasture and recommends initial grazing management regimes (use level and season of use) to help achieve those goals and minimize impacts and conflicts. These initial recommendations should be discussed with the grazing lessee to determine feasibility and should be implemented with flexibility.

### 4.5.1 Sensitive Cultural and Biological Resources

**Cultural Resources.** The Park is an important repository for significant cultural resources (LSA 2007), which have the potential of being impacted by grazing. In the past, the property and presumably those resources have been subjected to grazing. However, with the acquisition of the Park by the Regional Parks has come a heightened understanding of the importance of those resources, out of respect for their preservation, and a regulatory requirement as part of federal cultural resources review requirements.

We have classified sites in terms of impacts to grazing as 1) *high sensitivity* requiring wildlife-friendly exclusion fencing, 2) *moderate sensitivity* requiring seasonal grazing restrictions in the wet part of the year, and 3) *low sensitivity* requiring no grazing restrictions. This categorization refers only to the sensitivity of the cultural resource sites to grazing, and not to other potential sources of disturbance.

Prior to grazing pastures with *high sensitivity* cultural resources, LSA recommends that the Regional Parks identify and fence the boundaries of such resources to prevent grazing-related disturbance except as agreed upon by FIGR. This identification should be done by a professional archaeologist in consultation with the FIGR. The fencing may incorporate a 50-foot buffer area around recorded site boundaries based on surface materials if testing is not conducted to determine precise boundaries. A

buffer around the site is not needed if boundary definition excavation is conducted to confirm subsurface boundaries. For the purposes of this grazing plan, we are assuming a 50-foot buffer around each identified site. The areas encompassed by these buffers, which may not be available for cattle grazing, have been subtracted out of the available acreage of the respective pastures.

Because of confidentiality issues associated with cultural resources, the locations of these sites are not illustrated in this public-disclosure document. A separate confidential map and narrative have been provided to the Regional Parks concurrent with the submittal of this report.

**Biological Resources.** Sensitive biological resources include fragrant fritillary, a CNPS List 1b species, native grasslands, oak woodlands, seeps and other seasonal wetlands, and riparian and pool shore borders. Protection of these sensitive biological resources is addressed by adjustments to the grazing regime as discussed below.

### 4.5.2 Individual Pasture and Other Management Zone Prescriptions

The interim recommendations are presented below and summarized in Table A. Table B summarizes the grazing carrying capacities for the interim pasture configurations, assuming an average forage production year. See Appendix B for calculations of available forage and animal carrying capacity by pasture. Figure 4 illustrates the interim pasture locations and the distribution of major weed infestations and eroded areas. Figure 5 illustrates the interim pasture locations and the distribution of sensitive biological resources. Figure 6 illustrates the existing range improvements and the interim pasture configurations. Some of the existing water sources shown in Figure 6 (especially those in the western hills pastures) are from springs that dry up in the summer, at least in low or early rainfall years. The grazing prescriptions recommended below therefore may require that these sources be supplemented with larger storage tanks and possibly horizontal wells to tap deeper aquifers to allow for grazing during the prescribed dry season (May-December).

The following prescription is influenced by the tried-and-true past grazing regime under the former owners, the Cardoza's, who grazed about 150 cow-calf pairs when the lakebed and lower terrace fields were farmed and not grazed and up to 250 cow-calf pairs after farming on the terrace fields ceased and they were available to grazing. The lakebed is similarly unavailable for grazing under current conditions, although the terrace fields are available for grazing. The current grazing lessee, H and L Mohring, has been running approximately 200 cow-calf pairs (G. Mohring, pers. com. 2007).

**Park Center.** No grazing is recommended for the Park Center or headquarters area. This relatively small area does not have good forage potential for grazing. More importantly, this area receives a high level of visitor use and contains cultural and other sensitive resources. Fuel management and weed control should be achieved using measures other than grazing, such as mowing.

**Pasture 1: Northwest Hills.** Cannon Road, the primary access road to the Park runs through this pasture. Visitor use is anticipated to be high, although most of that use will be people driving through in vehicles as opposed to hikers and other pedestrian use. The priority for providing recreational opportunities must be balanced with a high potential for wildfire ignition and high human and property values. Wildland fuels management should take priority with educational and interpretive displays to inform the public on agricultural and resource issues.

A moderate stocking rate is recommended for the Northwest Hills Pasture grazing to reduce fuel loads. Although this pasture supports native grassland, wetlands, and riparian habitat, these sensitive resources are not extensive or of particularly high quality. On that basis, we determined that this pasture could tolerate a moderate level of grazing in the peak growing season (February-May) which is the recommendation for the interim plan. This recommendation also helps to balance the overall stocking rates on the property, because only one other pasture is recommended for grazing during this period.

**Pasture 2: Central West Hills.** Fragrant fritillary, which is a California CNPS list 1B species, is especially rare in the Park and occurs in limited numbers in only two pastures (Table A). This perennial wildflower blooms in the period February through March and in some years into April. The plant is particularly palatable to cattle and native deer *(Odocoileus hemionus)*. In both pastures (2 and 3) where this plant occurs in small stands we recommend that grazing be deferred until after the plants have flowered and set seed (after March or April). That will not only allow the fritillary to reproduce by seed, it will provide rest during the active growing season allowing the leaves to photosynthesize and store carbohydrates in the roots and bulbs. That stored energy will allow the plant to recover during the next wet season even if it was defoliated by grazing.

This pasture contains several seeps and associated seasonal wetlands, moist grasslands, and intermittent streams. These wetland features show degradation of vegetation and soils from past heavy livestock use. Much of this damage occurs during the wet season when soils are saturated. The season of use recommended for the fritillary above would avoid grazing during the wettest seasons. However, because the recommended grazing season includes the hot late summer months when livestock tend to concentrate on intermittent streams and damage woody riparian habitat, the following measures are recommended to protect and enhance those habitats:

- Temporary exclusion fencing should be installed to protect willows planted along the streams until established.
- Stocking rates and utilization levels should be light, leaving no less than 1250 lbs/ac RDM at the end of the grazing season.
- The existing water troughs in the Central West Hills Pasture are located in wetlands formed by seeps. Wetland soils and vegetation are impacted by the resulting concentrations of cattle around these troughs. It is recommended that these troughs be relocated to uplands in the vicinity (Figure 8). This would be accomplished by locating the water troughs on uplands at a lower elevation than the current locations, or by using a solar pump to feed water to the troughs.
- Mineral and other supplements should be placed away from wetland areas.

**Pasture 3: Southwest Hills.** This pasture also supports a stand of fragrant fritillary and we recommend a grazing season from May through December to avoid grazing during the plant's flowering season. This pasture also has riparian and seasonal wetland habitat along South Creek and isolated wetlands and moist grasslands associated with seeps. These features show evidence of vegetation degradation and erosion from past grazing practices. Erosion primarily occurs from trampling when soils are saturated. A light stocking rate during this drier grazing season should help minimize impacts on these resources and water quality. Grazing impacts on woody riparian vegetation can be compensated for by planting and temporary exclusion fencing as discussed in the biological resources study (LSA 2008) and placing supplements away from seeps and streams.

This grazing regime (light from May to December) could also benefit the patches of native perennial grasses (purple needlegrass) by removing competing early annual grass growth and allowing rest in the late spring for the bunchgrasses to recover and set seed. It could also benefit for similar reasons an annual native wildflower, Johnny jump-up, which is a food plant for a special-status butterfly. The recommended grazing regime may also be convenient for the livestock operator, because it would match that of the adjacent Central Hills Pasture so that both pastures could be grazed in common by leaving gates open.

However, this grazing regime is not intensive enough to control the infestations of medusahead, an extremely invasive non-native grass, which is prevalent in this pasture. Control of this species will require intensive grazing management as discussed below (Section 4.7.1).

Lobb's aquatic buttercups, a CNPS list 4 species, also grows in the spring in the Southwest Hills Pasture. It is known from two shallow pools in the spring. No protective measures are recommended for this annual plant at this time. However, the two populations should be carefully monitored in the spring to determine their responses of grazing and if corrective action is required.

A small, but high sensitivity cultural resource site is also located in this pasture. This feature should be fenced off to protect it from cattle trampling damage.

**Pasture 4: Tolay Creek.** This pasture contains riparian and seasonal wetland habitat around Pond 2 and along Cardoza Creek and Tolay Creek. These features show evidence of degradation from past grazing practices and are prioritized for restoration. Because of the concentration of sensitive riparian and pool-side areas, the high level of erosion and the anticipated intensive visitor use to this management area, and the fact that a grant has been obtained to restore riparian habitat along Tolay Creek, no grazing is recommended in the interim period, which will allow for establishment of riparian restoration planting. This will require development of additional permanent water sources to support livestock in the western hills during the summer when this pasture is traditionally grazed. As discussed under the long-term management plan (Section 4.6), this pasture will eventually be re-configured with a new fence to form a "riparian pasture" so that grazing can be managed to enhance the riparian and pond-side vegetation and protect it from excessive yearlong grazing. The adjacent Pond 1 in the Eastern Hills will also be included in the new fencing configuration. The Tolay Creek Pasture also includes high sensitivity cultural resource sites which should be fenced before grazing is recommenced.

As an exception to this general recommendation of rest from grazing in the interim period until the new fencing is installed, short periods of grazing may be allowed ("pulse grazing") in the late spring for vegetation management at the direction of Regional Parks staff. This would also require fencing to protect the high sensitivity cultural resource site, however.

**Pastures 5: North Terrace.** Natural resource concerns include extensive infestations of bristly ox-tongue on this formerly cultivated area. Because of its proximity to the Tolay Lake shoreline, this pasture tends to remain wet longer in the season. Grazing before the North Terrace Pasture dries could further compact the clay soils. Accordingly, a moderate stocking rate in the summer and fall (June-November) is recommended to address the heavy weed infestation in this pasture. This may provide control of bristly ox-tongue, because it is palatable to cattle (R. Nichols pers. obs.) and flowers late (July-December) when it would be susceptible to late season grazing as proposed.

Monitoring of the ox-tongue infestation should also be conducted to determine if it is being controlled by grazing.

**Pastures 6: South Terrace.** This pasture contains sensitive cultural resources. The Cultural Resources Study (LSA 2007) expresses concerns about impacts from trampling damage, especially by concentrated livestock use and trailing when soils are saturated. Because of its proximity to the Tolay Lake shoreline, this pasture tends to remain wet longer in the season, and grazing before the pasture dries could damage cultural resources and further compact the clay soils. Because of the high sensitivity of the cultural resources in this pasture, adequate protective exclusion fencing should be installed before cattle are re-introduced.

Natural resource concerns include the presence of moist grasslands, seasonal wetlands, and extensive infestations of bristly ox-tongue on this formerly cultivated area. A moderate stocking rate in the summer and fall (June-November) is recommended. This strategy has the added advantage of allowing for summer grazing when cattle are removed from other pastures and provide control of bristly ox-tongue. As with the North Terrace Pasture, the efficacy of using grazing to control bristly ox-tongue should be monitored, and alternative methods of control should be implemented if grazing does not achieve the desired reduction of this noxious weed.

The fence between the South Terrace Pasture and the Tolay Creek should be inspected and repaired. The gates should be kept closed to prevent cattle from trailing through cultural sites on the South Terrace Pasture on their way to the Tolay Creek Pasture with Pond 2 for drinking water. Existing water sources along the fence between the North and South Terrace pastures and adjacent to the Eastern Hills Pasture should also be inspected and repaired.

**Pasture 7: Eastern Hills.** This pasture supports dense oak woodland with large individual oak and bay trees. As discussed in the Biological Resources Study (LSA 2008), evidence of oak regeneration (seedlings and saplings) is lacking. A major objective of the Park is to encourage oak regeneration and formation of a woody understory, which is presently almost entirely absent. Livestock grazing is a factor in decreased oak regeneration, although it may be only one of several interacting factors including wildlife herbivory, weather fluctuations, and competition with annual grasses (McCreary 2001). Livestock grazing impacts on oak regeneration are probably most pronounced in the dry season, when oak foliage is one of the only sources of green forage. Lessening grazing pressure in the drier seasons (e.g., late spring, summer, and fall) is an effective strategy for reducing grazing impacts on oak resources (Wildland Solutions 2007). In addition, this pasture supports many seeps and moist grasslands that could benefit by reducing grazing pressure in the drier seasons, when they are most attractive to livestock.

Under the current configuration of pastures, Pond 1 is included in the Eastern Hills Pasture. Pond 1 supports an extensive margin of riparian vegetation that would be sensitive to grazing pressure. Recreational use, including fishing, is also anticipated to be high at Pond 1.

The spillways from Pond 1 are highly eroded, and there are other eroded areas in this pasture. (Under the long-term rangeland plan, below, the Pond 1 area would be fenced off from the rest of Eastern Hills Pasture.) Native grasslands are also present.

Head cuts along the eastern ridge in the Eastern Hills Pasture have been observed by Regional Parks personnel as the largest source towards visible sedimentation during winter storm events. Cattle grazing appears to accelerate the head cut migration and sedimentation. Exclusion fencing in the relatively small areas that are eroded is recommended. The portions of pasture excluded from cattle grazing should be planted with native shrubs.

Because of the extensive sensitive resources in this pasture, the prescription is for a conservative grazing regime (target RDM of 1,000 pounds/acre) in the wet season (January-April). This grazing regime is designed to maintain acceptable fuel levels. This grazing regime may also serve to control some weed infestations. The pasture should be monitored to see if the elimination of late-season grazing pressure allows for oak seedling regeneration, while achieving fuel reduction objectives.

The Eastern Hills Pasture contains a moderately sensitive cultural resource site. The prescribed wet-season grazing for this pasture would conflict with the prescription of dry-season grazing only for moderately sensitive cultural resource sites. This is a resource conflict that the Regional Parks will address.

**Tolay Lake Special Management Zone.** This area is to be excluded from grazing under the terms of a grant from the State Wildlife Resource Board. The Cultural Resources Study (LSA 2007) also recommends against any grazing to protect significant pre-historic resources from trampling by cattle. Accordingly, weed control will be limited to water management (flooding), hand methods, and herbicide use.

## 4.6 LONG-TERM GRAZING MANAGEMENT PLAN

This long-term plan is designed to be phased in as new fencing and water sources are installed. It allows for refinement of management strategies (grazing use levels and season of use) by re-aligning pasture boundaries to incorporate specific resources which would benefit from similar management strategies. The long-term strategy is to create two new riparian pastures through installation of new fencing and water troughs. According to Regional Parks Supervising Park Ranger Brando Bredo (pers. com.), increasing access to water should be a priority range improvement. Installation of water troughs fed from permanent seeps or horizontal wells as recommended is designed to allow increased flexibility in stocking, reduce impacts to natural water sources, and allow for a higher overall carrying capacity on the range.

The long-term recommendations are presented below and summarized in Table C. Table D summarizes the grazing carrying capacities for the long-term pasture configurations, assuming an average forage production year. See Appendix C for calculations of available forage and animal carrying capacity by pasture. Figure 7 illustrates the recommended long-term pasture configurations and the distribution of sensitive biological resources. Figure 9 illustrates the recommended long-term pasture configurations and the existing and proposed range improvements.

### 4.6.1 Proposed Range Improvements

A new fence is recommended to be installed across a portion of the Southwest Hills Pasture to separate South Creek (Figure 8). This would create a new South Creek Riparian Pasture which could

be served by the existing water trough adjacent to South Creek. The Regional Parks would install wildlife-friendly cattle fencing along the north bank of Tolay Creek and the west bank of Cardoza Creek; existing fencing between the old Tolay Creek Pasture and the old Eastern Hills Pasture will be removed. Additional new fencing will be installed around Pond 1 (formerly in the Eastern Hills Pasture) and existing fence removed above Pond 2 (formerly in the Tolay Creek Pasture) to create a newly configured Tolay-Cardoza Riparian Pasture which encloses both creeks and Ponds 1 and 2. The existing water trough which is located in a seep would be removed and replaced with a new trough on upland to the northeast (Figure 8) with a solar pump if necessary to move water from the former location. Locating additional water sources away from the ponds and removing cattle from this pasture during the dry season should minimize water quality issues because livestock will be less attracted to the ponds. If water quality continues to be impacted, however, temporary fencing may be used to restrict access of cattle to the pond shorelines. The fencing could be located far enough away from the pond to provide a vegetated filter strip between grazing areas and the water.

As discussed above, existing troughs located in seeps in the Central West Hills pasture will be relocated to uplands and provided with water by gravity or solar pumps from seeps or horizontal wells. An abandoned spring development and trough along the southeast boundary of the Park in the Eastern Hills Pasture should be inspected and repaired or replaced if feasible (Figure 8).

### 4.6.2 Individual Pasture Prescriptions

**Pasture 1: Northwest Hills.** No substantial changes are anticipated compared to the interim plan. The season of use was adjusted slightly to balance livestock numbers with other pasture's grazing regimes.

**Pasture 2: Central West Hills.** Once the existing stream sides are revegetated with native woody vegetation (cf. LSA 2008), a greater latitude in the acceptable cattle stocking levels and season of use is anticipated. Long-term revegetation efforts should be undertaken to restore the four intermittent drainages with woody riparian vegetation (cf. LSA 2008). These drainages will continue to be sensitive to grazing pressure, especially when soils are saturated in the wet season. The existing fragrant fritillary stands should continue to be protected by a season of use that is deferred until after the flowering period. The long-term prescription for the Central West Hills is to continue a light grazing regime in the dry season after the fritillary has flowered. Riparian exclusion fencing may be necessary if monitoring detects browsing damage on woody vegetation.

**New Pasture 3A: South Creek.** This pasture would be formed by installing a cross fence to separate it from the rest of Pasture 3 for the purpose of enhancing the South Creek riparian corridor and seasonal wetland/moist grassland complexes to the west. This configuration also could allow for the entire pasture to be rested from grazing for two or more years to allow for riparian habitat revegetation.

A light stocking rate is recommended during the late spring grazing season (March-May) should help minimize impacts, control fuel levels, and provide enhancement of riparian and wetland resources, and recreational uses.

**New Pasture 3B: Southwest Hills.** This pasture would be reconfigured to exclude the new South Creek Pasture, as well as seeps and associated seasonal wetlands and moist grasslands. This would

facilitate management strategies on the remaining pasture to favor other resource objectives such sustaining as livestock operations and providing for weed control. A moderate stocking rate with no restrictions on season of use would be favorable for providing flexibility for livestock production as well as for reducing fuel loads and fire hazards. The example in Table C shows a split grazing season (December-February and July-September) to provide forage when other pastures are not used.

This pasture should be targeted for control of the noxious weed medusahead using intensive grazing or other methods (see Section 4.7.1). Weed control strategies need to be balanced with other management objectives, which include for this pasture the restoration of woody vegetation along intermittent drainages and the protection of native wildflowers. If grazing is planned during the fragrant fritillary flowering season (February-April) it should be sheltered with a temporary exclosure, which should be maintained and weeded.

**New Pasture 4: Tolay Creek.** This pasture is formed by the recommended new fencing as described above to include lower Tolay Creek, Cardoza Creek, Pond 1, Pond 2, and the seeps above Pond 2 into a single management unit (new pasture 4). This newly configured Tolay Creek-Pond Pasture could be managed as a single unit for enhancement of wetland and riparian resources.

A light stocking rate during the late wet season (March-May) should help minimize impacts and provide enhancement of riparian and wetland resources and be compatible with recreational uses. The new configuration also would allow for the entire pasture to be rested from grazing for two or more years to allow for riparian habitat revegetation.

**Pasture 5. North Terrace.** As with the interim plan, a major emphasis will continue to be non-native weed control. Assuming that the interim moderate grazing regime achieved some control of the bristly ox-tongue, the long-term prescription would be for continued moderate grazing in the late spring, summer, and fall (June-November).

**Pasture 6. South Terrace.** With the long-term fencing installed to create New Pasture 4, the South Terrace Pasture will be expanded. The prescription of the South Terrace Pasture is to continue moderate grazing in the dry season (June-November).

**Pasture 7. Eastern Hills.** Acreage of this pasture would be reduced by the creation of the Tolay-Cardoza-Pond Riparian Pasture, which would remove the Pond 1 area. Elimination of this sensitive area would allow for more flexible stocking dates and periods of exposure to grazing, but the long-term objectives of increased oak regeneration, development of a woody understory, and native plant protection will continue. Accordingly, the prescription is to continue a conservative grazing rate (target RDM of 1,000 pounds/acre) during the wet season (October-March).

The Eastern Hills Pasture contains a moderately sensitive cultural resource site. The prescribed wet-season grazing for this pasture would conflict with the prescription of dry-season grazing only for moderately sensitive cultural resource sites. This is a resource conflict that the Regional Parks will address.

**Tolay Lake Special Management Zone.** In the long-term, we recommend an easing on the blanket restriction of grazing to be negotiated to allow the use of grazing as a weed management tool. Grazing for short periods for resource management objectives (invasive plant control) should be

allowed. We strongly recommend that the policy of excluding grazing from the whole of the Tolay Lake Special Management Zone be revisited with the relevant authorities and stakeholders. The lakebed has been heavily impacted by long history of dry-season farming. Annual cultivation of the seasonally flooded lakebed has perturbed the native soils, encouraging the current near monoculture of weeds under fallow conditions. As the Biological Resources Study (LSA 2008) has documented, the weed cover severely limits the wildlife habitat value of this potentially important resource. Grazing is a practical and cost-effective means of controlling some of these weeds.

Means should be investigated to protect sensitive cultural resources while allowing the use of grazing on the lakebed as a vegetation control method. Such means could include cultural resource surveys to record and clear areas, exclusion of cattle from identified sensitive areas, and seasonal restrictions on cattle grazing.

## 4.7 OTHER RANGELAND RESOURCE MANAGEMENT

Livestock grazing is one of many tools that can help achieve rangeland management objectives. Although it is usually the most cost-effective, reliable and practical option on a large scale, it should be augmented by other techniques on a site-specific basis in an integrated approach to best achieve resource goals such as invasive non-native plant control, hydrological integrity and erosion control and fire management. Non-grazing strategies for achieving these objectives are discussed below, as well as strategies incorporating grazing as a management tool.

### 4.7.1 Invasive Non-Native Plant Control

The expansion of existing populations and further establishment of non-native, invasive species threaten the long-term viability of the native ecosystems present within the Park. Invasive plants are defined as those that can spread into wildland ecosystems and displace desirable native species, hybridize with native plants and alter biological communities and ecosystem processes (Cal-IPC 2007). For the purposes of the RMP they correspond with those species listed in Table A of the California Invasive Plant Inventory (Cal-IPC 2007). Specific treatments for target invasive species are discussed below. It should be noted that as target species prioritized for control become less abundant, other species may fill the void. Additionally, new introductions of invasive species could occur in the future. For these reasons, the invasive plant control program should maintain flexibility based on monitoring to adapt to new challenges and opportunities.

Regional Parks staff should assess the extent and location of weedy species within the Park annually and should prescribe and implement appropriate control activities. Control/eradication activities such as physical controls (grazing, mowing, hand-pulling) and chemical/herbicide applications, as deemed appropriate for the species and circumstances of the infestation, should be supervised by Regional Parks staff in an integrated pest management approach.

Herbicides should be applied by a Licensed Applicator in accordance with recommendations by the manufacturer to control some weedy plant species. Usage (including timing and other seasonal restrictions) should be specified and/or modified by Regional Parks staff to minimize applications during periods of high activity by non-targeted species.

Mowing should be timed carefully to remove weed flowers prior to seed ripening. After initial treatments during the first 2 years, mowing schedules should be adjusted by Regional Parks staff using adaptive management based on monitoring results and observations. Mowing height should typically not exceed 3-4 inches. To minimize build-up of thatch and remove non-native seed-heads before they shatter, the mowing regime should use a haying and baling approach with the bales removed from the property to an appropriate location where weed introduction would not pose a threat to biodiversity.

The resource manager should closely follow applicable research on controlling target pest species and incorporate results from that research into the Park's native invasive plant control program. In addition, research on weed management through training goats and cows to select invasive species should be evaluated for use on this site and measures adopted if found effective and feasible (Voth 2006). Areas where weeds have been controlled should be seeded or planted with native perennial grasses to prevent re-establishment of undesirable vegetation. Figure 4 illustrates the major on-site weed infestations. The following initial target species can be controlled (but not necessarily eliminated) through a combination of treatments, as follows:

- ***Medusahead***. A carefully managed combination of prescribed fire, grazing, herbicide treatments and reseeding with native perennial grasses may be the most effective treatment of medusahead (McKell et al. 1962) and should be considered if feasible. In addition to the intensive grazing program discussed above, the following treatments should be implemented. Disking during the boot stage (prior to seed set) is an option, if followed by revegetation with desirable grasses and forbs. Mowing during the boot stage is also an alternative, but the straw would have to be baled and removed to remove seed-heads before they shatter and avoid thatch build-up. Treatment with glyphosate between mid-March and mid-May may also be effective in controlling medusahead.

  Control can be attained through intensive grazing to force livestock to graze medusahead, which could reduce medusahead by up to 90 percent in 2 years of carefully timed treatment (George 1992, George et al. 1989, Wildland Solutions 2005). Over 95 percent control of medusahead can be attained by very high intensity, short-duration (from a few days to two weeks) livestock grazing in the late spring (Doran 2007). High density grazing results in severe competition for forage between animals, forcing them to graze less selectively and more uniformly.

  This treatment is successful only when intensive grazing coincides with the period when medusahead is in the "boot" stage (before the seed head emerges from the uppermost leaf). This intensive grazing treatment should be timed (based on frequent observations by Regional Parks staff) to coincide with the boot-stage phenology of medusahead, which can vary from late April to early May depending on yearly weather fluctuations (Young et al. 1970). This timing is critical because if livestock grazing ceases prior to the boot stage, the plants will re-grow and produce new seed heads. If grazing occurs after the seed head emerges from the boot, the livestock will avoid it because of the sharp awns, and there is a high risk of spreading the infestation by livestock after the seed is ripe. Livestock should be removed as directed by Regional Parks staff when grazing has reached the "heavy" level of use, with RDM levels below 500 lbs/ac.
- ***Italian thistle*.** This vigorous annual is a serious pest plant in the Park and is rated statewide as a moderate threat (Cal-IPC 2007). It reproduces only by seed, which have a high germination rate and can remain viable in the soil as long as 8 years.

Effective control has been obtained using tillage followed by compaction with a roller prior to the first rains to maximize germination of thistle seeds. After the plants have emerged in response to germinating rains, they can be tilled under and the area reseeded with native plants (ESNERS 2000). Grazing by sheep, goats, and horses can be effective in controlling Italian thistle, but cattle need to be trained to graze it (Voth 2006). Application of selective herbicides (Picloram and 2,4,-D) have shown limited success in controlling this species (ESNERS 2000).

- ***Bristly ox-tongue.*** This species is considered a limited threat throughout California (Cal-IPC 2007), but it occurs in dense patches on moist sites on the terraces surrounding Tolay Lake that support little or no native vegetation as a result. At the Park, bristly ox-tongue is a major weed species, forming dense monocultures in the North Terrace Pasture, the South Terrace Pasture, and in the Tolay Lake Special Management Zone (Figure 4). The weed grows in formerly cultivated fields, where the native soil structure has been perturbed by years of plowing. These bristly ox-tongue fields are arguably the areas of least current biological value on the property. Bristly ox-tongue is the most widespread weed on the Park.

  If livestock grazing is not fully effective alone to control these infestations, repeated mowing should be conducted after flowering (April-December) but prior to seed set, with flower parts removed from the site. Small infestations may be controlled by hand pulling or hoeing 2-inches below the surface when soils are moist (ESNERS 2000).

- ***Purple star-thistle.*** Although rated as moderate priority invasive weed (List B) by the Cal-IPC (2007), this species is a high priority for control at the Park because it is more prevalent throughout the Bay Area and creates more impacts than a statewide rating system would suggest. This species, unlike yellow star-thistle, is unpalatable to livestock at all life stages and dense stands of this weed can preclude cattle from grazing (Witham 2006). Therefore, this species causes significant losses of forage and is not effectively controlled by grazing. It is often a biennial or perennial species, with rosettes forming the first year followed by flowering the second and subsequent years.

  Application of glyphosate in the late spring-early summer on the rosettes and early blooming plants after adjacent desirable annual species have set seed is an effective control (Amme 1985). Care must be taken to limit this treatment to areas devoid of native perennials because this herbicide is non-selective. Selective herbicides that are effective in these cases include 2,4,D; Dicamba; or Garlon 3A. Areas to be treated should be mowed in the early spring prior to seed set to remove standing purple star-thistle flowers and to open the treated areas to grazing (Witham 2006).

- ***Yellow star-thistle***. This species is rated as a high priority invasive species by the Cal-IPC (2007). A combination of techniques is most effective in controlling this annual invasive species, including grazing, mowing, burning, herbicide use, and biological controls. Mid to late- spring grazing (May-June), before the plant has produced spines but after bolting, may control seed production and spread to a limited degree (Thomsen et al. 1996). At the discretion of Regional Parks staff, season of use may allow for grazing at specified areas of infestation of yellow star-thistle.

  Where Regional Parks staff determines that infestations of yellow star-thistle are threatening the biological integrity of Park lands, a more focused management approach should be implemented. Under this approach, the infested area could be separated with temporary fencing. Grazing would be postponed within the exclosure to allow growth and elongation of the grasses and yellow star-

thistle, and then high intensity grazing would be applied during the period when yellow star-thistle begins to emerge from the rosette and flower. Repeated treatments would be required to maintain that control. Extra livestock management would be required to keep animals at the site past the normal grazing period, maintain the fencing, and manage the animals. If Regional Parks staff deems it appropriate, sheep or goats may be used instead of cattle for intensively managed grazing treatment of invasive species. In small areas where grazing is not feasible, mowing during the same period should be used to control yellow star-thistle.

- ***Himalayan blackberry.*** Himalayan blackberry grows most often in the understory of riparian areas where it forms impenetrable stands among the lower branches and trunks of the willow trees. It also grows as compact stands in a few grassland areas and at the head of unvegetated watercourses. When in riparian situations, it dominates the understory, appears to spread, and may exclude other species. Himalayan blackberry, however, provides excellent cover for wildlife especially considering the relative absence of cover at Park.

  Recommendations entail control by either hand removal or use of goats. Control should be phased such that alternative understory plant species would be established nearby prior to removal of a stand or portion of a stand of Himalayan blackberry. In this manner, cover would be maintained for wildlife. Given its value as vegetation cover for wildlife, control of Himalayan blackberry should be given a low priority compared to the other invasive species listed above.

- ***Water primrose.*** As discussed in the Biological Resources Study (LSA 2008), water primrose is a perennial species that appears to grow only in the Duck Pond (Figure 3). This high aggressive species covers all but a small area in the center of the pond by summer. Water primrose is an emergent species with much of its biomass growing above the surface of the water. Water primrose should be controlled before it becomes inadvertently established in other areas of the Park. It will displace native species and its decomposition will contribute to the eutrophication of waterbodies.

  The relatively small size and accessibility of the Duck Pond would facilitate the treatment of the water primrose with herbicide from the shore. Multiple treatments may be required for at least the first year with follow-up treatments the following approximately 5 years, if a bank of long-lived seeds has developed. Because water primrose is a perennial plant, mechanical cutting of the stems will result in re-growth and not control. Excavation of the Duck Pond may remove most of the water primrose, but there would be a need to dispose of the excavated material and a need for follow-up treatments.

  Eradication of water primrose should be a high and immediate priority. This plant is highly invasive and could spread beyond the Duck Pond to Tolay Creek. Once in the creek, it would be nearly impossible to control and would cause inestimable environmental damage. (See http://www.lagunadesantarosa.org/programs_rp_isc_lmp.shtml for the environmental damage water primrose is causing in the Laguna de Santa Rosa.)

- ***Water smartweed.*** As discussed in the Biological Resources Study (LSA 2008), water smartweed is a perennial species that covers the surface of the dried bed of Tolay Lake and Tolay Creek immediately below the lake. It also occurs further downstream in Tolay Creek and upstream of Tolay Lake. Water smartweed grows from perennial roots in the late spring and is the dominant cover by the time that the lake is dry. It may grow so thickly as to inhibit the foraging of ducks in Tolay Lake. Cultivation of the dried bed of Tolay Lake resulted in cutting the roots and spreading them throughout the lake bed. This contributed to the dominance of water smartweed within

Tolay Lake. Because of its widespread distribution, it would be nearly impossible to completely remove water smartweed from the Park.

Recommendations include monitoring the cover of water smartweed in Tolay Lake. If the cover of water smartweed continues to impede the use of the lake by wildlife, then treatment options should be considered. At least two options are available for control of water smartweed in Tolay Lake. The first option would entail grazing Tolay Lake. Cattle could be provided with seasonal access to Tolay Lake in order to reduce the density of water smartweed. If cattle do not provide sufficient control, then a glyphosate-based herbicide could be used.

- ***Poison hemlock***. As discussed in the Biological Resources Study (LSA 2008), poison hemlock grows in relatively small stands along the upper banks of Tolay Creek, along the bank of Eagle Creek, and possibly in other areas of Tolay Lake Regional Park. Poison hemlock typically excludes other species from occurring within its dense single-species stands. This weed tends to grow in areas that have been previously disturbed.

  Recommendations would be to control by cutting in late spring. Because poison hemlock is an annual plant, removal just before seed set should result in and almost complete control of the current year's growth. Follow-up control will be necessary until the residual seeds in the soil have been depleted.

- ***Other invasive species***. Other invasive non-native plants that have been identified on the Park include bull thistle (*Cirsium vulgare*), prickly lettuce (*Lactuca serriola*), and milk thistle (*Silybum marianum*). These should be inventoried and considered for control when they present a significant management problem, show evidence of rapid spread, or when they become priority targets as other higher priority invasive species are controlled. These other species should also be watched because they could spread into available niches once occupied by invasive species that have been controlled.

### 4.7.2 Fuel Breaks

Fuelbreaks (where vegetation is thinned or mowed) are generally preferred by park and open space districts in the Bay Area to firebreaks, where soils are disked or bladed to bare ground. Because of the high levels of ground disturbance and elimination of competitive native or naturalized vegetation, firebreaks often support dense stands of invasive non-native plants such as yellow star-thistle, which often provide higher fuel levels than the original grasslands. In addition, firebreaks are prone to erosion because of lack of vegetation cover and roots. Many open space managers have determined that livestock grazing and/or mowing can be as effective as disking if planned properly, as shown by the following examples:

- Both the East Bay Regional Park District and the Marin Open Space District do not disk firebreaks and instead promote livestock grazing and/or mowing for fuels management.
- Maintenance staff at Olompali State Historic Park maintain a fuel break of mowed grass, 100-feet-wide, along the freeway. A fire in 2006 burned to the edge of the mowed area but it was slowed down enough to allow for deployment of the fire department who successfully stopped the fire.

- The City of Fairfield's Serpa Ranch Rolling Hills Open Space originally called for a 100-foot-wide perimeter fire break, but the ranger determined that livestock grazing was adequate to reduce the fire hazard, and the fire break was not installed.
- A fire behavior model (BEHAVE) for the City of Fairfield's Rockville Hills Open Space determined that in the most likely fire scenario (Diablo wind late in the fall during a drought), a firebreak would be ineffective in stopping a wildfire, and that livestock grazing was the most practical and effective approach to fuels management.

Currently, fire breaks (except existing roads and powerline corridors) do not exist on the Park and it is recommended that none be created unless such breaks are required by the County Fire Department or other applicable regulatory entity and/or monitoring indicates that periodic wildfires are having adverse effects on the biological resources within the Park. If the creation of fire breaks becomes necessary, the following measures will be implemented:

- Prior to fire break construction, "no disk zones" should be established in areas of sensitive habitat such as riparian corridors, wetlands, native grasslands and special-status species occurrences. The "no disk zones" should be permanently staked and signed; using metal fence posts placed at least 50 feet from the edge of the sensitive habitat. A sign (No Disk Zone) should be installed at strategic points to alert the disk operator of the presence of the sensitive habitats.
- In areas designated as a "no disk zone," the disk operator should raise the disk-blades and cross the restricted zone. The disk-blades must not be lowered until the blades are beyond the No Disk Zone sign on the opposite side of the sensitive habitat. In no case should the operator allow the blades to touch the soil while in the restricted zone.
- "No disk zones" may not be crossed if there is standing water or if the soil is wet. In such cases, the disk operator must raise the blade and make a detour around the pool/swale or other type of wet area. A resource ecologist or ranger shall determine the best route around a pool/swale area.
- "No vehicle access" areas should be identified concurrently with establishing the "no disk zones." Detour routes should be identified on site maps to allow for access to the fire break routes while avoiding sensitive species habitat. "No vehicle access" areas should be identified in the field by temporary signs, arrows, and flagging placed at detour points at least one week prior to fire break construction.
- "No disk zones" in some habitats may have vegetation that compromises the fire break's effectiveness. If tall or dense vegetation occurs in a "no-disk zone," the vegetation should be mowed and the clippings removed after the seeds of native plants have dropped. The clippings should be removed either by hand using rakes, or with equipment that lifts them off the surface without removing the surface soil.
- In general, creation of fire breaks shall occur near the end of the growing season (May or June) and no later than July 1. Disking should be timed to discourage weeds. The ideal time to disk would be after the weeds flower but before the seeds ripen.
- Incorporate existing roads or other linear clearings into firebreaks as much as possible to minimize impacts. An effective option would be to mow 35- to 50-foot-wide strips on each side of existing dirt roads.

### 4.7.3 Native Grassland Restoration

Native grasses, primarily creeping wildrye (in moist grasslands) and purple needlegrass, occur sparingly in patches throughout the Park (Figure 5). The grazing regimes outlined above may promote the growth of native grasses, as the timing of grazing may allow for the production of seed from native grasses and a reduction in seed produced by non-native species. The density of stands of these grasses should be assessed by Regional Parks staff, who should recommend seeding or plug planting on a site-specific basis, especially in barren areas where weeds have been controlled or erosion treatments installed. The following recommendations are derived from the California Native Grassland Association Restoration Workshop (CNGA 2006).

For native grassland restoration to be successful, it is imperative that site preparation be conducted to control competing vegetation (especially non-native annual grasses), diminish their soil seed bank, and prepare a good seed or planting bed. This requires initial treatment using tillage or herbicide, preferable on a repeated basis, to germinate non-native seed and kill the emerging non-native annuals before the seed ripens, thus depleting the soil seed bank.

Planting of native grass plugs is the most successful (and most expensive and labor intensive) method for restoration because the grasses have already been established and can compete better with weed seedlings. Another advantage of plug planting is that a pre-emergent herbicide may be applied prior to planting to further suppress competing weeds. Plugs are available in 200-plug trays in 1¼-inch-by-1¼-inch-by-2½-inch cells. They are most efficiently planted using crews of three (trained volunteers are appropriate); one worker makes a hole with a dibble, the second places the plug in the hole, and the third pinches the holes closed (important to prevent desiccation of the plug). Plug planting is usually done in staggered rows. Closer spacing may be desirable where fast cover and weed suppression are goals.

Seeding is less successful because native grass seedlings are tiny and grow slowly, hence are easily smothered by fast growing annuals. For this reason vigorous site preparation is necessary to minimize non-native annual growth. The most effective method of native grass seeding is using a rangeland drill because it covers the seed with soil. However, drill seeding is limited to gentle slopes without rocks. Hydroseeding with wood mulch is the best alternative for steeper or rocky slopes.

**Native Grassland Restoration Seed Mix for Fast Cover (Erosion and Weed Control).** Native grass species selection depends on the site and objective of the seeding. If the objective is to attain rapidly establish a “cover crop” to control erosion and compete with weeds, the following commercially available annual or short-lived perennials should be considered:

| Common Name | Scientific Name |
|---|---|
| ‘Cucamonga’ brome | *Bromus carinatus* |
| Three-weeks fescue | *Vulpia microstachys* |

**Mesic Native Grassland Restoration Seed and Plug Mix**. For restoration of moist grasslands, seasonal wetlands and seeps, the following species should be considered with plugs of native rushes (*Juncus spp*.) and sedges (*Carex spp*.) in the wettest areas:

| Common Name | Scientific Name |
|---|---|
| California oatgrass | *Danthonia californica* |
| Meadow barley | *Hordeum brachyantherum* |
| Creeping wildrye (plugs only) | *Leymus triticoides* |
| California semaphore grass | *Pleuropogon californicum* |

**Upland Native Grassland Seed and Plug Mix.** The principal component of native grasslands on dry slopes is purple needlegrass. However, diversity can be augmented by including one or more of other native grass species. The following are native to grasslands in the region.

| Common Name | Scientific Name |
|---|---|
| Blue wildrye | *Elymus glaucus* |
| California melic | *Melica californica* |
| Torrey melic | *Melica torreyana* |
| Purple needlegrass | *Nassella pulchra* |

It is recommended that native forbs (wildflowers or legumes) not be included in the seed mix or planted with plugs. It is difficult enough to establish native grasses from seed without adding competition from native annuals. If desired for visual or biodiversity purposes, native forbs should be seeded or planted after the native grasses have become well established (2-3 years), preferably following treatment with a broadleaved selective herbicide to reduce non-native forb competition.

### 4.7.4 Rodent Control

Burrows created by rodents such as California ground squirrels *(Spermophilus beecheyi)* or Botta's pocket gopher *(Thomomys bottae)* are important to the survival of several other native animals, including burrowing owl *(Athene cunicularia)*. However, ground squirrels in particular can become pests where people feed them, can carry the plague, and their presence can conflict with adjacent agricultural land users.

Control of rodents should be judicious with the overall goal of reconciling public safety with wildlife habitat benefits. Use of gas to control rodents is not recommended. Cultural methods such as educating the public to refrain from feeding ground squirrels should be encouraged. Ground squirrels prefer short grass areas and may be discouraged from using an area if vegetation is allowed to grow tall and rank. Control activities using poison bait, if undertaken, should be within the parameters prescribed by the County Agricultural Agent.

# 5.0 MONITORING

Monitoring is required to determine if the rangeland management plan is being implemented properly (compliance monitoring), and to measure progress towards meeting the goals and objectives (effectiveness monitoring). Compliance monitoring is used to ensure that the terms and conditions of the grazing lease are being followed (Bush 2006). It includes visual inspections of range improvements (e.g., fencing, water sources) to ensure that they were installed and/or maintained properly. It also includes an assessment of "actual use," which is done by comparing the records the lessee provides of numbers, kinds, classes, and periods of livestock in each pasture with Regional Parks staff's observations. The most important form of compliance monitoring for managing livestock grazing is to gather and assess data to determine if the use levels for each pasture are consistent with the lease terms and the grazing strategies agreed upon by the Park and the lessee.

## 5.1 COMPLIANCE MONITORING

### 5.1.1 Visual Monitoring - Recommended

This monitoring program should be based on visual assessments of the vegetation during the grazing season to ensure that desired grazing levels are not exceeded. Monitoring visits would be made twice per grazing season: once in the fall (September or October) at the end of the grazing season to determine if the RDM targets were attained, and once in the spring during the growing season to determine if stocking rates need to be adjusted (upward or downward). Assessments of the grass height and RDM standards should be based on an average of multiple visual estimates distributed across the property in "key areas" (see definition Appendix A) that reflect the pasture as a whole.

Based on the ecological sites (Section 3.1), the recommended minimum number of key areas to be monitored in each pasture or management unit to assess RDM levels is as follows:

| | Number of Key Areas | |
|---|---|---|
| | **Interim plan** | **Long-range plan** |
| Park Center | 0 | 0 |
| Northwest Hills | 1 | 1 |
| Central West Hills | 2 | 2 |
| South Creek Riparian | n.a. | 2 |
| Southwest Hills | 4 | 2 |
| Tolay Creek | 3 | 3 |
| North Terrace | 2 | 2 |
| South Terrace | 2 | 2 |
| Eastern Hills | 4 | 4 |
| Tolay Lake Special Management Zone | 2 | 2 |
| Total | 20 | 20 |

Residual cover use patterns should also be mapped on standard aerial photographic base maps of the property at the time of the fall monitoring visit. This mapping; based on RDM visual estimates (see below) summarized under the use categories of light, moderate and heavy; may be used to document livestock distribution and resulting grazing use levels throughout each pasture. Use pattern maps provide a valuable tool for assessing the potential need and location for additional improvements (cross fencing, water, mineral supplements, etc.) to improve livestock distribution. An example of a use pattern map from 2006 is provided in this report (Figure 3), but this map is not representative of a typical grazing pattern because cattle were removed earlier than usual that year. Use pattern mapping may not be needed every year unless new improvements have been developed or other factors change livestock distribution.

Estimates can be facilitated using an RDM Monitoring Photo-Guide developed by Wildland Resource Solutions (Guenther 1998) using the following six utilization classes:

**RDM is between 1,000 and 1,250 lbs/ac**. Rangeland may show evidence of considerable use. Seed stalks may be heavily utilized. Ground cover by vegetation is essentially 100 percent complete. Little bare soil is apparent, except for occasional pocket gopher activity and livestock/game trails. A Robel Pole would be obscured to a height of 2 to 4+ inches. Golf ball sized objects may be partially visible at a distance of 10 feet, but seldom visible at a distance of 20 feet. This use class represents conservative to light grazing.

**RDM is between 750 and 1,000 lbs/ac**. Rangeland typically shows clear evidence of grazing use. Seed stalks may be heavily utilized or trampled. Some bare soil is apparent, including pocket gopher activity, from 20 feet. A Robel Pole would be irregularly obscured to a height of 1 to 2+ inches. Many golf ball sized objects are partially visible at a distance of 10 feet, and some may be barely visible at a distance of 20 feet. This use class represents moderate to conservative grazing use.

**RDM is between 500 and 750 lbs/ac**. Rangeland shows evidence of extensive grazing use. Residual vegetation is patchy with some areas grazed to less than 1 inch and other areas with 3 to 5 inches of vegetation remaining. Some bare soil is apparent. A Robel Pole would be partially obscured at a height of 1 to 2 inches. Many golf ball sized objects are clearly visible at a distance of 10 feet and most are visible at a distance of 20 feet. This use class represents heavy to moderate use levels.

**RDM is between 250 and 500 lbs/ac**. Rangeland shows evidence of extensive grazing use. Standing seed stalk are scarce; some seed stalks occur as litter on the ground. Ground cover is sparse and clumpy; large areas are grazed to about 1 inch; scattered areas of 3 to 5 inch vegetation exist. Some bare soil is readily apparent. A Robel Pole would be fully visible. Most golf ball sized objects are clearly visible at a distance of 10 feet and most are visible at a distance of 20 feet. This use class represents very heavy grazing use and if continued could result in rangeland degradation. One to 2 years at this level is appropriate for intensive grazing management such as for control of medusahead.

**RDM is between 125 and 250 lbs/ac**. Rangeland shows evidence of extreme grazing use. Residual vegetation is scarce with most areas uniformly grazed to 1 inch or less. Standing seed stalks are rare; however, seed stalks and seed heads occur as litter. Bare soil is obvious. A Robel

Pole would be fully visible. Golf ball sized objects are clearly visible at distances of 10 and 20 feet. This use class represents overgrazing and will eventually result in rangeland degradation.

**RDM is less than 125 lbs/ac**. Rangeland shows evidence of total use. No standing seed stalks remain. Some seed stalks and seed heads occur as litter on the ground. Most areas are grazed to less than 1 inch. Considerable bare soil is readily apparent. Golf ball sized objects are clearly visible at 20 feet. This use class represents severe overgrazing and will result in rangeland degradation.

### 5.1.2 Quantitative Monitoring - Supplemental

The visual estimates of RDM levels described above may be confirmed and calibrated by clipping plots in key locations in each grazing unit (Bartolome et al. 2002). For most purposes, this labor intensive method is not recommended for Park management.

Quantitative monitoring, if conducted, would entail placing a 0.96 sq. ft. quadrat on the ground, removing all summer annuals from the quadrat, clipping the remaining plant material as close to the ground as possible without disturbing the soil surface, and weighing the dry plant material. The RDM levels at each plot location may be documented each year by photographs from permanent photo stations. Representative photographs of the RDM levels in each community type should be taken annually.

## 5.2 BIODIVERSITY MONITORING

### 5.2.1 Recommended Biodiversity Monitoring

In addition to monitoring for determination of grazing use levels, species composition of grasslands should be assessed. This can be done on an informal, visual basis by the Regional Parks staff. Quantitative studies, of course, provide much more reliable data but are costly and may not be necessary to meet immediate Park management goals.

Biodiversity monitoring is labor intensive and expensive, so it does not need to be conducted every year. An initial monitoring study could be conducted as a baseline in the first year of mitigation, and continued yearly during the first 3 years after management actions, thereafter every 5 years, for example. The methodology described below is to be used only as a general guideline. Data from other open space monitoring programs should be analyzed to determine if similar data can be obtained from a less intensive sampling protocol.

### 5.2.2 Supplemental Biodiversity Monitoring

To conduct a quantitative effectiveness monitoring program to assess biodiversity at the Park, a detailed study plan should be drafted. One potential technique would be to use permanent belt transects, located and marked using GPS (global positioning system) technology for recording all of the grazing pastures. The transects would then be subdivided into segments for data collection and analysis. Percent cover of target species would be estimated and assigned to cover classes. Small

populations of invasive weeds or native target species outside of the transects that are not encountered inside the transects would be mapped using GPS receivers.

Target species for monitoring would include fragrant fritillary, native grasses such as purple needlegrass, and early perennial forbs such as Johnny jump-up. Monitoring results would be used for assessing adjustments to management activities such as weed control, grazing management, or revegetation. Monitoring results could also be used to determine locations for range improvements such as water sources, fencing, and supplements.

Cover mapping/monitoring could be conducted for larger stands of native grasses and invasive plant species. The boundary of these stands would be mapped using a GPS unit. The boundary would be monitored every three or so years to examine the status of the stand and to determine whether the stand is increasing or decreasing in size. Randomly located small plots may be used to sample the density of invasive plants, native grasses, and associated species in selected areas.

## 5.3 ADAPTIVE MANAGEMENT AND CONTINGENCY MEASURES

Based on monitoring results, changes in management prescriptions may be needed. For example, if deficiencies in achieving grassland management objectives are noted, applicable measures would be implemented to meet residual cover and height requirements and/or provide better distribution of grazing pressure. These measures could include measures such as changes in stocking rates, season of grazing, additional internal or exclusionary fencing, and relocation of water or supplements. Changes in prescriptions may also be made in response to emergency situations (e.g., fire, flood, severe damage to facilities) by the Regional Parks staff.

## 5.4 MONITORING REPORT

Annual monitoring reports should be prepared to document management activities, assess performance, identify problems, and recommend management actions. The Regional Parks staff in coordination with the grazing lessee could prepare the reports. The reports may include the following information:

- Description of any changes to the methodology employed during the past year of monitoring.
- Summary of results of the annual monitoring studies.
- Copies of data sheets and monitoring photographs.
- List of persons who participated in the monitoring and preparation of the annual report.
- List of persons receiving the report.
- One-page summary of the report contents.
- Summary of grazing actions during the preceding year.
- Summary of other management actions undertaken during the preceding year.
- Recommendations for modifications to the plan.

# 7.0 REFERENCES AND PERSONAL COMMUNICATIONS

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# 6.0 STUDY PREPARERS

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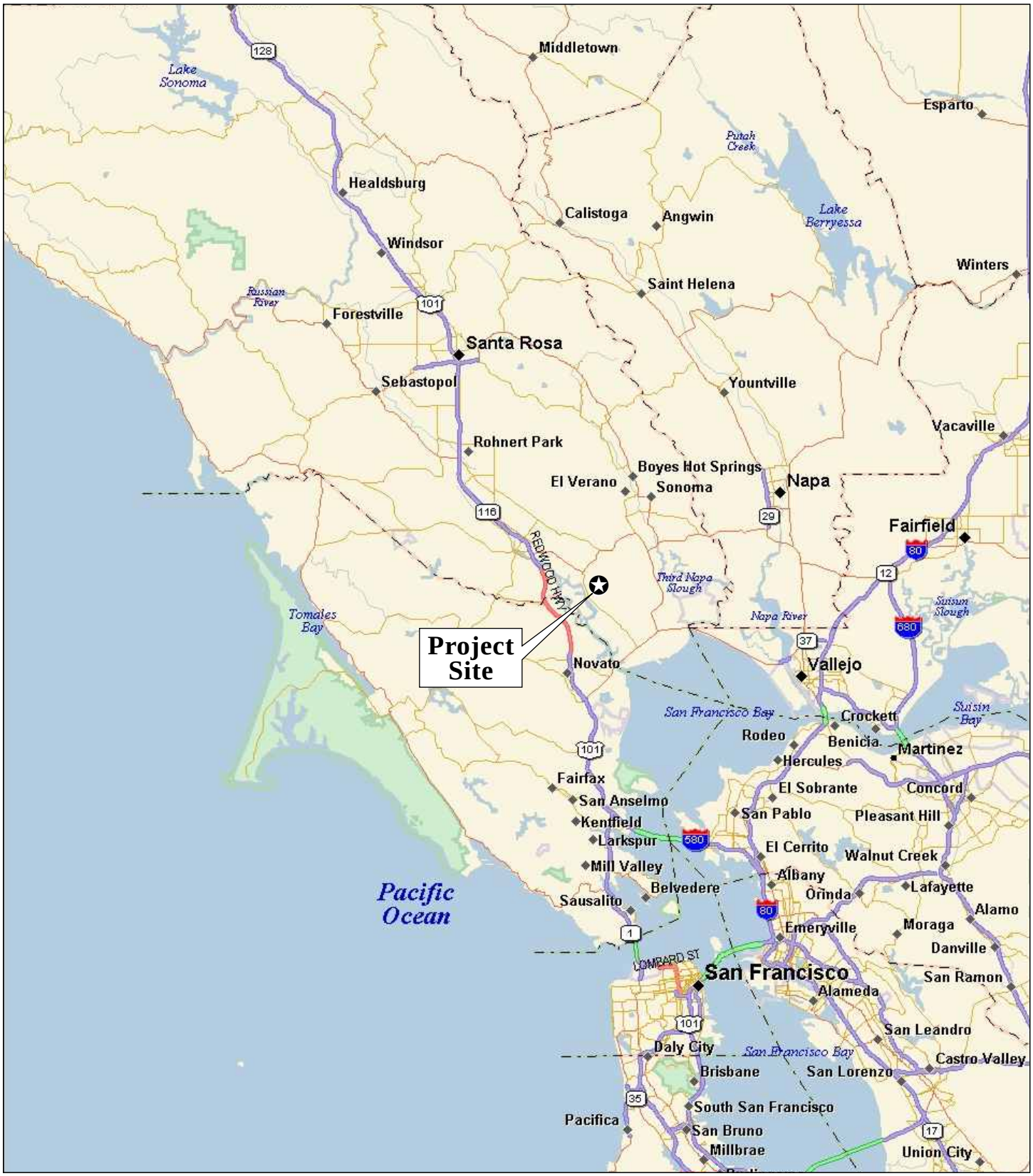
Mohring, Glenn. H and L Mohring. Grazing Tenant. Personal communication with Richard Nichols, LSA Associates, 2007.

# FIGURES




LSA

FIGURE 1

*Tolay Lake Regional Park*
*Rangeland Resources Study*

Regional Location

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SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

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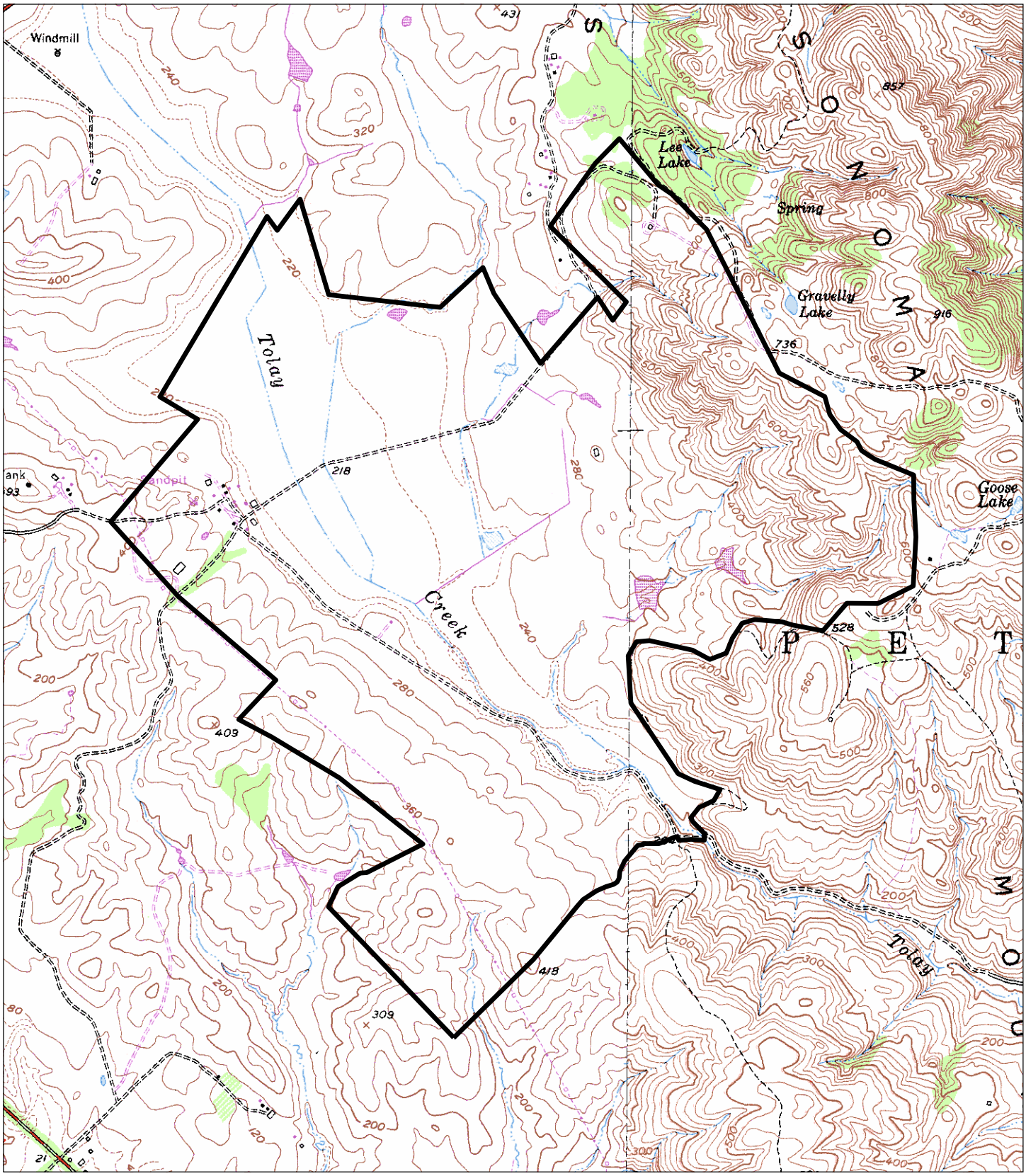


LSA

FIGURE 2

*Tolay Lake Regional Park*
*Rangeland Resources Study*

Study Area

N

0 500 1,000 2,000
FEET

SOURCE: USGS 7.5-minute Topos Petaluma (1980) and Sears Point (1968).

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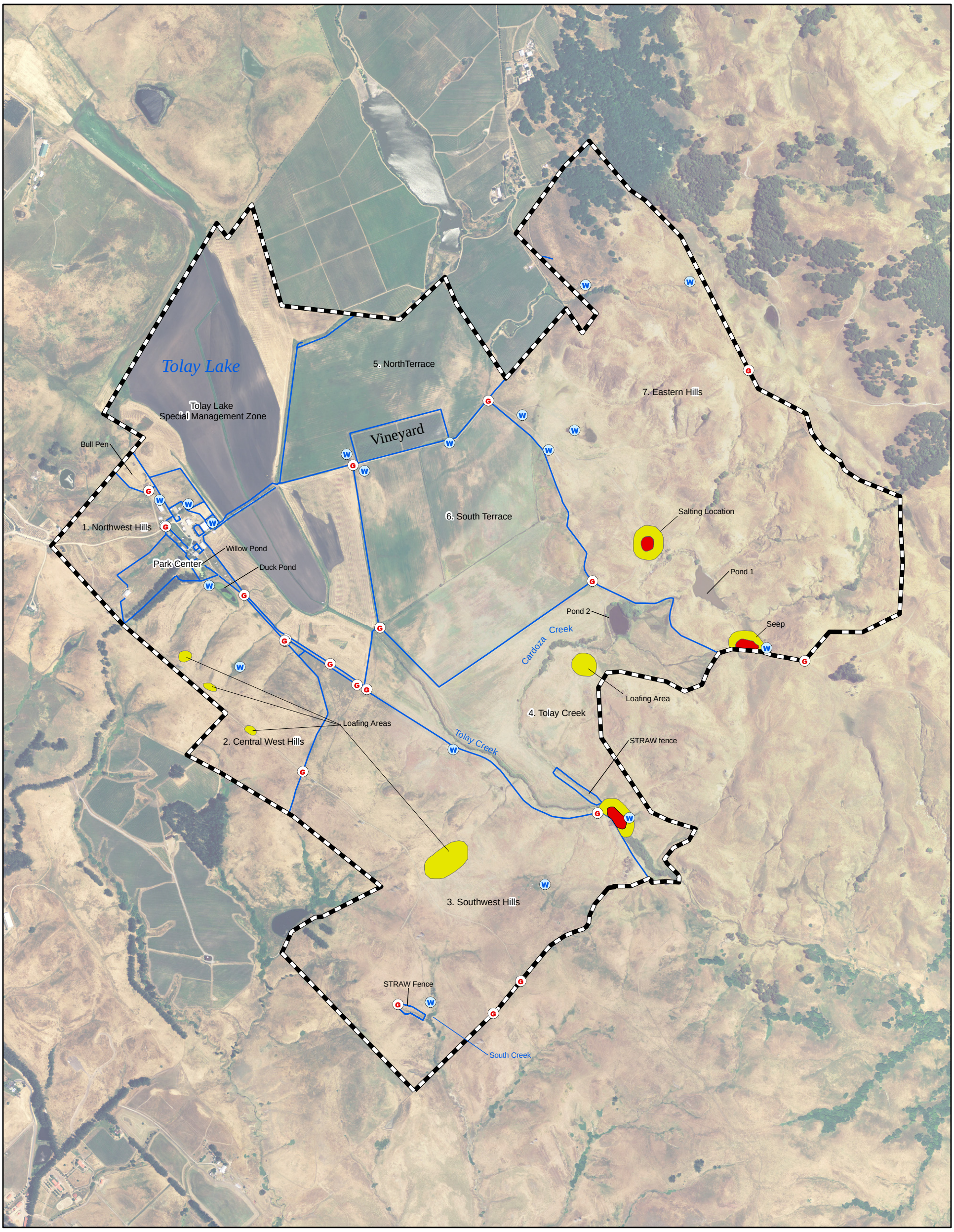


LSA

FIGURE 3

Tolay Lake Regional Park Boundary
Long-term Management Areas
Existing Fence
Existing Gate
Existing Water Trough
Area of High Grazing Intensity
Area of Medium Grazing Intensity
Area of Low Grazing Intensity

*Rangeland Resources Study*
*Tolay Lake Regional Park*

0 0.125 0.25
MILES

Grazing Use Pattern 2006

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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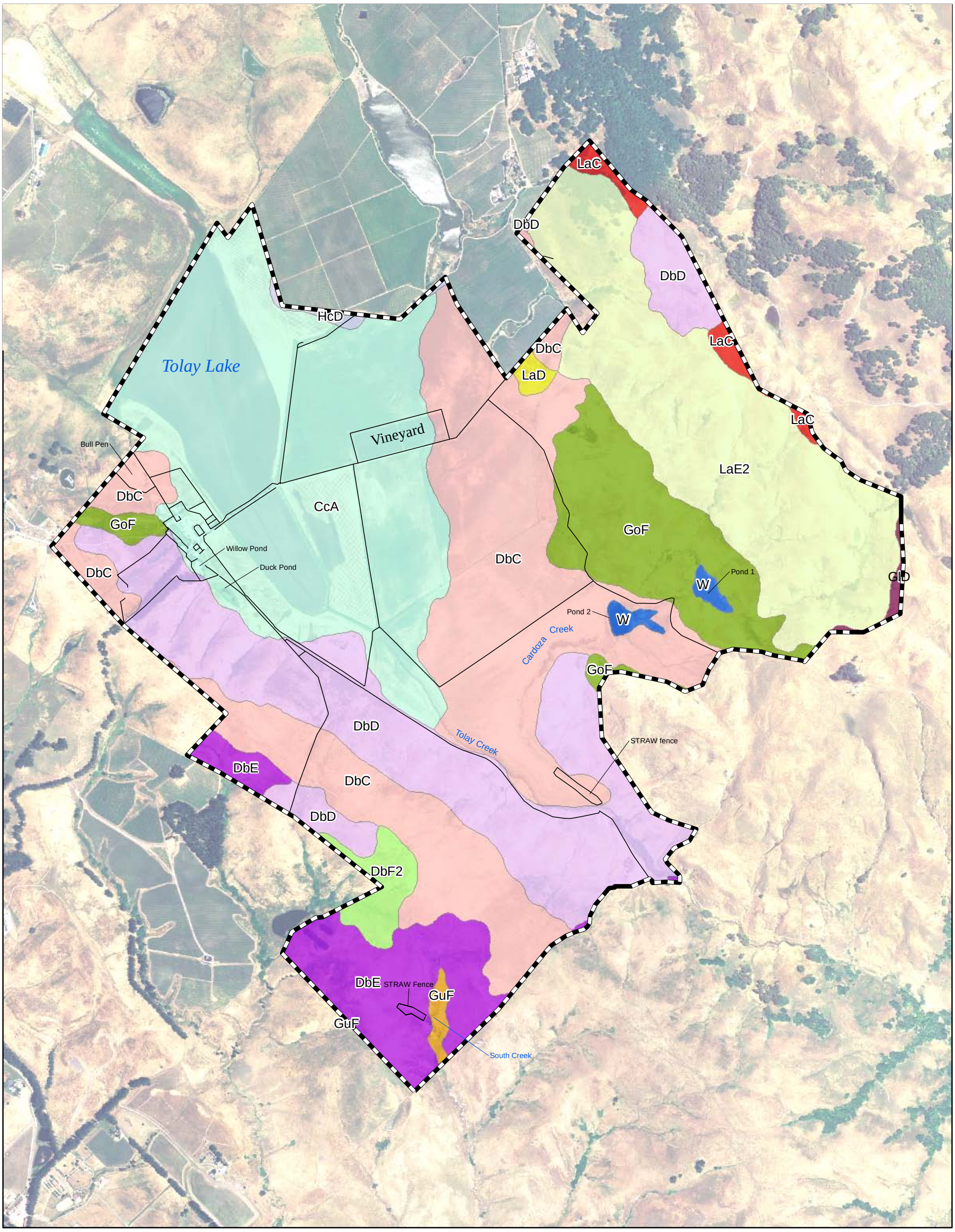


LSA

FIGURE 4

Tolay Lake Regional Park Boundary Perimeter Fence

Existing Fence

| Color | Map Unit | Soil Map Unit |
|---|---|---|
| | CcA | Clear Lake Clay Loam, 0-2% slopes |
| | DbC | Diablo Clay, 2-9% slopes |
| | DbD | Diablo Clay, 9-15% slopes |
| | DbE | Diablo Clay, 15-30% slopes |
| | DbF2 | Diablo Clay, 30-50% slopes, eroded |
| | GID | Goulding Cobbly Clay Loam, 5-15% slopes |
| | GoF | Goulding-Toomes Complex, 9-50% slopes |
| | GuF | Gullied Land |
| | HcD | Haire Clay Loam, 9-15% slopes |
| | LaC | Laniger Loam, 5-9% slopes |
| | LaD | Laniger Loam, 9-15% slopes |
| | LaE2 | Laniger Loam, 15-30% slopes, eroded |
| | W | Water |

*Rangeland Resources Study*
*Tolay Lake Regional Park*

Soils

0 0.125 0.25
MILES

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005), Soil Data modified from the Natural Resources Conservation Service

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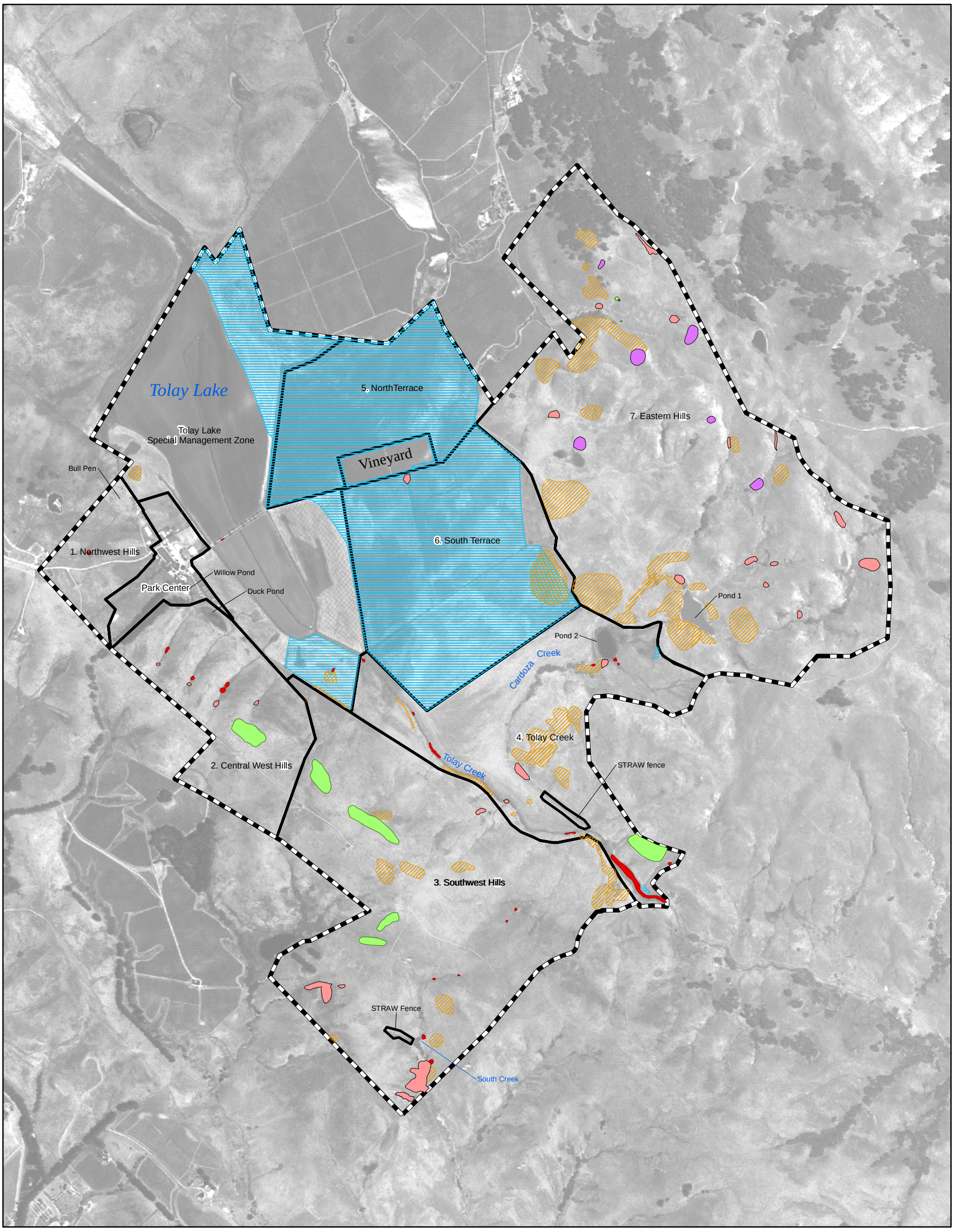


LSA

FIGURE 5

Tolay Lake Regional Park Boundary
Interim Management Areas
Italian thistle (*Carduus pycnocephalus*)
Star-thistle (*Centauria* spp.)
Erosion
Medusahead (*Taeniatherum caput*)
Bristly ox-tongue (*Picris echioides*)
Himalayan blackberry (*Rubus discolor*)

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MILES

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*Tolay Lake Regional Park*

Major Weed Infestations, Eroded Areas, and Interim Pasture Configurations

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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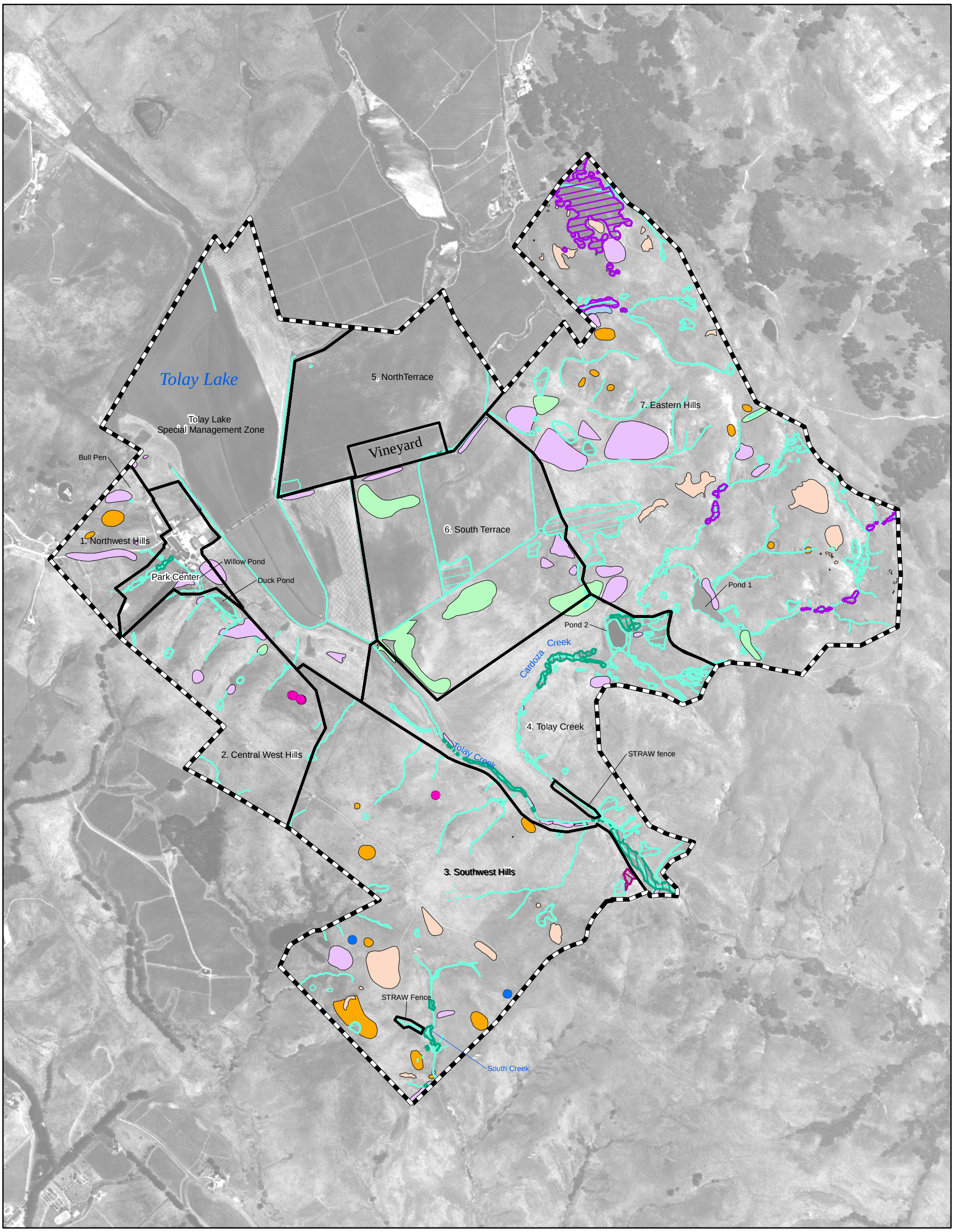


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FIGURE 6

Tolay Lake Regional Park Boundary
Interim Management Areas
Wetland
Stream Segment/Culvert
Oak Woodland
Riparian Woodland
Buckeye Woodland

Moist Grassland (*Danthonia, Leymus, Hordeum*, etc.)
Semaphore Grass Wetland (*Pleuropogon californica*)
Johnny-Jump-up (*Viola pedunculata*) Native Wildflower Field
Purple Needlegrass Grassland ( *Nassella pulchra*, etc.)
Mixed Native Wildflower Field (*Platystemon, Lithophragma*, etc)
Fragrant Fritillary (*Fritillaria liliacea*)
Lobb's Aquatic Buttercup (*Ranunculus lobbii*)

N

0 0.125 0.25
MILES

*Rangeland Resources Study*
*Tolay Lake Regional Park*

Sensitive Biological Resources and Interim Pasture Configurations

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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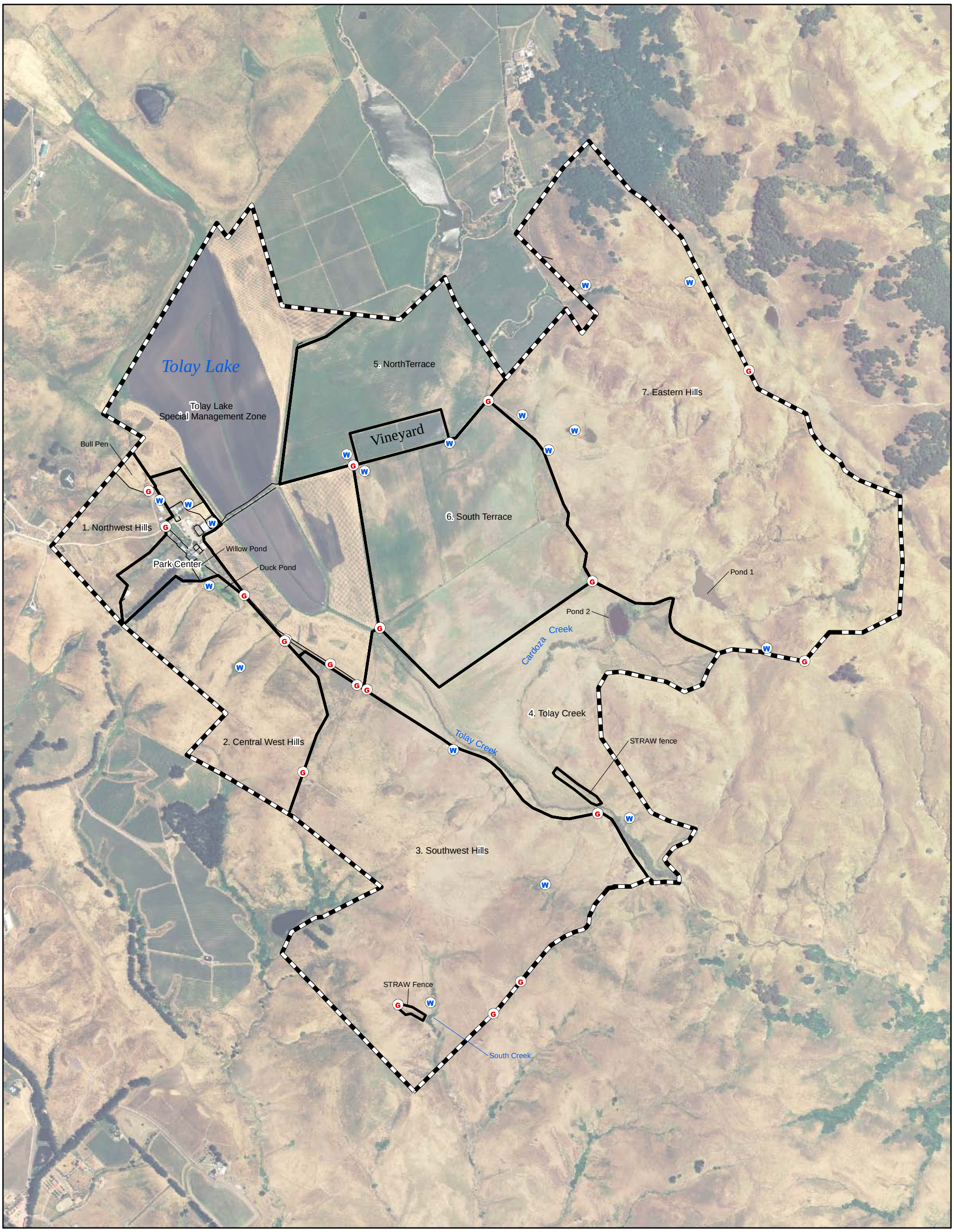


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FIGURE 7

Tolay Lake Regional Park Boundary

Interim Management Areas/Existing Fences

Existing Fences

Existing Gate

Existing Water Trough

*Rangeland Resources Study*
*Tolay Lake Regional Park*

N

Interim Pasture Configurations
and Existing Range Improvements

0 0.125 0.25
MILES

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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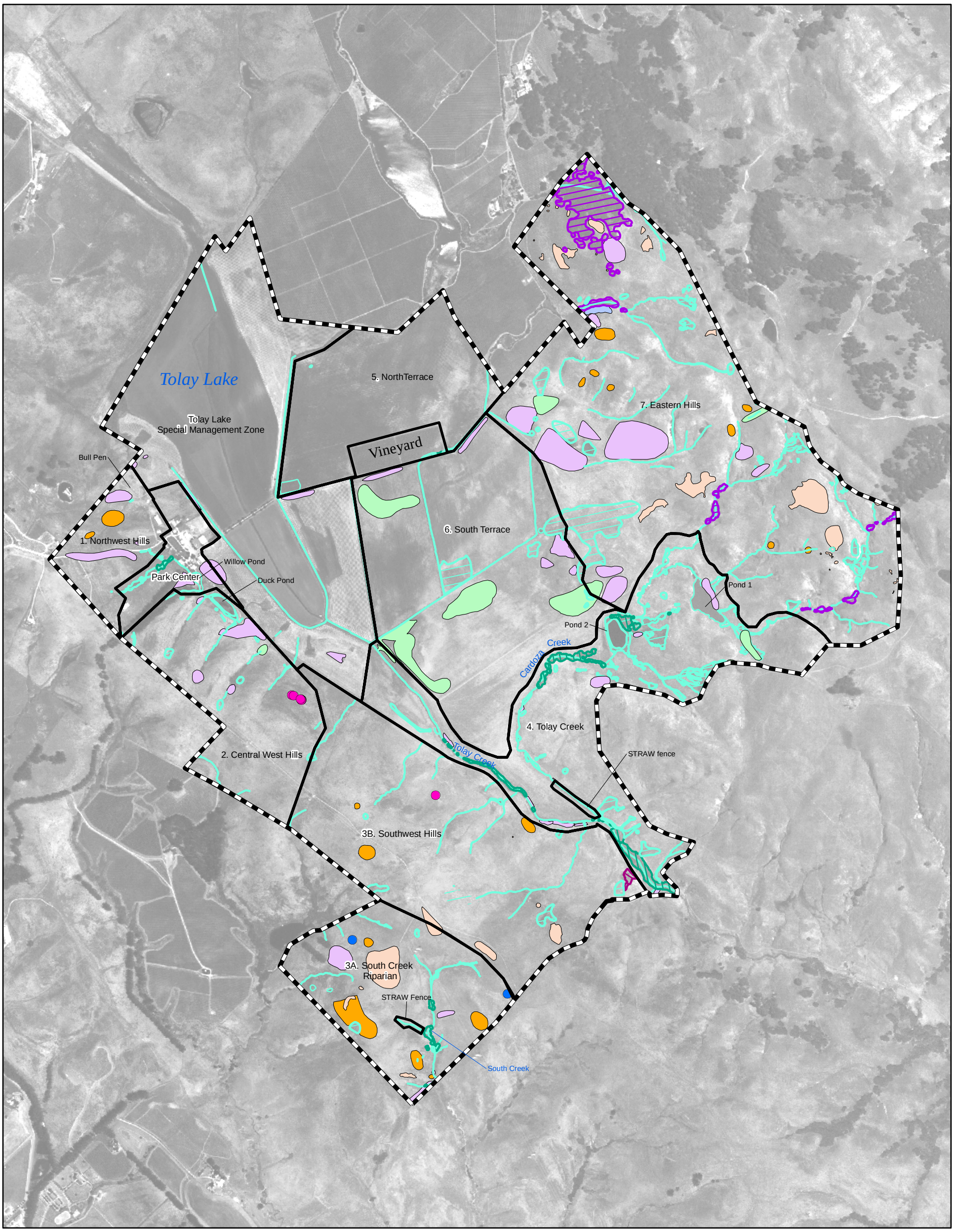


LSA

FIGURE 8

Tolay Lake Regional Park Boundary
Long-term Management Areas
Wetland
Stream Segment/Culvert
Oak Woodland
Riparian Woodland
Buckeye Woodland

Moist Grassland (*Danthonia, Leymus, Hordeum*, etc.)
Semaphore Grass Wetland (*Pleuropogon californica*)
Johnny-Jump-up (*Viola pedunculata*) Native Wildflower Field
Purple Needlegrass Grassland ( *Nassella pulchra*, etc.)
Mixed Native Wildflower Field (*Platystemon, Lithophragma*, etc)
Fragrant Fritillary (*Fritillaria liliacea*)
Lobb's Aquatic Buttercup (*Ranunculus lobbii*)

N

0 0.125 0.25
MILES

*Rangeland Resources Study*
*Tolay Lake Regional Park*

Sensitive Biological Resources and Long-term Pasture Configurations

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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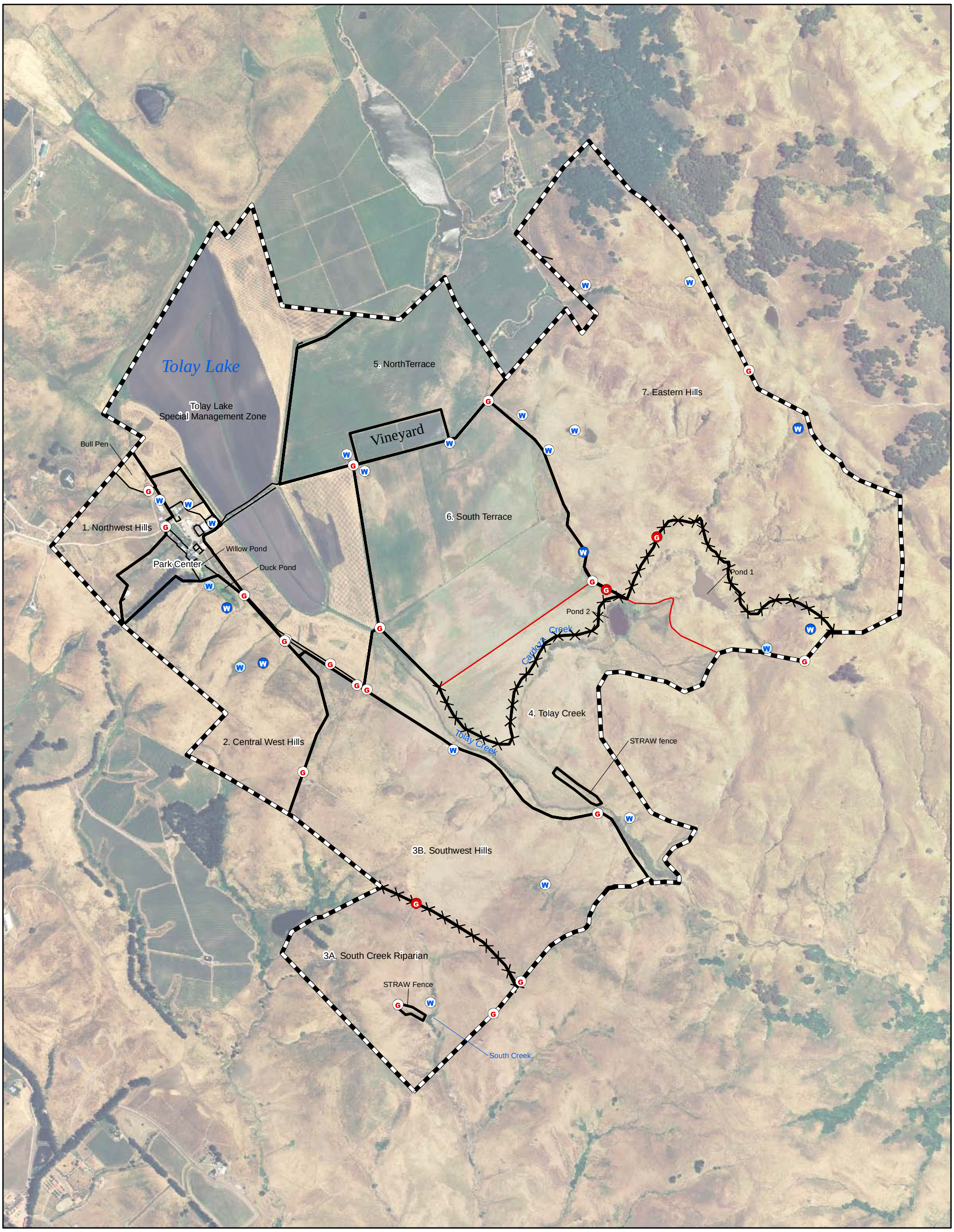


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FIGURE 9

Tolay Lake Regional Park Boundary
Long-term Management Areas
Existing Fence
Proposed Fence Removal
Proposed Fence Addition
Existing Gate
Proposed Gate
Existing Water Trough
Existing Water Trough (to be removed)
Proposed Water Trough

N

0 0.125 0.25
MILES

*Rangeland Resources Study*
*Tolay Lake Regional Park*

Long-term Pasture Configurations and Existing and Proposed Range Improvements

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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# TABLES

**Table A: Interim Rangeland Management Plan Summary, Tolay Lake Regional Park**

| Pasture/ Management zone | Park Center | 1. North-west Hills | 2. Central West Hills | 3. Southwest Hills | 4. Tolay Creek | 5. North Terrace | 6. South Terrace | 7. Eastern Hills | Tolay Lake Special Mgt. Zone | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Sensitive resources | | | | | | | | | | |
| Fragrant fritillary | | | x | x | | | | | | |
| Native grassland | x | x | x | x | x | | x | x | x | |
| Oak woodland | | | | | | | | x | | |
| Eroded soils | | | | x | x | | | | | |
| Wetlands | x | x | x | x | x | x | x | x | x | |
| Riparian | x | x | x | x | x | | | x | x | |
| Pond shore | x | | | | x | | x | x | x | |
| High sensitivity cultural resource* | x | | | x | x | | x | | x | |
| Moderate Sen-sitivity cultural resource** | x | | | | x | | x | x | x | |
| Acres | 31.8 | 41.6 | 108.9 | 341.1 | 184.7 | 107.6 | 187.8 | 484.6 | 264.2 | 1720.5 |
| Stocking rate/ Target RDM | No live-stock use | Moderate 750 lb/ac | Light 1,250 lb/ac | Light 1,250 lb/ac | No live-stock use | Moderate 750 lb/ac | Moderate 750 lb/ac | Conservative 1,000 lb/ac | No livestock use | |
| Grazing season | None | Feb-May | May-Dec | May-Dec | None | June-Nov. | June-Nov. | Jan-Apr | None | |
| AU in average year | | | | | | | | | | |
| January | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 105 |
| February | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 105 |
| March | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 105 |
| April | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 84 | 0 | 105 |
| May | 0 | 0 | 25 | 72 | 0 | 0 | 0 | 0 | 0 | 97 |
| June | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| July | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| August | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| September | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| October | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| November | 0 | 0 | 25 | 72 | 0 | 50 | 45 | 0 | 0 | 192 |
| December | 0 | 0 | 25 | 72 | 0 | 0 | 0 | 0 | 0 | 97 |

Notes: * Highly sensitive cultural resource = requires exclusion fencing if the area is subject to grazing.
** Sensitive cultural resources = requires exclusion fencing or dry season grazing only.

**Table B: Grazing Carrying Capacities, Interim Pasture Configurations, Tolay Lake Regional Park**

| Pasture | Acreage | Grazing intensity | Carrying Capacity (i.e., Animal Units) by Duration (months) in an Average Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2 | 4 | 6 | 8 | 10 | 12 |
| Park Center | 31.8 | Light | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Conservative | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Moderate | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Heavy | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| 1 Northwest Hills | 41.60 | Light | 31 | 15 | 10 | 8 | 6 | 5 |
| | | Conservative | 36 | 18 | 12 | 9 | 7 | 6 |
| | | Moderate | 41 | 21 | 14 | 10 | 8 | 7 |
| | | Heavy | 47 | 23 | 16 | 12 | 9 | 8 |
| 2 Central West Hills | 108.90 | Light | 101 | 51 | 34 | 25 | 20 | 17 |
| | | Conservative | 119 | 59 | 40 | 30 | 24 | 20 |
| | | Moderate | 136 | 68 | 45 | 34 | 27 | 23 |
| | | Heavy | 154 | 77 | 51 | 38 | 31 | 26 |
| 3 Southwest Hills | 341.10 | Light | 289 | 145 | 96 | 72 | 58 | 48 |
| | | Conservative | 339 | 170 | 113 | 85 | 68 | 57 |
| | | Moderate | 389 | 195 | 130 | 97 | 78 | 65 |
| | | Heavy | 439 | 219 | 146 | 110 | 88 | 73 |
| 4 Tolay Creek | 184.70 | Light | 163 | 82 | 54 | 41 | 33 | 27 |
| | | Conservative | 192 | 96 | 64 | 48 | 38 | 32 |
| | | Moderate | 220 | 110 | 73 | 55 | 44 | 37 |
| | | Heavy | 248 | 124 | 83 | 62 | 50 | 41 |
| 5 North Terrace | 107.60 | Light | 100 | 50 | 33 | 25 | 20 | 17 |
| | | Conservative | 117 | 58 | 39 | 29 | 23 | 19 |
| | | Moderate | 134 | 67 | 45 | 34 | 27 | 22 |
| | | Heavy | 151 | 76 | 50 | 38 | 30 | 25 |
| 6 South Terrace | 187.80 | Light | 168 | 84 | 56 | 42 | 34 | 28 |
| | | Conservative | 196 | 98 | 65 | 49 | 39 | 33 |
| | | Moderate | 225 | 113 | 75 | 56 | 45 | 38 |
| | | Heavy | 254 | 127 | 85 | 64 | 51 | 42 |
| 7 Eastern Hills | 484.60 | Light | 109 | 55 | 36 | 27 | 22 | 18 |
| | | Conservative | 168 | 84 | 56 | 42 | 34 | 28 |
| | | Moderate | 226 | 113 | 75 | 57 | 45 | 38 |
| | | Heavy | 284 | 142 | 95 | 71 | 57 | 47 |

| Pasture | Acreage | Grazing intensity | Carrying Capacity (i.e., Animal Units) by Duration (months) in an Average Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2 | 4 | 6 | 8 | 10 | 12 |
| Tolay Lake Special Management Zone | n.a. | Light | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Conservative | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Moderate | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Heavy | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Total | 1488.10 | Light | 961 | 481 | 320 | 240 | 192 | 160 |
| | | Conservative | 1167 | 583 | 389 | 292 | 233 | 194 |
| | | Moderate | 1372 | 686 | 457 | 343 | 274 | 229 |
| | | Heavy | 1577 | 789 | 526 | 394 | 315 | 263 |

## Table C: Long-term Rangeland Management Plan Summary, Tolay Lake Regional Park

| Pasture/ Management zone | Head-quarters | 1. North-west Hills | 2. Central West Hills | New 3A. South Creek Riparian | New 3B. Southwest Hills | New 4. Tolay Creek | 5. North Terrace | New 6. South Terrace | New 7. Eastern Hills | Tolay Lake Special Mgt. Zone | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sensitive resources | | | | | | | | | | | |
| Fragrant fritillary | | | x | x | x | | | | | | |
| Native grassland | x | x | x | x | x | x | | x | x | x | |
| Oak woodland | | | | | | | | | x | | |
| Eroded soils | | | | x | x | x | | | | | |
| Wetlands | x | x | x | x | x | x | x | x | x | x | |
| Riparian | x | x | x | x | x | x | | | x | x | |
| Pond shore | x | | | | | x | | x | x | x | |
| High sensitivity cultural resource* | x | | | x | x | x | | x | | x | |
| Moderate sensitivity cultural resource** | x | | | | | x | | x | x | x | |
| Acres | 31.8 | 41.6 | 108.9 | 114.9 | 225.6 | 204.4 | 107.6 | 216.2 | 426.5 | 264.4 | 1710.1 |
| Stocking rate/ Target RDM | No live-stock use | Moderate 750 lb/ac | Light 1,250 lb/ac | Light 1,250 lb/ac | Moderate 750 lb/ac | Light 1250lb/ac | Moderate 750 lb/ac | Moderate 750 lb/ac | Conservative 1,000 lb/ac | Conservative 1,000 lb/ac | |
| | None | Dec-Mar | May-Dec | Mar-June | Dec-Feb, Jul-Sept | Mar-June | April-Nov. | April-Nov. | Oct.-Mar | Pulsed | |
| AU in average year | | | | | | | | | | | |
| January | 0 | 21 | 0 | 0 | 88 | 0 | 0 | 0 | 54 | 0 | 163 |
| February | 0 | 21 | 0 | 0 | 88 | 0 | 0 | 0 | 54 | 0 | 163 |
| March | 0 | 21 | 0 | 69 | 0 | 98 | 0 | 0 | 54 | 0 | 242 |
| April | 0 | 0 | 0 | 69 | 0 | 98 | 0 | 0 | 0 | 0 | 167 |
| May | 0 | 0 | 25 | 69 | 0 | 98 | 0 | 0 | 0 | 0 | 192 |
| June | 0 | 0 | 25 | 0 | 0 | 0 | 45 | 87 | 0 | 0 | 157 |
| July | 0 | 0 | 25 | 0 | 88 | 0 | 45 | 87 | 0 | 0 | 245 |
| August | 0 | 0 | 25 | 0 | 88 | 0 | 45 | 87 | 0 | 0 | 245 |
| September | 0 | 0 | 25 | 0 | 88 | 0 | 45 | 87 | 0 | 0 | 245 |
| October | 0 | 0 | 25 | 0 | 0 | 0 | 45 | 87 | 54 | 0 | 211 |
| November | 0 | 0 | 25 | 0 | 0 | 0 | 45 | 87 | 54 | 0 | 211 |
| December | 0 | 21 | 25 | 0 | 88 | 0 | 0 | 0 | 54 | 0 | 188 |

Notes: * Highly sensitive cultural resource = requires exclusion fencing if the area is subject to grazing. Exclusion deducted from acreage.

** Sensitive cultural resources = requires dry season grazing only.

**Table D: Grazing Carrying Capacities, Proposed Pasture Configurations, Tolay Lake Regional Park**

| Pasture | Acreage | Grazing intensity | Carrying Capacity (i.e., Animal Units) by Duration (months) in an Average Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2 | 4 | 6 | 8 | 10 | 12 |
| Park Center | 31.8 | Light | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Conservative | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Moderate | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | Heavy | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| 1 Northwest Hills | 41.60 | Light | 31 | 15 | 10 | 8 | 6 | 5 |
| | | Conservative | 36 | 18 | 12 | 9 | 7 | 6 |
| | | Moderate | 41 | 21 | 14 | 10 | 8 | 7 |
| | | Heavy | 47 | 23 | 16 | 12 | 9 | 8 |
| 2 Central West Hills | 108.90 | Light | 101 | 51 | 34 | 25 | 20 | 17 |
| | | Conservative | 119 | 59 | 40 | 30 | 24 | 20 |
| | | Moderate | 136 | 68 | 45 | 34 | 27 | 23 |
| | | Heavy | 154 | 77 | 51 | 38 | 31 | 26 |
| 3 Southwest Hills | 225.60 | Light | 197 | 99 | 66 | 49 | 39 | 33 |
| | | Conservative | 231 | 116 | 77 | 58 | 46 | 39 |
| | | Moderate | 265 | 133 | 88 | 66 | 53 | 44 |
| | | Heavy | 299 | 150 | 100 | 75 | 60 | 50 |
| 3a South Creek Riparian | 114.9 | Light | 91 | 46 | 30 | 23 | 18 | 15 |
| | | Conservative | 107 | 54 | 36 | 27 | 21 | 18 |
| | | Moderate | 123 | 61 | 41 | 31 | 25 | 20 |
| | | Heavy | 139 | 69 | 46 | 35 | 28 | 23 |
| 4 Tolay Creek | 204.40 | Light | 131 | 65 | 44 | 33 | 26 | 22 |
| | | Conservative | 153 | 77 | 51 | 38 | 31 | 26 |
| | | Moderate | 176 | 88 | 59 | 44 | 35 | 29 |
| | | Heavy | 199 | 99 | 66 | 50 | 40 | 33 |
| 5 North Terrace | 107.60 | Light | 100 | 50 | 33 | 25 | 20 | 17 |
| | | Conservative | 117 | 58 | 39 | 29 | 23 | 19 |
| | | Moderate | 134 | 67 | 45 | 34 | 27 | 22 |
| | | Heavy | 151 | 76 | 50 | 38 | 30 | 25 |
| 6 South Terrace | 216.20 | Light | 194 | 97 | 65 | 49 | 39 | 32 |
| | | Conservative | 228 | 114 | 76 | 57 | 46 | 38 |
| | | Moderate | 262 | 131 | 87 | 65 | 52 | 44 |
| | | Heavy | 295 | 148 | 98 | 74 | 59 | 49 |

| Pasture | Acreage | Grazing intensity | Carrying Capacity (i.e., Animal Units) by Duration (months) in an Average Year | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2 | 4 | 6 | 8 | 10 | 12 |
| 7 Eastern Hills | 426.50 | Light | 104 | 52 | 35 | 26 | 21 | 17 |
| | | Conservative | 161 | 80 | 54 | 40 | 32 | 27 |
| | | Moderate | 217 | 108 | 72 | 54 | 43 | 36 |
| | | Heavy | 273 | 137 | 91 | 68 | 55 | 46 |
| Tolay Lake Special Management Zone | 264.40 | Light | 245 | 122 | 82 | 61 | 49 | 41 |
| | | Conservative | 287 | 144 | 96 | 72 | 57 | 48 |
| | | Moderate | 330 | 165 | 110 | 82 | 66 | 55 |
| | | Heavy | 372 | 186 | 124 | 93 | 74 | 62 |
| Total | 1741.60 | Light | 1195 | 597 | 398 | 299 | 239 | 199 |
| | | Conservative | 1439 | 720 | 480 | 360 | 288 | 240 |
| | | Moderate | 1684 | 842 | 561 | 421 | 337 | 281 |
| | | Heavy | 1928 | 964 | 643 | 482 | 386 | 321 |

# APPENDIX A

# DEFINITIONS OF RANGE MANAGEMENT TERMS

# APPENDIX A

# DEFINITIONS OF RANGE MANAGEMENT TERMS FOR THE TOLAY LAKE REGIONAL PARK RANGELAND RESOURCES STUDY

| TERM | DEFINITION |
|---|---|
| Air-dry weight | The weight of a substance (usually forage) after it has been allowed to dry to equilibrium with the atmosphere. |
| Animal-unit (AU)/ Animal Unit Equivalent (AUE) | Defines forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old; all other classes and kinds of animals can be related to this standard as animal unit equivalents (AUE), e.g., a bull equals 1.25 AU, a yearling steer or heifer equals 0.75 AU. |
| Animal-unit-month (AUM) | The amount (780 pounds) of air-dry forage calculated to meet one animal unit's requirement for one month. |
| Carrying capacity | The average number of livestock and wildlife that may be sustained on a management unit compatibly with management objectives. It is a function of site characteristics, and management goals and intensity. |
| Class of animal | Description of age and sex group for a particular kind of animal, e.g., cow, calf, yearling heifer, ewe, fawn. |
| Cover | (1) The plant or plant parts, living or dead, on the ground surface. (2) The proportional area of ground covered by plants on a stated area. |
| Forage | Browse and herbage that are available for food for grazing animals or to be harvested for feeding. |
| Forage production | The weight of forage that is produced within a designated period of time on a given area (e.g., pounds per acre). |
| Forb | A non-woody, broad-leafed plant. |
| Grass | A plant with long, narrow leaves having parallel veins and nondescript flowers. Stems are hollow or pithy in cross-section. |
| Grazing distribution | Dispersion of livestock grazing within a management unit. |
| Grazing management | The control of grazing and browsing animals to accomplish a desired result. |
| Grazing pressure | An animal-to-forage relationship measured in terms of animal units per unit weight of forage at any instant. |

| TERM | DEFINITION |
|---|---|
| Key area | A relatively small potion of a management unit selected because of its location, use, or grazing value as a monitoring point for grazing use. It is assumed key areas will reflect the overall acceptability of current grazing management over the whole unit. |
| Kind of animal | An animal species or species group such as sheep, cattle, goats, deer, horses, elk, antelope. |
| Monitoring | The orderly collection, analysis, and interpretation of resource data over time to evaluate progress toward meeting management objectives. |
| Native species | A species that is a part of the original fauna or flora of a given area. |
| Overgrazing | Continued heavy grazing that exceeds the recovery capacity of individual plants in the community and creates a deteriorated range. |
| Overstocking | Placing a number of animals on a given area that exceeds the forage supply during the time they are present. |
| Overuse | Using an excessive amount of the current year's growth. |
| Palatability | The relish with which a particular species or plant part is consumed by an animal. |
| Pasture | A grazing area enclosed and separated from other areas by fencing or other barriers. |
| Photopoint | A point from which photos are periodically taken to monitor long-term management responses. |
| Plant community | An assemblage of plants occurring together at any point in time, denoting no particular ecological status. |
| Range (Rangeland) | Any land supporting grazable or browsable vegetation and managed as a natural ecosystem; can include grasslands, forestlands, shrublands, and pasture. "Range" is not a land use. |
| Range improvement | Any practice designed to improve range condition or allow more efficient use. |
| Range management | A distinct discipline founded on ecological principles with the objective of sustainable use of rangelands and related resources for various purposes. |

| TERM | DEFINITION |
|---|---|
| Range site | Land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in its ability to produce vegetation and to respond to management. Synonymous with range site. |
| Residual dry matter (RDM) | Residual dry matter is the old plant material left standing or on the ground at the beginning of a new growing season (typically early fall immediately prior to the first rains). |
| Rest | Leaving an area ungrazed for a specified time. |
| Stocking rate | The number of specific kinds and classes of animals grazing a unit of land for a specified time period. |
| Use | The proportion of current years forage production that is consumed or destroyed by grazing animals. |
| Weed | (1) A plant growing where unwanted. (2) A plant having a negative value within a given management system. |

Reference:
Ortmann, J., L.R. Roath and E.T. Bartlett. 2000. Glossary of range management terms no. 6.105. Colorado State University Cooperative Extension. 5pp.

# APPENDIX B

# RANGE ANALYSIS (INTERIM PASTURES)

**Appendix B - Range Analysis: Interim Pastures**
**Tolay Lake Special Management Zone**

**Moderate Use**

| | |
|---|---|
| Target RDM (lb/acre) | 750 |
| Dry-Matter (lb) per AUM | 780 |

| Soil Type | Soil Symbol | Acres | Dry-weight Production (lb/acre) | | | Available Forage (AUM/acre) | | | Total Available Forage (AUM) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Favorable | Average | Unfavorable | Favorable | Average | Unfavorable | Favorable | Average | Unfavorable |
| Clear Lake clay loam, 0-2% slopes | *CcA* | 0.0 | 3,600 | 2,700 | 1,800 | 3.7 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 |
| Diablo clay, 2-9% slopes | *DbC* | 0.0 | 3,600 | 2,700 | 1,800 | 3.7 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 |
| Diablo clay, 9-15% slopes | *DbD* | 0.0 | 3,600 | 2,700 | 1,800 | 3.7 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 |
| Diablo clay, 15-30% slopes | *DbE* | 0.0 | 3,600 | 2,700 | 1,800 | 3.7 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 |
| Diablo clay, 30-50% slopes, eroded | *DbF2* | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Goulding Cobbly Clay Loam, 5-15% slopes | *GID* | 0.0 | 3,600 | 2,700 | 1,800 | 3.7 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 |
| Goulding-Toomes complex, 9-50% slopes | *GoF* | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gullied Land | *GuF* | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Haire clay loam, 9-15% slopes | *HcD* | 0.0 | 2,800 | 2,200 | 1,600 | 2.6 | 1.9 | 1.1 | 0.0 | 0.0 | 0.0 |
| Laniger loam, 5-9% slopes | *LaC* | 0.0 | 2,400 | 1,800 | 1,200 | 2.1 | 1.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Laniger loam, 9-15% slopes | *LaD* | 0.0 | 2,400 | 1,800 | 1,200 | 2.1 | 1.3 | 0.6 | 0.0 | 0.0 | 0.0 |
| Laniger loam, 15-30% slopes, eroded | *LaE2* | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Water | *W* | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | | **0.0** | | | | | | | **0.0** | **0.0** | **0.0** |

# APPENDIX C

# RANGE ANALYSIS (PROPOSED PASTURES)

**Appendix C - Range Analysis: Proposed Pastures**
**Tolay Lake Special Management Zone**

**Heavy Use**

| | |
|---|---|
| Target RDM (lb/acre) | 500 |
| Dry-Matter (lb) per AUM | 780 |

| Soil Type | Soil Symbol | Acres | Dry-weight Production (lb/acre) | | | Available Forage (AUM/acre) | | | Total Available Forage (AUM) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Favorable | Average | Unfavorable | Favorable | Average | Unfavorable | Favorable | Average | Unfavorable |
| Clear Lake clay loam, 0-2% slopes | *CcA* | 248.1 | 3,600 | 2,700 | 1,800 | 4.0 | 2.8 | 1.7 | 985.9 | 699.7 | 413.5 |
| Diablo clay, 2-9% slopes | *DbC* | 2.9 | 3,600 | 2,700 | 1,800 | 4.0 | 2.8 | 1.7 | 11.7 | 8.3 | 4.9 |
| Diablo clay, 9-15% slopes | *DbD* | 10.5 | 3,600 | 2,700 | 1,800 | 4.0 | 2.8 | 1.7 | 41.7 | 29.6 | 17.5 |
| Diablo clay, 15-30% slopes | *DbE* | | 3,600 | 2,700 | 1,800 | 4.0 | 2.8 | 1.7 | 0.0 | 0.0 | 0.0 |
| Diablo clay, 30-50% slopes, eroded | *DbF2* | | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Goulding Cobbly Clay Loam, 5-15% slopes | *GID* | | 3,600 | 2,700 | 1,800 | 4.0 | 2.8 | 1.7 | 0.0 | 0.0 | 0.0 |
| Goulding-Toomes complex, 9-50% slopes | *GoF* | | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gullied Land | *GuF* | | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Haire clay loam, 9-15% slopes | *HcD* | 2.9 | 2,800 | 2,200 | 1,600 | 2.9 | 2.2 | 1.4 | 8.4 | 6.2 | 4.0 |
| Laniger loam, 5-9% slopes | *LaC* | | 2,400 | 1,800 | 1,200 | 2.4 | 1.7 | 0.9 | 0.0 | 0.0 | 0.0 |
| Laniger loam, 9-15% slopes | *LaD* | | 2,400 | 1,800 | 1,200 | 2.4 | 1.7 | 0.9 | 0.0 | 0.0 | 0.0 |
| Laniger loam, 15-30% slopes, eroded | *LaE2* | | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Water | *W* | | 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | | **264.4** | | | | | | | **1047.7** | **743.8** | **439.9** |

appendix m

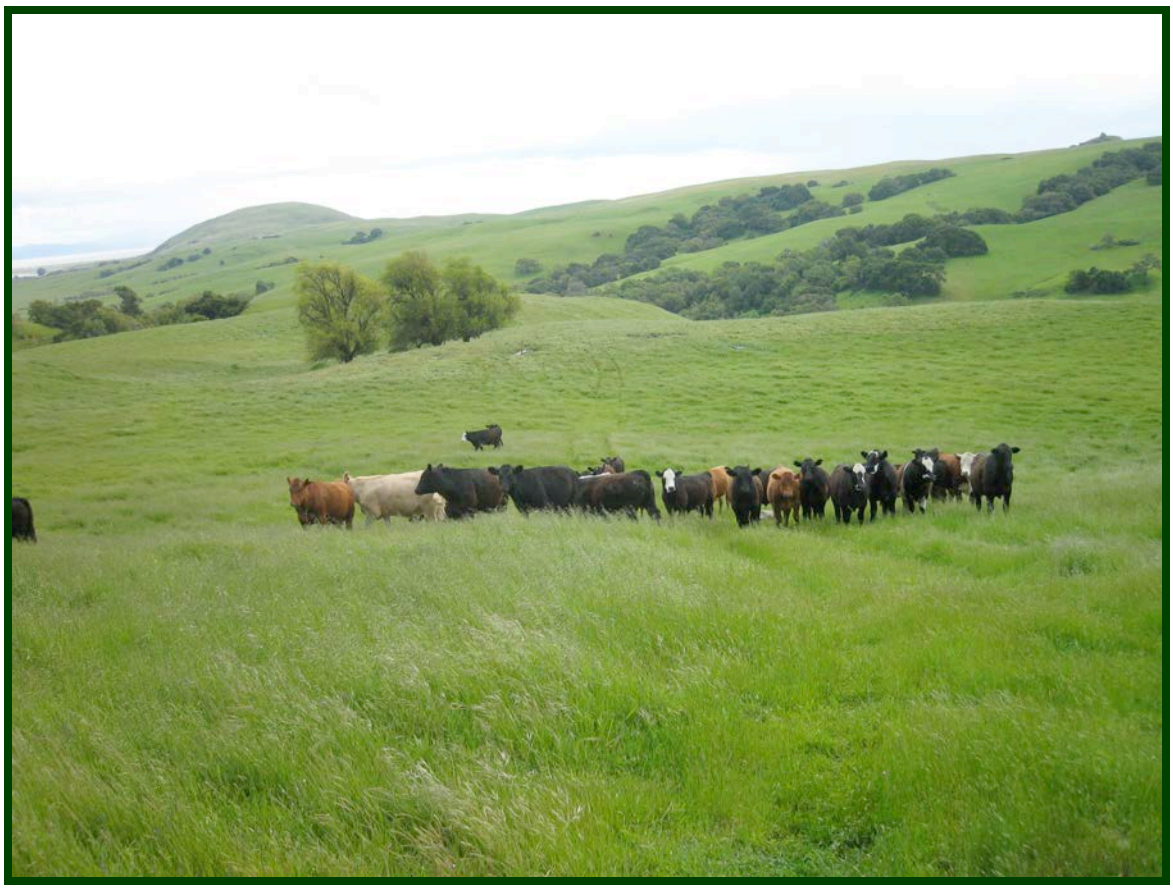
# Tolay Creek Ranch Grazing Plan

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

# Tolay Creek Ranch

# Grazing Plan



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June 8, 2010

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## Executive Summary

The primary purpose of this plan is to provide guidelines and direction to the Sonoma Land Trust (SLT), the current owner of the Tolay Creek Ranch (the Property), and the Sonoma County Regional Park District, the Property's future owner, for the use of livestock grazing to meet rangeland and resource conservation goals.

This grazing plan was designed to address natural resource management concerns at the Preserve while supporting the existing beef cattle operation. The Property has likely been grazed by domestic livestock for over 150 years, and a recent biological resources study (LSA Associates 2009) documents abundant wildlife and native grassland biodiversity on the Property. Tolay Creek, which flows for over two miles through the Property, has been degraded by livestock impacts over many decades. Riparian protection fencing and planting on Tolay Creek and its tributaries will restore habitat values and curb stream erosion within the riparian system.

As demonstrated by research and observational studies, native grassland plant diversity can be positively affected by grazing. Non-native annual plants that now dominate most of California's grasslands, compete with natives for water and sunlight, and can prevent germination and growth of certain native plants. Grazing removal from other local conservation lands, has led to the extirpation of some native grassland plants, including special-status species. As well as helping to preserve grassland biodiversity, grazing can effectively manage some noxious weeds and fire fuels. For these reasons, and for the preservation of local agriculture, the Sonoma Land Trust (SLT) has chosen to continue livestock grazing on this site.

This plan includes general background information and recommendations for livestock species, stocking rate, grazing season and timing, livestock distribution, as well as recommendations for riparian grazing and targeted grazing for an optional weed management program. Grazing recommendations should be used as guidelines, but are intended to be flexible to accommodate natural variations in forage production and other dynamic processes. Needed infrastructure improvements, and a simple monitoring program are also described.

# 1.0 Introduction

In 2007, Sonoma Land Trust (SLT) acquired the Tolay Creek Ranch (the Property) to protect its ecological and cultural resources and for future incorporation into Tolay Lake Regional Park, currently slated to occur in 2012.

This Grazing Plan describes a framework and provides specific recommendations for continuing livestock grazing on the Property for management of grassland species diversity, wildlife habitat, and fire fuels. The proposed grazing program will also continue to support productive agricultural use of the land.

Like virtually all California grasslands, livestock have likely grazed on the Property for about 150 years. The Property is leased to H & L Mohring and Sons, which has run livestock here for over 30 years. Glenn Mohring, who lives nearby, typically runs a cow-calf beef operation on the Property and on other nearby properties. Sheep were also raised on the Property in the past, as evidenced by the woven wire fencing that remains along some reaches of the boundary.

Currently, H & L Mohring and Sons typically run 220 to 250 cow-calf pairs on the Property and the 330 acres leased from the Roche family (Glenn Mohring personal communication 2010). This year, a grazing lease between the Mohrings and Sonoma County Regional Parks for Tolay Lake Regional Park left the Mohrings without enough animals to fully stock the Property. For the short-term, the Mohrings have subleased most of the Property to Dean Spinelli who has stocked it with six bulls and 120 cow-calf pairs. The Mohrings are using only one field to run 180 stockers this year.

Grazing has continued at Tolay Lake Regional Park, and incorporation of the Property into this park will result in a 3,400-acre property composed almost entirely of grassland. The most practical method for managing the grassland biodiversity, including plant species composition and wildlife habitat and fire fuels for such a large tract of land is through livestock grazing.

# 2.0 Site Description and Inventory

## 2.1 Physical Description

The 1,665-acre property occupies gently rolling hills surrounding, and the valley bottom adjacent to, lower Tolay Creek. The main stem of Tolay Creek bisects the upper part of the Property, then crosses the eastern boundary between the Property and the Roche Property several times before exiting the Property at Highway 121. Elevation ranges from 660 feet in the north end of the Property to 22 feet where Tolay Creek flows under Highway 121.

A detailed description of the Property's physical characteristics, biological resources, land use history, and the regulatory context of resource management are contained in a *Biological Resource Study, Tolay Creek Ranch, Sonoma County California* (LSA Associates 2009).

## 2.2 Vegetation

Vegetation is primarily open grassland with scattered oak and riparian woodland along Tolay Creek and some of its tributaries. Woodlands are generally degraded, with many riparian reaches lacking woody cover. In a few areas to the south of Tolay Creek, oak woodland extends from riparian zones into uplands, but only in very few locations does oak woodland exist separate from the riparian woodland.

Native and non-native grasslands are described separately in LSA Associates (2009). Although some distinct stands rich in native grass species occur on the Property, especially on the western ridge, there are also many locations where native and non-native grassland intergrade.

***Non-native Grasses***. Grassland vegetation is dominated by non-native, mostly annual species. Common non-native grasses in dry upland areas include ripgut brome (*Bromus diandrus*), soft chess (*B. horeaceus*), wild oats (*Avena fatua* and *A. barbata*), foxtail (*Hordeum murinum* ssp. *leporinum*); while Mediterranean barley (*H. marinum* ssp. *gussoneanum*) and Italian ryegrass (*Lolium multiflorum*) are common in low-lying, moister areas (LSA Associates 2009). Medusahead (*Taeniatherum caput-medusae*), an invasive non-native annual grass that has very low forage quality and other characteristics that makes it a troublesome weed, also occurs throughout the Property.

***Native Grasses.*** Small areas rich in and dense with native perennial grasses occur throughout the Property. More and larger stands of purple needlegrass (*Nassella pulchra*) occur on the hillslopes, while numerous stands of creeping wildrye (*Leymus triticoides*) and meadow barley (*Hordeum brachyantherum*) occur both on hills and in the valley bottom.

***Native Forbs***. Native and non-native forbs occur in both the native and non-native grasslands. Native forbs occur principally in dense stands scattered on slopes on the southwest side of Tolay Creek, while non-native forbs occur throughout the Property. Native forb species include Fremont star lily (*Zigadenus fremontii*), miniature lupine

(*Lupinus bicolor*), California buttercup (*Ranunculus californica*), narrow-leaved mules ears (*Wyethia angustifolia*), Kellogg's yampah (*Perideridia lelloggii*), hill morning glory (*Calystegia subacaulis*), yarrow (*Achillea millefolium*), blue-eyed grass (*Sisyrinchium bellum*), lotus (*Lotus wranglianus*), Ithurial's spear (*Tritelia laxa*), California poppy (*Eschscholzia californica*), soap plant (*Chorogalum pomeridianum*), California checker mallow (*Sidalcea malvaeflora*), and Johnny jump-up (*Viola pedunculata*). The Property also supports large stands of hayfield tarweed (*Hemizonia congesta* ssp. *lutescens*) (LSA Associates 2009).

***Non-native Forbs***. Non-native forbs include rose and subterranean clovers (*Trifolium hirtum* and *T. subterraneum*), broad-leaved and red-stemmed filarees (*Erodium botrys* and *E. cicutarium*), common vetch (*Vicia sativa*), Venus' needle (*Scandix pecten-veneris*) and other weed species listed below (LSA Associates 2009).

***Invasive Weeds***. Additional non-native forb species include the following invasive weeds: purple star-thistle (*Centaurea calcitrapa*), yellow star-thistle (*Centaurea solstichialis*), bristly ox-tongue (*Picris echioides*), Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), bull thistle (*Cirsium vulgare*), black mustard (*Brassica nigra*), and jointed charlock (*Rhapanus raphanistrum*) (LSA Associates 2009). Medusahead is also an invasive grassland weed and Himalayan blackberry (*Rubus discolor*) has become established in numerous locations along Tolay Creek and its tributaries.

2.2.1 **Forage Quality and Quantity**. Extensive grasslands at the Property provide green forage for seven to eight months each year. Overall forage quality is good, as grasslands are dominated by palatable species. The invasive weed species are generally of low palatability or unpalatable, but these constitute a relatively small proportion of the grassland vegetation. Fortunately, medusahead occurs in small, scattered stands and is not a dominant species.

In general, forage quality fluctuates with seasons and phenological stages of plant growth, and is highest in mid-spring when grasses are approaching maturity but have not yet flowered. This corresponds with the rapid spring growth period, when grassland biomass is also highest.

Forage production is very good, and most of the soil map units are classified into range sites by the *Sonoma County Soil Survey* (USDA 1972) that are among the most productive in Sonoma County, with the exception of the serpentine soils. Generally, forage production is lower on slopes where soils are thin and rocky, especially on the serpentine derived Montara cobbly clay loam soils, and production is higher in the valley bottom on deep, alluvial soils. Production can vary dramatically between years, depending on rainfall amount and distribution, and spring winds. Soil Survey values for the various map units at the Property range from 500 to 2,000 pounds per acre in an unfavorable year and 1,200 to 4,000 pounds per acre in a favorable year.

**Abundant forage in Mack Field, April 2010**

## 2.3 Wildlife

Grasslands on the Property are likely to support breeding grasshopper sparrows and horned larks. When occurring together, these species indicate high-quality, diverse grasslands, with horned larks preferring short grass and bare areas while grasshopper sparrows prefer taller grass habitats (LSA Associates 2009). This differential preference illustrates the need for some patchiness in grassland canopy height. Completely uniform grazing is undesirable, and grazing intensity should be light enough to allow a matrix of short, medium and tall patches of herbaceous vegetation, especially in the spring.

Grasslands also provide foraging habitat for other songbirds, raptors, and small mammals that they feed on (LSA Associates 2009). A six-year study by University of California Berkeley faculty and graduate students on East Bay grassland sites under light to moderate cattle grazing and repeated rotational sheep grazing has shown the presence of horned larks to be significantly and positively associated with livestock grazing. It has also shown that grasshopper sparrows are more likely to be found where there are livestock grazing and native bunch grasses. Grasshopper sparrows are also associated with greater vegetation height variability (Dr. James Bartolome personal communication 2010).

## 2.4 Soils

The *Sonoma County Soil Survey* (USDA 1972) divides the Property into four soil map types: Clear Lake clay loam, Diablo series, Goulding series, and Montara loam. Clear Lake clay loam occurs primarily in the level areas along Tolay Creek. The associated

vegetation is primarily herbaceous. The Diablo series occupies the slopes. It typically has low permeability, high runoff potential, and high shrink-swell potential, and supports grasslands and scattered oaks. The Goulding series is composed of clay and rocky loam on slopes and supports primarily grassland. The Montara cobbly clay is in the southwest portion of the property, overlying the serpentine rocks.

## 2.5 Riparian Areas

As its name implies, Tolay Creek is a prominent feature of the Tolay Creek Ranch. Tolay Creek and its tributaries begin on Tolay Lake Regional Park to the north. Tolay Creek's origin is the outlet of Tolay Lake, from which it flows southeast into Sonoma Creek, then San Pablo Bay.

Restoration and enhancement of Tolay Creek is recommended by both the *Biological Resource Study, Tolay Creek Ranch* (LSA Associates 2009) and the *Tolay Creek Riparian Enhancement Plan* (West Coast Watershed 2009), which describes Tolay Creek's condition and recommends enhancement measures, including construction of riparian livestock exclusion fencing and revegetation. Tolay Creek's condition is described in this plan:

> "In general, the riparian zones associated with Tolay Creek and its tributaries are highly degraded, characterized by steep, eroding banks and in many places completely devoid of native perennial vegetation."

The Biological Resources Study (LSA Associates 2009) describes riparian habitats as the most important habitat for landbirds in California, with several species depending on riparian habitat for their entire breeding cycle. Structural diversity and understory volume are important components of riparian habitat for breeding birds (Marin County Resource Conservation District et al. 2001). Due to the critical importance of high quality riparian habitat for breeding birds, and the scarcity of such habitat, a primary focus of the riparian restoration effort should be to create high-quality bird breeding habitat within the Tolay Creek riparian corridor.

LSA Associates (2009) also addresses restoration of the Tolay Creek riparian woodland and recommends that the entire length of the creek be fenced, with only occasional short-term grazing recommended within the fenced corridor to maintain the habitat diversity if cattails and bulrush become so dense that pools are filled in.

### 2.5.1 Livestock Impacts to Riparian Areas

. Livestock have had free access to Tolay Creek for many years and are at least partially responsible for the depauperate riparian vegetation. The dramatic downcutting and resultant bank erosion that Tolay Creek is currently experiencing has been analyzed by a fluvial geomorphologist (Florsheim 2008), who has not indicated that livestock grazing is the cause of the unstable riparian system. However, bank trampling and grazing and browsing of riparian vegetation has apparently degraded some localized areas of the creek and its tributaries.

Livestock can contribute to water quality degradation by addition of pathogens, nutrients, and sediment to creeks and waterbodies. Livestock borne pathogens include *Cryptosporidium parvum* and particular strains of *E. coli*, both of which can cause illness in humans. These pathogens are of particular concern where contaminated drainages flow into water bodies that serve as drinking water sources and/or contact recreational areas, neither of which occur downstream of Tolay Creek.

Nutrients, including nitrogen and phosphorous from livestock urine and fecal material, can degrade water quality and impact aquatic life. Livestock related nutrient pollution is most serious where animals are confined, such as dairies and feedlots, which produce large quantities of concentrated animal waste. Land extensive grazing, such as occurs at the Property, is much less likely to cause significant nutrient pollution, although animal waste deposited directly into waterways, or placements of livestock attractants such as water near waterways, can degrade water quality.[1]

## 2.6 Existing Infrastructure

Existing livestock infrastructure consists of cross fencing, boundary fencing with associated gates, and livestock watering systems. Infrastructure improvements are shown in Figure 1.

**Fencing at upper boundary between Mack Field and Tolay Lake Regional Park**

[1] Fifty to 60 percent of cattle fecal loading on annual rangelands is near cattle attractants (Dr. Ken Tate personal communication)

2.6.1 **Boundary Fencing**. Livestock fencing bounds the Property except at the border with the Roche Property, and along the north and west sides of the narrow section along Highway 121, which are both unfenced. Boundary fencing is all in poor to fair condition and consists of barbed-wire and/or woven sheep fence topped with barbed-wire. Repair and replacement of boundary fencing is generally considered to be the responsibility of both landowners where livestock grazing occurs on both sides of a boundary fence, but where livestock grazing occurs on only one side, the landowner operating the livestock ranch is obligated to contain the animals. California law[2] requires livestock owners to keep animals off of public highways.

**Table 1 Existing boundary fencing assessment**

| Fence Reach as Shown in Figure 1 | Section Location | Length in Feet | Comments |
|---|---|---|---|
| BF1 | Adjacent to Infineon Raceway properties, at southern boundary | 8,050 | Very poor condition |
| BF2 | Adjacent to Fredericks property, at southwestern boundary | 3,150 | Poor condition |
| BF3 | Adjacent to Gambonini property, at western boundary | 5,400 | Fair condition |
| BF4 | Adjacent to Tolay Lake Regional Park, at northern boundary | 10,420 | Poor to fair condition |
| BF5 | Adjacent to Lilly Property, at northern boundary | 6,350 | Poor to fair condition |
| BF6 | Adjacent to Highway 121 | 2,700 | Good condition, built by CalTrans in 2003 |
| | **Total** | **36,070** | |

[2] California Food and Agricultural Code Division 9, Part 1, Chapters 6 and 7

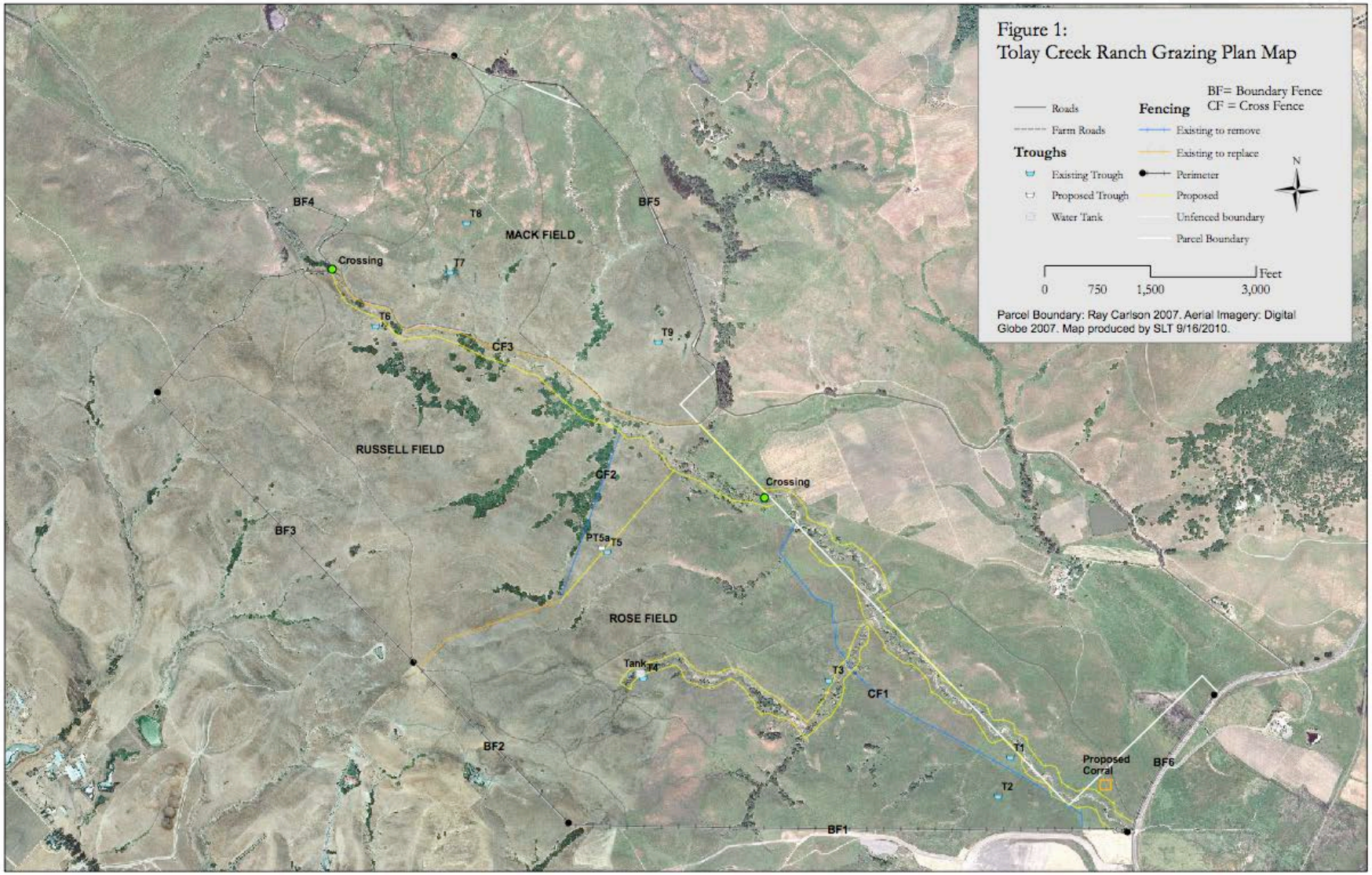
Figure 1:
Tolay Creek Ranch Grazing Plan Map
BF= Boundary Fence
CF = Cross Fence
Roads
Farm Roads
Troughs
Existing Trough
Proposed Trough
Water Tank
Fencing
Existing to remove
Existing to replace
Perimeter
Proposed
Unfenced boundary
Parcel Boundary
N
Feet
0
750
1,500
3,000
Parcel Boundary: Ray Carlson 2007. Aerial Imagery: Digital Globe 2007. Map produced by SLT 9/16/2010.
BF4
BF5
T8
MACK FIELD
Crossing
T7
T6
T9
CF3
RUSSELL FIELD
CF2
Crossing
BF3
PT5a
T5
ROSE FIELD
Tank
T4
T3
CF1
BF2
T1
Proposed Corral
BF6
T2
BF1

2.6.2 **Cross fencing**. Three existing cross fences divide the Property into the 712-acre Rose Field, the 480-acre Russell Field, and the 463-acre Mack Field, and separate a roughly 67-acre linear section of the Rose Field that is contiguous with the Roche Property from the remainder of the Rose Field. Cross fences are all in poor condition and the fence between the Rose and Russell fields is no longer effective in containing cattle.

2.6.3 **Livestock Water System**. The Property is endowed with abundant and well-distributed springs that fill nine livestock drinking troughs. The livestock water system consists of these troughs, a 5,000-gallon water storage tank, a pond, and distribution pipes. Livestock presently also drink out of Tolay Creek and its tributaries, to which they have had free access. Surface water from the pond fills trough T4 via a 2 inch pipe, and overflow from this trough fills the 5,000-gallon storage tank, which in turn fills trough T5. If the water level in the stock pond gets low enough, the storage tank and both of these troughs would dry up (Brad Stevens personal communication 2010).

**Table 2. Existing livestock water locations**

| **Rose Field** | **Comments** |
|---|---|
| T1 | Rectangular concrete trough installed in 2009, fed by 4 inch pipe, source unknown, has been in place less than one year |
| T2 | Rectangular concrete trough installed in 2009, fed by 4 inch pipe, source unknown, has been in place less than one year |
| T3 | Rectangular concrete trough installed in 2009, fed by 4 inch pipe, source unknown, has been in place less than one year |
| T4 | Round metal trough, fed by stock pond surface water, runs year-round |
| T5 | Rectangular concrete trough installed in 2009, fed by 4 inch pipe, from stock pond surface water, has been in place less than one year |
| **Russell Field** | |
| T6 | Rubbermaid trough, fed by very good spring that needs to be redeveloped, runs year-round except in drought years |
| **Mack Field** | |
| T7 | Old metal trough, spring fed, runs year-round; this trough is located very close to a seep which is heavily impacted by cattle who visit this trough to drink |
| T8 | Round concrete trough, spring fed, runs year-round |
| T9 | Rectangular metal trough, spring fed, runs year-round |

## 3.0 Management Goals and Objectives

SLT's overall goal for the Property is to protect its ecological, cultural, and scenic resources and to provide for future public recreation. More specific goals and objectives related to grazing include the following ecological goals (Neale 2009):

**Goal 1.** Enhance riparian habitat on Tolay Creek.

**Objective 1a.** Increase extent of native riparian vegetation on Tolay Creek and its tributaries.

**Objective 1b.** Reduce bank erosion on Tolay Creek and its tributaries.

**Goal 2.** Manage grazing to promote native plant species and discourage non-native species.

**Objective 2a.** Maintain native cover in serpentine and native-dominated grasslands through well-managed grazing.

**Objective 2b.** Prevent expansion of yellow star-thistle and purple star-thistle.

Goal 1 and its associated objectives will be achieved by excluding livestock from Tolay Creek and select tributaries. Occasional grazing may occur within the riparian exclusion area if needed for weed or fire fuel management, but, if so, grazing episodes will be only occasional and for short durations (see section 4.5).

Goal 2 and its objectives will be achieved through continued moderate grazing that will help to manage non-native, primarily annual biomass, and by using carefully timed short-duration, high-intensity grazing for yellow star-thistle management (see section 4.6). Purple star-thistle cannot be effectively managed with grazing.

The serpentine area on the west ridge supports extensive native forb cover, including Marin western flax (*Hesperolinon congestum*), cream cups (*Platystegon californicus*), California goldfields (*Lasthenia californica*) tidy-tips (*Layia* spp.), California plantain (*Plantago erecta*), and many other species. These small-statured plants thrive on the low fertility serpentine soils, due in part to the limited competition from non-native annual grasses that grow better on more fertile sites. In some areas of California, including San Jose, non-native annual grasses have recently invaded serpentine grasslands due to deposition of atmospheric nitrogen, which increases soil fertility and can drastically alter the native flora. Atmospheric nitrogen deposition has also been detected on non-serpentine sites in Sonoma County along Highway 12 and on Todd Road between Santa Rosa and Sebastopol (Daniel Gluesenkamp personal communication).

Continued grazing on the serpentine area and throughout the Property, should help maintain native cover by creating open areas in the grassland canopy, and exposing small areas of soil within which small-statured forbs can germinate and grow.

# 4.0 Proposed Grazing Program and Recommendations

Continuing the moderate level of grazing at the Property, combined with riparian fencing, and an increased level of weed management should preserve and enhance native plant species diversity and wildlife habitat while providing on-going management of fine fire fuels. Infrastructure improvements and placement of salt licks will be used to improve animal distribution to avoid under- or over-utilization of specific areas within the Property. The current cow-calf beef operation is compatible with management goals and objectives for the Property, and no significant changes to the overall livestock operation are proposed.

## 4.1 Livestock Species

Foraging habits, behaviors, and other characteristics differ between livestock species and classes that may make one type of livestock preferable over another for meeting site-specific management goals. Predator problems, site topography and local availability of livestock types are also important considerations.

Different species of animals prefer different topographic positions. Steepness of slope significantly influences distribution of cattle (Heady and Child 1994), while smaller animals, such as sheep and goats, are more able to traverse steep hillsides. Larger animals including cattle and horses prefer to graze level-to-gently rolling land. In areas with steep terrain, cattle generally congregate on more level areas, which can lead to heavy use of flat land unless infrastructure or attractants are used to improve distribution. The gentle topography of the Property is well suited to cattle grazing.

Small-scale targeted grazing by goats and/or sheep may be useful for managing weed species (see section 4.6), or for grazing within the riparian fence (see section 4.5), but extensive grazing by either of these species is not recommend because of their potential to negatively impact the native forbs and because predation by coyotes would likely cause significant livestock losses. If a future grazing tenant or Sonoma County Regional Parks utilizes goats or sheep for targeted grazing of weeds or riparian grazing, both of these smaller livestock species would require protection with webbed electric fencing and possibly guard dogs, or would need to be brought in to a secure enclosure at night.

Grazing animals are divided into groups based on their vegetation preferences and primary foraging methods. These groups include the grazers (cattle and horses), which have a diet dominated by grasses and grasslike plants, the browsers (goats), which consume primarily forbs and shrubs, and the intermediate feeders (sheep), which have no particular preference for grasses, forbs, or shrubs (Holechek, Pieper and Herbel 1998). Browsers commonly consume large amounts of green grass during rapid growth stages but avoid dry, mature grass and often experience digestive upsets if forced to consume too much mature grass (Vallentine 1990).

Body size and reticulo-rumen capacity, anatomical differences in teeth, lips, and mouth structure, grazing ability, and differences in digestive systems account for some of the differences in foraging behavior. Mouth size directly affects the degree of selectivity that

is physically possible; ruminants with small mouth parts such as sheep and goats, in contrast to cattle and horses, can more effectively utilize shrubs while selecting against woody material. Dietary preferences of different livestock species are shown in Table 3.

**Table 3. Generalized dietary preferences by domestic livestock species**

| Species | Dietary Preferences |
|---|---|
| Cattle | Grazer: mostly grasses, some seasonal use of forbs and browse |
| Horses | Grazer: mostly grasses, minor forbs and browse |
| Sheep | Intermediate feeder: high use of forbs, but also use high volumes of grass and browse |
| Goats | Browser to intermediate feeder: high forb use, but can utilize large amounts of browse and grass; highly versatile |

(Adapted from Vallentine 1990)

In addition to physiological influences on diet selection, animal behavior can strongly affect what livestock choose to eat. Young animals learn foraging behaviors from their mothers and peers and can be taught to eat or avoid certain plants.

Although many other factors can influence forage consumption, animal unit equivalents (AUEs) are useful in estimating stocking rates and comparing forage demand of different ages and species of animals. Animal unit equivalents vary by source, actual weight of animal, and individual animal (USDA 2003). Table 4 provides AUEs for common domestic livestock and can be used as follows:

7 mature sheep or goats = 1.4 animal units (7 x .2)
48 two year old cattle=38 animal units (48 x .8)

**Table 4. Animal unit equivalents**

| Animal kind and class | Animal Unit Equivalent | Monthly Forage Consumption |
|---|---|---|
| Cow, dry | .92 | 727 |
| Cow, with calf | 1.00 | 790 |
| Bull, mature | 1.35 | 1,067 |
| Cattle, 1 year old | .60 | 474 |
| Cattle, 2 year old | .80 | 632 |
| Horse, mature | 1.25 | 988 |
| Sheep, mature | .20 | 158 |
| Lamb, 1 year old | .15 | 118 |
| Goat, mature | .15 | 118 |
| Kid, 1 year old | .10 | .79 |

(Adapted from Vallentine 1990)

***Livestock Species Recommendations:***

- Continue the cattle grazing as described in this plan
- Utilize the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant or a third party, for riparian area grazing as described in section 4.5 and weed management as described in section 4.6

## 4.2 Stocking Rate and Grazing Capacity Estimates

Stocking rate is the actual number of animals on a site for a given period of time. Annual fluctuations in forage production mean that setting and adjusting stocking rates should be viewed as a process rather than an exercise in determining a precise number of animals that a site can carry.

The Property has supported about 220 cow-calf pairs for 30 years (Glenn Mohring, personal communication 2010). Animal numbers have varied within 10 to 15 percent between drought years when forage production has been very poor, and good forage years. The current condition of Property resources, including the considerable grassland species diversity, is in part due to livestock management at this stocking rate.

LSA Associates (2009) recommends maintaining the vegetation in roughly its current state, until more is known about the Property's ecology, although enhancement and weed control are recommended. The serpentine areas in particular is valuable due to high plant and insect diversity, and as noted by LSA (2009) this area has withstood the trampling of cattle since the arrival of the Spanish.

Riparian exclusion fencing will remove approximately 50 acres,[3] or three percent of the Property from grazing. If the stocking rate is reduced to reflect this, it would mean a reduction by seven to eight AUs.

### 4.2.1 Residual Dry Matter

**Residual Dry Matter**. Residual dry matter (RDM) is the dry, herbaceous biomass remaining on the ground at the end of the grazing season, usually measured in October, and before fall rains begin. Retaining an appropriate level of RDM serves several purposes. Adequate RDM minimizes early season erosion from rain splash, provides favorable conditions for seed germination, and has been shown to affect future years forage production and species composition on annual rangelands.

A moderate level of grazing should be maintained unless specific resources call for more or less intensive use. Rangeland researchers have defined and quantified "moderate grazing:" Clawson and McDougald (1982) found that too much RDM results in a thatch, which inhibits early response of new forage growth, and that maintenance of seeded annual legumes and filaree (*Erodium* spp.) abundance[4] requires adequate but lower amounts of RDM than grass forages and linked the idea of using broad categories to describe grazing impact on landscape appearance and stubble height: light grazing leaves three or more inches; moderate grazing leaves two inches; and heavy grazing leaves less than two inches with areas of bare soil visible from 20 feet away.

Early RDM research related RDM levels—which can be related to low, moderate, or heavy grazing—to subsequent years forage production and species composition (Heady 1956). Over the four years of an experiment that involved manually manipulating RDM levels within plots by hand clipping to various levels, Heady found that:

[3] It will also remove roughly nine acres of the Roche Property from grazing
[4] This indicates that excessive RDM can have a negative effect on some forb species

- increasing amounts of RDM on the soil immediately before the fall rains led to an increase in herbage production the following spring
- biomass production increased with increased weight of RDM between 1,200 and 2,400 pounds per acre
- some species responded to RDM treatments and some didn't
- RDM had a direct effect on composition and some species were favored when all mulch was removed, others were favored when none was removed, and a third group reached maximum composition with intermediate RDM levels; for example, California goldfields (then *Baeria chrysostoma*, now *Lasthenia californica*) was very abundant with no RDM and was absent where RDM was heaviest; conversely, soft chess (then *Bromus mollis*, now *B. hordeaceus*) was the only plant that increased significantly in percent composition with the heaviest RDM treatments; legumes were most abundant at intermediate RDM levels

In conclusion, RDM levels can dramatically effect forage production and species composition. A moderate level of grazing should be maintained to ensure continued high forage production and forage species diversity. For practical purposes, this means that significant bare or heavily grazed areas should not occur as this level of disturbance encourages invasion by thistles and other unpalatable noxious weeds, and that excessive lightly grazed areas should also be avoided to prevent thatch buildup, which is detrimental to early forage production and maintenance of important forbs such as clovers.

University of California researchers have established minimum RDM standards for different grassland types and climatic regions based on these attributes. Published standards (Bartolome et al. 2002) and professional judgment were used to determine a target minimum RDM level of 1,000 pounds per acre for the Property, except in the serpentine area and areas where high-intensity grazing is used for weed management. The serpentine area, which may have annual production of less then 1,000 pounds per acre, and which supports the most native forbs can have very low RDM.[5] Weed management areas may have RDM as low as several hundred pounds per acre in treatment years.

Low RDM in a single year is not apt to cause significant, lasting negative effects on forage resources, plant species composition, or other features. However, RDM below the recommended minimum level in two or more consecutive years should be avoided by destocking or supplemental feeding. RDM monitoring is discussed in more detail in section 6.2.

4.2.2 **Soil Survey Forage Production Estimate**. The *Sonoma County Soil Survey* (USDA 1972) provides estimates of forage production for range sites and/or soil map units for years of "favorable" and "unfavorable" moisture. Although these estimates are very general, and do not reflect site specific conditions such as past land uses and forage species composition, range site estimates provide rough guidelines for comparison with other methods.

[5] RDM levels of 500 pounds per acre for the serpentine area were used in stocking rate calculations, but slightly lower levels may be acceptable or even desirable.

Table 4 provides range site estimates for "unfavorable" and "favorable" moisture years for total AUMs, where one AUM is equal to 1,000 pounds of forage.

Subtracting 1,000 pounds per acre of RDM, results in an "unfavorable" year total of 1,169 available AUMs and a "favorable" year total of 3,948 available AUMs. Divided by 12 months, these values can be converted into stocking rates in AUs per year for a year-round grazing operation. The "unfavorable" year stocking rate would be 97 AUs/year, and the "favorable" year stocking rate would be 329 AUs/year. These values represent extremes in predicted forage production, so using the average should reflect what can be expected in most years.

**Table 5. Tolay Creek Ranch soil survey range site forage estimates**

| | Soil Unit | Acres | AUMs/acre "Unfavorabe" Year | AUMs/acre "Favorable" Year | Total AUMs "Unfavorable" Year | Total AUMs "Favorable" Year |
|---|---|---|---|---|---|---|
| CcA | Clear Lake clay loam 0-20% slopes | 176 | 2.0[6] | 4.0 | 352 | 704 |
| DbC | Diablo clay 2-9% slopes | 58 | 2.0[7] | 4.0 | 116 | 232 |
| DbD | Diablo clay 9-15% slopes | 240 | 1.8 | 3.6 | 432 | 864 |
| DbE | Diablo clay 15-30% slopes | 145 | 1.8 | 3.6 | 261 | 522 |
| DbE2 | Diablo clay 15-30% slopes, eroded | 756 | 1.8 | 3.6 | 1,361 | 2,722 |
| GoF | Goulding – Toomes complex, 9–50% slopes | 101 | 1.6 | 3.2 | 162 | 324 |
| GuF | Gullied land | 31 | NA | NA | 0 | 0 |
| MoE | Montara cobbly clay loam 2–30% slopes | 158 | .5 | 1.2 | 79 | 190 |
| | **Total** | **1,657** | | | **2,747** | **5,526** |
| **Less RDM of 1,000 lbs./acre (1.0 AUMs) for Clear Lake, Diablo and Goulding Soils and 500 lbs./acre (.5 AUMs) for Montara soils** | | | | | -1,578 | -1,578 |
| **Total available forage in AUMs (Total AUMs – RDM)** | | | | | **1,169** | **3,948** |
| **Average available forage for unfavorable and favorable years in AUMs** | | | | | **2,558** | |
| **Stocking rate in AUs for a year-round (12 month) operation (Total available forage in AUMs/12 months)** | | | | | **97** | **329** |
| **Average stocking rate for unfavorable and favorable years in AUs for a year-round (12 month) operation** | | | | | **213** | |

[6] The Sonoma County Soil Survey does not provide range site production estimates for Clear Lake clay loam 0-20% slopes; instead, the forage production estimate for dryland pasture production under a high level of management (Table 2, Soil Survey, Sonoma County) was used to represent production in a favorable year, with the assumption that production in an unfavorable year would be reduced by 50%

[7] The Sonoma County Soil Survey does not provide range site production estimates for Diablo clay 2-9% slopes; instead, the forage production estimate for dryland pasture production under a high level of management (Table 2, Soil Survey, Sonoma County) was used to represent production in a favorable year, with the assumption that production in an unfavorable year would be reduced by 50%

4.2.3 **Scorecard Grazing Capacity Estimate**. University of California researchers developed a simple "scorecard" that can be used to estimate grazing capacity on annual-dominated rangelands based on desired RDM levels and general site characteristics. This method provides rough estimates based on rainfall, canopy cover, and slope (McDougald et al. 1991). The scorecard method of estimating grazing capacity accounts for animal behavior by recognizing that grazing use decreases on steeper slopes.

**Table 6. Scorecard for Central Coast and Central Valley Foothills Zone (10 inch to 40 inch precipitation), with RDM adjusted upwards to 1,000 pounds per acre**

| | **Slope Classes** | | | |
|---|---|---|---|---|
| **Canopy Cover (percent)** | <10% | 10%-25 % | 25% - 40% | >40% |
| | **AUM/acre** | | | |
| **0% to 25%** | 1.4 | .4 | .3 | .1 |
| **25% to 50%** | .9 | .2 | .2 | 0 |
| **50% to 75%** | .4 | 0 | .1 | 0 |
| **75% to 100%** | 0 | 0 | 0 | 0 |
| | **RDM lb/acre** | | | |
| | 1,000 | 1,000 | 1,000 | 1,000 |

(Adapted from McDougald et al. 1991)

A digital elevation model generated by Gold Ridge Resource Conservation District, shows that 1,567 acres of the Property is on slopes of zero to 10 percent, and 90 acres is on slopes of 10 to 25 percent. According to this scorecard, the lower gradient slopes should provide 1.4 AUMs/acre of available forage, while slopes in the steeper slope class should provide .4 AUMs/acre of available forage, resulting in a total of 2,320 AUMs of available forage, or a stocking rate of 193 AUs on a year-round basis.[8]

4.2.4 **Current and Historic Stocking Rates**. Glenn Mohring, the current grazing tenant, has run cattle at the Property for over 30 years. Currently, Glenn has 180 stockers on the approximately 464-acre Mack Field. He brought them on-site in mid-December when they weighed about 500 pounds each, and they will be sold in mid-June when they weigh about 860 pounds each.

Glenn says that he is pretty conservative with his stocking rate, as he doesn't want to have to feed a lot of hay. In some years, if there is excess feed on the Mack Field after the stockers come off, he may graze this field with some of his cow/calf pairs (Glenn Mohring personal communication 2010).

In addition to the stockers, there are 120 cow-calf pairs plus six bulls on the remaining 1,201 acres. This year's total forage demand for both the stockers (see Table 7) and the cow-calf pairs is in 2,270 AUMs. This is equivalent to a stocking rate of 189 AUs/year. [9]

[8] 2,320 AUMs ÷ 12 months = 193 AUs; this scorecard slightly overestimates AUMs, because the 158 acres of Montara soils will have RDM of roughly 500 pounds per acre

[9] 734 AUMs for the stockers (see Table 7), + 120 Cow-calf pairs x 1 AUM/pair/month + 6 bulls x 1.35 AUM/bull/month x 12 months = 2,270 AUMs/year ÷ 12 months = 189

Glenn has typically run 220 to 250 cow-calf pairs on the Property plus the 330 acres leased from the Roche family, in past years when he did not buy stockers. This works out to almost eight acres per pair, or an average of 196 pairs for the Property.

**Table 7. Current stocking rate for 464-acre Mack Field with 180 500-pound stockers at an average of two pounds gain per day**

| Month | Stocker Weight in Pounds | Forage Demand for 180 Animals in AUMs |
|---|---|---|
| December (.5 months) | 500 | 45 |
| January | 560 | 101 |
| February | 620 | 112 |
| March | 680 | 122 |
| April | 740 | 133 |
| May | 800 | 144 |
| June (.5 months) | 860 | 77 |
| **Total** | **NA** | **734** |
| **Average per month** | **680 (.68 AUs)** | **122** |

4.2.5 **Summary and Recommended Stocking Rate**. Due to the interannual fluctuations in forage production, and the fact that recommended RDM levels are not absolute, stocking rates should be somewhat flexible. The seven to eight AUs that will be displaced due to the riparian fencing will slightly lower the historic stocking rate, as the fenced area will be grazed only occasionally and grazing may be by a small separate herd of sheep or goats.

An average of the favorable year and unfavorable year Soil Survey forage production estimates, the scorecard estimate, and current and the historic stocking rates, all indicate that a stocking rate ranging from 190 to 200 pairs, is appropriate for the Property. Although the Soil Survey favorable and unfavorable year estimates vary by over 300 percent, the unfavorable year value could occur in an extreme drought year, while the favorable year value probably reflects an extremely productive year similar to 2010. Stocking rates for other classes of livestock can be calculated using Table 4.

**Table 8. Comparison of results from grazing capacity estimation methods**

| Method of forage production estimation | Available forage in AUMs/acre | Stocking Rate in AUs for 12 Months |
|---|---|---|
| Soil Survey | 2,558[10] | 213[11] |
| Scorecard | 2,320 | 193 |
| Current stocking rate | 2,270 | 189 |
| Historic stocking rate | 2,820 | 196 |
| **Recommended range of stocking rates** | | **190 -200** |

4.2.6 **Stocking Rate Adjustments**. In severe drought years or in years of above-average forage production, stocking rates may need to be adjusted downward or upward during the grazing season to achieve management objectives. This process can be tricky, as it requires the livestock operator to be flexible and to respond quickly to unpredictable weather conditions that affect forage production. A livestock producer who must decrease

[10] Average of for unfavorable and favorable years
[11] Ibid

stocking rates in response to a spring drought may suffer financially. In a good forage year, adding animals may be difficult unless the operator has a large herd with the ability to move animals from other sites.

The stocking rate should be adjusted downward in poor feed years by weaning calves early, or culling more heavily than usual. In good forage years, culling animals lightly or retaining more replacement animals can be used to increase stocking rates. A process for adjusting stocking rates should be identified in the grazing contract.

***Stocking Rate Recommendations:***

- Maintain a stocking rate of 190 to 200
- In years of extreme drought, cattle should be culled more heavily than usual to decrease stocking by 10 to 15 percent
- In years of unusually high forage production, lighter culling or retaining more replacement heifers should be used to manage excess forage
- Maintain a minimum of 1,000 pounds per acre of RDM on Clear Lake, Diablo and Goulding Soils and 500 pounds per acre of RDM on Montara (serpentine) soils

## 4.3 Grazing Season and Timing

Except as described in section 4.6, the year-round grazing regime that has been practiced at the Property for many decades should continue. This low input, land extensive management system has preserved significant native forb populations, including the federally threatened Marin western flax and significant native grass stands, as well as diverse wildlife species including borrowing owls, ground nesting birds, and the federally threatened California red-legged frog (*Rana aurora draytonii*).

Although Tolay Creek and its tributaries have been degraded by long-term, year-round grazing impacts, the proposed riparian fencing and restoration program will improve riparian conditions.

Additional reasons for continuing land extensive, year-round grazing are:

- Year-round grazing is required to sustain cow-calf beef operations, which are the basis for California's beef industry; mother cows must have pasture throughout the year.
- Cattle that are spread out on the landscape at moderate stocking levels create grasslands with diverse structure, which provides suitable habitat for grassland birds and other wildlife species.
- More intensive grazing pressure, other than on a very small scale, may not be supported by some of the springs. For example, the water trough in the Russell Field has run dry in some drought years, and cattle have had to be removed from this field (Glenn Mohring, personal communication).

***Grazing Season and Timing Recommendations:***

- Continue the year-round grazing system that is currently in place throughout the Property
- Use carefully, short-term, targeted grazing for weed management as described in section 4.6
- Use occasional short-term grazing to manage fire fuels and weeds within the riparian fencing as described in section 4.5

## 4.4 Livestock Distribution

Livestock should be distributed throughout a site to avoid areas of overuse or underuse that can lead to rangeland degradation, but completely uniform grazing is undesirable as it decreases the variability in grassland structure. Replacement of the cross fence on the west ridge (CF2, as shown in Figure 1), and cross fencing that bounds the Mack Field, creates three fields that provide the framework for animal distribution on the Property. Within each field, water is the main attractant and livestock tend to use areas near water sources more heavily than distal locations. Shade and patches of particularly palatable forage are also livestock attractants that help distribute animals across the landscape.

Five water troughs in the Rose Field and three troughs in the Mack Field aid animal distribution in these fields, but with only one trough in the Russell Field, it has been underutilized in some years. Glenn Mohring has had to take animals out of the Russell Field late in the year in dry years when the one water trough could not provide enough water for cattle (Glenn Mohring personal communication 2010). Development of a second water trough on the north side of CF2 (PT5a), will improve animal distribution in this field (see Figure 1).

Other attractants such as salt licks or other nutritional supplements can also be used to improve livestock distribution. They should be placed in underutilized areas, as far from water as possible.

***Livestock Distribution Recommendations:***

- Install water trough PT5a in the Russell Field as shown in Figure 1
- Place salt licks and/or other mineral supplements in under utilized areas as needed

## 4.5 Riparian Grazing

The *Tolay Creek Riparian Enhancement Plan* (West Coast Watershed 2009) recommends extensive riparian revegetation for habitat enhancement and stabilization of Tolay Creek and its tributaries. This work will require livestock to be excluded from enhancement areas for the short-term, and possibly indefinitely from some areas; the plan suggests that fencing should be in place for a minimum of 10 years to allow riparian vegetation establishment and minimize bank erosion caused by cattle access to riparian areas. Barbed wire fencing will be installed to create an approximately 150 foot wide fenced corridor, which will result in exclusion of approximately 60 acres from the Property and the adjacent Roche Property. The riparian enhancement plan further recommends limited duration, seasonal livestock access during the dry season.

Since habitat enhancement is one of the main purposes of the fence construction, maximizing habitat values within the corridor should take precedence over utilizing the area for livestock forage. Livestock may be useful for limited and occasional grazing within the corridor, but maintaining a diverse habitat structure including a dense shrubby understory, a mid-level tree story, then an emergent, tall tree canopy layer should be the main objective of the riparian enhancement program.

The woody understory is important for birds that nest at or just above the ground level including Wilson's warbler, Swainson's thrush and/or spotted towhee and quail (Clinton Kellner personal communication 2010).

Since livestock grazing and browsing mostly affects vegetation within this lower zone, grazing should only occur when and if woody plants become well established, or if livestock can be excluded from woody riparian vegetation within the riparian corridors with electric or other portable fencing. Because Tolay Creek is sinuous in its lower reaches, and constructing corners in livestock fencing is expensive, straight reaches of riparian fencing will fence out some relatively large patches of grassland. These areas could be grazed if woody plants can be protected from browsing with temporary fencing, provided that water is also provided in portable troughs. Grazing should occur in these areas if undesirable weed species proliferate.

Fuel loading within the approximately 60-acre riparian corridor should not pose a significant danger to nearby homes or other properties, as grasslands surrounding the corridor will be grazed. Although the corridor will extend all the way down to Highway 121, the most likely ignition source for a wildland fire, fires in this area tend to burn toward the mouth of Tolay Creek due to north winds (Glenn Mohring personal communication 2010).

If and when riparian grazing is deemed necessary for weed management, it should take place for short periods after birds have fledged and in the dry season to prevent stream bank erosion, ideally from August through October (Marin County Resource Conservation District et al. 2001). During these months, while woody riparian vegetation is green and herbaceous vegetation is mostly dry, woody riparian vegetation will be particularly susceptible to livestock browsing. Very mature plants should be able to withstand some browsing pressure, but when riparian vegetation is young, grazing periods should be short and/or woody plants should be protected with portable fencing.

***Riparian Grazing Recommendations:***

- Annually evaluate the need for grazing within excluded riparian area, although leaving the riparian area ungrazed may be the best long-term option for riparian habitat protection
- Within the first five years after fencing, graze excluded grassland patches if weeds become prolific, using the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant, utilizing portable infrastructure

- In five to 10 years, determine if woody plants are well enough established to withstand some browsing by livestock and evaluate the possibility of allowing occasional cattle grazing within riparian exclusion area
- If riparian grazing is warranted, graze between August through October, when streambanks are dry and birds have fledged

### 4.6 Optional Grazing-based Weed Management Program

Targeted grazing has been used with some success to help manage populations of select weed species. Grazing trials led by Dr. Emilio Laca of the University of California at Davis have successfully reduced cover and seed output of medusahead in experimental settings. Similarly, yellow star-thistle management through grazing has shown some success in California (Thomsen et al. 1996).

The most critical aspects of targeted grazing for weed management are timing, stocking density, repetition of treatment, use of appropriate infrastructure, and use of appropriate livestock species. These factors should be applied to targeted grazing of any weed species at the Property.

When high-intensity grazing is used for weed management, treatment locations should be carefully selected as severe grazing episodes could detrimentally affect sensitive resources. Livestock numbers, location and size of treatment areas, and exact timing should be arranged annually with the livestock operator based on site conditions.

***Timing***. Target weed species must be grazed when they are palatable to the grazing or browsing livestock species, otherwise the grazing treatment will not be effective. Weeds should also be grazed when they are most susceptible to damage by defoliation and when flowering and/or seed set can be intercepted.

***Stocking Density***. Stocking density should be heavy enough to reduce target plant species to one to two inches in height. Stocking densities of about 2.5 to 6 AUs per acre are typically used.

***Repetition of Treatment***. Most weed species require repeated defoliation to either weaken plants or to intercept flowering and seed set. Plants will resprout after being grazed, but repeated, and/or heavy grazing may be effective at preventing or reducing flower heads.

***Appropriate Infrastructure***. Typically, weed species have lower palatability than other pasture plants, so livestock must be forced to graze or browse them. This is accomplished by confining livestock in the weed-infested area so they are forced to consume the target species. This is best accomplished with small enclosures made of electric fencing that is charged by a solar charger. Portable water troughs must also be provided.

***Appropriate Livestock Species***. As discussed in section 4.1, generally, goats and/or sheep more readily consume forbs and browse than do cattle. This means that these species are naturally more inclined to eat thistles, blackberries, black mustard, and other weeds that

occur on the Property. However, cattle will graze yellow star-thistle in the rosette to bolting stage (Launchbaugh and Walker 2006).

4.6.1 **Targeted Grazing of Yellow Star-thistle**. Following is a prescription for yellow star-thistle management. Timing of grazing is the most important factor in reducing this species through grazing, as it becomes less palatable once spines develop.

The following information was derived from Thomsen et al. (1996), Davison et al. (2007), and Doran (2009):

- Three to five years is likely needed to reduce populations and deplete the seed bank.
- Grazing does not eradicate yellow star-thistle, and long term management requires continued use of livestock or other weed-control practices appropriate for the site; by grazing after the earlier-maturing annuals have completed their life cycle and produced seed, plant diversity can be maintained.
- Grazing can be effective if implemented often enough to prevent flowering for several years to reduce populations. Grazing levels must be carefully controlled to avoid damage to desirable species.
- Like mowing, grazing can either decrease or increase yellow star-thistle, depending on the frequency of defoliation and stage of plant growth.

***Timing***. Yellow star-thistle should be grazed before spines and flowers start developing, but after the plants have bolted. At the bolting stage, yellow star-thistle can have about 14 percent protein and will be highly palatable to livestock. A complicating factor can be high soil moisture conditions resulting from heavy or late spring rains. If there is sufficient soil moisture, the plant will simply re-grow after defoliation. Adjustments to the density and duration of grazing episodes may be necessary as conditions change.

***Stocking Density***. Stocking density should be in the order of 6 AUs per acre for 10 to 14 days.

***Repetition of Treatment***. Grazing treatment should be repeated as needed if high soil moisture results in regrowth of yellow star-thistle. After initial grazing, depending on the rate of regrowth, one to three follow-up grazings at two-week intervals are required to adequately suppress yellow star-thistle growth.

***Appropriate Livestock Species***. By most accounts, sheep and goats consume yellow-star-thistle more readily than cattle do and are the species of choice for yellow star-thistle management. Horses should not graze yellow star-thistle as prolonged ingestion can lead to the fatal nervous disorder equine nigropallidal incephalomalacia, or "chewing disease" (Thomsen et al. 1996).

4.6.2 **Targeted Grazing of Medusahead**. Research conducted by the University of California at Davis (UCD) under the direction of Dr. Emilio Laca, Associate Professor of Plant Sciences, has shown short duration, high-intensity grazing by sheep to be effective

in greatly reducing medusahead. Precision grazing for medusahead management requires careful planning and timing because medusahead phenology is not always consistent; some plants may be at stage for grazing while some may not.

UCD experiments have shown that:

- High utilization levels (i.e. severe grazing) were more successful in reducing medusahead with less post-grazing regrowth than were lower utilization plots; best results occurred when plots were grazed to a height of one to two inches.
- Stocking densities of 2.6 to 2.8 AUs, which is equivalent to 13 to 14 mature sheep, per acre for 14 to 17 days were most effective; higher stocking densities, of about 5 AUs per acre for a shorter period were also effective.
- Late vegetative stage is the best time for defoliation; this phenological stage is reached before awns from the flowerhead appear above the flag leaf, when bumps can be felt within the leaf sheath, and growing points are elevated; if grazing occurs too early (before elongation of the internodes and elevation of growing points), plants will keep growing and flower heads will develop.
- Follow-up seeding with species that have quickly-developing, deep roots like medusahead provides competition with future years' medusahead seedlings.

**Medusahead plant at the proper stage for grazing**

The following information, which provides a framework for implementing a medusahead management program, is based on personal communications with Morgan Doran (2004 and 2008) and Sheila Barry (2008) and attendance at a medusahead field day at UCD in July 2007.

***Pre-planning***. Treatment areas should be identified a year in advance of grazing as medusahead plants are difficult to identify in their vegetative state. A global positioning system (GPS) should be used to define infested areas. In addition, treatment areas should be evaluated to ensure that they don't contain other resources that would be damaged by the intensive grazing treatment.

***Timing***. Timing of medusahead grazing is critical because the window of opportunity for late-spring grazing is very small. Careful monitoring and the ability to move an adequate number of livestock into the fenced treatment areas in a timely fashion are essential. If grazing occurs too early, the plants will re-sprout and if it occurs too late, the livestock will not graze the flower heads. The timing of this optimal phenological stage will vary depending on weather conditions but should usually occur in late April.

***Stocking Density***. Grazing intensity for late-spring grazing should be heavy, which may result in a higher proportion of bare ground than would normally be considered acceptable. Stocking density for late-spring grazing should be on the order of 2.5 to 5 AUs per acre,[12] or as needed to graze herbage down to a height of one to two inches. Because grazing will be somewhat patchy, areas of bare ground will be interspersed with one- to two-inch-tall biomass.

***Repetition of Treatment***. Grazing treatment should be repeated as needed.

***Appropriate Livestock Species***. Sheep have been used in most of the UCD trials, primarily because they were present on the main research site; cattle may be just as effective.

***Optional Grazing Based Weed Management Recommendations:***

- Prioritize weed species for grazing treatment and focus resources on highest priority species
- For annual species, identify treatment areas the year prior to treatment, preferably with a GPS
- Utilize portable fencing and water to confine livestock in treatment areas
- Utilize high-intensity grazing, with stocking densities of 2.5 to 6 AUs per acre
- Utilize the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant.

[12] Mr. Doran's research plots have been grazed at a rate of about 162 AUdays/acre, which equals 5.4 AUs/acre; these values were converted from 10 sheep/10$m^2$ plot for two days

## 4.7 Protection of Cultural Resources

The Property supports numerous important cultural resource sites that should be protected from damage by grazing related activities. Cultural resource records should be consulted before installation of any grazing infrastructure, implementation of high-intensity targeted grazing, or any other activities that could desecrate or damage cultural resources. In addition, an archaeologist should review the Cultural Resources Study for the Property prepared by LSA Associates and categorize archaeological sites according to their sensitivity to grazing. Highly sensitive sites should be protected from potential livestock damage by exclusion of grazing or avoidance of grazing when soils are wet and most susceptible to compaction. The Federated Indians of Graton Rancheria should be consulted as appropriate.

***Cultural Resource Protection Recommendations:***

- Consult an archaeologist to determine which archaeological sites are most sensitivity to livestock damage.
- Protect highly sensitive sites from potential livestock damage by exclusion of grazing or avoidance of grazing when soils are wet and most susceptible to compaction.
- Consult an archaeologist and/or cultural resource records as appropriate before any infrastructure improvements, high-intensity grazing, or other high impact activities are implemented
- Consult the Federated Indians of Graton Rancheria as appropriate

# 5.0 Infrastructure Recommendations

Existing infrastructure includes fencing, a water system, and a ruderal system of unsurfaced ranch roads, but is incomplete, as there is no on-site corral for working and loading cattle. Fence replacement, construction of a corral, addition of a water trough and redevelopment of some of the springs are all needed. Additionally, some of the dirt roads are gullying and are in need of water diversions or re-routing.

## 5.1 Fencing Recommendations

Boundary fences, are required by California law to "…prevent the ingress and egress of livestock…" and to "…have a minimum of three tightly stretched barbed wires securely fastened to posts of reasonable strength, firmly set in the ground not more than one rod apart, one of which wires shall be at least four feet above the surface of the ground."[13] Four to five strands of wire make stronger, longer lasting fences because of the tensile strength added by additional wires and because the closer spacing between wires discourages cattle from pushing their heads through the wires and loosening them.

The concept of "wildlife friendly fencing", which often has a bottom smooth wire that may be higher off the ground to allow animal movement underneath, has become popular in recent years. This type of fencing is fine for interior fencing, but should not be used on boundaries, as young calves may also be able to move under the high, smooth bottom wires.

5.1.1 **Boundary and Cross Fencing Recommendations**. Existing cross fences are in poor condition and should be realigned and replaced. Cross fence CF1, that runs northwest/southeast in the southern part of the Property should be removed. The proposed riparian fencing will function as a boundary fence on the eastern side of the Property, and CF1 will no longer serve a purpose.

Cross fence CF2, which bisects the West ridge from the eastern boundary to Tolay Creek should be replaced, with the northern portion realigned as shown in Figure 1. This realignment will allow installation of an additional trough adjacent to but north of trough T5 in the Russell Field, which will allow for improved livestock distribution and serve as a backup water source should trough T6 malfunction.

Cross fence CF3, which runs along the base of the Mack Field, just south of Mangel Ranch Road, should be replaced with new fencing to function as part of the riparian exclusion fencing.

Boundary fencing is in fair to poor condition, and should all be replaced within the next five to 10 years. Table 9 shows the various reaches that border adjacent properties, and their priority for replacement.

[13] California Code Section 17121

**Fencing at lower boundary between Mack Field and Tolay Lake Regional Park**

**Fencing at boundary between Mack Field and Lilly property**

**Table 9. Boundary fencing replacement priorities**

| Boundary Reach | Section Location | Length in feet | Replacement Priority |
|---|---|---|---|
| BF1 | Adjacent to Infineon Raceway properties, at southern boundary | 8,050 | 1 |
| BF2 | Adjacent to Fredericks property, at southwestern boundary | 3,150 | 5 |
| BF3 | Adjacent to Gambonini property, at western boundary | 5,400 | 2 |
| BF4 | Adjacent to Tolay Lake Regional Park, at northern boundary | 10,420 | 3 |
| BF5 | Adjacent to Lilly Property, at northern boundary | 6,350 | 4 |
| BF6 | Adjacent to Highway 121 | 2,700 | 6 |
| | **Total** | **36,070** | |

5.1.2 **Riparian Fencing Recommendations**. Riparian exclusion fencing should be installed as generally shown in Figure 1. Three pairs of gates should be installed in the riparian fencing to allow cattle to cross between the Rose Field and the Roche Property (two locations), and between the Russell Field and the Mack Field. These crossings can be constructed by installing pairs of 4- to 6-foot wide in-line gates on opposite sides of Tolay Creek in the two locations where only livestock will cross and a pair of 12- to 14-foot gates at the vehicle crossing. The paired gates can both be opened at the same time to allow occasional herding of cattle across the creek and to allow vehicles to cross where the ranch road crosses the creek.

5.1.3 **Seep Fencing Recommendations**. LSA Associates (2009) recommended fencing selected wet seeps to see if protection from grazing will improve wildlife cover in these important wildlife watering locations. One or two seeps could be fenced out entirely, or several seeps could be partially fenced to evaluate changes in wildlife cover in grazed and ungrazed seep areas. If results are positive, remaining seeps can be fenced.

5.1.4 **Livestock Corral Recommendations**. In order to function as an independent ranch unit, a corral for working and loading animals should be constructed in an area that is easily accessible to vehicles year-round from Highway 121. The corral should be of adequate size to handle 200 cow-calf pairs.

***Fencing Recommendations:***

- Construct boundary fencing of 4- to 5-strand barbed wire, with a top wire at 48 inches
- Construct “wildlife friendly” interior fencing with a smooth bottom wire
- Continue to maintain, and within five to 10 years, replace boundary fencing as prioritized in Table 9
- Construct riparian exclusion fencing that will also serve as a partial boundary fence between the Property and the Roche Property, leaving three gated crossings for livestock and/or vehicles movement
- Install two pairs of 4- to 6-foot wide in-line gates on opposite sides of Tolay Creek in the two locations where only livestock will cross and a pair of 12- to 14-foot gates at the vehicle crossing

- Replace cross fence CF2, moving the northern end to the east as shown in Figure 1
- Replace Cross fence CF3 with riparian exclusion fencing
- Remove cross fence CF1
- Install fencing around seeps and evaluate changes in wildlife cover; expand to other seeps if results are positive
- Construct a corral sufficient in size to handle at least 200 pairs, to the south of the main driveway from Highway 121 as shown in Figure 1

## 5.2 Livestock Watering System Recommendations

A sufficient, properly functioning and reliable water system is of utmost importance. The springs that serve the nine livestock water troughs are variable in terms of production, and flow rates are unknown. Most of them provide sufficient water for the livestock and to provide at least some of the water for the abundant wildlife on the Property.

Livestock water needs vary seasonally, with low amounts of drinking water required during winter and spring when green forage has a high water content, and higher amounts needed during summer. Generally, beef cattle on pasture need 15 to 20 gallons per day during dry periods. For a 200 head herd, the summer water demand would be 3,000 to 4,000 gallons per day. Springs should have sufficient flow to refill troughs quickly.

Because many wildlife species rely on livestock troughs for at least part of their water needs, troughs should be designed to accommodate their access and to prevent drowning of small animals by inclusion of wildlife escape structures in troughs.

Trough T7 is located just above a large seep, which is heavily impacted by cattle grazing and trampling. This trough should be moved as faraway as possible from the seep, with overflow piped back into the seep. This may allow the wetland vegetation, including Pacific rush, to recover enough to provide cover for birds, mammals, and reptiles that frequent seeps for drinking water (LSA Associates 2009).

**Trough 7 should be moved away from seep**

**Table 10. Recommended livestock water system improvements**

| Water Trough | Comments |
|---|---|
| **Rose Field** | |
| T1 | New trough, no improvements needed |
| T2 | New trough, no improvements needed |
| T3 | New trough, no improvements needed |
| T4 | Round metal trough, no improvements needed |
| T5 | New trough, no improvements needed |
| **Russell Field** | |
| PT5a | Proposed second trough in Russell Field would be fed by the same pipe that fills T5 |
| T6 | Rubbermaid trough, fed by very good spring, runs year-round except in drought years, spring needs to be redeveloped |
| **Mack Field** | |
| T7 | Old metal trough, spring fed, runs year-round, should be moved as far away as possible from the adjacent seep, with overflow piped back into the seep |
| T8 | Round concrete trough, spring fed, runs year-round, no improvements needed |
| T9 | Rectangular metal trough, spring fed, runs year-round, no improvements needed |

***Water System Recommendations:***

- Securely install wildlife escape ramps in all water troughs
- Redevelop the spring that feeds T6 and any other springs that decline in water production
- Install a new rectangular concrete trough in location PT5a as shown in Figure 1
- If the pond that feeds T4 is drained in late summer for bullfrog control, run a temporary pipe from the spring in the pond bottom to the storage tank to keep troughs T4 and T5 functioning; it is unknown how this will affect troughs T1 through T3

## 6.0 Adaptive Management

Adaptive management is the process whereby management is initiated, evaluated, and refined (Holling 1978). The formal adaptive management process, as shown in Figure 2, consists of a six-step cycle that is a useful framework for vegetation management. Monitoring plays an important role in the adaptive management process by providing

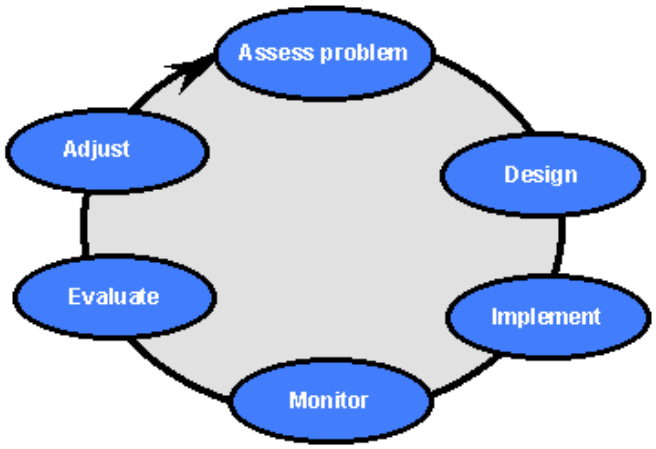


**Figure 2. Adaptive Management Cycle**

Figure 2 illustrates the six steps of adaptive management that should be applied to grazing management at the Property.

1. **Assess Problem**. This is an ongoing process that was begun by evaluation of management issues in the *Biological Resource Study, Tolay Creek Ranch* (LSA Associates 2009), the *Tolay Creek Riparian Enhancement Plan* (West Coast Watershed 2009), and in this grazing plan.

2. **Design**. This step represents the planning that has been accomplished by SLT staff, and as recommended in the *Tolay Creek Riparian Enhancement Plan* (West Coast Watershed 2009) and in this grazing plan.

3. **Implement**. Implementation of recommendations in the *Tolay Creek Riparian Enhancement Plan* (West Coast Watershed 2009) and in this grazing plan will begin this phase.

4. **Monitor**. On-going monitoring should be conducted to help determine if management actions are effectively achieving overall management goals and objectives and purposes of individual management actions. Compliance monitoring should also be performed to ensure that the grazing lessee is in compliance with lease requirements.

5. **Evaluate**. SLT, and in the future Sonoma County Regional Parks, should use information gathered through monitoring to determine if management recommendations are effectively meeting goals and objectives.

6. **Adjust**. Information gained in steps 4 and 5 should be used to evaluate and update, as necessary, this grazing plan and management recommendations included in other plans to improve management methods and results.

***Adaptive Management Recommendation*:**

- Follow the six steps of adaptive management as shown in Figure 2 and described above

# 7.0 Monitoring

Various types and techniques of monitoring are appropriate for helping to evaluate the effectiveness of management practices at the Property. In addition, the grazing tenants obligations as described in the grazing agreement should be monitored for compliance with the agreement.

***General Monitoring***. Various property conditions, not all of which are related to grazing, should be monitored on a regular basis. Erosion sites should be watched, with changes documented, and weed infestations should be monitored. Monitoring can be accomplished by recording observations, with photographs, and, in the case of new or spreading weed infestations, with a GPS.

***Effectiveness Monitoring***. Monitoring and evaluation of the riparian enhancement goal and objectives can be done fairly easily by comparing aerial photographs over time. Increased woody riparian cover will be evident in aerial photos, and ground truthing will confirm that woody plants are native.

To effectively evaluate Goal 2 and its related objectives, which focus on promoting native plant species and discouraging non-native species, long-term plant species composition monitoring would need to be conducted. Because SLT and Sonoma County Regional Parks do not have the institutional capability to conduct such monitoring, having local educational institutions and/or the Milo Baker Chapter of the California Native Plant Society develop an appropriate monitoring program should be explored.

***Compliance Monitoring***. Compliance monitoring should focus on provisions included in the grazing agreement, such as the grazing tenant's obligation to maintain fences, maintenance of the recommended stocking rate, and achieving target minimum RDM levels. Several methods that vary in accuracy and required time and effort can be used to estimate RDM, but simple and quick estimation should generally be used unless RDM estimates are disputed by the grazing tenant, in which case more intensive sampling should be conducted.

RDM monitoring methods can include direct measurement and visual estimation. The dry-weight-rank method combines direct measurement and visual estimation. With direct measurement, small plots are clipped and RDM is weighed to determine pounds per acre, while visual estimation methods focus on estimating RDM weight based on stubble height and appearance of the landscape. Some clipping and weighing should be done with visual estimation to check and calibrate the monitor's visual estimations. The following methodology is recommended for RDM monitoring at the Property.

- ***Timing***. Conduct RDM monitoring in early to mid-October before the rainy season begins.
- ***Visual Estimation***. After clipping and weighing as many quadrats as needed to calibrate the monitor's eye, he or she should estimate the RDM throughout the

Property, continuing to clip and weigh the occasional quadrat as needed to maintain fairly accurate estimates.

- ***Clipping Plots***. RDM should be clipped within one-square-foot quadrats, placed in small paper bags, and weighed with a hand held gram scale. Weight in grams can be converted to pounds per acre by multiplying grams per square foot by 96.
- ***Photographic Documentation***. Photographs of target RDM levels (minimum 1,000 pounds per acre),[14] patches of RDM below 1,000 pounds per acre, and significantly higher weights should be taken to help future monitors visualize RDM levels.

More information on RDM monitoring can be found in the *RDM Monitoring Photo-Guide* available from Wildland Solutions http://www.wildlandsolutions.com[15] and *California Guidelines for Residual Dry Matter (RDM) Management on Coastal and Foothill Annual Ranges* (Bartolome et al. 2002) ucanr.org/freepubs/docs/8092.pd.

***Monitoring Recommendations:***

- Explore relationships with local educational institutions and/or the Milo Baker Chapter of the California Native Plant Society for developing a monitoring program to evaluate native plant species populations
- Monitor the presence, distribution and population size of weeds within the riparian fencing and in uplands; adjust grazing and weed management activities accordingly.
- Perform RDM monitoring in the fall to ensure that minimum RDM standards are being met
- Require grazer to record how many animals are in each pasture each month.
- Meet at least annually with grazing tenant to review RDM monitoring, and other grazing lease provisions

[14] RDM levels may be significantly lower in the serpentine area, which is acceptable, due to lower biomass production,

[15] One drawback to this guide is that most of the photographs depict RDM levels that are inappropriately low for most of Sonoma County

# 8.0 Summary of Recommendations

***Livestock Species Recommendations:***

- Continue the cattle grazing as described in this plan
- Utilize the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant or a third party, for riparian area grazing as described in section 4.5 and weed management as described in section 4.6

***Stocking Rate Recommendations:***

- Maintain a stocking rate of 190 to 200
- In years of extreme drought, cattle should be culled more heavily than usual to decrease stocking by 10 to 15 percent
- In years of unusually high forage production, lighter culling or retaining more replacement heifers should be used to manage excess forage
- Maintain a minimum of 1,000 pounds per acre of RDM on Clear Lake, Diablo and Goulding Soils and 500 pounds per acre of RDM on Montara (serpentine) soils

***Grazing Season and Timing Recommendations:***

- Continue the year-round grazing system that is currently in place throughout the Property
- Use carefully, short-term, targeted grazing for weed management as described in section 4.6
- Use occasional short-term grazing to manage fire fuels and weeds within the riparian fencing as described in section 4.5

***Livestock Distribution Recommendations:***

- Install water trough PT5a in the Russell Field as shown in Figure 1
- Place salt licks and/or other mineral supplements in under utilized areas as needed

***Riparian Grazing Recommendations:***

- Annually evaluate the need for grazing within excluded riparian area, although leaving the riparian area ungrazed may be the best long-term option for riparian habitat protection
- Within the first five years after fencing, graze excluded grassland patches if weeds become prolific, using the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant, utilizing portable infrastructure
- In five to 10 years, determine if woody plants are well enough established to withstand some browsing by livestock and evaluate the possibility of allowing occasional cattle grazing within riparian exclusion area
- If riparian grazing is warranted, graze between August through October, when streambanks are dry and birds have fledged

***Optional Grazing Based Weed Management Recommendations:***

- Prioritize weed species for grazing treatment and focus resources on highest priority species
- For annual species, identify treatment areas the year prior to treatment, preferably with a GPS
- Utilize portable fencing and water to confine livestock in treatment areas
- Utilize high-intensity grazing, with stocking densities of 2.5 to 6 AUs per acre
- Utilize the small goat herd managed by Sonoma County Regional Parks at Tolay Lake Regional Park, or a small herd of sheep or goats provided by the grazing tenant

***Cultural Resource Protection Recommendations:***

- Consult an archaeologist to determine which archaeological sites are most sensitivity to livestock damage.
- Protect highly sensitive sites from potential livestock damage by exclusion of grazing or avoidance of grazing when soils are wet and most susceptible to compaction.
- Consult an archaeologist and/or cultural resource records as appropriate before any infrastructure improvements, high-intensity grazing, or other high impact activities are implemented
- Consult the Federated Indians of Graton Rancheria as appropriate

***Fencing Recommendations:***

- Construct boundary fencing of 4- to 5-strand barbed wire, with a top wire at 48 inches
- Construct “wildlife friendly” interior fencing with a smooth bottom wire
- Continue to maintain, and within five to 10 years, replace boundary fencing as prioritized in Table 9
- Construct riparian exclusion fencing that will also serve as a partial boundary fence between the Property and the Roche Property, leaving three gated crossings for livestock and/or vehicles movement
- Install two pairs of 4- to 6-foot wide in-line gates on opposite sides of Tolay Creek in the two locations where only livestock will cross and a pair of 12- to 14-foot gates at the vehicle crossing
- Replace cross fence CF2, moving the northern end to the east as shown in Figure 1
- Replace Cross fence CF3 with riparian exclusion fencing
- Remove cross fence CF1
- Install fencing around seeps and evaluate changes in wildlife cover; expand to other seeps if results are positive
- Construct a corral sufficient in size to handle at least 200 pairs, to the south of the main driveway from Highway 121 as shown in Figure 1

***Water System Recommendations:***

- Securely install wildlife escape ramps in all water troughs
- Redevelop the spring that feeds T6 and any other springs that decline in water

production
- Install a new rectangular concrete trough in location PT5a as shown in Figure 1
- If the pond that feeds T4 is drained in late summer for bullfrog control, run a temporary pipe from the spring in the pond bottom to the storage tank to keep troughs T4 and T5 functioning; it is unknown how this will affect troughs T1 through T3

***Adaptive Management Recommendation*:**
- Follow the six steps of adaptive management as shown in Figure 2 and described above

***Monitoring Recommendations:***
- Explore relationships with local educational institutions and/or the Milo Baker Chapter of the California Native Plant Society for developing a monitoring program to evaluate native plant species frequency
- Perform RDM monitoring in the fall to ensure that minimum RDM standards are being met
- Periodically evaluate other grazing lease provisions

# References

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**Personal Communications**

Barry, Sheila. 2008. Telephone conversation, January 22. Ms. Barry is the Natural Resources/Livestock Advisor for Santa Clara, Alameda, San Francisco, San Mateo and Contra Costa Counties; Ms. Barry has participated in UC research trials related to managing medusahead with high-intensity grazing.

Doran, Morgan. 2004. Telephone conversations, September 17, 21, 22, and October 6. Mr. Doran is the University of California Cooperative Extension Advisor for Livestock and Natural Resources for Yolo, Napa, and Solano Counties; Mr. Doran has participated in UC research trials related to managing medusahead with high-intensity grazing.

Doran, Morgan. 2009. Email communication, September 9. Mr. Doran is the University of California Cooperative Extension Advisor for Livestock and Natural Resources for Yolo, Napa, and Solano Counties; Mr. Doran has participated in UC research trials related to managing medusahead with high-intensity grazing.

Gluesenkamp, Daniel. 2010. Telephone conversation, May 24. Dr. Gluesenkamp is Director, Habitat Protection and Restoration for Audubon Canyon Ranch.

Kellner, Clinton. 2010. Voicemail message received March 31 in response to questions. Dr. Kellner was the Project Manager, botanist and entomologist for the *Biological Resources Study, Tolay Creek Ranch* by LSA Associates, Inc.

Mohring, Glenn. 2010. Telephone conversations, March 31, and May 14; meeting April 28. Mr. Mohring is the grazing tenant at the Tolay Creek Ranch.

Stevens, Brad. 2010. Telephone conversation, March 30. Mr. Stevens installed the new water troughs at the Tolay Ceek Ranch.

## Appendix 1

## Grazing Management Terms

**Animal Unit (AU)**. An adult cow or an adult cow and her calf, or the equivalent. A cow and her calf can be referred to as a "cow-calf pair", or simply a "pair" or the equivalent

**Animal Unit Month (AUM)**. The amount of forage that is needed to support one AU for one month. One AUM is equal to 1,000 lbs. of forage16

**Animal Unit Equivalent (AEU)**. A number relating the forage consumption of a kind or class of animal to one AU. For example, the AUE for a 1 year old kid is .1.

**Browser**. An animal that feeds primarily on woody vegetation.

**Cow-calf pair**. A mother cow and her calf, considered to be one AU.

**Forage**. Biomass, including herbaceous and woody (also called browse), that provides feed for grazing and/or bowsing animals.

**Grazer**. An animal that feeds primarily on herbaceous vegetation.

**Grazing Capacity**. The maximum number of livestock that can graze on a given site without adversely affecting range productivity, causing a decline in range condition, or resulting in other adverse impacts. Grazing capacity is expressed in pounds or tons of forage produced, often described in AUMs.

**Intermediate Feeder**. An animal that feeds by browsing and grazing.

**Residual Dry Matter (RDM)**. The amount of herbaceous biomass that should be left at the end of the grazing season to provide suitable conditions for germination of the following year's forage crop and for soil protection. RDM should be subtracted from forage production estimates to determine available forage. Professional opinions as to appropriate RDM levels vary to some degree and are dependent on site objectives. An economic objective aimed at producing the maximum amount of high-quality forage might differ from one aimed at providing specific habitat conditions.

**Stocking Density**. The number of AUs present on a given area at one point in time.

**Stocking Rate**. The number of AUs present on a given area over a designated time period.

[16] Forage weights used for this definition are variable. Some range managers use 1,000 pounds of forage for one AUM, which accounts for wasted forage. Others use a lower rate based on actual consumption (26 pounds per day per AU) and apply a "grazing efficiency rate" to account for wasted forage.

appendix n

# Wildlife Conservation Board Easement

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

Recorded: 9/29/05
Doc #: 2005-144636

RECORDING REQUESTED BY AND
WHEN RECORDED MAIL TO:

State of California
Wildlife Conservation Board
1807 13th Street, Suite 103
Sacramento, CA 95814

Space Above Line for Recorder's Use Only

# CONSERVATION EASEMENT DEED

THIS CONSERVATION EASEMENT DEED is made this 22nd day of September, 2005, by County of Sonoma ("Grantor"), in favor of THE STATE OF CALIFORNIA ("Grantee"), acting by and through its Department of Fish and Game, a subdivision of the California Resources Agency, with reference to the following facts:

## RECITALS

A. Grantor is the sole owner in fee simple of certain real property containing approximately 190 acres, located in the County of Sonoma, State of California, portions of designated Assessor's Parcel Numbers 068-060-057, 068-070-004, and 068-070-005, and more particularly described in Exhibit "A" attached hereto and incorporated herein by this reference (the "Property");

B. The Property possesses, or will possess in the future, wildlife and habitat values (collectively, "conservation values") of great importance to Grantee and the people of the State of California;

C. The Property provides, or will provide upon completion of the activities to be undertaken in the "Restoration and Management Plan for Tolay Lake" referred to in (F) below, high quality wetland and aquatic habitats in the form of a large seasonal lake that supports the following species: California red-legged frogs; western pond turtles, a wide variety of waterfowl and water birds including Canada geese, mallards, cinnamon teal, shovelers, greater scaup, bufflehead, and greater yellowlegs; and raptorial birds including marsh harriers, golden eagles, and white-tailed kites.

D. The Department of Fish and Game has jurisdiction, pursuant to Fish and Game Code Section 1802, over the conservation, protection, and management of fish, wildlife, native plants and the habitat necessary for biologically sustainable populations of those species, and the Department of Fish and Game is authorized to hold easements for these purposes pursuant to Civil Code Section 815.3, Fish and Game Code Section 1348, and other provisions of California law.

**E.** The Sonoma County Agricultural Preservation and Open Space District (SCAPOSD), will be acquiring the larger Cardoza Ranch property in part, with funds provided by the Department of Fish and Game and the Wildlife Conservation Board for the purposes of protecting its natural and historic open space values and providing for recreational use compatible with those open space values.

**F.** As a condition of grant contributions to SCAPOSD for the acquisition, SCAPOSD has agreed to provide this easement to the Department of Fish and Game, and to prepare a Restoration and Management Plan for Tolay Lake (Plan). The purpose of the Plan will be to restore Tolay Lake to a seasonal, shallow water lake whose function is primarily to benefit wildlife. Only wildlife-compatible recreational uses, approved by the Department of Fish and Game will be allowed within the area of the easement. The preparation and implementation of the Plan will be coordinated with and approved by the Department of Fish and Game. The Plan will describe enhancement measures needed to restore the hydrologic and wildlife functions of the lake and identify wildlife-compatible recreational uses of the lake.

## COVENANTS, TERMS, CONDITIONS AND RESTRICTIONS

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and pursuant to California law, including Civil Code Section 815, *et seq.*, hereby voluntarily grants and conveys to Grantee a conservation easement in perpetuity over the Property.

1. Purposes. The purposes of this Conservation Easement are to ensure the Property will be retained forever in its natural condition and to prevent any use of the Property that will impair or interfere with the conservation values of the Property. Grantor intends that this Conservation Easement will confine the use of the Property to such activities that are consistent with those purposes, including, without limitation, those involving the preservation, restoration and enhancement of native species and their habitats.

2. Grantee's Rights. To accomplish the purposes of this Conservation Easement, Grantor hereby grants and conveys the following rights to Grantee:

(a) To preserve and protect the conservation values of the Property;

(b) To enter upon the Property at reasonable times in order to monitor compliance with and otherwise enforce the terms of this Conservation Easement, and for scientific research and interpretive purposes by Grantee or its designees, provided that Grantee shall not unreasonably interfere with Grantor's authorized use and quiet enjoyment of the Property;

(c) To prevent any activity on or use of the Property that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features of the Property that may be damaged by any act of Grantor, or any use allowed by Grantor that is inconsistent with the purposes of this Conservation Easement;

(d) All mineral, air and water rights necessary to protect and to sustain the biological resources of the Property; and

(e) All present and future development rights allocated, implied, reserved or inherent in the Property; such rights are hereby terminated and extinguished, and may not be used on or transferred to any portion of the Property, nor any other property adjacent or otherwise.

3. Prohibited Uses. Any activity on or use of the Property inconsistent with the purposes of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following uses and activities by Grantor, Grantor's agents, and third parties, are expressly prohibited:

(a) Unseasonal watering; use of fertilizers, pesticides, biocides, herbicides or other agricultural chemicals; or weed abatement activities; unless the aforementioned uses are part of the Department of Fish and Game approved Plan; incompatible fire protection activities (for the purposes of this agreement, water use for fire fighting is not incompatible); and any and all other activities and uses which may adversely affect the purposes of this Conservation Easement;

(b) Use of off-road vehicles and use of any other motorized vehicles except on existing roadways;

(c) Grazing, unless it is part of the Department of Fish and Game approved Plan, or other agricultural activity of any kind;

(d) Recreational activities including, but not limited to, horseback riding, biking, hunting or fishing, except as may be specifically permitted as part of the Department of Fish and Game approved Plan under this Conservation Easement;

(e) Commercial or industrial uses;

(f) Any legal or de facto division, subdivision or partitioning of the Property;

(g) Construction, reconstruction or placement of any building, billboard or sign, or any other structure or improvement of any kind unless it is part of the Department of Fish and Game approved Plan;

(h) Depositing or accumulation of soil, trash, ashes, refuse, waste, bio-solids or any other materials;

(i) Planting, introduction or dispersal of non-native or exotic plant or animal species;

(j) Filling, dumping, excavating, draining, dredging, mining, drilling, removing or exploring for or extraction of minerals, loam, soil, sands, gravel, rocks or other material on or below the surface of the Property. Excavaton and or recontouring of the lake bed may be allowed as part of the approved Plan to enhance wildlife values;

(k) Altering the surface or general topography of the Property, including building of roads unless it is part of the Department of Fish and Game approved Plan;

(l) Removing, destroying, or cutting of trees, shrubs or other vegetation, except as required (1) by law for fire breaks, (2) for maintenance of existing foot trails or

roads, or (3) for prevention or treatment of disease or as provided for in the approved Plan; and

(m) Manipulating, impounding or altering any natural water course, body of water or water circulation on the Property, unless it is part of the Department of Fish and Game approved Plan to restore the historic Tolay Lake or the streams onsite; and activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters.

4. Grantor's Duties. Grantor shall undertake all reasonable actions to prevent the unlawful entry and trespass by persons whose activities may degrade or harm the conservation values of the Property. In addition, Grantor shall undertake all necessary actions to perfect Grantee's rights under Section 2 of this Conservation Easement, including but not limited to, Grantee's water rights.

5. Reserved Rights. Grantor reserves to itself, and to its personal representatives, heirs, successors, and assigns, all rights accruing from its ownership of the Property, including the right to engage in or to permit or invite others to engage in all uses of the Property that are not expressly prohibited or limited by, and are consistent with the purposes of, this Conservation Easement. Notwithstanding anything stated to the contrary herein, Grantor also reserves the right to lease the property for agricultural purposes. The term of the lease shall be limited to the term of the Agricultural Lease dated as of the recordation date of this document unless extended with the prior written approval of Grantee. Agricultural use may include activities necessary and associated with the harvesting of various crops, for example use of harvesting equipment or machinery, use of agricultural chemicals (in accordance with all applicable laws and regulations), and use of vehicles off roadways for agricultural purposes.

6. Grantee's Remedies. If Grantee determines that a violation of the terms of this Conservation Easement has occurred or is threatened, Grantee shall give written notice to Grantor of such violation and demand in writing the cure of such violation. If Grantor fails to cure the violation within thirty (30) days after receipt of written notice and demand from Grantee, or if the cure reasonably requires more than thirty (30) days to complete and Grantor fails to begin the cure within the thirty (30) day period or fails to continue diligently to complete the cure, Grantee may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Conservation Easement, to recover any damages to which Grantee may be entitled for violation of the terms of this Conservation Easement or for any injury to the conservation values of the Property, to enjoin the violation, *ex parte* as necessary, by temporary or permanent injunction without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies, or for other equitable relief, including, but not limited to, the restoration of the Property to the condition in which it existed prior to any such violation or injury. Without limiting Grantor's liability therefor, Grantee may apply any damages recovered to the cost of undertaking any corrective action on the Property.

If Grantee reasonably determines that circumstances require immediate action to prevent or mitigate damage to the conservation values of the Property, Grantee

may pursue its remedies under this Section 6 without prior notice to Grantor or without waiting for the period provided for cure to expire. Grantee's rights under this section apply equally to actual or threatened violations of the terms of this Conservation Easement. Grantor agrees that Grantee's remedies at law for any violation of the terms of this Conservation Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in this section, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of this Conservation Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this section shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity, including but not limited to, the remedies set forth in Civil Code Section 815, *et seq.*, inclusive. The failure of Grantee to discover a violation or to take immediate legal action shall not bar Grantee from taking such action at a later time.

If at any time in the future Grantor or any subsequent transferee uses or threatens to use the Property for purposes inconsistent with this Conservation Easement then, notwithstanding Civil Code Section 815.7, the California Attorney General or any entity or individual with a justiciable interest in the preservation of this Conservation Easement has standing as interested parties in any proceeding affecting this Conservation Easement.

6.1. Grantee's Discretion. Enforcement of the terms of this Conservation Easement by Grantee shall be at the discretion of Grantee, and any forbearance by Grantee to exercise its rights under this Conservation Easement in the event of any breach of any term of this Conservation Easement shall not be deemed or construed to be a waiver by Grantee of such term or of any subsequent breach of the same or any other term of this Conservation Easement or of any of Grantee's rights under this Conservation Easement. No delay or omission by Grantee in the exercise of any right or remedy shall impair such right or remedy or be construed as a waiver.

6.2. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury to or change in the Property resulting from (i) any natural cause beyond Grantor's control, including, without limitation, fire not caused by Grantor, flood, storm, and earth movement, or any prudent action taken by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes; or (ii) acts by Grantee or its employees.

7. Fence Installation and Maintenance. Grantor shall install and maintain a fence reasonably satisfactory to Grantee around the Conservation Easement area to protect the conservation values of the Property, including but not limited to wildlife corridors if required as part of the approved management plan for the easement area.

8. Access. This Conservation Easement does not convey a general right of access to the public.

9. Costs and Liabilities.

9.1. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Property. Grantor agrees that Grantee shall have no duty or responsibility for the operation, upkeep or maintenance of the Property, the monitoring of hazardous conditions thereon, or the protection of Grantor, the public or any third parties from risks relating to conditions on the Property. Grantor remains solely responsible for obtaining any applicable governmental permits and approvals for any activity or use permitted by this Conservation Easement Deed, and any activity or use shall be undertaken in accordance with all applicable federal, state, local and administrative agency statutes, ordinances, rules, regulations, orders and requirements.

9.2. Indemnities.

(a) *GRANTOR'S Indemnity*. Grantor shall hold harmless, indemnify, and defend Grantee, its agents, employees, volunteers, successors and assigns, from and against all damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property resulting from any act, omission, condition or other matter related to or occurring on or about the Property, except to the extent that such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of Grantee (it being the intent of this provision to limit Grantor's indemnity to the proportionate part of Grantee's damage, liability, claim or expense for which Grantor is responsible); and the obligations specified in Section 9.1. In the event of any claim, demand, or legal complaint against Grantee, the right to the indemnification provided by this Section 9.1 shall not apply to any cost, expense, penalty, settlement payment, or judgment, including attorneys' fees, incurred prior to Grantee 's written notice of such claim, demand, or legal complaint to Grantor, unless Grantor has acquired knowledge of the matter by other means, nor to any costs, expenses, or settlement payment, including attorneys' fees, incurred subsequent to that notice unless such cost, expense, or settlement payment shall be approved in writing by Grantor, which approval shall not be unreasonably withheld.

(b) *GRANTEE'S Indemnity*. To the extent authorized by Government Code Section 14662.5, Grantee shall hold harmless, indemnify, and defend Grantor, its heirs, devisees, successors and assigns, from and against all damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property, resulting from any act of Grantee on or about the Property except to the extent that such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of Grantor (it being the intent of this provision to limit Grantee 's indemnity to the proportionate part of Grantor 's damage, liability, claim or expense for which the act of Grantee is responsible). In the event of any claim, demand, or legal complaint against Grantor, the right to the indemnification provided by this Section 9.2 shall not apply to any cost, expense, penalty, settlement payment, or judgment, including attorneys' fees, incurred prior to Grantor's written notice of such claim, demand, or legal complaint to Grantee,

unless Grantor has acquired knowledge of the matter by other means.

9.3. Attorney's Fees. The prevailing Party in any action brought to enforce the terms of this Agreement or arising out of this Agreement may recover its reasonable costs and attorneys' fees expended in connection with such an action from the other Party.

9.4. Extinguishment. If circumstances arise in the future that render the purposes of this Conservation Easement impossible to accomplish, this Conservation Easement can only be terminated or extinguished, in whole or in part, by judicial proceedings in a court of competent jurisdiction.

9.5. Condemnation. This Conservation Easement is a "wildlife conservation easement" acquired by a State agency, the condemnation of which is prohibited except as provided in Fish and Game Code Section 1348.3.

10. Transfer of Easement. This Conservation Easement is transferable by Grantee, but Grantee may assign this Conservation Easement only to an entity or organization authorized to acquire and hold conservation easements pursuant to Civil Code Section 815.3 (or any successor provision then applicable) or the laws of the United States. Grantee shall require the assignee to record the assignment in the county where the Property is located.

11. Transfer of Property. Grantor agrees to incorporate the terms of this Conservation Easement by reference in any deed or other legal instrument by which Grantor divests itself of any interest in all or any portion of the Property, including, without limitation, a leasehold interest. Grantor further agrees to give written notice to Grantee of the intent to transfer any interest at least thirty (30) days prior to the date of such transfer. Grantee shall have the right to prevent subsequent transfers in which prospective subsequent claimants or transferees are not given notice of the covenants, terms, conditions and restrictions of this Conservation Easement. The failure of Grantor or Grantee to perform any act provided in this section shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

12. Anti-Deficiency. Nothing in this Conservation Easement shall be interpreted as a commitment or requirement that Grantee obligate or pay funds unless sufficient funds are made available to Grantee by appropriation for the purpose of this Conservation Easement.

13. Notices. Any notice, demand, request, consent, approval, or communication that either party desires or is required to give to the other shall be in writing and be served personally or sent by recognized overnight courier that guarantees next-day delivery or by first class mail, postage fully prepaid, addressed as follows:

| | |
|---|---|
| To Grantor: | County of Sonoma<br>Director of Regional Parks<br>2300 County Center Drive, Suite 120A<br>Santa Rosa, CA 95403 |
| | General Manager<br>Sonoma County Agricultural Preservation<br>and Open Space District<br>747 Mendocino Avenue, Suite 100<br>Santa Rosa, CA 95401 |
| To Grantee: | Department of Fish and Game<br>Central Coast Region<br>P.O. Box 47<br>Yountville, CA 94599<br>Attn: Regional Manager |
| With a copy to: | Department of Fish and Game<br>Office of the General Counsel<br>1416 Ninth Street, 12th Floor<br>Sacramento, CA 95814-2090<br>Attn: General Counsel |

or to such other address as either party shall designate by written notice to the other. Notice shall be deemed effective upon delivery in the case of personal delivery or delivery by overnight courier or, in the case of delivery by first class mail, five (5) days after deposit into the United States mail.

14. Amendment. This Conservation Easement may be amended by Grantor and Grantee only by mutual written agreement. Any such amendment shall be consistent with the purposes of this Conservation Easement and California law governing conservation easements and shall not affect its perpetual duration. Any such amendment shall be recorded in the official records of Sonoma County, State of California.

15. General Provisions.

(a) Controlling Law. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of California, disregarding the conflicts of law principles of such state.

(b) Liberal Construction. Despite any general rule of construction to the contrary, this Conservation Easement shall be liberally construed to effect the purposes of this Conservation Easement and the policy and purpose of Civil Code Section 815, *et seq.* If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purposes of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

(c) Severability. If a court of competent jurisdiction voids or invalidates on its face any provision of this Conservation Easement Deed, such action shall not affect the remainder of this Conservation Easement Deed. If a court of competent jurisdiction voids or invalidates the application of any provision of this Conservation Easement Deed to a person or circumstance, such action shall not affect the application of the provision to other persons or circumstances.

(d) Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Conservation Easement. No alteration or variation of this instrument shall be valid or binding unless contained in an amendment in accordance with Section 13.

(e) No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

(f) Successors. The covenants, terms, conditions, and restrictions of this Conservation Easement Deed shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall constitute a servitude running in perpetuity with the Property.

(g) Termination of Rights and Obligations. A party's rights and obligations under this Conservation Easement terminate upon transfer of the party's interest in the Conservation Easement or Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

(h) Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon its construction or interpretation.

(i) No Hazardous Materials Liability. Except as disclosed in that certain Phase I Environmental Site Assessment dated February 2004, Report of Investigation dated September 2004 and Seller's Disclosures under that certain Option and Purchase Agreement, dated April 20, 2004, all of which have been provided to Grantee, Grantor represents and warrants to the best of its knowledge, that it has no knowledge or notice of any Hazardous Materials (defined below) or underground storage tanks existing, generated, treated, stored, used, released, disposed of, deposited or abandoned in, on,

under, or from the Property, or transported to or from or affecting the Property. Without limiting the obligations of Grantor under Section 9.2, Grantor hereby releases and agrees to indemnify, protect and hold harmless Grantee (defined in Section 9.2) from and against any and all claims (defined in Section 9.2) arising from or connected with any Hazardous Materials or underground storage tanks present, alleged to be present, or otherwise associated with the Property at any time, except any Hazardous Materials placed, disposed or released by Grantee, its employees or agents. This release and indemnification includes, without limitation, claims for (i) injury to or death of any person or physical damage to any property; and (ii) the violation or alleged violation of, or other failure to comply with, any Environmental Laws (defined below). If any action or proceeding is brought against Grantee by reason of any such claim, Grantor shall, at the election of and upon written notice from Grantee, defend such action or proceeding by counsel reasonably acceptable to Grantee or reimburse Grantee for all charges incurred for services of the Attorney General in defending the action or proceeding.

Despite any contrary provision of this Conservation Easement Deed, the parties do not intend this Conservation Easement to be, and this Conservation Easement shall not be, construed such that it creates in or gives to Grantee any of the following:

(1) The obligations or liability of an "owner" or "operator," as those terms are defined and used in Environmental Laws (defined below), including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. Section 9601 *et seq.*; hereinafter, "CERCLA"); or

(2) The obligations or liabilities of a person described in 42 U.S.C. Section 9607(a)(3) or (4); or

(3) The obligations of a responsible person under any applicable Environmental Laws; or

(4) The right to investigate and remediate any Hazardous Materials associated with the Property; or

(5) Any control over Grantor's ability to investigate, remove, remediate or otherwise clean up any Hazardous Materials associated with the Property.

The term "Hazardous Materials" includes, without limitation, (a) material that is flammable, explosive or radioactive; (b) petroleum products, including by-products and fractions thereof; and (c) hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in CERCLA, the Resource Conservation and Recovery Act of 1976 (42 U.S.C. Section 6901 *et seq.*; hereinafter "RCRA"); the Hazardous Materials Transportation Act (49 U.S.C. Section 6901 *et seq.*; hereinafter "HTA"); the Hazardous Waste Control Law (California Health & Safety Code Section 25100 *et seq.*;

hereinafter "HCL"); the Carpenter-Presley-Tanner Hazardous Substance Account Act (California Health & Safety Code Section 25300 *et seq.*; hereinafter "HSA"), and in the regulations adopted and publications promulgated pursuant to them, or any other applicable Environmental Laws now in effect or enacted after the date of this Conservation Easement Deed.

The term "Environmental Laws" includes, without limitation, CERCLA, RCRA, HTA, HCL, HSA, and any other federal, state, local or administrative agency statute, ordinance, rule, regulation, order or requirement relating to pollution, protection of human health or safety, the environment or Hazardous Materials. Grantor represents, warrants and covenants to Grantee that activities upon and use of the Property by Grantor, its agents, employees, invitees and contractors will comply with all Environmental Laws.

(j) Warranty. Grantor represents and warrants that there are no outstanding mortgages, liens, encumbrances or other interests in the Property (including, without limitation, mineral interests) which have not been expressly subordinated to this Conservation Easement Deed, and that the Property is not subject to any other conservation easement.

(k) Additional Easements. Grantor shall not grant any additional easements, rights of way or other interests in the Property (other than a security interest that is subordinate to this Conservation Easement Deed), or grant or otherwise abandon or relinquish any water agreement relating to the Property, without first obtaining the written consent of Grantee. Grantee may withhold such consent if it determines that the proposed interest or transfer is inconsistent with the purposes of this Conservation Easement or will impair or interfere with the conservation values of the Property. This Section 14(k) shall not prohibit transfer of a fee or leasehold interest in the Property that is subject to this Conservation Easement Deed and complies with Section 11.

(l) Recording. Grantee shall record this Conservation Easement Deed in the Official Records of Sonoma County, California, and may re-record it at any time as Grantee deems necessary to preserve its rights in this Conservation Easement.

**IN WITNESS WHEREOF Grantor has executed this Conservation Easement Deed the day and year first above written.**

**GRANTOR:**

**COUNTY OF SONOMA**

BY: Mary E. Burns

NAME: Mary E. Burns

TITLE: Director, Regional Parks

DATE: 9/22/05

**GRANTEE:**

**STATE OF CALIFORNIA**
**WILDLIFE CONSERVATION BOARD**

BY: Al Wright

NAME: Al Wright

TITLE: Executive Director

DATE: 9/23/05

## CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of Sonoma } ss.

On September 22, 2005 (Date) before me, Vikkie Borelli, Notary Public (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Mary E. Burns (Name(s) of Signer(s))

☒ personally known to me
☐ proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/~~are~~ subscribed to the within instrument and acknowledged to me that ~~he~~/she/~~they~~ executed the same in ~~his~~/her/~~their~~ authorized capacity(~~ies~~), and that by ~~his~~/her/~~their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Vikkie R Borelli
Signature of Notary Public

MCI1 VIKKIE R. BORELLI COMM. #1394835 NOTARY PUBLIC-CALIFORNIA SONOMA COUNTY My Comm. Expires Jan.19, 2007 MCI1

### OPTIONAL

*Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.*

### Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

### Capacity(ies) Claimed by Signer

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

# ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of Sacramento } ss.

On 9-23-05 (DATE) before me, Terri L. Muzik, Notary Public (NOTARY),

personally appeared Al Wright (SIGNER(S))

☑ personally known to me - OR - ☐ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signatures on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

TERRI L. MUZIK
Comm. # 1531217
NOTARY PUBLIC - CALIFORNIA
Sacramento County
My Comm. Expires Dec. 30, 2008

WITNESS my hand and official seal.

Terri L. Muzik
NOTARY'S SIGNATURE

## OPTIONAL INFORMATION

The information below is not required by law. However, it could prevent fraudulent attachment of this acknowledgment to an unauthorized document.

### CAPACITY CLAIMED BY SIGNER (PRINCIPAL)

☐ INDIVIDUAL
☐ CORPORATE OFFICER

_____
TITLE(S)

☐ PARTNER(S)
☐ ATTORNEY-IN-FACT
☐ TRUSTEE(S)
☐ GUARDIAN/CONSERVATOR
☐ OTHER: _____

SIGNER IS REPRESENTING:
NAME OF PERSON(S) OR ENTITY(IES)

### DESCRIPTION OF ATTACHED DOCUMENT

_____
TITLE OR TYPE OF DOCUMENT

_____
NUMBER OF PAGES

_____
DATE OF DOCUMENT

_____
OTHER

RIGHT THUMBPRINT OF SIGNER

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LAKEBED CONSERVATION EASEMENT
EXHIBIT "A"
LEGAL DESCRIPTION

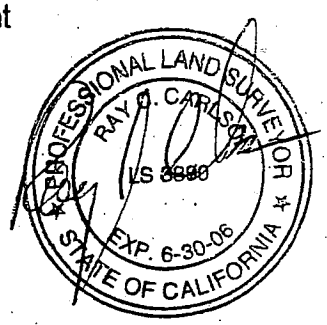
Being a portion of the lands of Marvin G. Cardoza and Rita Cardoza, his wife as Joint Tenants as described in Parcel One of the Grant Deed recorded as Document No. 1982-0428360 of Official Records, Sonoma County Records and further being a portion of Lot 3 of Parcel Map No. 7704 as filed in Book 336 of Maps, at Pages 33-34, Sonoma County Records, also being a portion of the lands of Vera C. Cardoza, as Trustee of the Vera C. Cardoza Trust; the lands of John S. Cardoza, Jr. and Mary L. Cardoza Trust; Edward J. Cardoza and Cathleen L. Cardoza; Vera C. Cardoza, as Trustee under the Will of George S. Cardoza, deceased; and Marvin Cardoza and Rita Cardoza as described those deeds recorded as Document No. 1992-0077601, Book 3661 of Official Records, at Page 352, Document No. 1994-0045629, 1990-0125314, and 1986-006811 all of Official Records, Sonoma County Records, and being more particularly described as follows:

Commencing at a ½" iron pipe with illegible plastic plug marking the most easterly corner of Lot 4 of the aforementioned Parcel Map No. 7704; thence along the southerly line of said Lot 4 South 40 degrees 42 minutes 39 seconds West, 1094.40 feet (Map, South 40 degrees 21 minutes 59 seconds West, 1094.54 feet) to the southerly corner of Lot 3 and 4 of said Parcel Map from which a 1" iron pipe with brass cap stamped "RP25" bears North 45 degrees 53 minutes 37 seconds West, 5.00 feet (Map, North 46 degrees 14 minutes 16 seconds West); thence along the southerly line of Lot 3 of said Parcel Map South 75 degrees 20 minutes 45 seconds West, 1783.42 feet (Map, South 75 degrees 01 minutes 20 seconds West) to the **True Point of Beginning** of the herein described parcel; thence leaving said southerly line South 33 degrees 45 minutes 48 seconds East, 762.01 feet; thence South 09 degrees 08 minutes 40 seconds East, 1543.06 feet; thence South 51 degrees 20 minutes 06 seconds West, 131.00 feet; thence North 76 degrees 25 minutes 58 seconds West, 1014.77 feet; thence North 40 degrees 43 minutes 41 seconds West, 1701.72 feet to the aforementioned southerly line of Lot 3; thence continuing North 40 degrees 43 minutes 41 seconds West, 1.14 feet; thence North 34 degrees 57 minutes 51 seconds West, 707.43 feet; thence North 16 degrees 15 minutes 29 seconds West, 697.30 feet; thence North 50 degrees 03 minutes 52 seconds West, 494.23 feet; thence South 84 degrees 00 minutes 01 seconds West, 656.83 feet to a ½" iron pipe tagged "RCE 11226" marking an angle point in the

northwesterly line of said Lot 3; thence along said northwesterly line North 30 degrees 43 minutes 48 seconds East, 2856.63 feet (Map, North 30 degrees 23 minutes 24 seconds East) to a point; thence leaving said northwesterly line South 25 degrees 05 minutes 25 seconds East, 2557.08 feet; thence South 33 degrees 45 minutes 48 seconds East, 1115.31 feet to the Point of Beginning.

Containing 187.4 acres, more or less.

APN 068-060-057 ptn
SCAPOSD – Tolay Lake Easement
Job No. 2004-055
July 29, 2005



**Project:** **Tolay Lake Ranch**
**Sonoma County**

# CERTIFICATE OF ACCEPTANCE

THIS IS TO CERTIFY that the interest in real property conveyed by the deed or grant, dated September 22, 2005, from County of Sonoma to the STATE OF CALIFORNIA, is hereby accepted by the undersigned officer on behalf of the State of California, pursuant to authority conferred by authorization of the Wildlife Conservation Board, Department of Fish and Game, Resources Agency, State of California, adopted on February 24, 2005, and the grantee consents to the recordation thereof by its duly authorized officer.

STATE OF CALIFORNIA
Resources Agency
Department of Fish and Game

By: Al Wright
Al Wright
Executive Director
Wildlife Conservation Board

Date: 9/23/05

appendix o

# SCAPOSD Conservation Easement
# Tolay Lake Ranch

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

RECORDING REQUESTED BY AND
RETURN TO:

Recorded: 9/29/05
Doc# 2005-144645

Sonoma County Agricultural
Preservation and Open Space District
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

# DEED AND AGREEMENT
# BY AND BETWEEN
# COUNTY OF SONOMA
# AND
# THE SONOMA COUNTY AGRICULTURAL PRESERVATION AND OPEN SPACE DISTRICT

The County of Sonoma, a political subdivision of the State of California (hereinafter referred to as GRANTOR), and the Sonoma County Agricultural Preservation and Open Space, a public agency formed pursuant to the provisions of Public Resources Code sections 5500 et seq. (hereinafter DISTRICT), its successors and assigns, agree as follows:

## RECITALS

A. GRANTOR is the owner in fee simple of certain real property (hereinafter "the Property") located in Sonoma County and more particularly described in Exhibit "A," attached hereto and made a part of hereof.

B. In 1990 the voters of Sonoma County approved the creation of DISTRICT and the imposition of a transactions and use tax by the Sonoma County Open Space Authority ("the Authority"). The purpose for the creation of DISTRICT and the imposition of the tax by the Authority was to preserve agriculture and open space by acquiring interests in appropriate properties from willing sellers in order to meet the mandatory requirements imposed on the County and each of its cities by Government Code sections 65560 *et seq.* and by the open space elements of their respective general plans. In order to accomplish that purpose, DISTRICT entered into a contract with the Authority whereby, in consideration of that entity financing DISTRICT's acquisitions, DISTRICT agreed to and

did adopt an acquisition program that was in conformance with the Authority's voter approved Expenditure Plan.

C. On April 19, 2005 DISTRICT's Board of Directors, in its Resolution No. 05-0328 determined, pursuant to Government Code section 65402 and Sonoma County Ordinance No. 5180, that the acquisition was consistent with the 1989 Sonoma County General Plan (specifically the Plan's Agricultural Resources and Open Space elements) because limited agricultural uses could continue on the property without interfering with potential low intensity outdoor recreation uses; the proposed conservation easement will allow for such agricultural uses, and ensure protection of the property's scenic, biotic, sensitive habitat and cultural resource values, including Tolay Lake; the acquisition will limit development of the land to low-intensity public outdoor recreation, resource restoration and enhancement, and other uses consistent with preservation of the area's open and scenic character; acquisition of the property, including the proposed conservation easement, will protect critical habitat for species including red-legged frog and western pond turtle. Further, the Open Space Element Map identifies "Planned Future Park" sites to indicate general areas where a need exists for parks. Proposed park sites for the south county are shown on the Open Space Element map for both the Petaluma and Sonoma Valley planning areas. Policy PF-2e, Public Facilities Element, states in part, "In the event that a proposed park or school site is designated on the land use or open space map, consider the designation as applying to a general area rather than a particular parcel." This general location provision of the General Plan has been routinely and uniformly followed by the Board for prior park acquisitions. Acquisition of the Tolay Lake property for a regional park is consistent with the General Plan in that it will provide public recreation in an area of the county with a designated need and is considered a public benefit. On April 19, 2005 the Authority determined, in its Resolution No. 2005-004 that the acquisition was consistent with its Expenditure Plan.

D. DISTRICT has the authority to acquire conservation easements by virtue of Public Resources Code section 5540 and possesses the ability and intent to enforce the terms of this Agreement.

E. As a condition of grant funds contributed to the acquisition of this Property, GRANTOR conveyed a conservation easement to the Department of Fish and Game that requires the creation of a Restoration and Management Plan for Tolay Lake.

NOW THEREFORE, in consideration of the foregoing recitations and of the mutual covenants, terms, conditions, and restrictions herein set forth and other valuable consideration receipt of which is hereby acknowledged, GRANTOR and DISTRICT agree as follows:

1. ***Grant and Acceptance of Conservation Easement***. Pursuant to the common and statutory law of the State of California including the provisions of Civil Code sections 815 to 816, inclusive, GRANTOR hereby grants to DISTRICT and DISTRICT accepts a conservation easement (hereinafter "this Easement" or "the Easement") in the Property in perpetuity.

2. ***Statement of Purpose***. The Property comprises 20% of the upper watershed of Tolay Creek, an important watershed that is part of the North San Pablo Bay and drains into the San Pablo Bay National Wildlife Refuge. It is hydrologically and ecologically connected to a large block of protected lands in the historic Sonoma Baylands wetlands stretching from the mouth of Tolay Creek to the Petaluma River. The Property provides important refuge habitat for several species, and particularly for a wide variety of raptors, ground nesters, passerine species, migratory shorebirds and waterfowl . As a key upland parcel in the Sonoma Baylands system, the Property, consisting of wetlands, riparian and upland habitat, open grasslands and a wide valley floor which is bisected by Tolay Creek, has significant restoration potential. In particular, restoration of natural hydrologic function to the ancient Tolay Lake will provide critical structural and functional habitat for numerous wildlife species and plant communities and will benefit species that travel the Pacific Flyway. The Property will also provide low-intensity public outdoor recreation that is compatible with the Conservation Values. The Property's features described above, comprise the natural resource, open space and scenic values of the Property and are generally referred to collectively herein as "the Conservation Values" of the Property. It is the purpose of this Easement to (a) conserve and protect, in perpetuity, the Conservation Values of the Property, (b) to enhance and restore the Conservation Values by specifically permitting the creation of an ecologically viable ecosystem capable of providing wetland habitat for endangered and threatened species, migratory shorebirds, and waterfowl, and (c) to prevent any uses of the Property that would significantly impair or interfere with these Conservation Values. This purpose, as further defined by the provisions of this Easement, is generally referred to collectively herein as "the Conservation Purpose of this Easement." (hereinafter "the Conservation Purpose of this Easement")

3. ***Affirmative Rights Granted to the DISTRICT***. GRANTOR conveys the following rights to DISTRICT:

3.1 ***Protecting Conservation Values***. DISTRICT shall have the right to identify, preserve and protect the Conservation Values of the Property; and

3.2 ***Property Inspections***. DISTRICT shall have the right to enter upon the Property and to inspect, observe, and study the Property for the purposes of (i) identifying the current uses and practices thereon and the condition thereof, (ii) monitoring the uses and practices regarding the Property to determine whether they are consistent with this Easement, and (iii) enforcing the terms of this Easement pursuant to Section 13 below. Entry shall be permitted at least once a year at reasonable times, upon 24 hours' prior notice to GRANTOR, and shall be made in a manner that will not unreasonably interfere with GRANTOR's use and quiet enjoyment of the Property pursuant to the terms and conditions of this Easement. Each entry shall be for only so long a duration as is reasonably necessary to achieve the inspection, monitoring and subsequent enforcement, if applicable, but may not be limited to a single physical entry during a single twenty-four hour period.

3.3 ***Approval of Certain Activities***. DISTRICT shall have the right to review and approve proposed uses and activities as more specifically set forth in Section 4 and Exhibit B herein, and in accordance with Section 7.

4. ***Prohibited and Restricted Uses of the Property***. Any activity on the Property or use of the Property which is inconsistent with the Conservation Purpose of this Easement is prohibited. Without limiting the generality of the foregoing, the activities and uses described in Exhibit B attached hereto are expressly prohibited or restricted.

5. ***GRANTOR's Reserved Rights***. In addition to the express rights reserved in Exhibit B, GRANTOR reserves to Itself and to GRANTOR's personal representatives, heirs, successors and assigns, all rights accruing from their ownership of the Property, including the right to engage in, or permit or invite others to engage in all uses of the Property that are not expressly prohibited or restricted herein and are not inconsistent with the Conservation Purpose of this Easement. Without limiting the generality of the foregoing, and subject to the terms of Exhibit B, the following rights are expressly reserved:

5.1. ***Recreational and Educational Use***. GRANTOR reserves the right to use the Property for low-intensity, recreational and/or educational purposes, so long as no significant surface alteration, significant impact to natural resources, or other development of the land occurs in connection with such use, and so long as such use is consistent with the terms, conditions and Conservation Purpose of this Easement, which rights include, but are not limited to, hiking, horseback riding, bike riding, and nature study. All recreational and educational activities shall be consistent with the Tolay Lake Park Management Plan and the Restoration and Management Plan for Tolay Lake.

5.2. ***Habitat Enhancement:*** GRANTOR reserves the right to conduct restoration activities in accordance with the Restoration and Management Plan for Tolay Lake which will be developed in partnership with the California Department of Fish and Game subject to the approval of the DISTRICT in accordance with the provisions of Paragraph 7 of this Easement. To undertake conservation and restoration activities including, but not limited to, bank and soil stabilization, practices to reduce erosion, enhancement of plant and wildlife habitat; and activities which promote biodiversity in accordance with sound, generally accepted practices and all applicable laws, ordinances and regulations. All restoration and enhancement activities shall be consistent with the Restoration and Management Plan for Tolay Lake and the Tolay Lake Park Management Plan.

5.3 ***Fire Management***. To undertake fire management plans for the purpose of fire control and/or natural resource management. Such methods may include prescriptive burning, limited brush removal, and grazing of the Property consistent with a Rangeland Management Plan prepared by GRANTOR or a qualified professional. DISTRICT shall receive prior notification of such plans which shall be approved by the California Department of Forestry and Fire Protection and appropriate local fire protection and permitting agencies.

5.4 ***Plant Collection.*** GRANTOR reserves the right to permit limited supervised collection of plant materials for cultural interpretive uses at a level that is consistent with the Conservation Purpose of this Easement.

The allowed uses, practices and rights to improve the Property which are not retained by GRANTOR under Sections 5.1, 5.2, 5.3, and 5.4 above or allowed under Exhibit B are hereby extinguished. In the event that such extinguishment is determined to be unlawful or otherwise unenforceable, then those uses, practices and rights contributing to the improvement of the Property are hereby assigned by GRANTOR to DISTRICT. Neither GRANTOR nor DISTRICT shall use or receive the benefit from any increase in allowable uses, practices and rights to improve the Property, that are inconsistent with this Easement, resulting from any change in applicable governmental land use regulations.

6. ***Merger of Parcels***. GRANTOR acknowledges that the Property currently consists of separate parcels as shown on the current Sonoma County Assessment Roll. GRANTOR further acknowledges that one or more additional parcels may exist on the Property through the recognition of previously unrecognized parcels created by patent or deed conveyances, subdivisions, lot line adjustments, surveys, recorded or unrecorded maps or other documents and, that existing or future land use regulations might permit

these parcels to be sold or otherwise conveyed separately from one another as separate legal parcels. It is the intent of GRANTOR and DISTRICT to prevent the separate conveyance of any of these parcels. To the extent not already accomplished as a condition precedent to the acceptance by DISTRICT of this Easement, GRANTOR shall apply for and pursue to completion an application to the County of Sonoma, or, such other governmental agency having jurisdiction, for the consolidation or merger of any existing parcels or claimed parcels of the Property into a single parcel. If the parcels cannot be merged because of their lack of contiguity or for any other reason, GRANTOR shall pursue and secure such other applicable legal restrictions so that no such existing parcels or claimed parcels may be separately sold or conveyed from the others or the property as a whole.

7. ***Notice and Approval Procedures***. Some uses permitted by this Easement require that prior written notice be given by GRANTOR to DISTRICT, while other uses permitted by this Easement require the prior written approval of DISTRICT. Any activity proposed to be done or undertaken by GRANTOR which requires prior notice or the prior approval of DISTRICT shall be commenced only after satisfaction of the requirements of this Section and of Section 18. Notice shall be given or approval requested by using the appropriate form available at DISTRICT's offices. DISTRICT may consider notices and requests for approval in different forms, provided that all necessary information is provided to permit DISTRICT to make an informed judgment as to the consistency of the GRANTOR's request with the terms of this Easement.

7.1 ***Uses/Activities Requiring Notice to DISTRICT***. GRANTOR shall deliver the notice to DISTRICT at least forty-five (45) days prior to the commencement of any use or practice requiring notification.

7.2 ***Uses/Activities Requiring Prior Approval from DISTRICT***. DISTRICT shall have forty-five (45) days from the receipt of a complete request for approval to review the proposed use or practice and to approve, conditionally approve, approve with modifications, disapprove or otherwise respond to the request. If the request for approval is approved, conditionally approved or approved with modifications, the requested use or practice may only be undertaken in accordance with the terms, conditions and modifications of the approval. DISTRICT's decision to disapprove a request for approval shall be supported by a finding that the requested use or practice is inconsistent with the Conservation Purpose of this Easement or that the request for approval is incomplete or inaccurate. The approval of the DISTRICT obtained in one circumstance shall not be deemed or construed to be a waiver by DISTRICT of any subsequent change in use or practice.

7.3 ***DISTRICT's Failure to Respond***. Should DISTRICT fail to post its response to GRANTOR's request for approval within forty-five (45) days of the receipt of said notice, GRANTOR shall send a second notice by registered or certified mail. Should DISTRICT fail to respond to the second notice within ten (10) days of the receipt thereof, GRANTOR may appeal to DISTRICT's Board of Directors.

7.4 ***Non-Permitted Uses; DISTRICT's Approval***. In the event GRANTOR desires to commence a use or practice on the Property which is not expressly reserved or prohibited in Exhibit B or Section 5, GRANTOR shall seek DISTRICT's prior written approval of such use or practice in accordance with the procedure set forth in Section 7.2 above. The exercise of any use or practice pursuant to a right not expressly reserved in Exhibit B or Section 5 may constitute a breach of this Easement and be subject to the provisions of Section 13.

8. ***Costs and Liabilities Related to the Property***.

8.1 ***Maintenance of the Property***. GRANTOR agrees to bear all costs and liabilities of any kind related to the operation, upkeep, and maintenance of the Property and does hereby indemnify and hold DISTRICT harmless therefrom. Without limiting the foregoing, GRANTOR agrees to pay any and all real property taxes, fees, exactions and assessments and each of them levied or imposed by local, state or federal authorities on the Property. GRANTOR shall be solely responsible for any costs related to the maintenance of general liability insurance covering acts on the Property. Except as specifically set forth in Section 9.2 below, DISTRICT shall have no responsibility whatever for the operation of the Property, the monitoring of hazardous conditions thereon, or the protection of GRANTOR, the public, or any third parties from risks relating to conditions on the Property. GRANTOR hereby agrees to indemnify and hold DISTRICT harmless from and against any damage, liability, claim, or expense (including attorneys' fees) relating to such matters. Without limiting the foregoing, DISTRICT shall not be liable to GRANTOR or any other person or entity in connection with consents given or withheld hereunder, or in connection with any entry upon the Property occurring pursuant to this Easement, or on account of any claim, liability, damage, or expense suffered or incurred by or threatened against GRANTOR or any other person or entity, except as such claim, liability, damage, or expense is the result of DISTRICT'S negligence, gross negligence, or intentional misconduct.

8.2 ***Hazardous Materials***. Notwithstanding any other provision of this Easement to the contrary, the parties do not intend and this Easement shall not be construed such that (1) it creates in DISTRICT the obligations or liabilities of an "owner" or "operator" as those words are defined and used in environmental laws, as defined

below, including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 United States Code, sections 9601 et seq. and hereinafter "CERCLA") or (2) it creates in DISTRICT the obligations or liabilities of a person described in 42 United States Code section 9607(a)(3) or (3) DISTRICT has the right to investigate and remediate any hazardous materials, as defined below, associated with the Property or (4) DISTRICT has any control over GRANTOR'S ability to investigate and remediate any hazardous materials associated with the Property. GRANTOR represents, warrants and covenants to DISTRICT that GRANTOR'S use of the Property shall comply with all environmental laws as that phrase is defined below. For the purposes of this Easement:

i. The term "hazardous materials" includes, without limitation, any flammable explosives, radioactive materials, hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in CERCLA, the Hazardous Materials Transportation Act, as amended (49 United States Code sections 1801 et seq.), the Resource Conservation and Recovery Act of 1976, as amended (42 United States Code sections 6901 et seq.), sections 25117 and 25316 of the California Health & Safety Code, and in the regulations adopted and publications promulgated pursuant to them, or any other federal, state, or local environmental laws, ordinances, rules, or regulations concerning the environment, industrial hygiene or public health or safety now in effect or enacted after this date of this Easement.

ii. The term "environmental laws" includes, without limitation, any federal, state, local or administrative agency statute, regulation, rule, ordinance, order or requirement relating to environmental conditions or hazardous materials.

9. ***Indemnities***.

9.1 ***GRANTOR'S Indemnity***. GRANTOR shall hold harmless, indemnify, and defend DISTRICT, its agents, employees, volunteers, successors and assigns, from and against damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with (i) injury to or the death of any person, or physical damage to property resulting from any act, omission, condition or other matter related to or occurring on or about the Property, except as such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of DISTRICT (it being the intent of this provision to limit GRANTOR'S indemnity to the proportionate part of DISTRICT'S damage, liability, claim or expense for which GRANTOR is responsible); and (ii) the obligations specified in Section 8. In the event of any claim, demand, or legal complaint against DISTRICT, the right to the indemnification provided by this Section 9.1 shall not apply to any cost, expense, penalty,

settlement payment, or judgment, including attorneys' fees, incurred prior to DISTRICT'S written notice of such claim, demand, or legal complaint to GRANTOR, unless GRANTOR has acquired knowledge of the matter by other means, nor to any costs, expenses, or settlement payment, including attorneys' fees, incurred subsequent to that notice unless such cost, expense, or settlement payment shall be approved in writing by GRANTOR, which approval shall not be unreasonably withheld.

9.2 ***DISTRICT'S Indemnity***. DISTRICT shall hold harmless, indemnify, and defend GRANTOR, its heirs, devisees, successors and assigns, from and against all damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property and attributable to DISTRICT, except to the extent that such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of GRANTOR (it being the intent of this provision to limit DISTRICT'S indemnity to the proportionate part of GRANTOR'S damage, liability, claim or expense for which DISTRICT is responsible). In the event of any claim, demand, or legal complaint against GRANTOR, the right to the indemnification provided by this Section 9.2 shall not apply to any cost, expense, penalty, settlement payment, or judgment, including attorneys' fees, incurred prior to GRANTOR'S written notice of such claim, demand, or legal complaint to DISTRICT, nor to any costs, expenses, or settlement payment, including attorneys' fees, incurred subsequent to that notice unless such cost, expense, or settlement payment shall be approved in writing by DISTRICT, which approval shall be in DISTRICT'S sole discretion. DISTRICT hereby also agrees to hold harmless, indemnify and defend GRANTOR from and against all damages, liabilities, claims and expenses, including attorneys' fees, asserted against GRANTOR by any officer, agent, employee, or volunteer of DISTRICT, for personal injury and/or property damage arising out of any inspection or visit to the Property by any such officer, agent, employee or volunteer of DISTRICT, except to the extent that such injury is attributable to the negligence, intentional act or willful misconduct of GRANTOR.

10. ***Public Access to the Property.*** Nothing in this Easement shall be construed to preclude GRANTOR's right to grant access to third parties across the Property, provided that such access is allowed in a reasonable manner and is consistent with the Conservation Purpose of this Easement and so long as such activity is undertaken subject to the terms and conditions of this Easement.

11. ***Interpretation and Construction***. To the extent that this Easement may be uncertain or ambiguous such that it requires interpretation or construction, then it shall be

interpreted and construed in such a way that meets the Conservation Purpose of this Easement. It is the intention of the parties that any interpretation or construction shall promote the Conservation Purpose of this Easement.

12. ***Baseline Documentation for Enforcement***. District acknowledges that the present uses of the Property are consistent with the Conservation Purpose of this Easement. In order to establish the present condition of the Property, DISTRICT, in consultation with GRANTOR will prepare a Baseline Documentation Report within three (3) months of the execution of this Easement which will be maintained on file with DISTRICT and which is intended to serve as an objective information baseline for monitoring compliance with the terms of this Easement. The parties agree that the Baseline Documentation Report is intended to provide an accurate representation of the Property at the time of the execution of this Easement. GRANTOR and DISTRICT recognize that changes in natural resource management practices and management of the recreational uses of the property may dictate an evolution of the management of the Property, consistent with the Conservation Purpose of this Easement.

13. ***Remedies for Breach***.

13.1 ***DISTRICT's Remedies***. In the event of a violation or threatened violation of any term, condition, covenant, or restriction contained in this Easement, DISTRICT may, following notice to GRANTOR, which notice shall contain a reasonable and specific cure period, institute a suit to enjoin and/or recover damages for such violation and/or to require the restoration of the Property to the condition that existed prior to such violation. The notice shall be a general written notification of the condition claimed by the DISTRICT to be a violation that is either mailed or otherwise delivered by DISTRICT to GRANTOR. If DISTRICT reasonably determines that circumstances require immediate action to prevent or mitigate damage to the values protected by this Easement, DISTRICT may pursue its remedies under this paragraph without waiting for the cure period to expire, and shall have the right, upon the giving of 24 hours' notice, to enter the Property for the purpose of assessing damage or threat to the Conservation Values protected by this Easement and determining the nature of curative or mitigation actions that should be taken. DISTRICT's rights under this Section apply equally in the event of either actual or threatened violations of the terms of this Easement, and GRANTOR agrees that DISTRICT's remedies at law for any violation of the terms of this Easement are inadequate and that DISTRICT shall be entitled to the injunctive relief described herein, both prohibitive and mandatory, in addition to such other relief, including damages, to which DISTRICT may be entitled, including specific performance of the terms of this Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies.

13.2 ***DISTRICT'S Discretion***. Enforcement of the terms of this Easement shall be at the sole discretion of DISTRICT, and any forbearance by DISTRICT to exercise its rights under this Easement in the event of any breach of any term of this Easement by GRANTOR shall not be deemed or construed to be a waiver by DISTRICT of such term or of any subsequent breach of the same or any other term of this Easement. Any failure by DISTRICT to act shall not be deemed a waiver or forfeiture of DISTRICT'S right to enforce any term, condition, covenant, or purpose of this Easement in the future.

13.3 ***Liquidated Damages***. Inasmuch as the actual damages resulting from the loss [or depreciation] of the Conservation Values of the Property and caused by its breach by GRANTOR are uncertain and would be impractical or extremely difficult to measure, the parties agree that the damages allowed by Civil Code section 815.7(c) shall be measured as follows:

(a) For an improvement prohibited by this Easement, an amount equal to the product of (i) the market value of the improvement, (ii) the length of time that the improvement exists on the Property (in terms of years), and (iii) the then current annual interest rate for post judgment interest; and

(b) For an activity or change in use prohibited by this Easement, whether or not it involves an improvement, an amount equal to any economic gain realized by GRANTOR because of the activity or change in use; and (c) For an activity or change in use prohibited by this Easement, whether or not it involves an improvement and where there is no measurable economic gain realized by GRANTOR, the product of (i) the cost of restoration, as set forth in a written estimate by a qualified person selected by DISTRICT, (ii) the length of time that the prohibited activity or use continues (in terms of years) and (iii) the then current annual interest rate for post judgment interest.

13.4 ***GRANTOR'S Compliance***. If DISTRICT, in the notice to GRANTOR, demands that GRANTOR remove an improvement, discontinue a use or both and claims the damages allowed by Civil Code section 815.7(c), then GRANTOR may mitigate damages by fully complying with DISTRICT'S notice within the cure period provided therein. In the event of litigation arising out of the notice, brought either by GRANTOR or by DISTRICT, in which GRANTOR prevails, then GRANTOR shall be entitled to economic damages; provided, however, that neither DISTRICT nor GRANTOR shall be entitled to damages where DISTRICT has not claimed damages in its notice.

13.5 ***Remedies Nonexclusive***. The remedies set forth in this Section 13 are not intended to displace any other remedy available to either party as provided by this Easement, Civil Code sections 815 et seq. or any other applicable local, state or federal law.

14. ***Acts Beyond GRANTOR'S Control.*** Nothing contained in this Easement shall be construed to entitle DISTRICT to bring any action against GRANTOR for any injury to or change in the Property resulting from causes beyond GRANTOR'S control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken by GRANTOR under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes so long as such action, to the extent that GRANTOR has control, is designed and carried out in such a way as to further the Conservation Purpose of this Easement.

15. ***Condemnation***. In the event that the Property or some portion thereof is condemned for public use by an entity other than DISTRICT, the market value for purposes of just compensation shall be determined as though this Easement did not exist and GRANTOR and DISTRICT shall share the compensation on the following basis: GRANTOR 38% and DISTRICT 62%. In the apportionment of the proceeds from an eminent domain proceeding, an adjustment shall be made in GRANTOR's favor for any increase in value after the date of this Easement that is attributable to improvements; provided such increase in value is earned through GRANTOR's efforts and is not the result of value added by this easement, the passage of time or other passive means; and provided, further, that such increase in value is not the result of activities constituting a breach of this Easement.

16. ***Agreement to Bind Successors***. The Easement herein granted shall be a burden upon and shall continue as a restrictive covenant and equitable servitude running in perpetuity with the Property and shall bind GRANTOR, GRANTOR'S heirs, personal representatives, lessees, executors, all persons claiming under GRANTOR, successors, including but not limited to purchasers at tax sales, and assigns forever. The parties intend that this Easement shall benefit and burden, as the case may be, their respective successors, assigns, heirs, executors, administrators, agents, employees, and all other persons claiming by or through them pursuant to the common and statutory law of the State of California, including, *inter alia*, Civil Code sections 815-816.

17. ***Subsequent Deeds and Leases***. GRANTOR agrees that a clear reference to this Easement will be made in any subsequent deed, or other legal instrument, by means of which any interest in the Property (including, but not limited to, a leasehold interest) is conveyed, that GRANTOR will attach a copy of this Easement to any such instrument,

and that GRANTOR will notify DISTRICT in writing ten (10) days prior to any such conveyance. These obligations of GRANTOR shall not be construed as a waiver or relinquishment by DISTRICT of rights created in favor of DISTRICT by this Easement.

18. ***Notices.*** All notices, (including requests, demands, approvals, or communications) under this Easement shall be in writing.

18.1 ***Method of Delivery***. Notice shall be sufficiently given for all purposes as follows:

(a) When personally delivered to the recipient, notice is effective on delivery.

(b) When mailed first class to the last address of the recipient known to the party giving notice, notice is effective on delivery.

(c) When mailed by certified mail with return receipt requested, notice is effective on receipt if delivery is confirmed by a return receipt.

(d) When delivered by overnight delivery with charges prepaid or charged to the sender's account, notice is effective on delivery if delivery is confirmed by the delivery service.

(e) When sent by telex or fax to the last telex or fax number of the recipient known to the party giving notice, notice is effective on receipt as long as (1) a duplicate copy of the notice is promptly given by first-class or certified mail or by overnight delivery or (2) the receiving party delivers a written confirmation of receipt. Subject to the foregoing requirements, any notice given by telex or fax shall be considered to have been received on the next business day if it is received after 5 p.m. (recipient's time) or on a non-business day.

18.2 ***Refused, Unclaimed, or Undeliverable Notices***. Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified shall be considered to be effective as of the first date that the notice was refused, unclaimed, or considered undeliverable by the postal authorities, messenger, or overnight delivery service.

18.3 ***Addresses***. Addresses for purposes of giving notice are set forth below:

**To GRANTOR:** Director of Regional Parks
County of Sonoma
2300 County Center Drive, 120A
Santa Rosa, CA 95403

**To DISTRICT:** General Manager
Sonoma County Agricultural Preservation
and Open Space District
747 Mendocino Avenue
Santa Rosa, CA 95401

19. ***Entire Agreement; Severability***. This instrument sets forth the entire agreement of the parties with respect to the Easement and supercedes all prior discussions, negotiations, understandings, or agreements relating to the Easement, all of which are merged herein. No alteration or variation of this instrument shall be valid or binding unless contained in a written amendment executed by GRANTOR and DISTRICT and recorded by the Sonoma County Recorder. In the event any provision of this Easement is determined by the appropriate court to be void and unenforceable, all remaining terms and conditions will remain valid and binding.

20. ***Estoppel Certificates***. DISTRICT shall, at any time during the existence of the Easement, upon not less than thirty (30) days' prior written notice from GRANTOR, execute and deliver to GRANTOR a statement in writing certifying that the Easement is unmodified and in full force and effect (or, if modified, stating the date of execution and date of recording of the respective amendment) and acknowledging that there is not, to DISTRICT'S knowledge, any default by GRANTOR hereunder, or, if DISTRICT alleges a default by GRANTOR, specifying such default. DISTRICT's obligation to deliver the statement of certification is conditioned on GRANTOR's reimbursing DISTRICT for all costs and expenses reasonably and necessarily incurred in its preparation as determined by DISTRICT's General Manager.

IN WITNESS WHEREOF, GRANTOR and DISTRICT have executed this Easement this 27th day of September, 2005.

GRANTOR:
COUNTY OF SONOMA

By: _____
Chair of the Board of Supervisors
Tim Smith

DISTRICT:

SONOMA COUNTY AGRICULTURAL PRESERVATION AND OPEN SPACE DISTRICT

By_____
President of the Board of Directors
Tim Smith

ATTEST:

Eeve T. Lewis by V Borelli
EEVE T. LEWIS, County Clerk and
ex-officio Clerk of the Board of Directors

## CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California }
County of Sonoma } ss.

On September 27, 2005 (Date) before me, Vikkie Borelli Notary Public, (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Jim Smith, Chair Board of Supervisors Jim Smith, President, Ag + Open Space Dist. (Name(s) of Signer(s))

☐ personally known to me
☐ proved to me on the basis of satisfactory evidence

to be the person(s) whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/~~her/their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

WITNESS my hand and official seal.

Vikkie R. Borelli
Signature of Notary Public

VIKKIE R. BORELLI
COMM. #1394835
NOTARY PUBLIC -CALIFORNIA
SONOMA COUNTY
My Comm. Expires Jan.19, 2007

### OPTIONAL

*Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.*

### Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

### Capacity(ies) Claimed by Signer

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

(RITA & MARVIN PARCEL)

**EXHIBIT A**

**The Real property**

The land referred to is situated in the unincorporated area of the County of Sonoma, State of California, and is described as follows:

TRACT ONE:

PARCEL ONE:

LOT 3, as said lot is shown and delineated upon that certain Parcel Map No. 7704, filed August 10, 1982 in Book 336 of Maps, Pages 33 and 34, Sonoma County Records.

A.P. No. 068-060-057

PARCEL TWO:

AN EASEMENT for road and utility purposes, 50 feet in width, over and across Lot 2, as said Lot and easement are shown on the map referred to herein.

TRACT TWO:

PARCEL ONE:

LOT 4, as said lot is shown and delineated upon that certain Parcel Map No. 7704, filed August 10, 1982 in Book 336 of Maps, Pages 33 and 34, Sonoma County Records.

A.P. No. 068-060-058

PARCEL TWO:

AN EASEMENT for road and utility purposes, 50 feet in width, over and across Lot 2, as said Lot and easement are shown on the map referred to herein.

PARCEL THREE:

AN EASEMENT for pedestrian and vehicular ingress and egress more particularly described as follows:

A RIGHT-OF-WAY easement, a uniform strip of land 12 feet in width, across the lands of Martinelli as said lands are described by Deed recorded in Book 1512 of Official Records, Page 45, Sonoma County Records, the center line of which is more particularly described as follows:

BEGINNING at a point in the centerline of an existing road on the Northerly boundary line of the lands of Gilardi as said lands are described by Deed recorded

in Book 3538 of Official Records, Page 835, Sonoma County Records, from which a set 3/4" iron pipe, on the Northerly line of said lands of Gilardi, tagged LS 5092, bears South 67° 03' 53" West 10.00 feet and also from said point of beginning a set 3/4" iron pipe, tagged LS 5092, at an existing 6" x 8" fence corner post, at the Northwesterly corner of said lands of Gilardi, bears South 67° 03' 53" West 2856.53 feet; thence Northerly from said point of beginning the following courses along the center line of an existing road: North 23° 05' West 105.67 feet to a curve concave Easterly having a radius of 200.00 feet, Northerly along said curve through a central angle of 8° 04' for a distance of 28.16 feet, North 15° 01' West 407.05 feet to an angle point, North 6° 16' West 171.60 feet to a curve concave Easterly having a radius of 380.00 feet, Northerly along said curve through a central angle of 11° 45' for a distance of 77.93 feet, North 5° 29' East 227.7 feet to an angle point, North 8° 08' East 89.00 feet to a curve concave Westerly having a radius of 205.00 feet, Northerly along said curve through a central angle of 27° 18' for a distance of 97.68 feet, North 19° 10' West 36.00 feet to a curve concave Easterly having a radius of 810.00 feet, Northerly along said curve through a central angle of 8° 03' for a distance of 113.80 feet, North 11° 07' West 220.00 feet to a curve concave Westerly having a radius of 390.00 feet, Northerly along said curve through a central angle of 37° 10' for a distance of 252.99 feet, North 48° 17' West 74.40 feet to a curve concave Easterly having a radius of 270.00 feet, Northerly along said curve through a central angle of 27° 37' for a distance of 130.14 feet, North 20° 40' West 60.60 feet to an angle point, North 28° 44' West 50.05 feet to a curve concave Easterly having a radius of 450.00 feet, Northerly along said curve through a central angle of 18° 32' for a distance of 145.56 feet, North 10° 12' West 78.00 feet to a curve concave Westerly having a radius of 170.00 feet, Northerly along said curve through a central angle of 42° 22' for a distance of 125.70 feet, North 52° 34' West 67.99 feet to a curve concave Northeasterly having a radius of 130.00 feet, Northerly along said curve through a central angle of 20° 04' for a distance of 45.53 feet, North 32° 30' West 88.00 feet to an angle point, North 35° 00' West 95.00 feet to an angle point and North 28° 00' West 41 feet more or less to the Southerly line of State Highway 116 (Stage Gulch Road).

PARCEL FOUR:

AN EASEMENT for pedestrian and vehicular ingress and egress more particularly described as follows:

A RIGHT-OF-WAY easement, a uniform strip of land 12 feet in width, across the lands of Gilardi as described in that Deed recorded in Book 3538 of Official Records, Page 835, Sonoma County Records, the centerline of which is more particularly described as follows:

COMMENCING at a found 1/2" iron pipe, tagged L.S. 5092, at a fence corner, the Southwesterly corner of said lands of Gilardi; thence North 66° 59' 40" East, 2334.15 feet along the Southerly line of said lands of Gilardi, to the point of beginning of said centerline at the centerline of an existing road and a point on a curve concave Westerly having a radius of 300.00 feet from which a radial line of said curve bears South 76° 33' 43" West; thence Northerly the following courses along said existing road; Northerly along said curve through a central angle of 4° 33' 43" for a distance of 23.89 feet, North 18° 00' 00" West 54.35 feet, North 11° 30' 00" West 201.40 feet, North 13° 45' 00" West 126.10 feet to a curve concave Easterly having a radius of 300.00 feet, Northerly along said curve through a central angle of 20° 55' 00" for a distance of 109.52 feet, North 7° 10' 00" East, 186.00 feet to a curve concave Easterly having a radius of 400.00 feet, Northerly along said curve through a central angle of 16° 50' 00" for a distance of 117.52 feet to a curve concave Southeasterly having a radius of 210.00 feet, Northerly and Northeasterly along said curve through a central angle of 37° 00' 00" for a distance of 135.61 feet, North 61° 00' 00" East 146.68 feet to a curve concave Northwesterly having a radius of 310.00 feet, Northeasterly and Northerly along said curve through a central angle of 71° 15' 00" for a distance of 385.50 feet, North 10° 15' 00" West 81.75 feet, North 18° 00' 00" West 152.50 feet, North 31° 30' 00" West 186.32 feet to a curve concave Westerly having a radius of 250.00 feet, Northerly along said curve through a central angle of 28° 20' 00" for a distance of 114.90 feet, North 57° 50' 00" West 172.74 feet to a curve concave Easterly having a radius of 620.00 feet, Northerly along said curve through a central angle of 18° 52' 00" for a distance of 204.16 feet, North 38° 58' 00" West 180.00 feet to a curve concave Easterly having a radius of 180.00 feet, Northerly along said curve through a central angle of 29° 18' 00" for a distance of 92.05 feet, North 9° 40' 00" West 133.04 feet to a curve concave Easterly having a radius of 940.00 feet, Northerly along said curve through a central angle of 7° 28' 00" for a distance of 122.50 feet, North 2° 12' 00" West 74.14 feet to a curve concave Westerly having a radius of 415.00 feet, Northerly along said curve through a central angle of 20° 53' 00" for a distance of 151.26 feet and North 23° 05' 00" West 2.32 feet to the Northerly line of said lands of Gilardi, from which a set 3/4" iron pipe tagged L.S. 5092 bears South 67° 03' 53" West 10.00 feet.

PARCEL FIVE:

A 40 FOOT easement for road and utility purposes over Lot 2 as shown upon Parcel Map No. 5085-A filed October 14, 1976 in Book 240 of Maps at Pages 23, 24 and 25, Sonoma County Records and as further described in a deed recorded May 21, 1985 as Document No. 1985- 31917, Official Records.

## *Exhibit B*
## *Prohibited and Restricted Uses of the Property*

1. **Subdivision/Development Rights.** The legal or de facto subdivision of the Property or any of its constituent parcels for any purpose, including but not limited to gaining recognition of previously unrecognized parcels created by patent or deed, conveyance, subdivision or survey; the seeking of a partition remedy in a lawsuit; the transfer of development rights within or outside the ownership of the Property; and/or the sale, alienation, finance or conveyance of one parcel of the Property apart from the sale of the entire Property is prohibited, except through the power of Eminent Domain. Notwithstanding anything stated to the contrary in the previous sentence, GRANTOR may, subject to DISTRICT's prior written approval, undertake the following actions:

1.1 Conveyance for Conservation Purposes. GRANTOR may voluntarily convey a portion of the Property to a government or non-profit entity exclusively for conservation or public access purposes.

1.2 Boundary Line Adjustments. GRANTOR may relocate one or more boundary lines between two or more of the existing contiguous parcels on the Property, where the land taken from one parcel is added to a contiguous parcel and neither a greater number of parcels nor a greater number of buildable parcels than originally existed are thereby created.

**2. Commercial Uses.** Any commercial use of or activity on the Property is prohibited, except for the following rights reserved by GRANTOR:

2. 1 Recreational Use. Recreational concessions or short-term special events may be operated on the Property in accordance with the Tolay Lake Park Management Plan and at a level that is consistent with the Conservation Purpose of this Easement.

2. 2 Park Complex/Visitor Center. GRANTOR may develop visitor-serving uses within the Park Complex Area in accordance with the Tolay Lake Park Management Plan and at a level that is consistent with the Conservation Purpose of this Easement.

2.3 Agricultural Use. In addition to the rights reserved in Paragraph 5.3 of this Easement, GRANTOR reserves the right to engage in limited agricultural use of the Property in accordance with the Tolay Lake Park Management Plan and at a level that is consistent with the Conservation Purpose of this easement, subject to approval by the District, Wildlife Conservation Board and State Coastal Conservancy.

3. **Recreational Use.** Any recreational use of the property that would adversely impact the conservation values of the property is prohibited, including the following:

3.1 Camping. The use of the Property for limited or supervised camping by permit is allowed at a level that is consistent with the Conservation Purpose of this Easement. Any other camping on the Property shall be consistent with the Conservation Purpose of this Easement and shall be subject to approval by the District, Wildlife Conservation Board and State Coastal Conservancy.

3.2 Water based recreation on lake and ponds. Any public use of existing or restored water bodies for motorized watercraft is prohibited. Any use of non-motorized watercraft must be consistent with the Lake Restoration and Management Plan and Conservation Easement held by the Department of Fish and Game and must be consistent with the Conservation Purpose of this Easement.

3.3 Ball fields. The development of ball fields is prohibited.

3.4 Night lighting. The development or installation of lighting to allow for public recreational uses outside of a Park Complex/Visitor Center Area past sunset is prohibited.

4. **Residential Use.** Any residential use of or activity on the Property is prohibited, except for the following rights reserved by the GRANTOR relating to residential use of the Property.

4.1 To lease one or more of the residences on the Property consistent with the terms, conditions, and purpose of this Easement.

5. **Structures and Improvements.** No residences, buildings or other structural improvements, shall be placed, constructed or reconstructed on the Property, other than as provided for in the Park Management Plan.

5.1 Maintenance, Repair or Replacement of Existing Structural Improvements. GRANTOR may maintain, renovate, or replace agricultural, residential, and related buildings, structures and improvements, whether existing at the date hereof or constructed subsequently pursuant to the provisions of this Easement, in their present location as described in the Baseline Report and shown on the Baseline Site Map; provided that any renovation, or replacement of an existing building, structure, or improvement may not substantially alter its character or function or increase its present height, or the land surface area it occupies.

5.2 New Structural Improvements for Recreational, Educational or Interpretive Uses. GRANTOR may place or construct, after prior written approval of the DISTRICT, additional buildings, structures and improvements necessary for the permitted recreational, educational, or interpretive use of the Property, provided that any additional buildings, structures and improvements are located within the Park Complex Area as more particularly described in the Baseline Report and shown on the Baseline Site Map.

5.3 Roads. Construction of new roads, reconstruction or expansion of existing roads is subject to the DISTRICT's prior written approval, and are restricted to roads as may be directly required for uses and activities permitted herein, so long as such road construction, expansion or reconstruction is otherwise consistent with the purposes, terms and conditions of this Easement. Roads shall be constructed and maintained so as to minimize erosion and sedimentation and ensure proper drainage, utilizing Best Management Practices as recommended by the U.S. Forest Service, California Department of Forestry & Fire Protection or other similar or successor entity. Roads may not be paved with asphalt, concrete or other impervious surface unless such paving is identified in and consistent with the Park Management Plan or required by any law, code, ordinance or regulation. Roads that are abandoned, permanently closed and/or decommissioned shall be restored, stabilized and ensured of proper drainage.

5.4 Fences. Construction of new fences is restricted to fencing only as necessary for agricultural uses, natural resources protection or other uses accessory to the residential or recreational use of the Property. Such fencing must be the minimum necessary for such uses. In the event of destruction or deterioration of any fences, whether existing at the date hereof or constructed subsequently pursuant to the provisions of this Agreement, GRANTOR may replace such fencing with a fence of similar size (i.e., no greater in height or length), function, capacity and location, without prior notice to or approval by DISTRICT, provided, however, that such replacement: (i) is consistent with the conservation purpose of this Agreement, including the preservation of scenic values; (ii) does not impede wildlife movement; and (iii) complies with the DISTRICT'S current standards for fences on conservation lands. In the event any fence, or portion thereof, becomes unnecessary for the uses described in this paragraph, GRANTOR shall remove such fencing from the Property.

5.5 Utilities. Expansion, development or construction of utilities, including but not limited to electric power, septic or sewer, communication lines, and water storage and delivery systems ("Utility Systems") is prohibited, provided however, that, upon written notification to DISTRICT, GRANTOR may reconstruct, replace and maintain the current Utility Systems, and subject to DISTRICT's approval, develop and expand the Utility Systems when directly required for the uses permitted in Paragraphs 4 and 5 of this Easement, so long as such expansion is constructed in a manner that is otherwise consistent with the purposes, terms and conditions herein.

5.6 Signs. The construction of outdoor advertising structures such as signs and billboards is prohibited, provided however, that GRANTOR reserves the right to construct signs on the Property which are necessary to accomplish the permitted uses herein, so long as such signs are constructed, placed or utilized in a manner that is otherwise consistent with the purposes, terms and conditions of this Easement, and that no sign other than Park Entry signs exceed thirty-two (32) square feet in size and/or be artificially illuminated without prior written approval of the DISTRICT. Any signs to be placed on the property must comply with the Matching Grant Agreement between GRANTOR and DISTRICT.

6. **Water Resources.** Except as may be necessary to implement the Lake Restoration and Management Plan as described in Paragraph 5.2 of this Agreement, relating to the maintenance, replacement, development and expansion of water storage and delivery systems, the draining, filling, dredging, diking, damming or other alteration, development or manipulation of watercourses, springs and wetlands is prohibited; provided, however, that GRANTOR may conserve riparian, wetland and instream habitats for fish and wildlife, and may take necessary actions in the event of an emergency situation.

7. **Easements.** The granting of new temporary or permanent easements, and the modification or amendment of existing easements is prohibited without the approval of the DISTRICT. New easements or easement modifications shall only be granted where they will remove or significantly lessen the impact of existing easements of record on the Conservation Values set forth in this Easement or if such new or modified easement furthers the Conservation Purpose of this Easement. It is the duty of GRANTOR to prevent the use of the Property by third parties which may result in the creation of prescriptive rights which may be inconsistent with the conservation purpose of this Easement.

8. **Motorized Vehicles.** Motorized vehicles shall not be used off roads, except in an emergency, or directly in connection with permitted agricultural, conservation, wildlife or recreation management activities and when otherwise consistent with the purposes, terms and conditions herein.

9. **Soil Degradation.** Any use or activity that causes soil degradation, loss of productivity, or erosion, or contributes to the pollution of any surface or sub-surface waters is prohibited.

10. **Mineral Exploration.** The exploration for, or development and extraction of, geothermal resources, minerals and hydrocarbons by any surface or sub-surface mining or any other method is prohibited; provided however, that GRANTOR may use rock material from the existing quarry site, as designated on the Baseline Site Map, on site and in connection with the permitted uses under the terms of this Easement.

11. **Storage/Dumping.** The dumping, release, burning, permanent storage, or other disposal of wastes, refuse, debris, motorized vehicles or hazardous substances is prohibited; except for the

following rights reserved by GRANTOR in connection with the permitted uses under the terms of this Easement:

11.1 Storage of Materials Related to Permitted Uses. The storage of vehicles, building materials, machinery or agricultural supplies required for permitted uses may be stored in existing agricultural structures as delineated on the Baseline Site Map, so long as such storage is consistent with law, public health and sound agricultural practices.

11.2 Storage of Construction Materials. Construction and other work materials which are visible from public roadways may be stored outside while work is in progress for a period not to exceed ninety (90) days.

12. **Surface Alteration or Excavation.** Any alteration of the contour of the Property in any manner whatsoever including, but not limited to, excavating or removing soil, sand, gravel, rock, peat or sod is prohibited, except as necessary in connection with the permitted uses as provided in this Easement.

13. **Tree Removal.** The harvesting, cutting, removal, or destruction of any trees is prohibited, provided, however, that GRANTOR reserves the right to cut or remove trees as reasonably necessary for personal, non-commercial use on the Property, including without limitation (a) to control insects and disease, (b) to prevent personal injury and property damage, (c) to allow construction or repair of residential, recreational, educational, or agricultural structures and improvements, (d) to allow for habitat restoration activities, and (e) as necessary for the purpose of fire control and/or natural resource management as more specifically defined in Section 5.3 of the Easement.

# CERTIFICATE OF ACCEPTANCE
(Government Code Section 27281)
# OF REAL PROPERTY BY THE BOARD OF DIRECTORS OF THE SONOMA COUNTY AGRICULTURAL PRESERVATION AND OPEN SPACE DISTRICT

This is to certify that the interests in real property conveyed by the Conservation Easement Agreement dated September 27, 2005, from the County of Sonoma to the Sonoma County Agricultural Preservation and Open Space District, a governmental agency formed pursuant to the provisions of Public Resources Code Section 5506.5, is hereby accepted by the President of the Board of Directors on behalf of the District pursuant to the authority conferred by Resolution No. 05-0840 of the Board of Directors, Dated September 27, 2005, and the District consents to the recording thereof by its duly recognized officer.

Sonoma County Agricultural Preservation and Open Space District

Dated: 9/27/05

By: _____
Tim Smith, President
Board of Directors

ATTEST:

_____
Eeve T. Lewis, County Clerk and
ex-officio clerk of the Board of Directors

appendix p

# SCAPOSD Conservation Easement
# Tolay Creek Ranch

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

(9)

RECORDING REQUESTED BY AND
RETURN TO:

CHICAGO TITLE CO.
12/21/2007 15:16 DEED
RECORDING FEE: 0.00
PAID

2007134280 1
OFFICIAL RECORDS OF
SONOMA COUNTY
JANICE ATKINSON
29 PGS

Sonoma County Agricultural
Preservation and Open Space District
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

EXEMPT FROM RECORDING FEES
GOV. CODE SECTION 6103

DEED AND AGREEMENT
BY AND BETWEEN
THE SONOMA LAND TRUST
AND
THE SONOMA COUNTY AGRICULTURAL PRESERVATION
AND OPEN SPACE DISTRICT

The Sonoma Land Trust, a California non-profit corporation (hereinafter referred to as GRANTOR), and the Sonoma County Agricultural Preservation and Open Space DISTRICT, a public agency formed pursuant to the provisions of Public Resources Code sections 5500 et seq. (hereinafter DISTRICT), its successors and assigns, agree as follows:

RECITALS

A. GRANTOR is the owner in fee simple of certain real property (hereinafter "the Property") located in Sonoma County and more particularly described in Exhibit A, attached hereto and made a part of hereof.

B. In 1990 the voters of Sonoma County approved the creation of DISTRICT and the imposition of a transactions and use tax by the Sonoma County Open Space Authority ("the Authority"). The purpose for the creation of DISTRICT and the imposition of the tax by the Authority was to preserve agriculture and open space by acquiring interests in appropriate properties from willing sellers in order to meet the mandatory requirements imposed on the County and each of its cities by Government Code sections 65560 *et seq.* and by the open space elements of their respective general plans. In order to accomplish that purpose, DISTRICT entered into a contract with the Authority whereby, in consideration of that entity financing DISTRICT's acquisitions, DISTRICT agreed to and did adopt an acquisition program that was in conformance with the Authority's voter approved Expenditure Plan.

C. On November 6, 2007, DISTRICT's Board of Directors, in its Resolution No. 07-0930 determined that the acquisition of a conservation easement in the Property, pursuant to Government Code section 65402 and Sonoma County Ordinance No. 5180, was consistent with the 1989 Sonoma County General Plan (specifically the Plan's Open Space element) because the acquisition of the Property will ensure the preservation of its largely open, scenic character as well as the preservation of critical plant and animal habitat areas. On October 11, 2007 the Sonoma County Open Space Authority determined, in its Resolution No. 2007-024 that the acquisition was consistent with its Expenditure Plan.

D. DISTRICT has the authority to acquire conservation easements by virtue of Public Resources Code section 5540 and possesses the ability and intent to enforce the terms of this Agreement.

THEREFORE, in consideration of the foregoing recitations and of the mutual covenants, terms, conditions, and restrictions herein set forth and other valuable consideration receipt of which is hereby acknowledged, GRANTOR and DISTRICT agree as follows:

1. ***Grant and Acceptance of Conservation Easement***. Pursuant to the common and statutory law of the State of California including the provisions of Civil Code sections 815 to 816, inclusive, GRANTOR hereby grants to DISTRICT and DISTRICT accepts a conservation easement (hereinafter "this Easement" or "the Easement") in the Property in perpetuity.

2. ***Statement of Purpose***. It is the purpose of this Conservation Easement Agreement to preserve the open space, scenic, and natural resource values of the Property, and each of them, and to prevent any uses of the Property that will significantly impair or interfere with those values. The Property possesses natural, scenic, open space, wildlife and watershed values (collectively, "Conservation Values") of importance to the DISTRICT, the GRANTOR, the people of Sonoma County, and the people of the State of California. In particular the Conservation Values include:

**Tolay Creek and Watershed**. the Property includes approximately 3 miles of Tolay Creek, which is identified as a Priority Riparian Corridor by Sonoma County Agricultural Preservation and Open Space District ("SCAPOSD") and the Sonoma County General Plan. (Connecting Communities and The Land, A Long-Range Acquisition Plan. SCAPOSD. June, 2006; Acquisition Plan 2000. SCAPOSD. July, 2000.) Tolay Creek feeds into the California Department of Fish and Game Napa Sonoma Marsh complex and the U. S. Fish and Wildlife Service San Pablo Bay

Wildlife Refuge, a biologically rich seasonal wetland and tidal wetland complex in Sonoma County, and ultimately into San Francisco Bay. Restoration and protection of the Tolay Creek watershed is major concern of the State of California and Sonoma County. (The Goals Project. 1999. Baylands Ecosystem Habitat Goals U. S. Environmental Protection Agency).

**Habitat**. The preservation of the Property provides habitat for important plant and animal species integral to preserving the natural character of Sonoma County. Habitats on the property include moist grasslands, serpentine grasslands, approximately 3 miles of Tolay Creek and riparian corridor, open meadows, and oak woodlands. Uplands, such as those that occur on the Property, have been identified as an integral component of the San Francisco Bay ecosystem and this Property provides an opportunity to protect key watershed habitats associated with San Francisco Bay. The variety of habitats on the Property will support an abundance of species, including an active golden eagle nest site, the Opler's longhorn moth, Prairie falcon, and northern burrowing owl; all of which are on the California "Special Animals" list. Accordingly, this Agreement will primarily preserve the Property's unique natural habitats and associated wildlife including Tolay Creek and its riparian zone. The Property is located in an area designated (a) by SCAPOSD as a Species Rich Area (Connecting Communities and The Land, A Long-Range Acquisition Plan. SCAPOSD. June, 2006; Acquisition Plan 2000. SCAPOSD. July, 2000.); (b) by Sonoma County as a sensitive natural area with occurrences of special status species (Sonoma County General Plan, 1989. Biotic Resource Area Map, Figure OSRC-2); The special status species in the area may include California red-legged frog (California Department of Fish and Game's Natural Diversity Database (CNDDB ).

**Connectivity**. The Riparian Corridor is immediately adjacent to approximately 20,000 acres of state, federal, local and privately protected lands. It represents one of the only remaining undeveloped natural freshwater to salt marsh ecosystems, including approximately 3 miles of the Tolay Creek riparian corridor, connecting Tolay Lake to San Francisco Bay. The Property is adjacent to Tolay Lake Regional Park and the Sonoma County Cougar Mountain open space easement, which in turn is contiguous with Sonoma Land Trust's 2,327 acre Sears Point Restoration Project and in close proximity to California Department of Fish and Game's Napa-Sonoma Marsh complex, and the San Pablo Bay National Wildlife Refuge and other public protected lands. Its protection furthers SCAPOSD's objectives to (a) protect land that provides viable habitat linkages for wildlife and intact core habitat areas, (b) conserve contiguous areas of high quality riparian habitat, and (c) provide connections between natural areas throughout the county. (Connecting Communities and The Land, A Long-Range Acquisition Plan. SCAPOSD. June, 2006; Acquisition Plan 2000. SCAPOSD. July, 2000.).

**Open Space and Scenic Resources.** The Property ranges from 100 feet on the valley floor to 780 feet in the hills, with several overlooks providing spectacular views of the Petaluma River basin, Mt. Tamalpais, San Francisco, Oakland, Mt. Diablo, Mt. St. Helena and other scenic points in the Bay Area. The Property is prominently visible from and provides scenic enjoyment to the general public from State Highways 37 and 121. In summary, it is the purpose of this Agreement to protect the Property's Conservation Values and to prevent any uses of the Property that would significantly impair or interfere with those values. These purposes, as further defined by the provisions of this Agreement, are generally referred to collectively hereinafter as "the Conservation Purpose of this Easement".

GRANTOR intends that this Agreement will confine the uses of the Property to the following, which are consistent with the Conservation Purpose of this Easement: (a) habitat management restoration and enhancement, including compatible agriculture, including grazing and rangeland management; (b) management and conservation of natural resources, including related scientific research; (c) low intensity outdoor public educational and recreational activities and (d) residential uses within one area of approximately five (5) acres (hereinafter, the "Residential Envelope"); all as allowed by Exhibit "B" hereto. GRANTOR shall prepare a Management Plan for the Property that addresses (a) through (d) above in this paragraph and provide the Management Plan to DISTRICT for review. In addition, GRANTOR shall refrain from those uses and practices that are inconsistent with the conservation purpose of this Agreement, which include, but are not limited to, the uses and practices identified in Exhibit "B."

3. ***Affirmative Rights Granted to the DISTRICT***. GRANTOR conveys the following rights to DISTRICT:

3.1 ***Protecting Conservation Values***. DISTRICT shall have the right to identify, preserve and protect the Conservation Values of the Property; and

3.2 ***Property Inspections***. DISTRICT shall have the right to enter upon the Property and to inspect, observe, and study the Property for the purposes of (i) identifying the current uses and practices thereon and the condition thereof, (ii) monitoring the uses and practices regarding the Property to determine whether they are consistent with this Easement, and (iii) enforcing the terms of this Easement pursuant to Section 13 below. Entry shall be permitted at least once a year at reasonable times, upon 24 hours' prior notice to GRANTOR, and shall be made in a manner that will not unreasonably interfere with GRANTOR's use and quiet enjoyment of the Property pursuant to the terms and conditions of this Easement. Each entry shall be for only so long a duration as is reasonably necessary to achieve the inspection, monitoring and subsequent enforcement, if applicable, but may not be limited to a single physical entry during a single twenty-four hour period; and

3.3 ***Approval of Certain Activities***. DISTRICT shall have the right to review and approve proposed uses and activities as more specifically set forth in Section 5 and Exhibit B herein, and in accordance with Section 7.

4. ***Prohibited and Restricted Uses of the Property***. Any activity on the Property or use of the Property which is inconsistent with the Conservation Purpose of this Easement is prohibited. Without limiting the generality of the foregoing, the activities and uses described in Exhibit B attached hereto are expressly prohibited or restricted.

5. ***GRANTOR's Reserved Rights***. The allowed uses, practices and rights to improve the Property which are not retained by GRANTOR above or allowed under Exhibit B are hereby extinguished. In the event that such extinguishment is determined to be unlawful or otherwise unenforceable, then those uses, practices and rights contributing to the improvement of the Property are hereby assigned by GRANTOR to DISTRICT. Neither GRANTOR nor DISTRICT shall use or receive the benefit from any increase in allowable uses, practices and rights to improve the Property, that are inconsistent with this Easement, resulting from any change in applicable governmental land use regulations.

6. ***Merger of Parcels***. GRANTOR acknowledges that the Property currently consists of a single parcel as shown on the current Sonoma County Assessment Roll. GRANTOR further acknowledges that one or more additional parcels may exist on the Property through the recognition of previously unrecognized parcels created by patent or deed conveyances, subdivisions, lot line adjustments, surveys, recorded or unrecorded maps or other documents and, that existing or future land use regulations might permit these parcels to be sold or otherwise conveyed separately from one another as separate legal parcels. It is the intent of GRANTOR and DISTRICT to prevent the separate conveyance of any of these parcels. To the extent not already accomplished as a condition precedent to the acceptance by DISTRICT of this Easement, GRANTOR shall apply for and pursue to completion an application to the County of Sonoma, or, such other governmental agency having jurisdiction, for the consolidation or merger of any existing parcels or claimed parcels of the Property into a single parcel. If the parcels cannot be merged because of their lack of contiguity or for any other reason, GRANTOR shall pursue and secure such other applicable legal restrictions so that no such existing parcels or claimed parcels may be separately sold or conveyed from the others or the property as a whole.

7. ***Notice and Approval Procedures***. Some uses permitted by this Easement require that prior written notice be given by GRANTOR to DISTRICT, while other uses permitted by this Easement require the prior written approval of DISTRICT. Any activity proposed to be done or undertaken by GRANTOR which requires prior notice or the prior

approval of DISTRICT shall be commenced only after satisfaction of the requirements of this Section and of Section 18. Notice shall be given or approval requested by using the appropriate form available at DISTRICT's offices. DISTRICT may consider notices and requests for approval in different forms, provided that all necessary information is provided to permit DISTRICT to make an informed judgment as to the consistency of the GRANTOR's request with the terms of this Easement.

7.1 ***Uses/Activities Requiring Notice to DISTRICT***. GRANTOR shall deliver the notice to DISTRICT at least forty-five (45) days prior to the commencement of any use or practice requiring notification.

7.2 ***Uses/Activities Requiring Prior Approval from DISTRICT***. DISTRICT shall have forty-five (45) days from the receipt of a complete request for approval to review the proposed use or practice and to approve, conditionally approve, approve with modifications, disapprove or otherwise respond to the request. If the request for approval is approved, conditionally approved or approved with modifications, the requested use or practice may only be undertaken in accordance with the terms, conditions and modifications of the approval. DISTRICT's decision to disapprove a request for approval shall be supported by a finding that the requested use or practice is inconsistent with the Conservation Purpose of this Easement or that the request for approval is incomplete or inaccurate. The approval of the DISTRICT obtained in one circumstance shall not be deemed or construed to be a waiver by DISTRICT of any subsequent change in use or practice.

7.3 ***DISTRICT's Failure to Respond***. Should DISTRICT fail to post its response to GRANTOR's request for approval within forty-five (45) days of the receipt of said notice, GRANTOR shall send a second notice by registered or certified mail. Should DISTRICT fail to respond to the second notice within ten (10) days of the receipt thereof, GRANTOR may appeal to DISTRICT's Board of Directors.

7.4 ***Non-Permitted Uses; DISTRICT's Approval***. In the event GRANTOR desires to commence a use or practice on the Property which is not expressly reserved or prohibited in Exhibit B or Section 5, GRANTOR shall seek DISTRICT's prior written approval of such use or practice in accordance with the procedure set forth in Section 7.2 above. The exercise of any use or practice pursuant to a right not expressly reserved in Exhibit B or Section 5 may constitute a breach of this Easement and be subject to the provisions of Section 13.

8. ***Costs and Liabilities Related to the Property***.

8.1 ***Maintenance of the Property***. GRANTOR agrees to bear all costs and liabilities of any kind related to the operation, upkeep, and maintenance of the Property and does hereby indemnify and hold DISTRICT harmless therefrom. Without

limiting the foregoing, GRANTOR agrees to pay any and all real property taxes, fees, exactions and assessments and each of them levied or imposed by local, state or federal authorities on the Property. GRANTOR shall be solely responsible for any costs related to the maintenance of general liability insurance covering acts on the Property. Except as specifically set forth in Section 9.2 below, DISTRICT shall have no responsibility whatever for the operation of the Property, the monitoring of hazardous conditions thereon, or the protection of GRANTOR, the public, or any third parties from risks relating to conditions on the Property. GRANTOR hereby agrees to indemnify and hold DISTRICT harmless from and against any damage, liability, claim, or expense (including attorneys' fees) relating to such matters. Without limiting the foregoing, DISTRICT shall not be liable to GRANTOR or any other person or entity in connection with consents given or withheld hereunder, or in connection with any entry upon the Property occurring pursuant to this Easement, or on account of any claim, liability, damage, or expense suffered or incurred by or threatened against GRANTOR or any other person or entity, except as such claim, liability, damage, or expense is the result of DISTRICT'S negligence, gross negligence, or intentional misconduct.

8.2 ***Hazardous Materials***. Notwithstanding any other provision of this Easement to the contrary, the parties do not intend and this Easement shall not be construed such that (1) it creates in DISTRICT the obligations or liabilities of an "owner" or "operator" as those words are defined and used in environmental laws, as defined below, including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 United States Code, sections 9601 et seq. and hereinafter "CERCLA") or (2) it creates in DISTRICT the obligations or liabilities of a person described in 42 United States Code section 9607(a)(3) or (3) DISTRICT has the right to investigate and remediate any hazardous materials, as defined below, associated with the Property or (4) DISTRICT has any control over GRANTOR'S ability to investigate and remediate any hazardous materials associated with the Property. GRANTOR represents, warrants and covenants to DISTRICT that GRANTOR'S use of the Property shall comply with all environmental laws as that phrase is defined below. For the purposes of this Easement:

i. The term "hazardous materials" includes, without limitation, any flammable explosives, radioactive materials, hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in CERCLA, the Hazardous Materials Transportation Act, as amended (49 United States Code sections 1801 et seq.), the Resource Conservation and Recovery Act of 1976, as amended (42 United States Code sections 6901 et seq.), sections 25117 and 25316 of the California Health & Safety Code, and in the regulations adopted and publications promulgated pursuant to them, or any other federal, state, or local environmental laws, ordinances, rules, or regulations concerning the environment, industrial hygiene or public health or safety now in effect or enacted after this date of this Easement.

ii. The term "environmental laws" includes, without limitation, any federal, state, local or administrative agency statute, regulation, rule, ordinance, order or requirement relating to environmental conditions or hazardous materials.

9. ***Indemnities***.

9.1 ***GRANTOR'S Indemnity***. GRANTOR shall hold harmless, indemnify, and defend DISTRICT, its agents, employees, volunteers, successors and assigns, from and against damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with (i) injury to or the death of any person, or physical damage to property resulting from any act, omission, condition or other matter related to or occurring on or about the Property, except as such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of DISTRICT (it being the intent of this provision to limit GRANTOR'S indemnity to the proportionate part of DISTRICT'S damage, liability, claim or expense for which GRANTOR is responsible); and (ii) the obligations specified in Section 8. In the event of any claim, demand, or legal complaint against DISTRICT, the right to the indemnification provided by this Section 9.1 shall not apply to any cost, expense, penalty, settlement payment, or judgment, including attorneys' fees, incurred prior to DISTRICT'S written notice of such claim, demand, or legal complaint to GRANTOR, unless GRANTOR has acquired knowledge of the matter by other means, nor to any costs, expenses, or settlement payment, including attorneys' fees, incurred subsequent to that notice unless such cost, expense, or settlement payment shall be approved in writing by GRANTOR, which approval shall not be unreasonably withheld.

9.2 ***DISTRICT'S Indemnity***. DISTRICT shall hold harmless, indemnify, and defend GRANTOR, its heirs, devisees, successors, agents and assigns, from and against all damages, liabilities, claims and expenses, including reasonable attorneys' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property and attributable to DISTRICT, except to the extent that such damage, liability, claim or expense is the result of the negligence, gross negligence, or intentional misconduct of GRANTOR (it being the intent of this provision to limit DISTRICT'S indemnity to the proportionate part of GRANTOR'S damage, liability, claim or expense for which DISTRICT is responsible). In the event of any claim, demand, or legal complaint against GRANTOR, the right to the indemnification provided by this Section 9.2 shall not apply to any cost, expense, penalty, settlement payment, or judgment, including attorneys' fees, incurred prior to GRANTOR'S written notice of such claim, demand, or legal complaint to DISTRICT, nor to any costs, expenses, or settlement payment, including attorneys' fees, incurred subsequent to that notice unless such cost, expense, or settlement payment shall be

approved in writing by DISTRICT, which approval shall be in DISTRICT'S sole discretion. DISTRICT hereby also agrees to hold harmless, indemnify and defend GRANTOR from and against all damages, liabilities, claims and expenses, including attorneys' fees, asserted against GRANTOR by any officer, agent, employee, or volunteer of DISTRICT, for personal injury and/or property damage arising out of any inspection or visit to the Property by any such officer, agent, employee or volunteer of DISTRICT, except to the extent that such injury is attributable to the negligence, intentional act or willful misconduct of GRANTOR.

10. ***Public Access to the Property.*** Nothing in this Easement shall be construed to preclude GRANTOR's right to grant access to third parties across the Property, provided that such access is allowed in a reasonable manner and is consistent with the Conservation Purpose of this Easement and so long as such activity is undertaken subject to the terms and conditions of this Easement.

11. ***Interpretation and Construction***. To the extent that this Easement may be uncertain or ambiguous such that it requires interpretation or construction, then it shall be interpreted and construed in such a way that meets the Conservation Purpose of this Easement. It is the intention of the parties that any interpretation or construction shall promote the Conservation Purpose of this Easement.

12. ***Baseline Documentation for Enforcement***. District acknowledges that the present uses of the Property are consistent with the Conservation Purpose of this Easement. In order to establish the present condition of the Property, DISTRICT has prepared a Baseline Documentation Report which will be maintained on file with DISTRICT and which is intended to serve as an objective information baseline for monitoring compliance with the terms of this Easement. The parties agree that the Baseline Documentation Report will provide an accurate representation of the Property at the time of the execution of this Easement.

13. ***Remedies for Breach***.

13.1 ***DISTRICT's Remedies***. In the event of a violation or threatened violation of any term, condition, covenant, or restriction contained in this Easement, DISTRICT may, following notice to GRANTOR, which notice shall contain a reasonable and specific cure period, institute a suit to enjoin and/or recover damages for such violation and/or to require the restoration of the Property to the condition that existed prior to such violation. The notice shall be a general written notification of the condition claimed by the DISTRICT to be a violation that is either mailed or otherwise delivered by DISTRICT to GRANTOR. If DISTRICT reasonably determines that circumstances require immediate action to prevent or mitigate damage to the values protected by this Easement, DISTRICT may pursue its remedies under this paragraph without waiting for the cure period to expire, and shall have the right, upon the giving of 24 hours' notice, to

enter the Property for the purpose of assessing damage or threat to the Conservation Values protected by this Easement and determining the nature of curative or mitigation actions that should be taken. DISTRICT's rights under this Section apply equally in the event of either actual or threatened violations of the terms of this Easement, and GRANTOR agrees that DISTRICT's remedies at law for any violation of the terms of this Easement are inadequate and that DISTRICT shall be entitled to the injunctive relief described herein, both prohibitive and mandatory, in addition to such other relief, including damages, to which DISTRICT may be entitled, including specific performance of the terms of this Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies.

13.2 ***DISTRICT'S Discretion***. Enforcement of the terms of this Easement shall be at the sole discretion of DISTRICT, and any forbearance by DISTRICT to exercise its rights under this Easement in the event of any breach of any term of this Easement by GRANTOR shall not be deemed or construed to be a waiver by DISTRICT of such term or of any subsequent breach of the same or any other term of this Easement. Any failure by DISTRICT to act shall not be deemed a waiver or forfeiture of DISTRICT'S right to enforce any term, condition, covenant, or purpose of this Easement in the future.

13.3 ***Liquidated Damages***. Inasmuch as the actual damages resulting from the loss or depreciation of the Conservation Values of the Property and caused by its breach by GRANTOR are uncertain and would be impractical or extremely difficult to measure, the parties agree that the damages allowed by Civil Code section 815.7(c) shall be measured as follows:

(a) For an improvement prohibited by this Easement, an amount equal to the product of (i) the market value of the improvement, (ii) the length of time that the improvement exists on the Property (in terms of years), and (iii) the then current annual interest rate for post judgment interest; and

(b) For an activity or change in use prohibited by this Easement, whether or not it involves an improvement, an amount equal to any economic gain realized by GRANTOR because of the activity or change in use; and

(c) For an activity or change in use prohibited by this Easement, whether or not it involves an improvement and where there is no measurable economic gain realized by GRANTOR, the product of (i) the cost of restoration, as set forth in a written estimate by a qualified person selected by DISTRICT, (ii) the length of time that the prohibited activity or use continues (in terms of years) and (iii) the then current annual interest rate for post judgment interest.

13.4 ***GRANTOR'S Compliance***. If DISTRICT, in the notice to GRANTOR, demands that GRANTOR remove an improvement, discontinue a use or both and claims the damages allowed by Civil Code section 815.7(c), then GRANTOR may mitigate damages by fully complying with DISTRICT'S notice within the cure period provided therein. In the event of litigation arising out of the notice, brought either by GRANTOR or by DISTRICT, in which GRANTOR prevails, then GRANTOR shall be entitled to economic damages; provided, however, that neither DISTRICT nor GRANTOR shall be entitled to damages where DISTRICT has not claimed damages in its notice.

13.5 ***Remedies Nonexclusive***. The remedies set forth in this Section 13 are not intended to displace any other remedy available to either party as provided by this Easement, Civil Code sections 815 et seq. or any other applicable local, state or federal law.

14. ***Acts Beyond GRANTOR'S Control.*** Nothing contained in this Easement shall be construed to entitle DISTRICT to bring any action against GRANTOR for any injury to or change in the Property resulting from causes beyond GRANTOR'S control, including, without limitation, fire, flood, storm, and earth movement, or from any prudent action taken by GRANTOR under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes so long as such action, to the extent that GRANTOR has control, is designed and carried out in such a way as to further the Conservation Purpose of this Easement.

15. ***Condemnation***. In the event that the Property or some portion thereof is condemned for public use by an entity other than DISTRICT, the market value for purposes of just compensation shall be determined as though this Easement did not exist and GRANTOR and DISTRICT shall share the compensation on the following basis: **GRANTOR 84.6% and DISTRICT 15.4%.** These percentages are derived from the purchase price paid for the fee title of the property before being encumbered by the conservation easement. In the apportionment of the proceeds from an eminent domain proceeding, an adjustment shall be made in GRANTOR's favor for any increase in value after the date of this Easement that is attributable to improvements; provided such increase in value is earned through GRANTOR's efforts and is not the result of value added by this easement, the passage of time or other passive means; and provided, further, that such increase in value is not the result of activities constituting a breach of this Easement.

16. ***Agreement to Bind Successors***. The Easement herein granted shall be a burden upon and shall continue as a restrictive covenant and equitable servitude running in perpetuity with the Property and shall bind GRANTOR, GRANTOR's heirs, personal representatives, lessees, executors, all persons claiming under GRANTOR, and

GRANTOR's successors, including but not limited to purchasers at tax sales, and assigns forever. The parties intend that this Easement shall benefit and burden, as the case may be, their respective successors, assigns, heirs, executors, administrators, agents, employees, and all other persons claiming by or through them pursuant to the common and statutory law of the State of California, including, *inter alia*, Civil Code sections 815-816.

17. ***Subsequent Deeds and Leases***. GRANTOR agrees that a clear reference to this Easement will be made in any subsequent deed, or other legal instrument, by means of which any interest in the Property (including, but not limited to, a leasehold interest) is conveyed, that GRANTOR will attach a copy of this Easement to any such instrument, and that GRANTOR will notify DISTRICT in writing ten (10) days prior to any such conveyance. These obligations of GRANTOR shall not be construed as a waiver or relinquishment by DISTRICT of rights created in favor of DISTRICT by this Easement.

18. ***Notices.*** All notices, (including requests, demands, approvals, or communications) under this Easement shall be in writing.

18.1 ***Method of Delivery***. Notice shall be sufficiently given for all purposes as follows:

(a) When personally delivered to the recipient, notice is effective on delivery.

(b) When mailed first class to the last address of the recipient known to the party giving notice, notice is effective on delivery.

(c) When mailed by certified mail with return receipt requested, notice is effective on receipt if delivery is confirmed by a return receipt.

(d) When delivered by overnight delivery with charges prepaid or charged to the sender's account, notice is effective on delivery if delivery is confirmed by the delivery service.

(e) When sent by telex or fax to the last telex or fax number of the recipient known to the party giving notice, notice is effective on receipt as long as (1) a duplicate copy of the notice is promptly given by first-class or certified mail or by overnight delivery or (2) the receiving party delivers a written confirmation of receipt. Subject to the foregoing requirements, any notice given by telex or fax shall be considered to have been received on the next business day if it is received after 5 p.m. (recipient's time) or on a nonbusiness day.

18.2 ***Refused, Unclaimed, or Undeliverable Notices***. Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified shall be considered to be effective as of the first date

that the notice was refused, unclaimed, or considered undeliverable by the postal authorities, messenger, or overnight delivery service.

18.3 ***Addresses***. Addresses for purposes of giving notice are set forth below:

**To GRANTOR:** Ralph Benson, Executive Director
Sonoma Land Trust
966 Sonoma Avenue
Santa Rosa, CA 95404

**To DISTRICT:** Andrea Mackenzie, General Manager
Sonoma County Agricultural Preservation
and Open Space DISTRICT
747 Mendocino Avenue
Santa Rosa, CA 95401

19. ***Entire Agreement; Severability***. This instrument sets forth the entire agreement of the parties with respect to the Easement and supercedes all prior discussions, negotiations, understandings, or agreements relating to the Easement, all of which are merged herein. No alteration or variation of this instrument shall be valid or binding unless contained in a written amendment executed by GRANTOR and DISTRICT and recorded by the Sonoma County Recorder. In the event any provision of this Easement is determined by the appropriate court to be void and unenforceable, all remaining terms and conditions will remain valid and binding.

20. ***Estoppel Certificates***. DISTRICT shall, at any time during the existence of the Easement, upon not less than thirty (30) days' prior written notice from GRANTOR, execute and deliver to GRANTOR a statement in writing certifying that the Easement is unmodified and in full force and effect (or, if modified, stating the date of execution and date of recording of the respective amendment) and acknowledging that there is not, to DISTRICT'S knowledge, any default by GRANTOR hereunder, or, if DISTRICT alleges a default by GRANTOR, specifying such default. DISTRICT's obligation to deliver the statement of certification is conditioned on GRANTOR's reimbursing DISTRICT for all costs and expenses reasonably and necessarily incurred in its preparation as determined by DISTRICT's General Manager.

IN WITNESS WHEREOF, GRANTOR and DISTRICT have executed this Easement this 10th day of December, 2007

GRANTOR:

By:_____
Ralph Benson, Executive Director
SONOMA LAND TRUST
(The signatory warrants and represents to DISTRICT that he has been authorized by the Corporation to execute this Agreement)

By_____
Valerie Brown, President of the Board of Directors

ATTEST:

Robert Deis by Dees
Robert Deis, Clerk of the Board of Directors

## CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of Sonoma } ss.

On 12/10/07 (Date), before me, B.J. Woods, Notary Public (Name and Title of Officer (e.g., "Jane Doe, Notary Public")),

personally appeared Ralph Benson (Name(s) of Signer(s)),

☐ personally known to me
☒ proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

B. J. WOODS
COMM. #1566912
NOTARY PUBLIC -CALIFORNIA
SONOMA COUNTY
My Comm. Expires May 1, 2009

MCI1 MCI1

Place Notary Seal Above

Signature of Notary Public

### OPTIONAL

*Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.*

**Description of Attached Document**

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

**Capacity(ies) Claimed by Signer**

Signer's Name: _____

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

## CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of Sonoma }

On Dec. 11, 2007 (Date) before me, Mary J. Bowman, Notary Public (Name and Title of Officer (e.g., "Jane Doe, Notary Public")),

personally appeared Valerie Brown (Name(s) of Signer(s)),

☒ personally known to me

☐ (or proved to me on the basis of satisfactory evidence)

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that ~~he~~/she/~~they~~ executed the same in ~~his~~/her/~~their~~ authorized capacity(~~ies~~), and that by ~~his~~/her/~~their~~ signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

MCI1 MARY J. BOWMAN MCI1
COMM. #1651676
NOTARY PUBLIC -CALIFORNIA
SONOMA COUNTY
My Comm. Expires Mar. 14, 2010

Place Notary Seal Above

Signature Mary J. Bowman
Signature of Notary Public

### OPTIONAL

*Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.*

**Description of Attached Document**

Title or Type of Document: Deed and Agreement (Sonoma Land Trust and Sonoma County Agricultural Preservation and Open Space - Roche Project)

Document Date: _____ Number of Pages: 20

Signer(s) Other Than Named Above: _____

**Capacity(ies) Claimed by Signer(s)**

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
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**LEGAL DESCRIPTION**

**EXHIBIT "A"**

The land referred to herein is situated in the State of California, County of Sonoma, Unincorporated Area, and is described as follows:

Parcel One:

All of Fields 2, 3, 5, 6, 7, 8, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 34 and 35, as numbered and designated upon the Map of Lakeville Stock Farms, filed April 25, 1934 in Book 50 of Maps, pages 11, 12 and 13, Sonoma County Records, and more particularly described as follows:

Beginning at the Southwesterly corner of Field No. 4, a point on the Easterly line of the right of way of the Northwestern Pacific Railroad Company, and distant North 81° 10' East, 3157.8 feet from "Iron Axel Tree" mentioned in Suit "Harrison Mecham vs. William Eihler" in 1879; thence along said Easterly right of way line, North 24° 55' 30" East 584.69 feet; thence on a curve to the Left, the radius of which is 1472.69 feet, a distance of 510.0 feet; thence North 5° 05' 30" East, 545.0 feet; thence on a curve to the Right, the radius of which is 1597.38 feet, a distance of 1301.57 feet; thence leaving said Easterly line, North 38° 13' West, 80.0 feet to a point on the Westerly line of said Railroad right of way, at the Southeasterly corner of Field No. 10; thence North 56° 45' West, 417.81 feet to the Southwesterly corner of Field No. 10, a point on the Easterly right of way line of the State Highway; thence North 61° 59' West 60.0 feet to a point on the Westerly right of way line of said State Highway; thence along said Westerly line, South 28° 01' West 739.61 feet; thence on a curve to the Right, the radius of which is 670 feet, a distance of 531.88 feet; thence South 70° 20' 30" West, 378.29 feet; thence on a curve to the Right, the radius of which is 1970 feet, a distance of 138.0 feet to a point which bears North 75° 18' East, 60.0 feet from the Southeasterly corner of Field No. 16; thence leaving the Westerly line of said State Highway, North 52° 06' West, 2339.0 feet; North 8° 39' West, 17.28 feet; North 8° 46' West, 186.71 feet; North 36° 09' West, 100.93 feet; North 57° 24' West, 361.06 feet; North 35° 05' West, 76.29 feet; North 5° 12' East 122.20 feet; North 54° 31' West, 51.09 feet; North 49° 38' West, 8.14 feet; North 35° 19' West, 8.50 feet; North 26° 25' West, 36.72 feet; North 67° 13' West, 48.67 feet; North 42° 49' West, 460.35 feet; North 62° 47' West, 270.96 feet; North 47° 59' West, 509.1 feet; North 58° 21' West 72.0 feet; North 75° 21' West, 87.51 feet; South 89° 03' West 400.2 feet; North 64° 19' West, 45.37 feet; North 43° 54' West, 79.52 feet; North 26° 19' West, 79.39 feet; North 4° 43' East, 142.7 feet; North 19° 36' West, 25.4 feet; North 57° 30' West, 25.97 feet; South 68° 02' West, 29.87 feet; South 82° 17' West 16.98 feet; North 61° 27' West, 14.48 feet; South 81° 49' West, 16.7 feet; South 62° 18' West, 23.79 feet; South 45° 29' West, 350.13 feet; South 85° 36' West, 127.97 feet; North 71° 40' West, 213.81 feet; North 29° 42' West 567.69 feet; North 76° 34' West 959.0 feet; South 87° 10' West 480.18 feet; North 70° 16' West 129.68 feet; South 75° 45' West, 162.16 feet; South 86° 50' West, 182.81 feet; South 60° 38' West, 78.51 feet; South 60° 23' West, 52.85 feet; South 60° 30' West 144.50 feet; South 83° 09' West, 397.89 feet; South 61° 48' West 183.42 feet; South 82° 35' West, 309.55 feet; North 66° 04' West, 217.0 feet; North 60° 36' West, 17.76 feet; North 28° 16' West, 31.02 feet; North 19° 33' East, 82.25 feet; North 10° 28' West, 17.73 feet; North 78° 18' West, 15.38 feet to the Southwesterly corner of Field No. 24, at the Westerly end of a private road; thence North 7° 05' West, 444.31 feet to the corner common to Fields 24, 33 and 34; thence along the line between Fields 33 and 34, North 25° 57' West, 19.73 feet; North 58° 31' West, 262.14 feet; North 30° 20' West, 166.63 feet; North 32° 08' East, 116.78 feet; North 23° 18' East, 269.38 feet; North 17° 46' West, 1053.26 feet; North 64° 27' West, 265.12 feet; North 24° 02' West, 1289.11 feet; North 39° 57' West, 902.06 feet; North 67° 56' West, 959.53 feet; North 51° 46' West, 92.49 feet; North 66° 24' West, 26.03 feet; North 81° 48' West, 304.79 feet; North 72° 16' West, 221.71 feet, and North 61° 31' West, 479.78 feet to the corner common to Fields 33, 34 and 55; thence along the dividing line between Fields 34 and 55, North 60° 52' West, 30.26 feet; North 79° 46' West, 424.31 feet; North 73° 21' West, 162.17 feet; North 85° 12' West, 47.15 feet; North 42° 51' West, 9.41 feet to the common corner of Fields 34, 55 and 54; thence along the dividing line between Fields 34 and 54, South 58° 17' West, 17.12 feet; North 33° 19' West, 5.10 feet; North 85° 32' West, 333.66 feet; South 73° 03' West, 190.56 feet to the common corner of Fields 34, 53 and 54; thence along the dividing line between Fields 34 and 53, South 32° 56' West, 262.29 feet; South 20° 39' West, 238.12 feet; South 69° 44' West, 264.44 feet; North 61° 23' West, 288.78 feet; North 77° 57' West, 649.37 feet; South 85° 16' West, 192.19 feet; South 30° 54' West, 241.19 feet; South 03° 48' East, 696.11 feet; South 33° 57' East, 1252.08 feet; South 66° 10' East,

268.72 feet; South 72° 31' East, 397.02 feet; South 28° 22' West, 191.65 feet; South 66° 12' West, 237.51 feet; South 38° 55' West, 198.09 feet; South 30° 56' East, 68.07 feet; South 44° 35' East, 197.06 feet; South 43° 59' East, 24.81 feet; South 26° 31' East, 32.88 feet; South 02° 26' East, 23.31 feet; South 34° 51' West, 19.08 feet; South 31° 07' East, 20.31 feet; South 07° 50' West, 37.44 feet; North 86° 13' West, 196.68 feet; South 84° 13' West, 178.39 feet; North 36° 19' West, 17.36 feet; North 14° 31' East, 15.64 feet; North 52° 44' West, 47.40 feet to the common corner to Fields 35, 36 and 53; thence South 66° 46' West, 271.43 feet; South 89° 54' West, 233.73 feet; South 01° 50' West, 13.09 feet; South 81° 31' West, 78.58 feet; South 39° 29' West, 301.53 feet; South 24° 02' West, 173.64 feet; South 05° 05' West, 98.63 feet; South 28° 03' West, 64.06 feet; South 55° 16' West, 64.10 feet; South 71° 10' West, 113.01 feet; South 67° 58' West, 150.60 feet; South 57° 38' West, 236.74 feet; South 39° 36' West, 116.39 feet; South 39° 20' West, 980.60 feet to the most Westerly corner of Field 35; thence along the dividing line, between Lots 16, 17, 18 and 21, 22, 23 and 24, La Croze Survey of Petaluma Rancho, as per Map recorded February 8, 1864 in Liber 8 of Maps, page 13; being also the Westerly line of Fields 35 and 22, South 44° 36' East, 621.20 feet; South 44° 29' East, 4766.3 feet to the common corner to Fields 35 and 22; South 44° 07' East, 3095.80 feet to the Southerly line of Lot 24, La Croze Survey, being also the Northerly line of the 1000 acre tract known as Mecham Relief Fund; thence along the Southerly line of Lots 24, 31 and 40, South 89° 33' East, 4913 feet; North 89° 32' East, 644.60 feet; North 89° 16' East, 1725.20 feet to the Iron Axel Tree; South 19° 43' East, 47.09 feet to the common corner to Mecham Relief Fund, M.S. Almeida and North Bay Farms Company; thence along the Northerly line of Lands of Almeida, North 89° 43' East, 278.3 feet to Engineer's Station 319+72.7 of State Highway; North 89° 43' East, 1679.50 feet; thence along the Easterly line of Almeida, South 14° 11' West, 2463.50 feet to the point on the Easterly line of said Highway, at a point which bears North 56° 38' East, 30 feet from Engineer's Station "R" 300+30.56; South 33° 22' East, 786.50 feet to an iron pipe on the Easterly line of the State Highway, from which Engineer's Station "L" 293+64.64 bears South 56° 38' West, 30 feet distant; South 11° 04' West, 584.50 feet; South 51° 49' East, 615.6 feet to an iron pipe; South 39° 23' East 480.10 feet to an iron pipe; South 50° 36' East, 201.40 feet to an iron pipe on the Westerly line of the right of way of the Northwestern Pacific Railroad Company, from which Engineer's Station 472+90 bears North 78° 10' East, 40 feet distant; thence leaving Lands of Almeida, South 50° 03-1/2' East, 127.8 feet to a point on the Easterly line of said right of way; thence along said right of way, South 11° 17-1/2' East, 1082.1 feet to the Southwesterly corner of Field 3; thence East, 91.3 feet to the Southeasterly corner of said Field; thence along the Easterly line of Field 3, North 03° 52' West, 783.42 feet; North 00° 53' East, 506.38 feet; North 00° 38' West, 947.03 feet; North 19° 14' East, 468.68 feet; North 30° 26' East, 251.20 feet; North 36° 57' East, 945.53 feet; North 20° 53' East, 429.72 feet; North 02° 49' West, 177.20 feet; North 53° 33' East, 219.25 feet; North 87° 54' East, 293.65 feet; North 73° 58' East, 530.04 feet to the common corner between Fields 3 and 4; thence along the Southerly line of the Lands of O.D. Donnell, Jr., North 33° 23' West, 529.20 feet; North 71° 04' West, 184.11 feet; North 05° 06' East, 545.41 feet; North 65° 26' West, 1462.09 feet to the point of beginning.

Excepting therefrom any portion lying within the State Highway, and the Northwestern Pacific Railroad Right of Way.

Also excepting all that portion lying Southerly of the Northerly line, Easterly of the Westerly line and Southeasterly of the Southwesterly line of the State Highway.

Also excepting all that portion conveyed in the Deed to the State of California recorded September 22, 1994 under Document No. 1994-0108938 of Official Records of Sonoma County.

Also excepting therefrom all that certain real properties described in Certificates of Compliance recorded October 2, 1996, as Document Nos. 96-87909, 96-87910, 96-87911, 96-87913, 96-87914, and 96-87915 , Sonoma County Records.

The following Parcel Two is described for convenience only, and may be included in conveying documents; but cannot be included in a policy of title insurance.

Parcel Two:

A right of way within Field 16, as delineated on said Map from the Northeasterly corner thereof to its Southeasterly corner along the Easterly boundary of that Field, being the Westerly line of the State Highway, for a telephone line of two wires strung on poles, and the right of maintenance and replacement thereof, and ingress and egress for those purposes, being a right reserved to North Bay Farms Company, a corporation, in and by said Deed dated December 30, 1941, to said O.D. Donnell, Jr.

APN: 068-090-001, 022, 023, 068-080-002, 003

RESERVING THEREFROM:

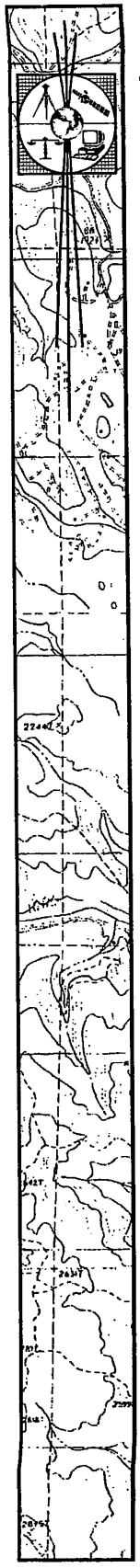
See Exhibit"B" attached hereto and made a part hereof

EXHIBIT "B"

**Deed reservation - Pipeline to Winery east of Hwy 121**

Reserving therefrom a right of access in favor of Grantor for the exclusive purpose of performing maintenance and repairs of the existing water transmission lines crossing portions of Sonoma County Assessor's Parcel Number 068-080-022, which water transmission lines are described in that certain Water Sharing Agreement dated December 13, 2006, and recorded December 18, 2006 as Instrument No. 2006-156163 in the Sonoma County Records ("Water Sharing Agreement"), and which lines are located as described and depicted in the attached Exhibit "B1" and "B2".

Such right of access and right to maintain the existence of said water transmission lines terminates no later than December 13, 2011, after which time Grantee shall be free to remove said lines at Grantee's sole expense. Grantor shall indemnify, defend, and hold harmless Grantee, its agents, successors and assigns, from and against any and all liabilities, claims or demands relating to or arising from entry onto Grantee's property for the purposes described herein by Grantor or by any party to the Water Sharing Agreement, or by any of their contractors, agents and employees. To the extent reasonably possible, Grantor shall restore the Grantee's property to its condition immediately preceding Grantor's entry for the purposes contemplated hereby. Upon the request of Grantee or Grantee's successor, Grantor or Grantor's successor shall promptly execute any documents deemed necessary by the title company selected by Grantee to remove any cloud on title caused by the right of access for maintenance and repairs and the right to maintain the existence of said water transmission lines.



# Ray Carlson & Associates, Inc.

**Mapping A Better World™**

## EXHIBIT "B1"

Being an easement 12 feet in width for water line purposes, said centerline being more particularly described as follows.

Commencing at a set ½" iron pipe tagged LS 3890 at the most southerly corner of Lot 39 as shown on that map titled "Subdivision of a portion of the Petaluma Rancho" filed in Book 8 of Maps, at Page 13, Sonoma County Records; thence along the common line of Lots 39 and 40 of said map North 45 degrees 55 minutes 11 seconds East, 2206.00 feet to the TRUE POINT OF BEGINNING from which a set ½" iron pipe marking the most easterly corner of Lot 39 of said map bears North 45 degrees 55 minutes 11 seconds East, 434.00 feet; thence leaving said common line South 40 degrees 12 minutes 33 seconds East, 246.74 feet; thence South 46 degrees 49 minutes 57 seconds East, 115.96 feet; thence South 45 degrees 32 minutes 24 seconds West, 33.53 feet; thence South 28 degrees 19 minutes 43 seconds East, 10.37 feet, to the northerly right of way of State Highway Route 121 and the terminus of the hereon described centerline.

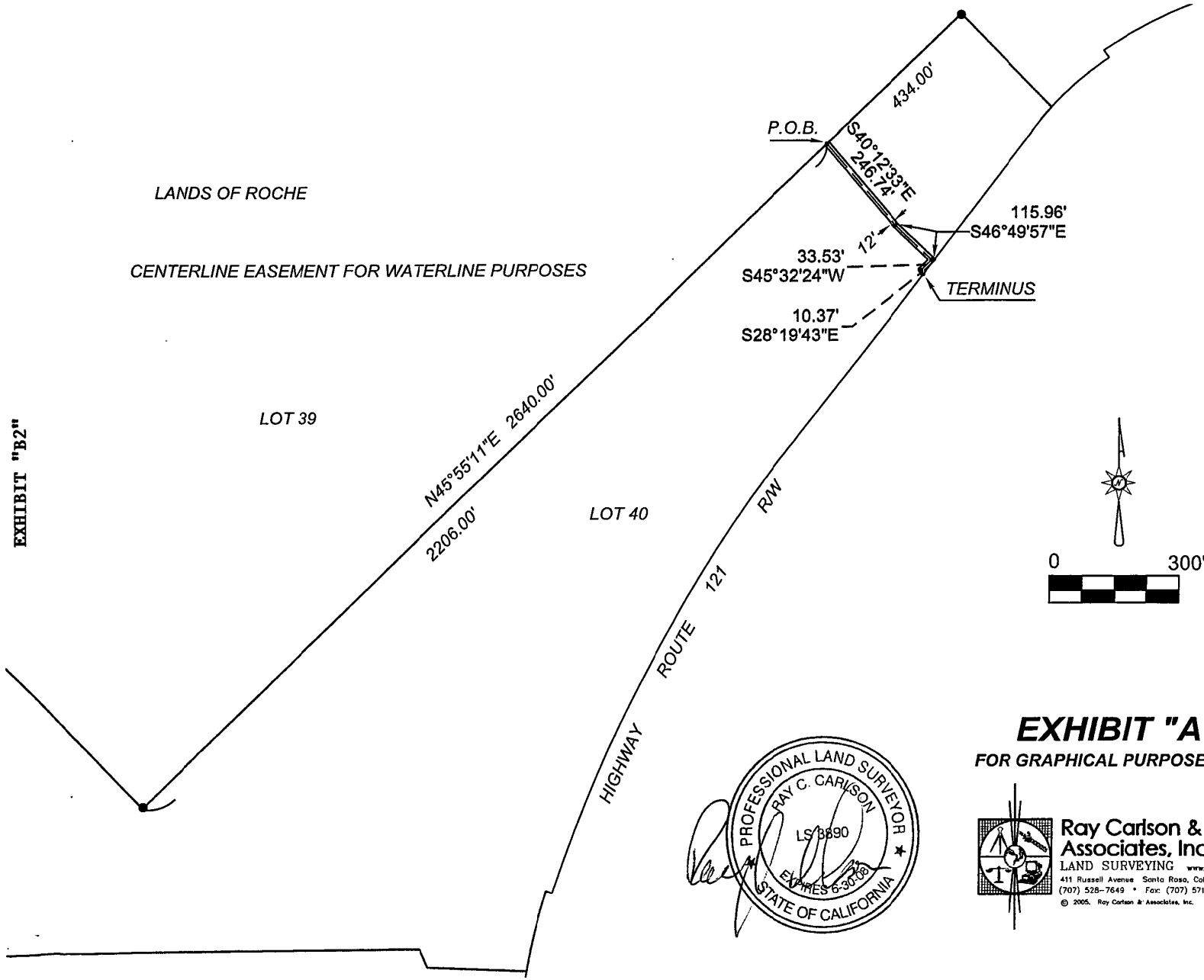
Sideline of this easement or to lengthen or shorten to conform to the common boundary line between Lots 39 and 40 and the northerly right of way of State Highway Route 121.

BASIS OF BEARINGS: North 45 degrees 55 minutes 11 seconds East, 2640 feet between set ½" iron pipe tagged LS 3890 at the southerly corner of Lot 39 and set ½" iron pipe tagged LS 3890 at the easterly corner of Lot 39 as shown on that map titled "Subdivision of a portion of the Petaluma Rancho" filed in Book 8 of Maps, at Page 13, Sonoma County Records. Said pipes will be shown on a map to be filed with the County of Sonoma (see note below). Said bearing is based upon the North American Datum of 1983, California Zone 2 on October 30, 2007, having a mean convergence angle of minus 00 degrees 18 minutes 11 seconds. To obtain ground distances multiply distances by 0.99996575.

All set ½" iron pipes referred to above will be shown and delineated on a Record of Survey map to be filed with the County of Sonoma at the request of Sonoma Land Trust in 2007.

APN 068-090-016, 019, 021 (ESMT)
SONOMA LAND TRUST
Job No. 2007-094
December 4, 2007


411 Russell Avenue • Santa Rosa, CA 95403 • Office: 707.528.7649 • Fax: 707.571.5541
E-mail: rca@rcmaps.com • Web: www.rcmaps.com




# EXHIBIT "A"

**FOR GRAPHICAL PURPOSES ONLY**

Ray Carlson & Associates, Inc.
LAND SURVEYING www.rcmaps.com
411 Russell Avenue Santa Rosa, California 95403
(707) 528-7649 • Fax: (707) 571-5541

## EXHIBIT B
### RESERVED AND RESTRICTED RIGHTS

Any activity on the Property or use of the Property that is inconsistent with the Conservation Purpose of this Easement is prohibited.

Without limiting the generality of the foregoing, the following activities and uses are expressly reserved or restricted as set forth below. This list does not constitute an exhaustive recital of consistent and inconsistent activities and uses, but rather (a) establishes specific allowed and prohibited activities and uses and (b) provides guidance in determining the consistency of other activities with the Conservation Purpose of this Easement pursuant to the procedure set forth in Section 7 of this Easement Agreement.

1. **Subdivision/Development Rights.** The legal or de facto subdivision of the Property or any of its constituent parcels for any purpose, including but not limited to gaining recognition of previously unrecognized parcels created by patent or deed, conveyance, subdivision or survey; the seeking of a partition remedy in a lawsuit; the recordation of a tentative map, final map, parcel map or equivalent document, the transfer of development rights within or outside the ownership of the Property; and/or the sale, alienation, finance or conveyance of any parcels of the Property is prohibited, except through the power of Eminent Domain. Notwithstanding anything stated to the contrary in the previous sentence, GRANTOR may, subject to DISTRICT's prior written approval, undertake the following actions:

1.1 **Conveyance for Conservation Purposes.** Subject to prior written approval by the DISTRICT, GRANTOR may voluntarily convey the Property or a portion of the Property to a government or non-profit entity exclusively to provide for conservation and public access purposes consistent with the Conservation Purpose of this Easement.

2. **Land Uses**. Use of the Property is permanently restricted solely to open space and natural resource protection, habitat enhancement and restoration, recreation, education, residential, and grazing and rangeland management uses as defined in this Exhibit B. Any commercial or industrial use of or activity on the Property is prohibited except as expressly reserved herein. Any alteration of the contour of the Property in any manner whatsoever including, but not limited to, excavating or removing soil, sand, gravel, rock, peat or sod is prohibited except as necessary in connection with the allowed uses as provided in this Easement. Further, no use allowed below shall result in significant soil degradation, or significant pollution or degradation of any surface or subsurface waters. Any use or activity that causes soil degradation, loss of productivity, or erosion, or contributes to the pollution of any surface or sub-surface waters is prohibited.

2.1 **Recreational and Educational Use.** GRANTOR reserves the right to use the Property for low-intensity public recreational and educational purposes. All improvements associated

with the low-intensity recreational and educational uses, such as hiking, horseback riding, bicycling, camping, outdoor education, docent-led public tours, ecological and archaeological research and study, enjoyment of open space and other such uses similar in nature and intensity, shall be placed or constructed in a manner that shall minimize surface alteration of the land and reduce any significant impact to natural and cultural resources in connection with such use and is consistent with the Conservation Purpose of this Easement. At such time that the Property would be open to the general public for recreational uses, the recreational provider shall develop a Park Master Plan with prior review and approval by the District of said Plan. Uses and practices that are consistent with the Park Master Plan are permitted under this Easement provided that they are undertaken in accordance with the terms and provisions of this Agreement and in a manner that is consistent with the Conservation Purpose of this Easement, and further provided that they are undertaken in compliance with all applicable laws and regulations and that all applicable governmental approvals and permits are properly obtained and followed. The Park Master Plan may be further amended from time to time as required by changed conditions such as the evolving recreational needs of the public so long as any amendment to uses within the subject Property is not inconsistent with the Conservation Purpose of this Easement and is subject to approval of DISTRICT's General Manager.

2.1.1 Public Access. GRANTOR reserves the right to charge a fee for low-instensity public recreational access, including tours and outings, that require GRANTOR's staff and/or consultants time to plan, arrange and/or participate in the tours and outings. The fee shall not exceed GRANTOR's reasonable and necessary costs actually incurred in conducting said public access and maintaining the Property.

2.2 **Vegetation and Fire Management.** GRANTOR reserves the right to undertake vegetation management plans for the purpose of fire control and/or natural resource management in a manner that is consistent with the Conservation Purpose of this Easement. Such methods may include prescriptive and nonprescriptive burning, livestock grazing and removal of non-native flora and poison oak. Such methods shall comply with GRANTOR's Management Plan or other planning documents including the Park Master Plan and all applicable laws, ordinances, and regulations, including those of the California Department of Forestry and Fire Protection and appropriate local fire protection agencies.

2.2.1 Livestock Grazing. GRANTOR reserves the right to lease all or a portion of the Property solely for livestock grazing in a manner that is consistent with the Conservation Purpose of this Easement including for the purpose of resource protection, including fire fuel control, weed management, enhancement of grassland biodiversity and improvement of wildlife habitat and provided that such grazing shall be in sufficient number of livestock to ensure proper rangeland management and reduce the risk of soil degradation on the Property.

2.3 **Residential Use.** GRANTOR reserves the right to reside on, and use the Property within a 5-acre Residential Envelope, for typical residential domestic activities, consistent with the terms, conditions of this Easement and in a manner that is consistent with the Conservation Purpose of this Easement. The location of the Residential Envelope is subject

to prior written DISTRICT approval unless provided for in a DISTRICT approved Park Master Plan pursuant to Paragraph 2.1 of this Exhibit B. The right to use the property for residential purposes includes the right to rent and lease the property for residential purposes in a manner that is consistent with the Conservation Purpose of this Easement.

3. **Restoration and Enhancement.** GRANTOR reserves the right to undertake conservation and restoration activities including, but not limited to, bank and soil stabilization; practices to reduce erosion; enhancement of water quality and plant and wildlife habitat; creation of ponds; restoration, conservation and management of wetlands, ponds and in-stream habitats for fish and wildlife and activities which promote biodiversity in accordance with sound, generally accepted practices and all applicable laws, ordinances and regulations. GRANTOR reserves the right to remove or control invasive, non-native plant species or feral, non-native animal species that threaten the Conservation Purpose of this Easement, using techniques that minimize harm to native wildlife and plants and in accordance with all applicable laws. All activities pursuant to the restoration and enhancement of the Property shall be done in accordance with sound, generally accepted practices and all applicable laws, ordinances and regulations and in a manner that is consistent with the Conservation Purpose of this Easement.

4. **Structures and Improvements.** As of the date of this Easement, there are no structures on the Property except for a dirt and gravel road which provides access to the Property from Highway 121 (the "Access Road"), additional dirt and gravel ranch roads, small former hunting shack, and spring boxes and pipes related to conveyance of water from the springs to the adjacent property as depicted on the Baseline Documentation Report as well as wire fences, a stone wall, gates, culverts, and livestock water troughs. No buildings, roads, utilities or other structural improvements, shall be placed, constructed or reconstructed on the Property except the following:

4.1 New Residential Structures. GRANTOR reserves the right, within a 5-acre Residential Envelope only, to construct, alter, improve, remove, replace and maintain the following additional structures: not more than one residence, ranger or caretaker's residence which shall not exceed 3,000 square feet in size and 25 feet in height, and associated outbuildings and other structures usual and customary to permitted residential uses, as well as utilities including, but not limited to, septic waste disposal systems, freshwater supply, power, access road and communication systems to serve the Property only.

4.2 Improvements for Restoration and Vegetation Management Uses. GRANTOR reserves the right to construct, place, reconstruct and maintain improvements for restoration and vegetation management uses, including but not limited to water cisterns or similar containers and associated water conveyance and storage infrastructure, such as piping and pumps for livestock grazing as allowed in Paragraph 2.2.1 and in connection with fire management and restoration and enhancement activities provided said improvements are located, designed and constructed in a manner to prevent (a) soil erosion, (b) impairment of streams and water quality, (c) damage to native plant communities and wildlife habitat and (d) to prevent impact to the open space, scenic, cultural, biotic and natural resources of the Property with prior written DISTRICT approval unless provided for in a DISTRICT approved Park Master Plan pursuant to Paragraph 2.1 of this Exhibit B.

4.3 Improvements for Recreation and Education Uses. GRANTOR reserves the right to repair, replace, construct, place, reconstruct and maintain the following public recreation management structures and facilities for education and recreation uses, including but not limited to unpaved pedestrian and equestrian trails, interpretive signage, picnic tables, restrooms, parking areas, registration and information kiosks, potable water facilities, campsites, study markers and grids, gates, barriers or low fences to control unauthorized use, prevent access by motor vehicles or protect fragile areas and areas under active management or study, viewing platforms, boardwalks, and foot bridges for recreation and education uses which will lessen the impact of human foot traffic over the natural and cultural resources of the Property, provided said improvements are located, designed and constructed in a manner to prevent (a) soil erosion, (b) impairment of streams and water quality, and (c) damage to native plant communities and wildlife habitat. All structures, improvements and trails shall be sited in locations that do not impact the open space, scenic, cultural, biotic and natural resources of the Property with prior written DISTRICT approval unless provided for in a DISTRICT approved Park Master Plan pursuant to Paragraph 2.1 of this Exhibit B.

4.4 New Structural Improvements for Alternative Energy Resources. Subject to the DISTRICT's prior written approval, GRANTOR may place or construct improvements for the development and utilization of wind and solar energy resources for use solely on the Property in a manner that is consistent with the Conservation Purpose of this Easement.

4.5 Fences. Construction of new fences is prohibited, except as may be necessary for uses and activities permitted herein including livestock grazing. Such fencing must be the minimum necessary for such uses and must (i) be consistent with the Conservation Purpose of this Agreement, including the preservation of scenic values; (ii) must not unreasonably impede wildlife movement; and (iii) must comply with the DISTRICT's standards for fences on conservation lands. In the event of destruction or deterioration of any fences, whether existing at the date hereof or constructed subsequently pursuant to the provisions of this Agreement, GRANTOR may replace such fencing with a fence of similar size (i.e., no greater in height or length), function, capacity and location, without prior notice to or approval by DISTRICT, in accordance with the above referenced standards. In the event any fence, or portion thereof, becomes unnecessary for the uses described in this paragraph, GRANTOR shall remove such fencing from the Property.

4.6 Roads. Except as provided for in a District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, construction of new roads, reconstruction or expansion of existing roads is subject to the DISTRICT's prior written approval, and are restricted to roads as may be directly required for uses and activities permitted herein, so long as such road construction, expansion or reconstruction is otherwise consistent with the purposes, terms and conditions of this Easement. Roads shall be constructed and maintained so as to minimize erosion and sedimentation and ensure proper drainage, utilizing Best Management Practices as recommended by the U.S. Natural Resources Conservation Service or other similar or successor entity. For the purpose of this Agreement, a Best Management Practice is a practice, technique, or measure that is currently considered to be the most effective, practical means of preventing or minimizing soil, sediment, and pollution run-off to a water body. Roads may not be paved withimpervious surface materials unless such paving is

required by any law, code, ordinance or regulation. Roads that are abandoned, permanently closed and/or decommissioned shall be restored or revegetated with native species, stabilized and ensured of proper drainage.

4.7 Public Parking. GRANTOR reserves the right to construct, improve and maintain a permeable public parking area and access road in a location identified in GRANTOR's Management Plan and/or a Park Master Plan, as necessary for the permitted public recreational, educational or resource management uses of the Property and in a manner that is consistent with the Conservation Purpose of this Easement.

4.8 Signs. Except as provided for in District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, construction of outdoor advertising structures such as signs and billboards is prohibited, provided however, that GRANTOR reserves the right to place the following types of signs on the Property, (a) two signs identifying the Property which shall individually not exceed thirty-two (32) square feet; (b) signs to mark the boundary of the Property or to prevent trespass sign shall individually not exceed four (4) square feet and (c) four (4) directional signs, which shall individually not exceed thirty-two (32) square feet, to be erected on Sonoma County Assessor's Parcel Number 068-090-022, within fifty (50) feet of the Highway 121, generally in the following locations; one (1) approach sign adjacent to the Highway facing traffic traveling west, one (1) approach sign adjacent to the Highway facing traffic traveling east, and two (2) signs at the Access Road entrance with one (1) sign on each side.

4.9 Utilities. GRANTOR reserves the right to reconstruct, replace and maintain utility systems. Except as provided for in District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, expansion, development or construction of utilities, including but not limited to electric power, septic or sewer, communication lines, and water storage and delivery systems ("Utility Systems") is prohibited, except subject to DISTRICT's approval, when directly required for the uses permitted in Paragraphs 2, 3, 4, and 6 of this Exhibit B, so long as such development and expansion of the Utility Systems is constructed in a manner that is consistent with the terms,conditions and Conservation Purpose of this Easement.

5. **Water Resources.** Except as provided for in District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, the draining, filling, dredging, diking, damming or other alteration, development or manipulation of watercourses, springs and wetlands is prohibited, except as is expressly allowed in Paragraphs 2, 3 and 4 of this Exhibit B.

6. **Easements.** Use of existing easements of record granted prior to this Agreement may continue. The granting of new temporary or permanent easements, and the modification or amendment of existing easements is prohibited without the prior approval of the DISTRICT. DISTRICT's approval shall be based upon its finding that such new or modified easement does not negatively impact the open space, scenic and natural resource values of the Property or the Conservation Purpose of this Easement. It is the duty of GRANTOR to prevent the use of the Property by third parties that may result in the creation of prescriptive rights.

7. **Motorized Vehicles**. Motorized vehicles are prohibited except for emergency purposes, or directly in connection with permitted recreational, restoration and Property management activities in a manner that is consistent with the Conservation Purpose of this Easement.

8. **Mineral Exploration and Surface Alteration**. The exploration for, or development and extraction of, geothermal resources, minerals and hydrocarbons by any surface or sub-surface mining or any other method is prohibited. Except as provided for in District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, any alteration of the surface of the land is prohibited, including, without limitation, the excavation, mining, or removal of soil, sand, gravel, rock, peat, minerals, or sod, except as required in the course of any activity permitted herein. Best Management Practices shall be employed to minimize soil erosion during and after construction of all permitted structures. For the purpose of this Agreement, a Best Management Practice is a practice, technique, or measure that is currently considered to be the most effective, practical means of preventing or minimizing soil, sediment, and pollution run-off to a water body. Notwithstanding the foregoing, surface alterations may be made to for purposes of scientific research and to investigate archeological features of the Property with the approval of the District and when such field investigations meet the standards required for "state sites" or "state archeological sites" under California Law.

9. **Storage/Dumping**. The dumping, release, burning, permanent storage, or other disposal of wastes, refuse, debris, motorized vehicles or hazardous substances is prohibited, except for the following rights reserved by GRANTOR in connection with the permitted uses under the terms of this Easement.

9.1 Storage of Construction Materials. Except as provided for in District approved Park Master Plan, pursuant to Paragraph 2.1 of this Exhibit B, construction and other work materials, during a construction period, which are visible from public roadways may be stored outside in an area that will not impact the natural or cultural resources of the Property, while work is in progress for a period not to exceed ninety (90) days.

10. **Native Tree and Plant Removal**. The harvesting, cutting, removal, or destruction of any native tree or plant is prohibited, provided, however, that GRANTOR reserves the right to cut or remove trees or plants to (a) control insects and disease, (b) prevent personal injury and property damage, (c) as allowed under Paragraphs 2.2, and (d) the collection of seeds or plants for the purpose of scientific research and/or the propagation of plants for future restoration activities, and/or natural resource management as more specially defined in Paragraph 3 of this Exhibit.

CERTIFICATE OF ACCEPTANCE
(Government Code Section 27281)
OF REAL PROPERTY BY THE
BOARD OF DIRECTORS OF THE
SONOMA COUNTY AGRICULTURAL PRESERVATION
AND OPEN SPACE DISTRICT

This is to certify that the interests in real property conveyed by the Conservation Easement Agreement dated December 10, 2007, from Sonoma Land Trust to the Sonoma County Agricultural Preservation and Open Space District, a governmental agency formed pursuant to the provisions of Public Resources Code Section 5506.5, is hereby accepted by the President of the Board of Directors on behalf of the District pursuant to the authority conferred by Resolution No. 07-0930 of the Board of Directors, dated November 6, 2007 and the District consents to the recording thereof by its duly authorized officer.

Sonoma County Agricultural Preservation
and Open Space District

Dated: 12/11/07

By: Valerie Brown
Valerie Brown
President Board of Directors

ATTEST:

Robert Deis, Clerk of the Board of
Directors

appendix q

# California State Parks Accessibility Guidelines

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

appendix r

# Capital Investments, Revenue Stream, Expenditures, and Phasing

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

## PHASING

| | Trails / Camping / Picnic | Cost | Buildings | Cost | Roads | Cost | Interpretive | Cost | Enviro Restoration | Cost | FIGR Cultrual Gathering Area | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maint exist cond. for opening | $10,000 | Park Center at Open | $18,000 | Various wetland restor | w/partners | | |
| | TCR Entry to WR | $80,000 | New equipment shop | insurance | | | | | | | | |
| | Bridge #1/TCR Entry - Vehicle Bridge | $150,000 | Screen plantings | $4,822 | Park center service yard road | O&M | | | | | | |
| | S Springs Service | 4,500 | | | | | | | | | | |
| | | | Overflow parking | O&M | | | | | | | | |
| | Lake Vista | $20,000 | | | | | Lake Vista | $6,000 | | | | |
| | Burrowing Owl | $15,000 | Old dairy barn - partial preserve | $75,000 | | | | | | | | |
| | | | Equestrian parking | $7,000 | Equestrian entry road | $15,000 | | | | | | |
| | Fish Pond to Lakeville | Vol O&M | | | | | | | | | | |
| | Equestrian Park Center | Vol/O&M | | | | | | | | | | |
| | Oak Knoll hike | Vol O&M | | | | | | | | | | |
| | West Ridge Interpret hike (sm Vol/O&M) | $31,500 | Park Center Lndscp & Culinary Garden | $15,000 | | | | | | | | |
| | West Ridge Loop (sm Vol/O&M) | 15,000 | | | | | | | | | | |
| | Ghost Rock | $20,000 | | | | | | | | | | |
| | Picnic tables and benches | O&M / Fndtn | | | | | | | | | | |
| | **Decom** | $60,000 | | | | | | | | | | |
| | Burrowing Owl | | Well and water system | $750,000 | Cannon Ln | $2,000,000 | | | | | | |
| | east of farm bridge | | | | Pave Entry Road | $50,000 | | | | | | |
| | S West Ridge | | | | | | | | | | | |
| first 5 years | | **$396,000** | | **$851,822** | | **$2,075,000** | | **$24,000** | | | = | **$3,346,822** |
| | Middle Ridge hike | $60,000 | Move historical corral | $2,000 | | | Comprehensive plan | $80,000 | | | Cultural garhtering area $624,000 | |
| | S - East Ridge | $60,000 | Develop additional Parking | O&M | | | | | | | Cost & Timing TBD FIGR | |
| | Group Camping Park Center | $150,000 | Sales/ Group picnic shelter | $10,000 | | | Entry Rd vista | $6,000 | | | | |
| | | | | | | | East ridge View Point | $6,000 | | | | |
| | Historic Lakeville eastside link | $14,500 | Park office | $952,000 | | | Oakwoodland | $18,000 | | | | |
| | Bridge #4/Lakevill Rd - Vehicle Bridge | $150,000 | | | | | Park Center Interp Programs | $36,000 | | | | |
| | | | Vera/Green House- - DEMO | $50,000 | | | Ghost Rock | $6,000 | | | | |
| | TCR East Creek hike | $25,000 | | | | | Ag | $12,000 | | | | |
| | | | New ranger residence | $500,000 | | | Petaluma Marsh | $6,000 | Lake Restoration | $2,800,000 | | |
| | Camp Access | $16,000 | Ranch Manager residence | $500,000 | | | | | | | | |
| | Camp Backpack ind. site | $20,000 | | | | | | | | | | |
| | | | South parking lot | nieghbor | | | | | | | | |
| | West Creek Hike (sm Vol/O&M) | $30,000 | | | | | | | | | | |
| | | | | | | | South Entrance | $10,000 | | | | |
| | Group picnic | $10,000 | | | | | | | | | | |
| | | | | | South entry road - A/C Pave | nieghbor | | | | | | |
| | | | | | South intersection signal | nieghbor | | | | | | |
| 5-10 Years | | **$535,500** | | **$2,014,000** | | | | **$180,000** | | **$2,800,000** | = | **$5,529,500** |
| | East Ridge Canyon | $32,000 | Waste water facility | $750,000 | | | Centeral Ponds | $18,000 | Various wetland restor | $3,327,000 | | |
| | Bridge #2/Near Mengel Rd - trail bridge | $75,000 | | | | | Middle Rach | $12,000 | | | | |
| | Bridge #3/replacement - trail bridge | $75,000 | Visitor center w/restroom | $7,000,000 | | | Historical Route | $18,000 | | | | |
| | Meadow | 22,000 | Boardwalk | $50,000 | | | | | | | | |
| | NW springs | Vol O&M | Visitor Center Parking | $19,500 | | | Tolay Crk | $18,000 | | | | |
| | | | Stormwater & drainage for Parking | $250,000 | | | Bayview Point | $6,000 | | | | |
| | Group Camping Ponds | $150,000 | | | | | portable interpret | $10,000 | | | | |
| | | | Outdoor class stage | $50,000 | | | | | | | | |
| | | | | | | | | **$82,000** | | | | |
| 10-20 years | | **$354,000** | | **$8,119,500** | | | | **$82,000** | | **$3,327,000** | = | **$11,882,500** |
| | Assess Additional Trail need | | Hay Barn/Stone floor barn - preserve | $2,742,900 | | | | | | | | |
| | One Tree Knoll hike | $15,000 | | | | | | | | | | |
| | South Creek hike | $25,000 | Animal pen | O&M | | | | | | | | |
| | MR Connect hike | Vol/O&M | | | | | | | | | | |
| | | | Temproary residence/Artist | MIG ??? | | | | | | | | |
| | | | Kitchen and dining | $620,000 | | | | | | | | |
| | | | New bunk house | $850,000 | | | | | | | | |
| | | | Showers | $30,000 | | | | | | | | |
| | | | Restroom | $20,000 | | | | | | | | |
| | | | Creamery - preserve | $550,000 | | | | | | | | |
| | | | Old shop - preserve | $326,000 | | | | | | | | |
| | | | Equipment Shed - preserve | $395,000 | | | | | | | | |
| | | | Slaughter house - preserve | $425,000 | | | | | | | | |
| | | | Scotts house - preserve | $500,000 | | | | | | | | |
| 20-35 years | | **$40,000** | | **$6,458,900** | | | | | | | = | **$6,498,900** |
| | | | | | | | | | | | | **$27,257,722** |

## PARK FEATURES

Blue Cost KDB Est. - MIG Please edit as needed

**Trails**

Bridge
- Bridge #1/TCR Entry - Vehicle Bridge $150,000
- Bridge #2/Near Mengel Rd - trail bridge $75,000
- Bridge #3/replacement - trail bridge $75,000
- Bridge #4/Lakevill Rd - Vehicle Bridge $150,000

Decom
- Park office $60,000
- Pond Access from Farm Bridge
- All old ranch roads not being used
- Burrowing Owl
- West Ridge Access from South

New $290,400
- Causeway lake restore
- TCR Entry to WR $80,000
- West Ridge Loop (sm Vol/O&M) $15,000
- S - East Ridge $60,000
- Middle Ridge Hike $60,000
- Burrowing Owl $15,000
- Camp Access $16,000
- Lake Vista $20,000
- Historic Lakeville eastside link $14,500
- East Ridge Canyon $32,000
- Equestrian Park Center Vol/O&M
- West Creek Hike (sm Vol/O&M) $30,000
- West Ridge Interpret hike (sm Vol/O&M) $31,500
- Ghost Rock $20,000
- Meadow $22,000
- Oak Knoll hike Vol O&M
- NW springs Vol O&M
- Fish Pond to Lakeville Vol O&M
- S Springs Service $4,500
- TCR East Creek hike $25,000

Existing
- Cardoza
- West Ridge
- West Ridge Viewpoint
- Historic Lakeville
- Oak Knoll
- Vista Pond Loop
- Vista Pond Access
- Oak Knoll Access
- South Lake to Farm Bridge

TBD
- One Tree Knoll hike $15,000
- South Creek hike $25,000
- MR Connect hike Vol/O&M

**Infrastructure**

- 2 Scotts house - preserve $500,000
- 4 Vera/Green House- - DEMO $50,000
- 6 Hay Barn/Stone floor barn - preserve $2,742,900
- 7 Old dairy barn - partial preserve $75,000
- 8 Creamery - preserve $550,000
- 12 Old shop - preserve $326,000
- 14 Equipment Shed - preserve $395,000
- 15 Slaughter house - preserve $425,000
- A Cultural garhtering area FIGR
- C New equipment shop insurance
- D Screen plantings $4,822
- E Ranch Manager residence $500,000
- F Pave Entry Road $50,000
- G Group Camping Park Center $150,000
- G Group Camping Ponds $150,000
- H Overflow parking O&M
- I Animal pen O&M
- J Move historical corral $2,000
- K Visitor center w/restroom $7,000,000
- M New bunk house $850,000
- N Park office $952,000
- O Group picnic $10,000
- Q Park Center Lndscp & Culinary Garden $15,000
- R Temproary residence/Artist MIG ???
- S Sales/ Group picnic shelter $10,000
- T New ranger residence $500,000
- U Showers $10,000
- V Restroom $20,000
- X Kitchen and dining $620,000
- Z Equestrian parking $7,000
- AA Boardwalk $50,000
- BB Outdoor class stage $50,000

Additional Facilities
- Waste water facility $750,000
- Well and water system $750,000
- Camp Backpack ind. site $20,000
- Picnic tables and benches O&M / Fndtn

Parking
- Stormwater & drainage for Parking $250,000
- Visitor Center Parking $19,500
- Overflow parking O&M

Roads
- Maint exist cond. for opening $10,000
- Cannon Ln $2,000,000
- Equestrian entry road $15,000
- Park center service yard road O&M
- South entry road - A/C Pave nieghbor
- South parking lot nieghbor
- South intersection signal nieghbor

**Interpret**

- Comprehensive plan $80,000
- Ghost Rock $6,000
- Entry Rd vista $6,000
- 1 Park Center at Open $18,000
- Park Center Interp Programs $36,000
- 2 Lake Vista $6,000
- 3 Petaluma Marsh $6,000
- 4 Ag $12,000
- 5 Oakwoodland $18,000

| | | |
|---|---|---|
| 6 | East ridge View Point | $6,000 |
| 7 | Centeral Ponds | $18,000 |
| 8 | Middle Rach | $12,000 |
| 9 | Historical Route | $18,000 |
| 10 | Tolay Crk | $18,000 |
| 11 | Bayview Point | $6,000 |
| 12 | South Entrance | $10,000 |
| | portable interpret | $10,000 |

| **Restoration** | | |
|---|---|---|
| | Various wetland restoration | $3,327,000 |
| | Various wetland restoration | w/partners |
| | Lake Restoration | $2,800,000 |

appendix s

# Operations and Maintenance Checklist

Due to the nature and length of this appendix, this document is not available as an accessible document. If you need assistance accessing the contents of this document, please contact Victoria Willard, ADA Coordinator for Sonoma County, at (707) 565-2331, or through the California Relay Service by dialing 711. For an explanation of the contents of this document, please direct inquiries to Karen Davis-Brown, Park Planner II, Sonoma County Regional Parks Department at (707) 565-2041.

TOLAY LAKE REGIONAL PARK
Master Plan Project

**Table 9-1. Tolay Lake Regional Park Master Plan (Operations and Maintenance Checklist)**

| O&M Item | How often performed (As-needed, Daily, Weekly, Etc.) | Level of Effort required* | Notes |
|---|---|---|---|
| **Park Operations** | | | |
| ***Patrol / Opening and Closing*** | | | |
| Vehicular and Foot Patrols (Day and Night) | Daily | 2 | |
| Opening/Closing Gates | Daily | 1 | |
| Public Interaction | Daily | 1 | |
| Supporting Volunteers | Daily | 1 | |
| Enforce Dog Regulations | Daily | 1 | |
| Permit Orientation Sessions | N/A | | |
| | | | |
| ***Fee Collection*** | | | |
| Fee Booth / Iron Ranger(s) | Weekly | 1 | |
| Financial Management (Cash Handling, Accounting Practices) | Weekly | 1 | |
| ***Light Maintenance*** | | | |
| Removal of Graffiti | Monthly | 1 | |
| Manage Vandalism | Monthly | 1 | |
| ***Public Safety (Law Enforcement and Emergency Response)*** | | | |
| Coordination with Lakeville Volunteer Fire Department | | 1 | |
| Fish and Wildlife Regulations | Daily | 1 | |
| Park Access for Law Enforcement | N/A | | (Ranger Staff) |
| Parking Regulations and Enforcement | Daily | 2 | |
| Emergency Response/Evacuation | As Needed | 2 | Seasonal Variability |
| Search and Rescue | As Needed | 2 | |
| Identification of Helipads and water sources | Annually | 1 | |
| ***Sanitation*** | | | |
| Restroom Cleaning / Restocking | Daily | 1 | |
| Litter Pick-up | Daily | 1 | |

| O&M Item | How often performed (As-needed, Daily, Weekly, Etc.) | Level of Effort required* | Notes |
|---|---|---|---|
| Restrooms-flush | Daily | 1 | |
| Restrooms-backcountry | Daily | 1 | |
| Potable and non-Potable Water | Weekly | 1 | |
| Wastewater Treatment | Weekly | 1 | |
| Solid Waste Management (Trash, Recycling, Compost) | Weekly | 1 | |
| Use of Portable Toilets for Special Events | Annually | 1 | Fall Festival |
| ***Public Outreach*** | | | |
| Docent Led Tours | Monthly | 1 | |
| Environmental education sessions | Weekly | 2 | |
| Special Events | Seasonally | 3 | Fall Festival |
| School Groups | Weekly | 2 | |
| Cooperation with Community Partners | As Needed | 1 | |
| **Park Maintenance** | | | |
| ***Bridges*** | | | |
| General Maintenance and Upkeep | Annually | 1 | |
| ***Buildings*** | | | |
| Maintenance of Park Buildings | As Needed/Monthly | 2 | |
| ***Infrastructure*** | | | |
| Fence maintenance/repair | As Needed | 1 | |
| Replacement of Damaged Facilities | As Needed | 1 | |
| Wastewater Treatment Plant / Septic Systems | As Needed | 1 | |
| Stormwater Management | Seasonally | 2 | |
| Irrigation Systems | Seasonally | 2 | |
| Water Supply/water quality testing | As Needed | 1 | |
| Plumbing | As Needed | 1 | |
| Electrical Systems / PG&E lines | As Needed | 1 | |
| Cleaning (Pressure Washing) or Painting | Seasonally | 1 | |
| Signage | As Needed | 1 | |
| Lighting | As Needed | 1 | |
| ***Non-Paved Surfaces*** | | | |

| O&M Item | How often performed (As-needed, Daily, Weekly, Etc.) | Level of Effort required* | Notes |
|---|---|---|---|
| Grading | Seasonally | 2 | |
| Management of Fugitive Dust (Watering) | Seasonally | 1 | |
| Water Bars | Seasonally | 1 | |
| Drainage structure maintenance/improvement | Seasonally | 2 | |
| Temporary Trail Closures Due to Environmental Conditions | Seasonally | 1 | |
| Trail decommissioning | As Needed | 2 | |
| Multiple-Use Trails | As Needed | 2 | |
| ***Park Amenities*** | | | |
| Maintenance of park amenities including: BBQs, fire rings, tables, benches, drinking fountains and hose bibs | Monthly | 2 | |
| Disposal of coals from BBQs and fire rings | Seasonally/Weekly | 1 | |
| ***Paved Surfaces*** | | | |
| Paved trails | As Needed/Annually | 1 | |
| Grading | As Needed/Annually | 1 | |
| Drainage structure maintenance/improvement | As Needed/Annually | 1 | |
| Parking Lots | As Needed/Annually | 1 | |
| Sealing and Striping | As Needed/Annually | 1 | |
| ***Pest Management*** | | | |
| Beaver control | As Needed/Annually | | |
| Feral pigs | As Needed/Annually | | |
| ***Vegetation / Landscape Management*** | | | |
| Mowing / Weeding | Seasonally/Weekly | 3 | |
| Sodding / Re-sodding / Mulching | As Needed | 2 | |
| Irrigation of Fields and Vegetation | Seasonally | 2 | |
| Seeding / Planting | Seasonally | 2 | |
| Use of Herbicides and Pesticides (Star thistle management in backcountry) | Seasonally | 2 | Staff/Contract |
| Pruning | As Needed | 1 | |
| Priority Fuels Management | As Needed | 1 | |

| O&M Item | How often performed (As-needed, Daily, Weekly, Etc.) | Level of Effort required* | Notes |
|---|---|---|---|
| Management of Ethno-Botanical Garden | Monthly | 2 | |
| **Other O&M Items** | | | |
| ***Wildfire Management*** | | | |
| Management of Fires for Fire Pits and BBQs | As Needed/Seasonally | 1 | |
| Removal of Hazardous Fuels | As Needed/Seasonally | 1 | |
| Use of Power Tools/Vehicles during high risk conditions | As Needed/Seasonally | 1 | |
| ***Agricultural Practices*** | | | |
| Cattle Grazing | N/A | | |
| Management of farm animals | Daily | 2 | Ranger Staff/Contract |
| Marvin's Garden | Monthly | 2 | |
| Haying – Special Use Permit | Seasonally | 1 | |
| Farm equipment repair | As Needed | 1 | |
| Orchard Fruit Tree Management | As Needed/Seasonally | 2 | |
| Animal Handling | Weekly | 2 | |
| Collaboration with Farmers | As Needed | 1 | |
| ***Items Requiring Coordination/Support with Other Agencies*** | | | |
| Historic Building Maintenance and Upgrades | As Needed | 1 | |
| Resource Monitoring (Soil Analysis, Visitor Use) | As Needed | 1 | |
| Habitat Restoration | As Needed | 2 | |
| Cultural resource protection | Daily | 2 | Ranger Staff |
| Mosquito Abatement | Seasonally | 1 | |
| Access Roads and Directional Signage | As Needed | 1 | |

*1=mild/light, 2=moderate/medium, 3=intense/heavy