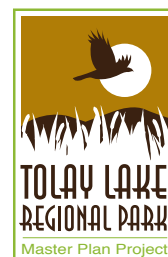

Biological Resources Report

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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 (SCRPP), 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 (SCAPOS) 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 37 in 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 Petaluma¹ and Sonoma² 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 serpentinitized 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; Moderately alkaline (pH 8.0)	Poorly drained; Negligible to high runoff; Slow to very slow permeability	May support clay associated rare plants; High potential to support wetlands (clays, shrink-swell); Native grasses and forbs, non-native annual grasses; Low erosion potential (neutral slopes);
Diablo clay (DbC)	2-9%	Yes	Residuum, sedimentary rock; Moderately alkaline (pH 8.0)	Well drained; Slow runoff (dry), medium to rapid (wet); Slow permeability	May support clay associated rare plants; May support wetlands (clay-rich and shrink-swell); Annual grasses and forbs; 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; Slightly acid (pH 6.0)	Well-somewhat excessively drained; Medium-rapid runoff; Moderate permeability	May support volcanic associated rare plants; May support seep wetlands; Oaks, scrub, grasses and forbs; Moderate-high erosion potential (slopes)
Goulding-Toomes complex (GoF)	9-50%	No			
Haire clay loam (HcD)	9-15%	No	Alluvium, sedimentary rock; Slightly acid (pH 6.0)	Moderately well drained; Slow-rapid runoff; Very slow permeability	May support sandstone associated rare plants; May support seasonal wetlands (low slopes); Annual grasses and forbs; Low-moderate erosion potential
Laniger loam (LaC)	5-9%	No	Residuum, rhyolite; Medium to slightly (pH 6.0-6.5)	Well-somewhat excessively drained; Medium-rapid runoff; Moderate-rapid permeability	May support volcanic associated rare plants; May support seep wetlands; Oaks, manzanita, ceanothus, and grasses 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; Moderately alkaline (pH 8.0)	Well drained; Medium-high runoff; Moderately slow permeability	May support serpentine associated rare plants; May support seep wetlands; Native grasses and forbs; Low-moderate erosion potential (slopes)
Gullied Land	varies	No	mixed	Well drained	Unlikely to support rare plants (disturbance); May support swale wetlands and non-wetland waters; Non-native and ruderal plants; 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 watershed 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: March 22, 23, 30 May 5, 8, 24 June 2, 5 July 12, 13, 16	WY2005**: normal (0.5 inch above average) WY2006: normal (4 inches above average)
Wetland Assessment (Tolay Creek Ranch)	LSA	2008: March 28 April 1, 5, 11 May 10, 16, 19, 21-23, 26-27	WY2007: below normal (13.5 inches below average) WY2008: below normal (13 inches below average)
Rare Plant Surveys & Vegetation Mapping	LSA	2006: March 22, 23, 30 May 5, 8, 24 June 2, 5 July 12, 13, 16 July 28 August 6, 21 November 5 2007: January 19 2008: March 28 April 1, 5, 11 May 10, 16, 19, 21-23, 26-27	
Wetland Update & Vegetation Classification	WRA	2013: January 21	Oct 2012 – Jan 2013: normal

Field Study	Responsible Party	Date(s)	Recent Climatic Condition*
Bird Counts	PWA	2006: April 15, 29 October 17, 24 November 6 December 2 2007: January 27 April 7, 21 May 7 September 1, 23 November 3 December 8 2008: February 20 March 15 April 19 May 24 June 21 July 19 September 13 October 5 November 15 December 14 2009: January 2 February 21	WY2006: normal (4 inches above average) WY2007: below normal (13.5 inches below average) WY2008: below normal (13 inches below average) 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 (<i>Schoenoplectus acutus</i> Herbaceous Alliance)	CDFW Rank G5 S4; Section 404/401 CWA
		Cattail marshes (<i>Typha angustifolia</i> Herbaceous Alliance)	CDFW Rank G5 S5; Section 404/401 CWA
		Saltmarsh bulrush marshes (<i>Bolboschoenus maritimus</i> Herbaceous Alliance)	CDFW Rank G4 S3; Section 404/401 CWA
		Salt grass flats (<i>Distichlis spicata</i> Herbaceous Alliance)	CDFW Rank G5 S4; Section 404/401 CWA
		**Water smartweed marsh (<i>Persicaria amphibia</i> Provisional Herbaceous Alliance)	CDFW No Rank; Section 404/401 CWA
	Vernal Pools	Common spikerush marshes (<i>Eleocharis macrostachya</i> Herbaceous Alliance)	CDFW Rank G4 S4; Section 404/401 CWA
		**California semaphore grass patches (<i>Pleuropogon californicus</i> Provisional Herbaceous Alliance)	CDFW No Rank; Section 404/401 CWA
	Meadows and Seeps	Meadow barley patches (<i>Hordeum brachyantherum</i> Herbaceous Alliance)	CDFW Rank G4 S3?; Section 404/401 CWA
		**California semaphore grass patches (<i>Pleuropogon californicus</i> Provisional Herbaceous Alliance)	CDFW No Rank; Section 404/401 CWA
		Pacific rush marshes (<i>Juncus effusus</i> 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 (<i>Juncus patens</i> Provisional Herbaceous Alliance)	CDFW Rank G4? S4?; Section 404/401 CWA
		Common monkeyflower seeps (<i>Mimulus guttatus</i> 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 (<i>Salix laevigata</i> Woodland Alliance)	CDFW Rank G3 S3; Section 404/401 CWA (partial); Section 1600 CFGC
Woodlands and Groves	Cismontane Woodland	Coast live oak woodlands (<i>Quercus agrifolia</i> Woodland Alliance)	CDFW Rank G5 S4
		Valley oak woodlands (<i>Quercus lobata</i> Woodland Alliance)	CDFW Rank G3 S3
		California buckeye groves (<i>Aesculus californica</i> Woodland Alliance)	CDFW Rank G3 S3
		Blue gum groves (<i>Eucalyptus globulus</i> Semi-natural Woodland Stands)	No Rank
	Closed-cone Coniferous Forest	Monterey cypress stands (<i>Hesperocyparis macrocarpa</i> Woodland Alliance)	No Rank*
Rock Outcrops	Coastal Scrub	Poison oak scrubs (<i>Toxicodendron diversilobum</i> Shrubland Alliance)	G4 S4
Grasslands	Valley and Foothill Grassland (native)	Purple needlegrass grasslands (<i>Stipa pulchra</i> Herbaceous Alliance)	G4 S3?
		California oat grass prairies (<i>Danthonia californica</i> Herbaceous Alliance)	CDFW Rank G4 S3

Biological Community	Vegetation Structure & Type ¹	Vegetation Alliance ²	Sensitive Status ³
		Creeping wild rye turfs (<i>Elymus triticoides</i> 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 (<i>Viola pedunculata</i> Undocumented Herbaceous Alliance)	CDFW No Rank
		Cream cup wildflower fields (<i>Platystemon californicus</i> Undocumented Herbaceous Alliance)	CDFW No Rank
	Valley and Foothill Grassland (non-native)	Italian rye grass grasslands (<i>Festuca perennis</i> Semi-natural Herbaceous Stands)	No Rank
		**Medusa head patches (<i>Elymus caput-medusae</i> undescribed Semi-natural Herbaceous Stands)	No Rank
		Slender wild oat grasslands (<i>Avena barbata</i> Semi-natural Herbaceous Stands)	No Rank
		Soft chess grasslands (<i>Bromus hordeaceus</i> Semi-natural Herbaceous Stands)	No Rank
		Dogtail grass grasslands (<i>Cynosurus echinatus</i> Semi-natural Herbaceous Stands)	No Rank

¹Source: CNPS Vegetation Mapping Classification (CNPS 2013)

²Source: *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009)

³Sensitive 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 and 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 the Park Headquarters. Naturalized, and often invasive, plant species identified include blackwood acacia (*Acacia melanoxydon*), 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 (*Carduelis 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 still 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. Secondly, 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 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 pricklegass (*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 where 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 overwintering waterfowl. LSA (2009b) and PWA have identified eleven duck species, eight of which are dabblers, and include gadwall (*Anas strepera*), American widgeon (*Anas americana*), mallard (*Anas platyrhynchos*), cinnamon teal (*Anas cyanoptera*), 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 (*Egretta 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

Wildflower 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 pecten-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 (*Spermophilus 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 (*Spermophilus 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 jordani*), 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 (*Scleropus 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 CNDDDB (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 vernal 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 CNDDDB (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 vernal 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 manna grass, 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 CNDDDB (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 vernal 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 mangrass, 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 CNDDDB (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 CNDDDB (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 manna grass, 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 CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB (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 vernal 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 CNDDDB (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 CNDDDB (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 CNDDDB (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 vernal 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 CNDDDB (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 CNDDDB (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 CNDDDB (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 hayfield 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 CNDDDB (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 CNDDDB (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 CNDDDB (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 vernal 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 CNDDDB (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 CNDDDB (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 CNDDDB (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 due 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 CNDDDB (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 CNDDDB 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 vincularis*). 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 CNDDDB (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 CNDDDB 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 CNDDDB (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 vernal 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 USGS 7.5-minute quadrangles in Colusa, Glenn, Lake, Marin, Mendocino, Napa, Solano, Sonoma, Sutter, Tehama, and Yolo Counties (CNPS 2013). There is one CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB (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 CNDDDB. 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 CNDDDB; 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 CNDDDB, 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 endangered 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 CNDDDB 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 boylei*) 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 laid 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 (Burrige 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 18th 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 Anadel 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-19th 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 19th 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 they 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 copped trees can stump sprout. Although blue gum is often considered a hazard tree from a tendency for wind fall and fire, and the probably alleolopathic 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 plan, 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 options 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 plan, 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:

Invasive Plant Species:

- 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.

Invasive Wildlife Species:

- 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 CNDDDB, 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 CNDDDB (CDFG 2013a). Sensitive plant communities are also identified by CDFW (CDFG 2003, CDFG 2007, CDFG 2009), and CNDDDB 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.

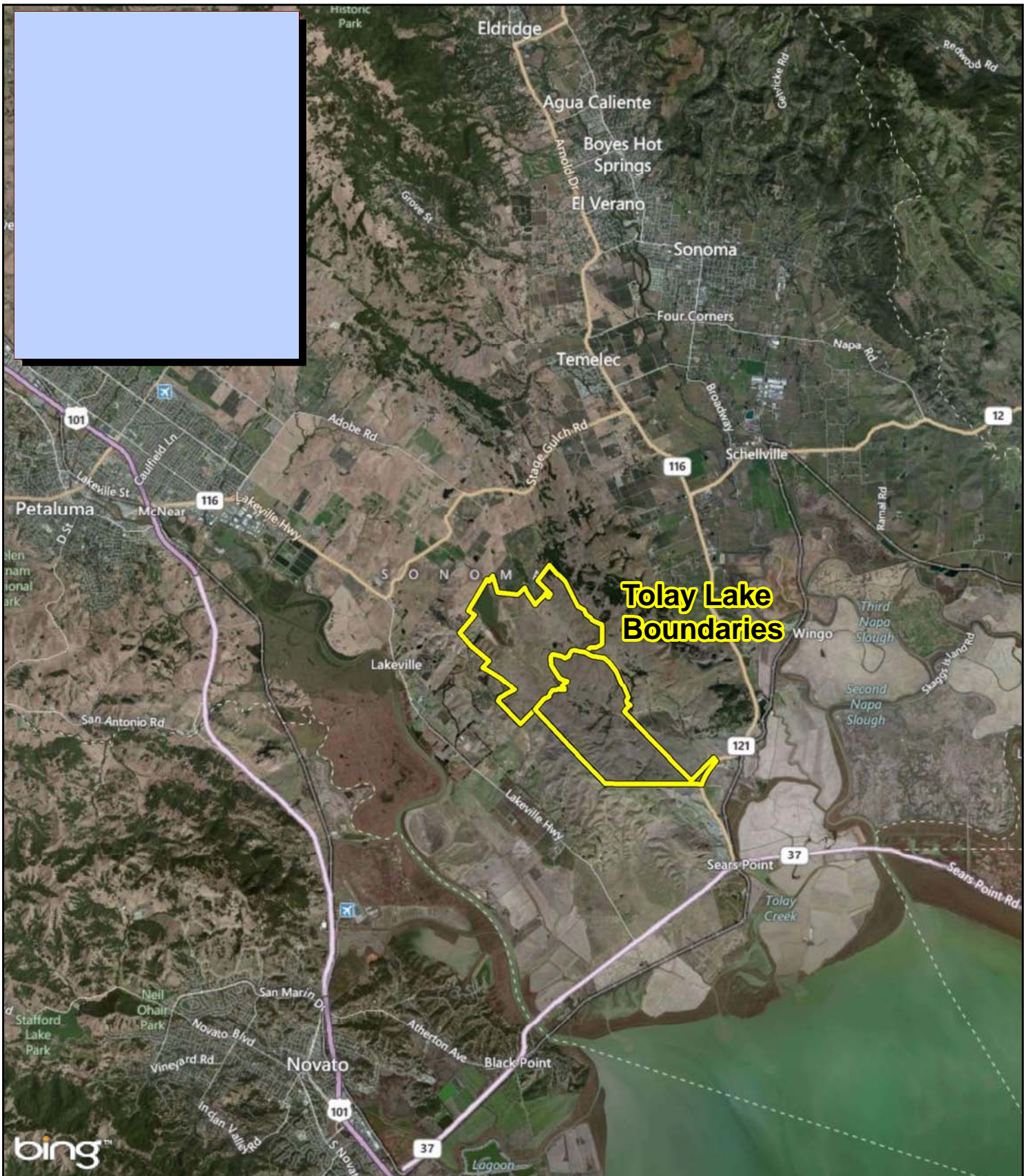
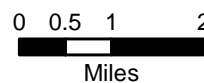


Figure 1. Location and Setting of Tolay Regional Park

Tolay Lake Regional Park
 Sonoma County, California



Date: January 2012
 Map By: Michael Rochelle

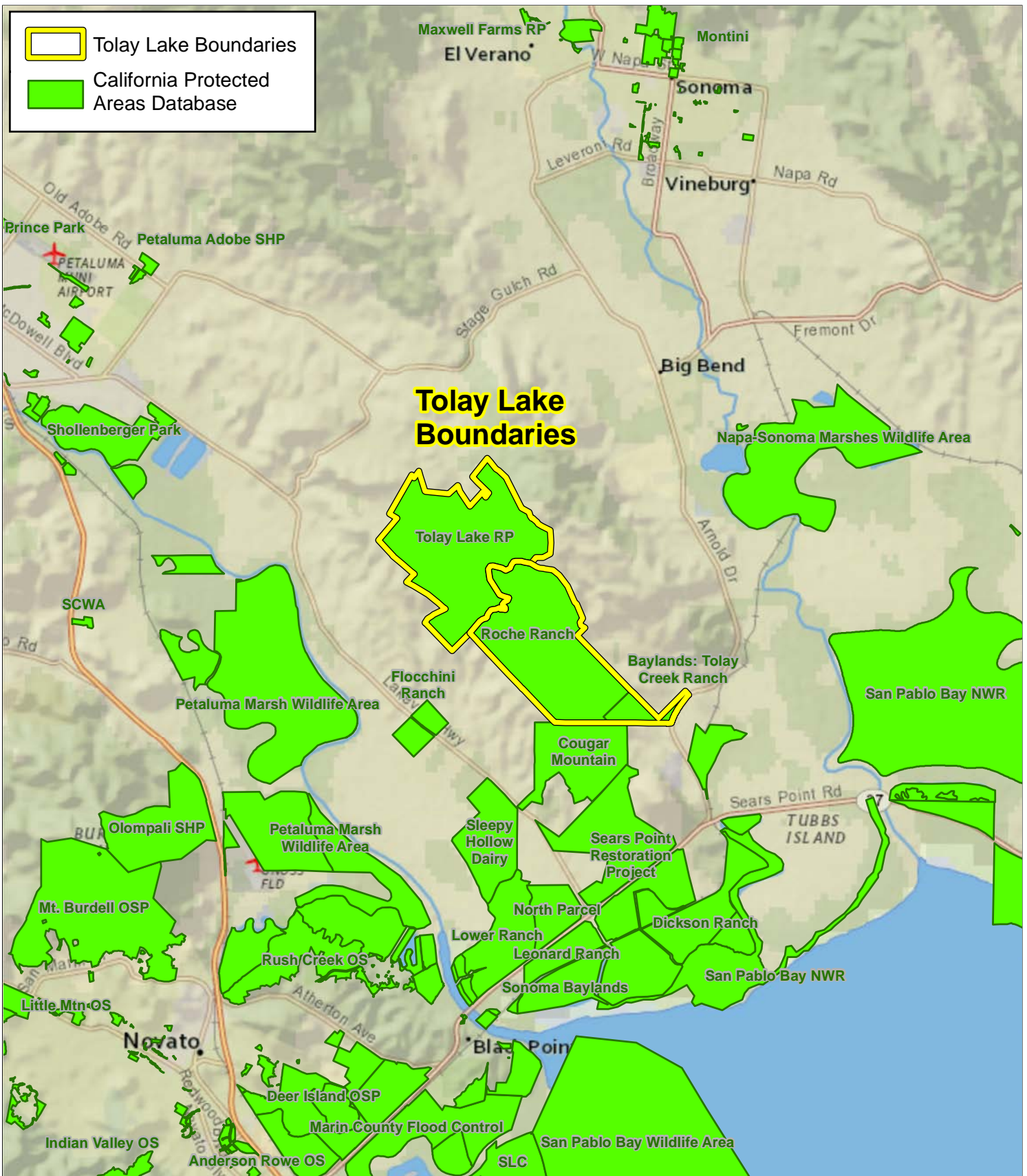
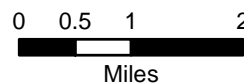


















Figure 2. Conserved Lands in the Tolay Lake Regional Park Region

Tolay Lake Regional Park
Sonoma County, California



Date: March 2013
Map By: Michael Rochelle
Basemap: NatGeo

- | | |
|--|---|
|  Tolay Lake Boundaries |  GoF: GOULDING-TOOMES COMPLEX, 9 TO 50 PERCENT SLOPES |
|  CcA: CLEAR LAKE CLAY LOAM, 0 TO 2 PERCENT SLOPES |  GuF: GULLIED LAND |
|  DbC: DIABLO CLAY, 2 TO 9 PERCENT SLOPES |  HcD: HAIRE CLAY LOAM, 9 TO 15 PERCENT SLOPES |
|  DbD: DIABLO CLAY, 9 TO 15 PERCENT SLOPES |  LaC: LANIGER LOAM, 5 TO 9 PERCENT SLOPES |
|  DbE2: DIABLO CLAY, 15 TO 30 PERCENT SLOPES, ERODED |  LaD: LANIGER LOAM, 9 TO 15 PERCENT SLOPES |
|  DbE: DIABLO CLAY, 15 TO 30 PERCENT SLOPES |  LaE2: LANIGER LOAM, 15 TO 30 PERCENT SLOPES, ERODED |
|  DbF2: DIABLO CLAY, 30 TO 50 PERCENT SLOPES, ERODED |  MoE: MONTARA COBBLY CLAY LOAM, 2 TO 30 PERCENT SLOPES |
|  GID: GOULDING COBBLY CLAY LOAM, 5 TO 15 PERCENT SLOPES |  W: WATER |

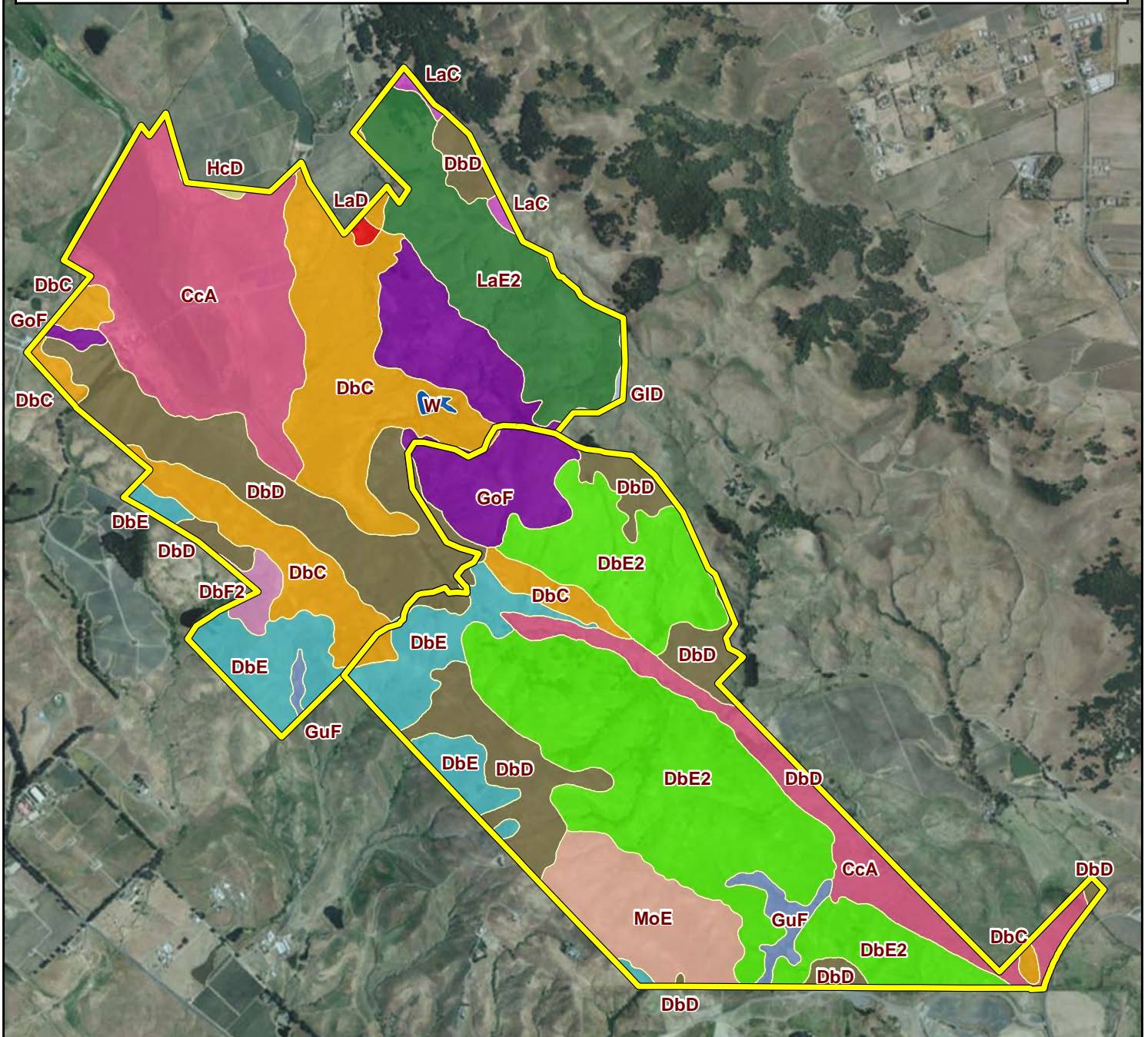
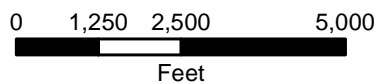


Figure 3. Mapped Soil Units within Tolay Lake Regional Park

Tolay Lake Regional Park
Sonoma County, California







Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

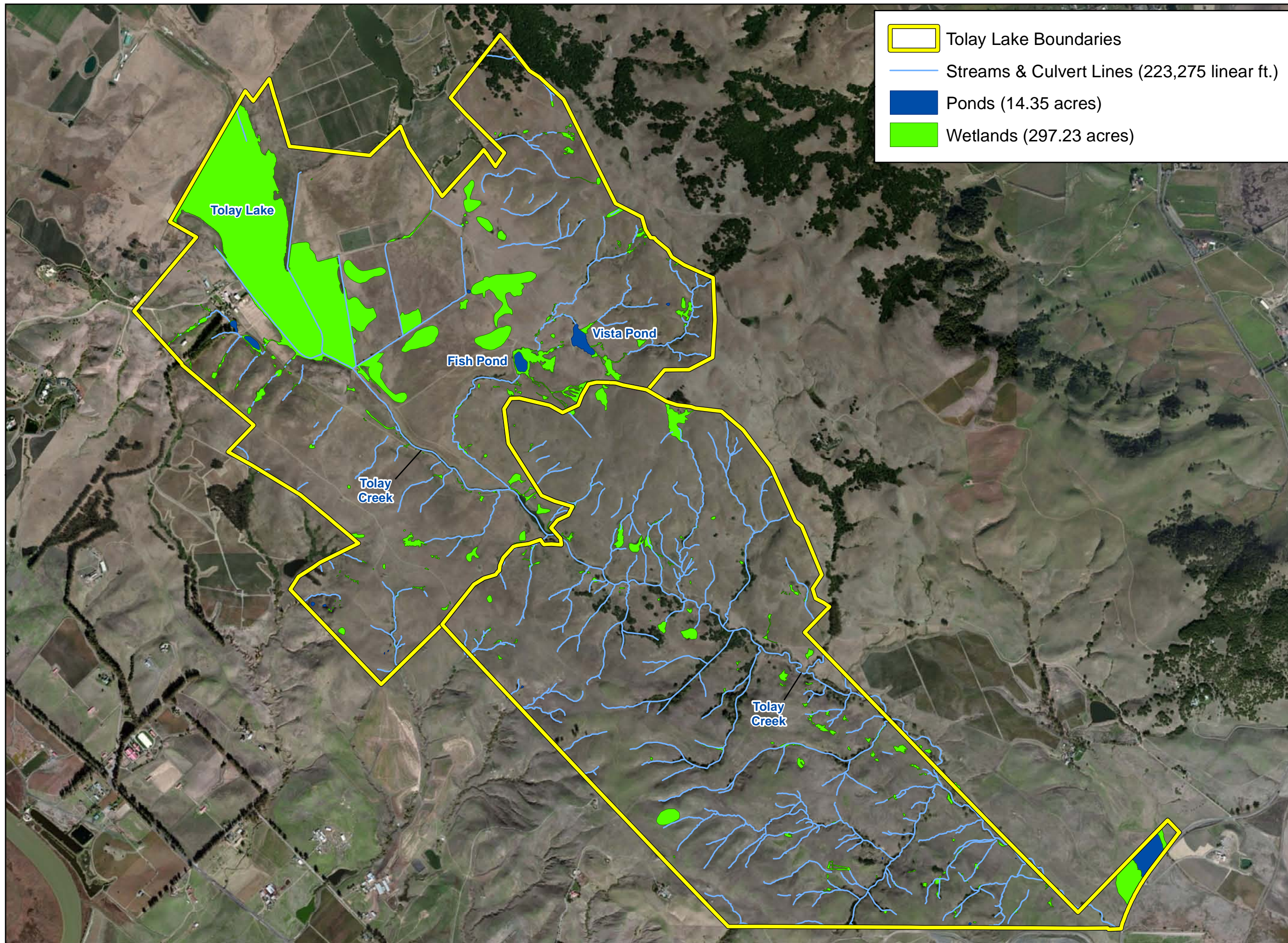
Tolay Lake
Regional Park

Sonoma County,
California

Figure 4.

Wetlands and
Waters Mapped
in Tolay Lake
Regional Park

-  Tolay Lake Boundaries
-  Streams & Culvert Lines (223,275 linear ft.)
-  Ponds (14.35 acres)
-  Wetlands (297.23 acres)



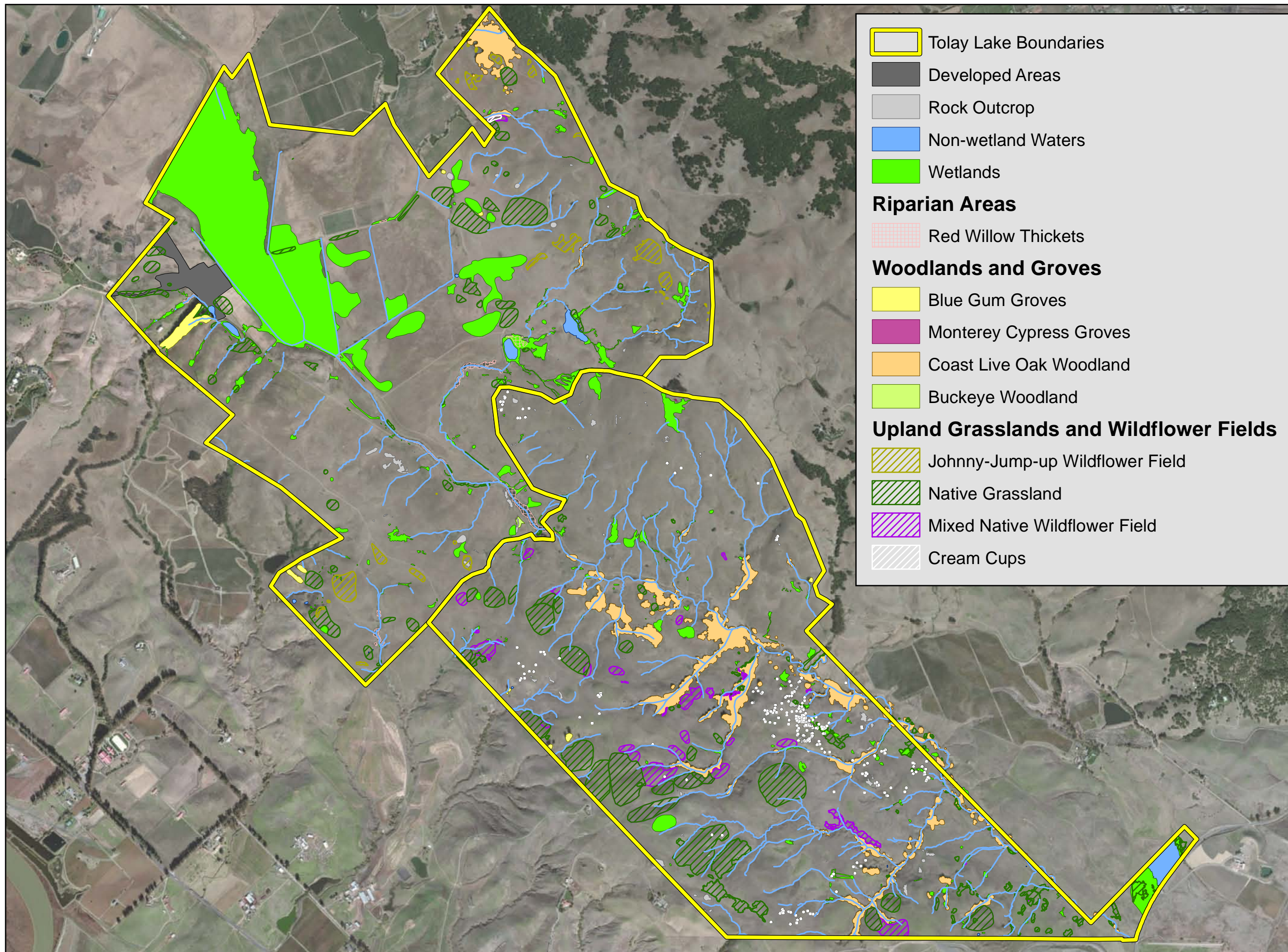
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Feet

Tolay Lake Regional Park

Sonoma County, California

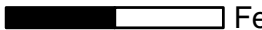
Figure 5.

Biological Communities within Tolay Lake Regional Park



-  Tolay Lake Boundaries
-  Developed Areas
-  Rock Outcrop
-  Non-wetland Waters
-  Wetlands
- Riparian Areas**
-  Red Willow Thickets
- Woodlands and Groves**
-  Blue Gum Groves
-  Monterey Cypress Groves
-  Coast Live Oak Woodland
-  Buckeye Woodland
- Upland Grasslands and Wildflower Fields**
-  Johnny-Jump-up Wildflower Field
-  Native Grassland
-  Mixed Native Wildflower Field
-  Cream Cups



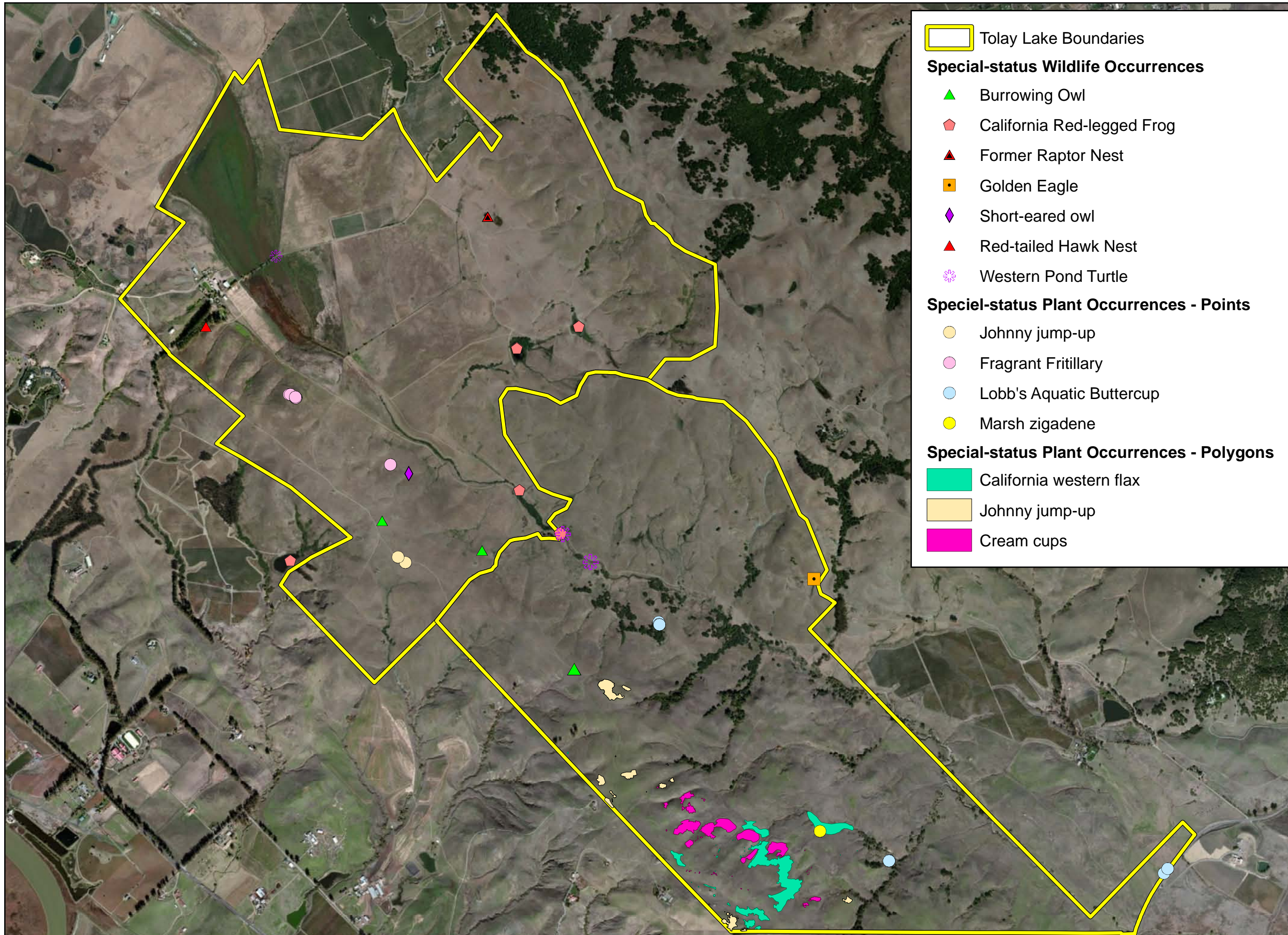
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Tolay Lake Regional Park

Sonoma County, California

Figure 6.

Special-status Plant and Wildlife Species within Tolay Lake Regional Park



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

Special-status Plant Occurrences - Points

- Johnny jump-up
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Marsh zigadene

Special-status Plant Occurrences - Polygons

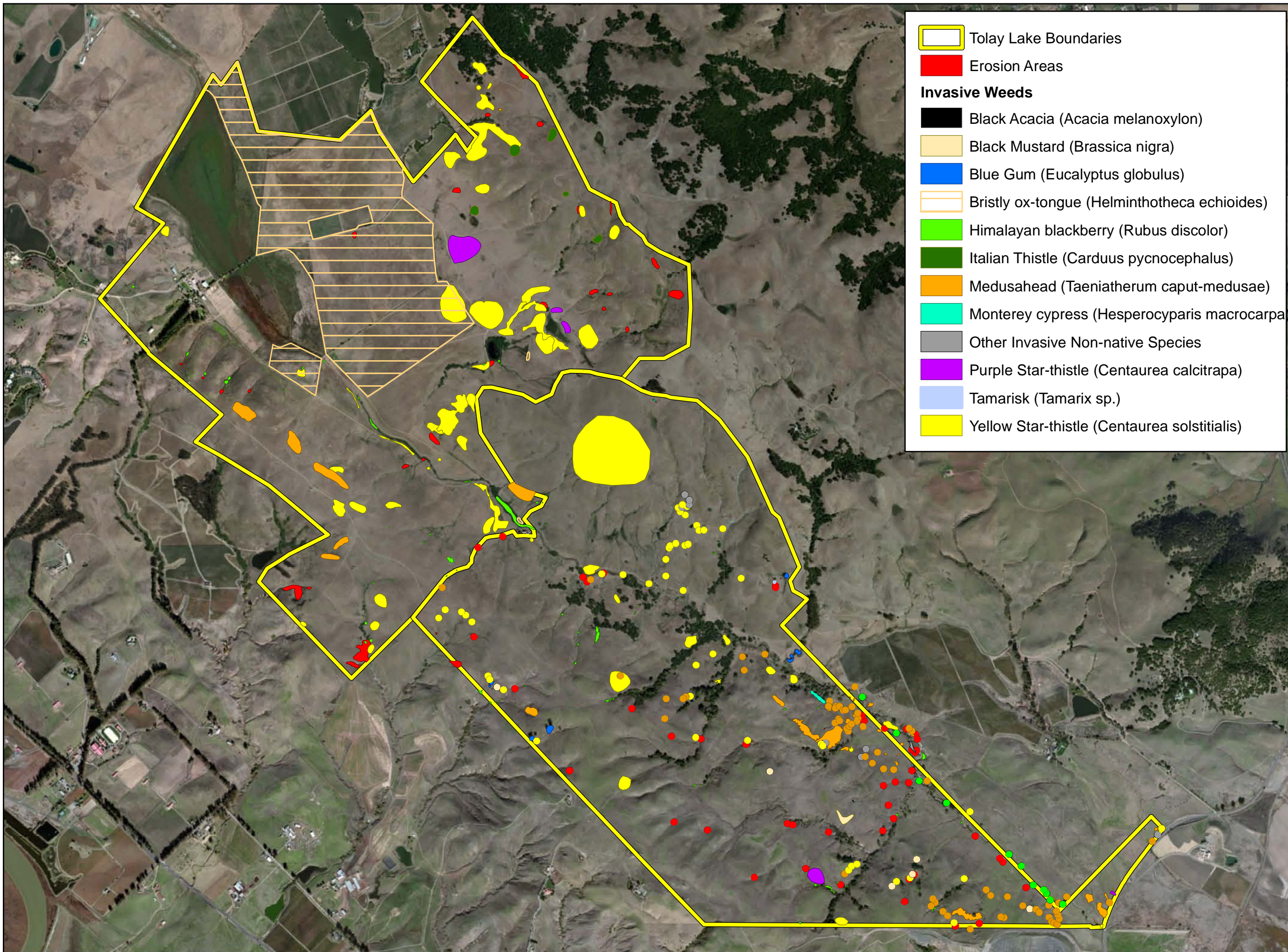
- California western flax
- Johnny jump-up
- Cream cups



0 1,000 2,000
Feet

Tolay Lake
Regional Park
Sonoma County,
California

Figure 7.
Invasive Plant
Species and Erosion
within Tolay Lake
Regional Park










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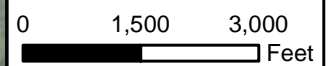
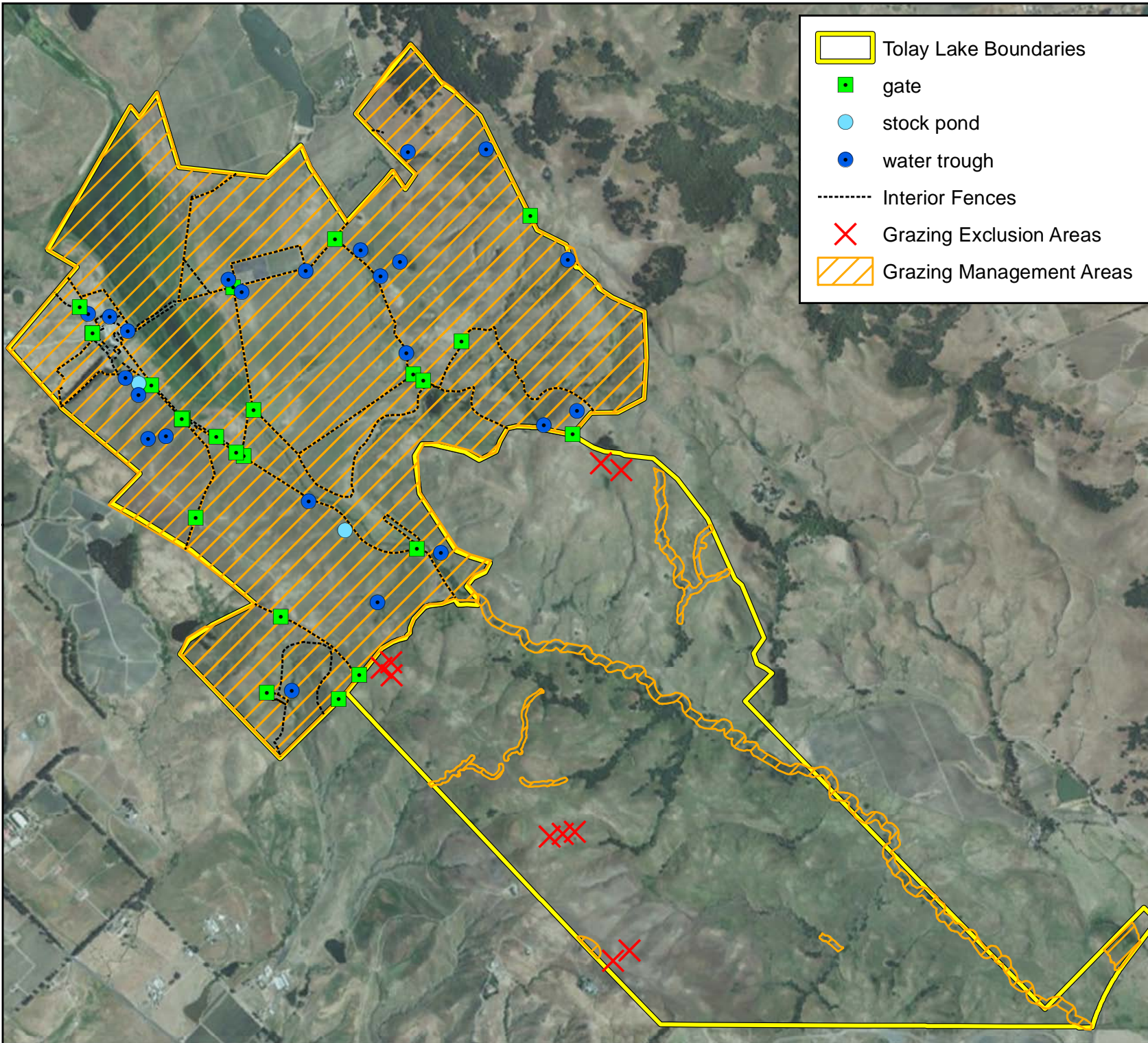
Tolay Lake
Regional Park

Sonoma County,
California

Figure 8.

Grazing Management
and Infrastructure
within Tolay Lake
Regional Park

-  Tolay Lake Boundaries
-  gate
-  stock pond
-  water trough
-  Interior Fences
-  Grazing Exclusion Areas
-  Grazing Management Areas



Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

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- Sam Bacchini, Biological Consultant, EIP Associates, Sacramento, Conducted field work for Parsons (1996) *in*: LSA 2009b.
- Steve Ehret, Park Planner, Sonoma County Regional Parks *in*: LSA 2009b.
- Jake Newell, Stewardship Planner, Sonoma County Agricultural Preservation and Open Space District. Email correspondence.
- Janet Thiessen, volunteer for the Raptor Project *in*: LSA 2009b.

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	SCIENTIFIC 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]	<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	common soap plant	perennial forb	native	--	--	NL	--	--
Alismataceae	<i>Alisma lanceolatum</i>	water plantain	perennial forb	non-native	--	--	OBL	--	--
Amaranthaceae	<i>Amaranthus blitoides</i>	mat amaranth	annual forb	native	--	--	NL	--	--
Amaranthaceae	<i>Amaranthus retroflexus</i>	redroot amaranth	annual forb	non-native	--	--	NL	--	--
Anacardiaceae	<i>Toxicodendron diversilobum</i>	poison oak	deciduous shrub	native	--	--	NL	--	--
Apiaceae	<i>Conium maculatum</i>	poison hemlock	perennial forb	non-native	--	moderate	FAC	--	--
Apiaceae	<i>Daucus pusillus</i>	American wild carrot	annual forb	native	--	--	NL	--	--
Apiaceae	<i>Eryngium aristulatum</i> var. <i>aristulatum</i>	California button celery	perennial forb	native	--	--	OBL	--	VPA?
Apiaceae	<i>Eryngium armatum</i>	coastal button celery	perennial forb	native	--	--	FACW	--	VPA?
Apiaceae	<i>Foeniculum vulgare</i>	fennel	perennial forb	non-native	--	high	NL	--	--
Apiaceae	<i>Lomatium utriculatum</i>	hog fennel	perennial forb	native	--	--	NL	WI	--
Apiaceae	<i>Lomatium</i> sp.	biscuit root	perennial forb	native	--	--	NL	unknown	--
Apiaceae	<i>Osmorhiza berteroi</i>	sweet cicely	perennial forb	native	--	--	FACU	--	--
Apiaceae	<i>Perideridia kelloggii</i>	Kellogg's yampah	perennial forb	native	--	--	NL	WI	--
Apiaceae	<i>Sanicula bipinnata</i>	poison sanicle	perennial forb	native	--	--	NL	--	--
Apiaceae	<i>Sanicula bipinnatifida</i>	purple sanicle	perennial forb	native	--	--	NL	WI	--
Apiaceae	<i>Sanicula crassicaulis</i>	Gamble weed	perennial forb	native	--	--	NL	--	--
Apiaceae	<i>Scandix pecten-veneris</i>	shepherd's needle	annual forb	non-native	--	--	NL	--	--
Apiaceae	<i>Torilis arvensis</i>	hedge parsley	annual forb	non-native	--	moderate	NL	--	--
Apiaceae	<i>Torilis nodosa</i>	knotted hedgeparsley	annual forb	non-native	--	--	NL	--	--
Apocynaceae [Asclepiadaceae]	<i>Asclepias fascicularis</i>	Mexican milkweed	perennial forb	native	--	--	FAC	--	GEN
Araceae	<i>Lemna</i> sp.	duck weed	perennial forb	native	--	--	OBL	--	unknown
Araliaceae [Apiaceae]	<i>Hydrocotyle ranunculoides</i>	water pennywort	perennial forb	native	--	--	OBL	--	--
Aristolochiaceae	<i>Aristolochia californica</i>	Dutchman's pipe	perennial vine	native	--	--	NL	--	--
Asteraceae	<i>Achillea millefolium</i>	common yarrow	perennial forb	native	--	--	FACU	--	--
Asteraceae	<i>Achyraea mollis</i>	soft blow wifes	annual forb	native	--	--	FAC	--	GEN
Asteraceae	<i>Agoseris grandiflora</i>	large-flowered agoseris	perennial forb	native	--	--	NL	--	--
Asteraceae	<i>Anthemis cotula</i>	mayweed	annual forb	non-native	--	assessed	FACU	--	--
Asteraceae	<i>Artemisia douglasiana</i>	mugwort	perennial forb	native	--	--	FACW	--	--
Asteraceae	<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush	evergreen shrub	native	--	--	NL	--	--
Asteraceae	<i>Baccharis salicifolia</i>	mule fat	evergreen shrub	native	--	--	FACW	--	--
Asteraceae	<i>Blennosperma nanum</i> var. <i>nanum</i>	common blennosperma	annual forb	native	--	--	FACW	--	VPI?

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR STATUS ³	SERPENTINE STATUS ⁴	VERNAL POOL STATUS ⁵
Asteraceae	<i>Carduus pycnocephalus</i>	Italian thistle	annual forb	non-native	--	moderate	NL	--	--
Asteraceae	<i>Centaurea calcitrapa</i>	purple star thistle	annual forb	non-native	--	moderate	NL	--	--
Asteraceae	<i>Centaurea melitensis</i>	toçalote	annual forb	non-native	--	moderate	NL	--	--
Asteraceae	<i>Centaurea solstitialis</i>	yellow star thistle	annual forb	non-native	--	high	NL	--	GEN
Asteraceae	<i>Cirsium vulgare</i>	bull thistle	perennial forb	non-native	--	moderate	FACU	--	--
Asteraceae	<i>Cotula coronopifolia</i>	brass buttons	perennial forb	non-native	--	limited	OBL	--	GEN
Asteraceae	<i>Erigeron philadelphicus</i>	Philadelphia fleabane	perennial forb	native	--	--	FACU	--	--
Asteraceae	<i>Eurybia radulina</i> [<i>Aster radulinus</i>]	roughleaf aster	perennial forb	native	--	--	NL	--	--
Asteraceae	<i>Grindelia camporum</i>	common gumplant	perennial forb	native	--	--	FACW	WI	--
Asteraceae	<i>Helminthotheca echioides</i> [<i>Picris echioides</i>]	bristly ox-tongue	perennial forb	non-native	--	limited	FAC	--	--
Asteraceae	<i>Hemizonia congesta</i> ssp. <i>lutescens</i>	yellow hayfield tarweed	annual forb	native	--	--	NL	--	--
Asteraceae	<i>Hemizonia congesta</i> ssp. <i>luzulifolia</i>	white hayfield tarweed	annual forb	native	--	--	NL	--	--
Asteraceae	<i>Hesperevax sparsiflora</i> var. <i>sparsiflora</i>	erect dwarf cudweed	annual forb	native	--	--	FACU	WI	--
Asteraceae	<i>Hypochaeris glabra</i>	smooth catsear	annual forb	non-native	--	limited	NL	--	GEN
Asteraceae	<i>Hypochaeris radicata</i>	hairy catsear	perennial forb	non-native	--	moderate	FACU	--	--
Asteraceae	<i>Lactuca saligna</i>	willowleaf lettuce	annual forb	non-native	--	--	FACU	--	--
Asteraceae	<i>Lactuca serriola</i>	prickly lettuce	annual forb	non-native	--	assessed	FACU	--	--
Asteraceae	<i>Lasthenia californica</i> ssp. <i>californica</i>	California goldfields	annual forb	native	--	--	UPL	--	VPA?
Asteraceae	<i>Lasthenia glaberrima</i>	smooth goldfields	annual forb	native	--	--	OBL	--	VPI?
Asteraceae	<i>Layia chrysanthemoides</i>	smooth tidytips	annual forb	native	--	--	FACW	--	GEN
Asteraceae	<i>Layia gaillardoides</i>	woodland tidytips	annual forb	native	--	--	NL	--	--
Asteraceae	<i>Layia platyglossa</i>	coastal tidytips	annual forb	native	--	--	NL	--	--
Asteraceae	<i>Madia gracilis</i>	gumweed tarweed	annual forb	native	--	--	NL	--	--
Asteraceae	<i>Madia sativa</i>	coast tarweed	annual forb	native	--	--	NL	--	GEN
Asteraceae	<i>Matricaria discoidea</i> [<i>Chamomilla suaveolens</i>]	pineapple weed	annual forb	non-native	--	--	FACU	--	GEN
Asteraceae	<i>Microseris douglasii</i> ssp. <i>tenella</i>	Douglas' silverpuffs	annual forb	native	--	--	UPL	WI/IN	GEN
Asteraceae	<i>Pseudognaphalium luteoalbum</i> [<i>Gnaphalium luteoalbum</i>]	Jersey cudweed	annual forb	non-native	--	--	FACW	--	--
Asteraceae	<i>Pseudognaphalium stramineum</i> [<i>Gnaphalium stramineum</i>]	cotton batting plant	perennial forb	native	--	--	FAC	--	--
Asteraceae	<i>Senecio vulgaris</i>	old man in the Spring	annual forb	non-native	--	--	FACU	--	GEN
Asteraceae	<i>Silybum marianum</i>	milk thistle	perennial forb	non-native	--	limited	NL	--	--
Asteraceae	<i>Sonchus asper</i> ssp. <i>asper</i>	prickly sow thistle	annual forb	non-native	--	assessed	FACU	--	--

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR STATUS ³	SERPENTINE STATUS ⁴	VERNAL POOL STATUS ⁵
Asteraceae	<i>Sonchus oleraceus</i>	common sow thistle	annual forb	non-native	--	--	NL	--	--
Asteraceae	<i>Taraxacum officinale</i>	common dandelion	perennial forb	non-native	--	assessed	FACU	--	--
Asteraceae	<i>Tragopogon porrifolius</i>	purple salsify	perennial forb	non-native	--	--	NL	--	--
Asteraceae	<i>Wyethia angustifolia</i>	narrow leaf mule ears	perennial forb	native	--	--	FACU	--	--
Asteraceae	<i>Xanthium spinosum</i>	spiny cocklebur	annual forb	native	--	--	FACU	--	--
Asteraceae	<i>Xanthium strumarium</i>	rough cocklebur	annual forb	native	--	--	FAC	--	GEN
Boraginaceae	<i>Amsinckia intermedia</i> [<i>Amsinckia menziesii</i> var. <i>intermedia</i>]	common fiddleneck	annual forb	native	--	--	NL	--	--
Boraginaceae	<i>Amsinckia menziesii</i> [<i>Amsinckia menziesii</i> var. <i>menziesii</i>]	Menzies' fiddleneck	annual forb	native	--	--	NL	--	--
Boraginaceae	<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	heliotrope	perennial forb	native	--	--	OBL	--	GEN
Boraginaceae [Hydrophyllaceae]	<i>Nemophila heterophylla</i>	white baby blue eyes	annual forb	native	--	--	NL	--	--
Boraginaceae [Hydrophyllaceae]	<i>Phacelia</i> sp.	phacelia	annual or perennial forb	native	unknown	--	unknown	unknown	--
Boraginaceae	<i>Plagiobothrys nothofulvus</i>	rusty popcornflower	annual forb	native	--	--	FAC	--	GEN
Boraginaceae	<i>Plagiobothrys stipitatus</i>	slender popcornflower	annual forb	native	--	--	FACW	--	VPA?
Brassicaceae	<i>Brassica nigra</i>	black mustard	annual forb	non-native	--	moderate	NL	--	--
Brassicaceae	<i>Capsella bursa-pastoris</i>	shepherd's purse	annual forb	non-native	--	--	FACU	--	GEN
Brassicaceae	<i>Cardamine californica</i>	California Toothwort	perennial forb	native	--	--	NL	--	--
Brassicaceae	<i>Cardamine oligosperma</i>	Idaho bittercress	annual forb	native	--	--	NL	--	GEN
Brassicaceae	<i>Caulanthus lasiophyllus</i> [<i>Guillenia lasiophylla</i>]	California mustard	annual forb	native	--	--	NL	--	--
Brassicaceae	<i>Lepidium nitidum</i>	shining pepperweed	annual forb	native	--	--	FAC	--	VPA?
Brassicaceae	<i>Nasturtium officinale</i> [<i>Rorippa nasturtium-aquaticum</i>]	watercress	perennial forb	native	--	--	OBL	--	GEN
Brassicaceae	<i>Raphanus raphanistrum</i>	jointed charlock	perennial forb	non-native	--	--	NL	--	--
Brassicaceae	<i>Raphanus sativus</i>	wild radish	perennial forb	non-native	--	limited	NL	--	--
Brassicaceae	<i>Rorippa curvisiliqua</i>	curvepod yellowcress	perennial forb	native	--	--	OBL	--	GEN
Brassicaceae	<i>Sinapis arvensis</i>	charlock	annual forb	non-native	--	limited	NL	--	--
Brassicaceae	<i>Sisymbrium officinale</i>	hedge mustard	annual forb	non-native	--	--	NL	--	--
Campanulaceae	<i>Downingia pulchella</i>	flat-face calicoflower	annual forb	native	--	--	OBL	--	VPA
Caprifoliaceae	<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	upright snowberry	deciduous shrub	native	--	--	FACU	--	--
Caprifoliaceae	<i>Symphoricarpos mollis</i>	creeping snowberry	deciduous shrub	native	--	--	NL	--	--
Caryophyllaceae	<i>Cerastium fontanum</i> ssp. <i>vulgare</i>	mouse-ear chickweed	perennial forb	non-native	--	--	FACU	--	--
Caryophyllaceae	<i>Cerastium glomeratum</i>	mouse-ear chickweed	annual forb	non-native	--	--	FACU	--	GEN

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR STATUS ³	SERPENTINE STATUS ⁴	VERNAL POOL STATUS ⁵
Caryophyllaceae	<i>Minuartia douglasii</i>	Douglas' stitchwort	annual forb	native	--	--	NL	SI	--
Caryophyllaceae	<i>Polycarpon tetraphyllum</i>	fourleaf manyseed	annual forb	non-native	--	--	NL	--	GEN
Caryophyllaceae	<i>Sagina apetala</i>	annual pearlwort	annual forb	native	--	--	FAC	--	--
Caryophyllaceae	<i>Silene gallica</i>	windmill pink	annual forb	non-native	--	--	NL	--	GEN
Caryophyllaceae	<i>Spergularia rubra</i>	red sandspurry	perennial forb	non-native	--	--	FAC	--	GEN
Caryophyllaceae	<i>Stellaria media</i>	common chickweed	annual forb	non-native	--	--	FACU	--	GEN
Chenopodiaceae	<i>Atriplex prostrata</i> [<i>Atriplex triangularis</i>]	fat hen	annual forb	non-native	--	--	FAC	--	--
Chenopodiaceae	<i>Chenopodium album</i>	white goosefoot	annual forb	non-native	--	--	FACU	--	--
Convolvulaceae	<i>Calystegia subacaulis</i> ssp. <i>subacaulis</i>	hillside morning glory	perennial forb	native	--	--	NL	--	--
Convolvulaceae	<i>Convolvulus arvensis</i>	field bindweed	perennial forb	non-native	--	assessed	NL	--	GEN
Convolvulaceae [Cuscutaceae]	<i>Cuscuta</i> sp.	dodder	annual forb	unknown	unknown	unknown	unknown	unknown	unknown
Convolvulaceae	<i>Cressa truxillensis</i>	spreading alkaliweed	perennial forb	native	--	--	FACW	--	VPA
Crassulaceae	<i>Crassula aquatica</i>	water pygmyweed	annual forb	native	--	--	OBL	--	VPI?
Crassulaceae	<i>Crassula connata</i>	sand pygmyweed	annual forb	native	--	--	FAC	--	GEN
Cucurbitaceae	<i>Marah fabacea</i>	wild cucumber	perennial vine	native	--	--	NL	--	--
Cupressaceae	<i>Hesperocyparis macrocarpa</i> [<i>Cupressus macrocarpus</i>]	Monterey cypress	evergreen tree	native	Rank 1B.2*	--	NL	--	--
Cyperaceae	<i>Bolboschoenus maritimus</i> [<i>Scirpus maritimus</i>]	saltmarsh bulrush	perennial graminoid	native	--	--	OBL	--	--
Cyperaceae	<i>Carex abrupta</i>	abrupt-beaked bulrush	perennial graminoid	native	--	--	FAC	--	--
Cyperaceae	<i>Carex</i> sp.	sedge	perennial graminoid	native?	unknown	--	unknown	unknown	unknown
Cyperaceae	<i>Carex</i> sp.	sedge	perennial graminoid	native?	unknown	--	unknown	unknown	unknown
Cyperaceae	<i>Cyperus eragrostis</i>	tall flatsedge	perennial graminoid	native	--	--	FACW	--	GEN
Cyperaceae	<i>Eleocharis macrostachya</i>	common spikerush	perennial graminoid	native	--	--	OBL	--	VPI?
Cyperaceae	<i>Schoenoplectus acutus</i> var. <i>occidentalis</i> [<i>Scirpus acutus</i> var. <i>occidentalis</i>]	hardstem bulrush	perennial graminoid	native	--	--	OBL	--	--
Cyperaceae	<i>Schoenoplectus americanus</i> [<i>Scirpus americanus</i>]	chairmaker's bulrush	perennial graminoid	native	--	--	OBL	--	--
Dipsacaceae	<i>Dipsacus fullonum</i>	Fuller's teasel	perennial forb	non-native	--	moderate	FAC	--	--
Dryopteridaceae	<i>Dryopteris arguta</i>	California wood fern	perennial fern	native	--	--	NL	--	--
Equisetaceae	<i>Equisetum arvense</i>	field horsetail	perennial fern	native	--	--	FAC	--	--
Equisetaceae	<i>Equisetum laevigatum</i>	smooth horsetail	perennial fern	native	--	--	FACW	--	--
Equisetaceae	<i>Equisetum telmateia</i> ssp. <i>braunii</i>	giant horsetail	perennial fern	native	--	--	FACW	--	--
Ericaceae	<i>Arbutus menziesii</i>	Pacific madrone	evergreen tree	native	--	--	NL	--	--

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR STATUS ³	SERPENTINE STATUS ⁴	VERNAL POOL STATUS ⁵
Euphorbiaceae	<i>Chamaesyce maculata</i>	spotted spurge	annual forb	non-native	--	--	NL	--	--
Euphorbiaceae	<i>Chamaesyce</i> sp.	spurge	annual or perennial forb	unknown	unknown	unknown	unknown	unknown	unknown
Euphorbiaceae	<i>Euphorbia crenulata</i>	Chinese caps	perennial forb	native	--	--	NL	--	--
Euphorbiaceae	<i>Euphorbia peplus</i>	petty spurge	annual forb	non-native	--	--	NL	--	--
Fabaceae	<i>Acacia melanoxylon</i>	blackwood acacia	evergreen tree	non-native	--	limited	NL	--	--
Fabaceae	<i>Acmispon americanus</i> var. <i>americanus</i> [<i>Lotus purshianus</i> var. <i>purshianus</i>]	American lotus	annual forb	native	--	--	NL	--	GEN
Fabaceae	<i>Acmispon wrangelianus</i> [<i>Lotus wrangelianus</i>]	Wrangel's lotus	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Astragalus gambelianus</i>	Gambel's dwarf milk vetch	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Glycyrrhiza lepidota</i>	American licorice	perennial forb	native	--	--	FAC	--	--
Fabaceae	<i>Lathyrus vestitus</i> var. <i>vestitus</i>	common Pacific pea	perennial forb	native	--	--	NL	WI	--
Fabaceae	<i>Lathyrus</i> sp.	pea	annual or perennial forb	unknown	unknown	unknown	unknown	unknown	unknown
Fabaceae	<i>Lotus corniculatus</i>	bird's-foot trefoil	perennial forb	non-native	--	assessed	FAC	--	GEN
Fabaceae	<i>Lotus tenuis</i>	narrowleaf bird's-foot trefoil	perennial forb	non-native	--	--	NL	--	--
Fabaceae	<i>Lupinus bicolor</i>	miniature lupine	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Lupinus formosus</i> var. <i>formosus</i>	summer lupine	perennial forb	native	--	--	NL	--	--
Fabaceae	<i>Lupinus microcarpus</i> var. <i>densiflorus</i>	chick lupine	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Lupinus nanus</i>	sky lupine	annual forb	native	--	--	NL	--	GEN
Fabaceae	<i>Lupinus succulentus</i>	hollowleaf annual lupine	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Medicago polymorpha</i>	bur medic	annual forb	non-native	--	limited	FACU	--	--
Fabaceae	<i>Melilotus indicus</i>	yellow annual sweetclover	annual forb	non-native	--	--	FACU	--	--
Fabaceae	<i>Melilotus officinalis</i>	yellow sweetclover	annual forb	non-native	--	assessed	FACU	--	--
Fabaceae	<i>Thermopsis californica</i> var. <i>californica</i>	California goldenbanner	perennial forb	native	--	--	NL	--	--
Fabaceae	<i>Trifolium albopurpureum</i>	rancheria clover	annual forb	native	--	--	FACU	--	--
Fabaceae	<i>Trifolium bifidum</i> var. <i>bifidum</i>	Pinole clover	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Trifolium campestre</i>	hop clover	annual forb	non-native	--	--	NL	--	--
Fabaceae	<i>Trifolium ciliolatum</i>	tree clover	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Trifolium depauperatum</i>	cowbag clover	annual forb	native	--	--	FAC	--	--
Fabaceae	<i>Trifolium dubium</i>	Shamrock clover	annual forb	non-native	--	--	FACU	--	--
Fabaceae	<i>Trifolium fragiferum</i>	strawberry clover	perennial forb	non-native	--	--	FACU	--	--
Fabaceae	<i>Trifolium fucatum</i>	bull clover	annual forb	native	--	--	FACU	WI/IN	--
Fabaceae	<i>Trifolium gracilentum</i>	pinpoint clover	annual forb	native	--	--	NL	WI/IN	--
Fabaceae	<i>Trifolium hirtum</i>	rose clover	annual forb	non-native	--	moderate	NL	--	--
Fabaceae	<i>Trifolium incarnatum</i>	crimson clover	annual forb	non-native	--	--	NL	--	--

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Fabaceae	<i>Trifolium microdon</i>	thimble clover	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Trifolium oliganthum</i>	mini-tomcat clover	annual forb	native	--	--	NL	--	--
Fabaceae	<i>Trifolium subterraneum</i>	subterranean clover	annual forb	non-native	--	--	NL	--	--
Fabaceae	<i>Trifolium variegatum</i>	small-flowered variegated clover	annual forb	native	--	--	FAC	--	VPA?
Fabaceae	<i>Vicia benghalensis</i>	reddish tufted vetch	annual forb	non-native	--	--	NL	--	--
Fabaceae	<i>Vicia sativa ssp. nigra</i>	garden spring vetch	annual forb	non-native	--	--	UPL	--	--
Fabaceae	<i>Vicia sativa ssp. sativa</i>	pubescent spring vetch	annual forb	non-native	--	--	UPL	--	--
Fagaceae	<i>Quercus agrifolia</i> var. <i>agrifolia</i>	coast live oak	evergreen tree	native	--	--	NL	--	--
Fagaceae	<i>Quercus kelloggii</i>	California black oak	deciduous tree	native	--	--	NL	--	--
Fagaceae	<i>Quercus lobata</i>	valley oak	deciduous tree	native	--	--	FACU	--	--
Frankeniaceae	<i>Frankenia salina</i>	alkali heath	perennial forb	native	--	--	FACW	--	VPA?
Gentianaceae	<i>Zeltnera muehlenbergii</i> [<i>Centaurium muehlenbergii</i>]	Monterey centaury	annual forb	native	--	--	FACW	--	GEN
Geraniaceae	<i>Erodium botrys</i>	longbeak stork's bill	annual forb	non-native	--	assessed	FACU	--	GEN
Geraniaceae	<i>Erodium cicutarium</i>	redstem stork's bill	annual forb	non-native	--	limited	NL	--	--
Geraniaceae	<i>Erodium moschatum</i>	musky stork's bill	annual forb	non-native	--	assessed	NL	--	GEN
Geraniaceae	<i>Geranium dissectum</i>	cutleaf geranium	annual forb	non-native	--	moderate	NL	--	GEN
Geraniaceae	<i>Geranium molle</i>	woodland geranium	perennial forb	non-native	--	assessed	NL	--	GEN
Iridaceae	<i>Sisyrinchium bellum</i>	blue-eyed grass	perennial forb	native	--	--	FACW	--	--
Juncaceae	<i>Juncus balticus</i> ssp. <i>ater</i>	Baltic rush	perennial graminoid	native	--	--	FACW	--	--
Juncaceae	<i>Juncus bufonius</i>	toad rush	annual graminoid	native	--	--	FACW	--	VPA?
Juncaceae	<i>Juncus effusus</i> ssp. <i>pacificus</i>	Pacific rush	perennial graminoid	native	--	--	FACW	--	--
Juncaceae	<i>Juncus mexicanus</i>	Mexican rush	perennial graminoid	native	--	--	FACW	--	GEN
Juncaceae	<i>Juncus patens</i>	common rush	perennial graminoid	native	--	--	FACW	--	--
Juncaceae	<i>Juncus phaeocephalus</i>	brownhead rush	perennial graminoid	native	--	--	FAC	--	VPA?
Juncaginaceae	<i>Triglochin scilloides</i> [<i>Lilaea scilloides</i>]	flowering-quillwort	annual forb	native	--	--	OBL	--	VPI?
Lamiaceae	<i>Lamium purpureum</i>	purple deadnettle	annual forb	non-native	--	--	NL	--	--
Lamiaceae	<i>Marrubium vulgare</i>	horehound	perennial forb	non-native	--	limited	FACU	--	--
Lamiaceae	<i>Mentha pulegium</i>	pennyroyal	perennial forb	non-native	--	moderate	OBL	--	VPA?
Lamiaceae	<i>Stachys ajugoides</i>	bugle hedgenettle	perennial forb	native	--	--	OBL	--	VPA?
Lauraceae	<i>Umbellularia californica</i>	California bay	evergreen tree	native	--	--	FAC	--	--
Liliaceae	<i>Calochortus luteus</i>	yellow mariposa lily	perennial forb	native	--	--	NL	--	--
Liliaceae	<i>Calochortus venustus</i>	butterfly mariposa	perennial forb	native	--	--	NL	--	--
Liliaceae	<i>Fritillaria liliacea</i>	fragrant fritillary	perennial forb	native	Rank 1B.2	--	NL	WI	GEN

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Limnanthaceae	<i>Limnanthes douglasii</i>	Douglas' meadowfoam	annual forb	native	--	--	OBL	--	VPA
Linaceae	<i>Hesperolinon californicum</i>	California dwarf flax	annual forb	native	--	--	NL	SI	--
Lythraceae	<i>Ammannia coccinea</i>	purple ammannia	annual forb	native	--	--	OBL	--	--
Lythraceae	<i>Lythrum hyssopifolia</i>	hyssop loosestrife	annual forb	non-native	--	moderate	OBL	--	VPA?
Malvaceae	<i>Abutilon theophrasti</i>	velvet-leaf	annual forb	non-native	--	--	FACU	--	--
Malvaceae	<i>Malva nicaeensis</i>	bull mallow	annual forb	non-native	--	--	NL	--	--
Malvaceae	<i>Malvella leprosa</i>	alkali mallow	perennial forb	native	--	--	FACU	--	GEN
Malvaceae	<i>Sidalcea malviflora</i> ssp. <i>laciniata</i>	California checkerbloom	perennial forb	native	--	--	FACW	--	--
Martyniaceae	<i>Proboscidea lutea</i>	yellow devil's claw	annual forb	non-native	--	--	NL	--	--
Melanthiaceae [Liliaceae]	<i>Toxicoscordion fontanum</i> [<i>Zigadenus micranthus</i> var. <i>fontanus</i>]	marsh star lily	perennial forb	native	Rank 4.2	--	OBL	BE/SI	--
Melanthiaceae [Liliaceae]	<i>Toxicoscordion fremontii</i> [<i>Zigadenus fremontii</i>]	Fremont's star lily	perennial forb	native	--	--	NL	--	--
Montiaceae [Portulacaceae]	<i>Calandrinia ciliata</i>	common redmaids	annual forb	native	--	--	FACU	--	GEN
Montiaceae [Portulacaceae]	<i>Claytonia exigua</i>	serpentine springbeauty	annual forb	native	--	--	NL	SI	--
Montiaceae [Portulacaceae]	<i>Claytonia perfoliata</i>	miner's lettuce	annual forb	native	--	--	FAC	--	GEN
Moraceae	<i>Ficus carica</i>	common fig	deciduous tree	non-native	--	moderate	FACU	--	--
Myrsinaceae [Primulaceae]	<i>Anagallis arvensis</i>	scarlet pimpernel	annual forb	non-native	--	--	NL	--	GEN
Myrsinaceae [Primulaceae]	<i>Anagallis minima</i> [<i>Centunculus minimus</i>]	chaffweed	annual forb	native	--	--	NL	--	VPI?
Myrtaceae	<i>Eucalyptus globulus</i>	blue gum	evergreen tree	non-native	--	moderate	NL	--	--
Onagraceae	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	annual forb	native	--	--	NL	--	--
Onagraceae	<i>Clarkia</i> sp.	clarkia	annual forb	native	unknown	--	--	unknown	--
Onagraceae	<i>Epilobium brachycarpum</i>	annual willowherb	annual forb	native	--	--	NL	--	GEN
Onagraceae	<i>Epilobium campestre</i> [<i>Epilobium pygmaeum</i>]	smooth willowherb	annual forb	native	--	--	OBL	--	VPI?
Onagraceae	<i>Ludwigia</i> sp.	floating primrose	perennial forb	unknown	--	unknown	OBL	--	--
Onagraceae	<i>Taraxia ovata</i> [<i>Camissonia ovata</i>]	sun cup	perennial forb	native	--	--	NL	--	--
Orobanchaceae [Scrophulariaceae]	<i>Bellardia trixago</i>	Mediterranean linseed	annual forb	non-native	--	limited	NL	--	--
Orobanchaceae [Scrophulariaceae]	<i>Castilleja attenuata</i>	valley tassels	annual forb	native	--	--	NL	--	GEN

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Orobanchaceae [Scrophulariaceae]	<i>Castilleja densiflora</i>	dense-flowered owl's-clover	annual forb	native	--	--	NL	--	GEN
Orobanchaceae [Scrophulariaceae]	<i>Castilleja exserta</i>	exserted owl's-clover	annual forb	native	--	--	NL	--	--
Orobanchaceae [Scrophulariaceae]	<i>Castilleja rubicundula</i> ssp. <i>lithospermoides</i>	cream sacs	annual forb	native	--	--	NL	WI	--
Orobanchaceae [Scrophulariaceae]	<i>Parentucellia viscosa</i>	yellow glandweed	annual forb	non-native	--	limited	FAC	--	--
Orobanchaceae [Scrophulariaceae]	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	Johnny-tuck	annual forb	native	--	--	NL	--	GEN
Orobanchaceae [Scrophulariaceae]	<i>Triphysaria pusilla</i>	dwarf owl's clover	annual forb	native	--	--	NL	--	GEN
Orobanchaceae [Scrophulariaceae]	<i>Triphysaria versicolor</i> ssp. <i>faucibarbata</i>	yellowbeak owl's clover	annual forb	native	--	--	NL	--	GEN
Papaveraceae	<i>Eschscholzia californica</i>	California poppy	perennial forb	native	--	--	NL	--	--
Papaveraceae	<i>Platystemon californicus</i>	creamcups	annual forb	native	--	--	NL	WI	--
Phrymaceae [Scrophulariaceae]	<i>Mimulus aurantiacus</i> var. <i>aurantiacus</i>	sticky monkey	evergreen shrub	native	--	--	NL	--	--
Phrymaceae [Scrophulariaceae]	<i>Mimulus guttatus</i>	common monkeyflower	perennial forb	native	--	--	OBL	--	VPA?
Plantaginaceae [Callitriche]	<i>Callitriche</i> sp.	starwort	annual or perennial forb	unknown	--	--	unknown	--	unknown
Plantaginaceae [Scrophulariaceae]	<i>Collinsia heterophylla</i> var. <i>heterophylla</i>	purple Chinese houses	annual forb	native	--	--	NL	--	--
Plantaginaceae [Scrophulariaceae]	<i>Kickxia elatine</i>	sharpleaf cancerwort	perennial forb	non-native	--	--	FAC	--	--
Plantaginaceae	<i>Plantago erecta</i>	foothill plantain	annual forb	native	--	--	NL	WI/IN	GEN
Plantaginaceae	<i>Plantago lanceolata</i>	English plantain	perennial forb	non-native	--	limited	FACU	--	GEN
Plantaginaceae	<i>Plantago major</i>	common plantain	perennial forb	non-native	--	--	FAC	--	--
Plantaginaceae	<i>Plantago subnuda</i>	tall coastal plantain	perennial forb	native	--	--	FACW	--	--
Plantaginaceae [Scrophulariaceae]	<i>Veronica peregrina</i> ssp. <i>xalapensis</i>	purslane speedwell	annual forb	native	--	--	OBL	--	VPA?
Plantaginaceae [Scrophulariaceae]	<i>Veronica persica</i>	bird's-eye speedwell	annual forb	non-native	--	--	NL	--	--
Poaceae	<i>Agrostis exarata</i>	spike bentgrass	perennial graminoid	native	--	--	FACW	--	--
Poaceae	<i>Avena barbata</i>	slender wild oat	annual graminoid	non-native	--	moderate	NL	--	--
Poaceae	<i>Avena fatua</i>	wild oat	annual graminoid	non-native	--	moderate	NL	--	--
Poaceae	<i>Brachypodium distachyon</i>	false brome	perennial graminoid	non-native	--	moderate	NL	--	--
Poaceae	<i>Briza minor</i>	little rattlesnake grass	annual graminoid	non-native	--	--	FAC	--	GEN

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Poaceae	<i>Bromus diandrus</i>	ripgut brome	annual graminoid	non-native	--	moderate	NL	--	--
Poaceae	<i>Bromus hordeaceus</i>	soft chess	annual graminoid	non-native	--	limited	FACU	--	GEN
Poaceae	<i>Crypsis schoenoides</i>	swamp pricklegrass	annual graminoid	non-native	--	--	FACW	--	UNK
Poaceae	<i>Cynodon dactylon</i>	Bermuda grass	perennial graminoid	non-native	--	moderate	FACU	--	--
Poaceae	<i>Cynosurus echinatus</i>	dogtail grass	annual graminoid	non-native	--	moderate	NL	--	--
Poaceae	<i>Danthonia californica</i>	California oat grass	perennial graminoid	native	--	--	FAC	SI	GEN
Poaceae	<i>Distichlis spicata</i>	saltgrass	perennial graminoid	native	--	--	FACW	--	VPA?
Poaceae	<i>Elymus caput-medusae</i> [<i>Taeniatherum caput-medusae</i>]	Medusa head	perennial graminoid	non-native	--	high	NL	--	GEN
Poaceae	<i>Elymus glaucus</i>	blue wild rye	perennial graminoid	native	--	--	FACU	--	GEN
Poaceae	<i>Elymus multisetus</i>	big squirreltail	perennial graminoid	native	--	--	NL	--	--
Poaceae	<i>Elymus triticoides</i> [<i>Leymus triticoides</i>]	creeping wild rye	perennial graminoid	native	--	--	FAC	--	GEN
Poaceae	<i>Festuca arundinacea</i>	tall fescue	perennial graminoid	non-native	--	moderate	FAC	--	--
Poaceae	<i>Festuca bromoides</i> [<i>Vulpia bromoides</i>]	brome fescue	perennial graminoid	non-native	--	--	FACU	--	GEN
Poaceae	<i>Festuca myuros</i> [<i>Vulpia myuros</i>]	rattail fescue	perennial graminoid	non-native	--	moderate	FACU	--	GEN
Poaceae	<i>Festuca perennis</i> [<i>Lolium multiflorum</i>]	Italian rye grass	annual graminoid	non-native	--	moderate	FAC	--	GEN
Poaceae	<i>Gastridium phleoides</i> [<i>Gastridium ventricosum</i>]	nit grass	annual graminoid	non-native	--	--	FACU	--	GEN
Poaceae	<i>Glyceria X occidentalis</i> [<i>Glyceria occidentalis</i>]	western mannagrass	perennial graminoid	non-native	--	--	OBL	--	GEN
Poaceae	<i>Holcus lanatus</i>	common velvet grass	perennial graminoid	non-native	--	moderate	FAC	--	--
Poaceae	<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>	meadow barley	perennial graminoid	native	--	--	FACW	--	GEN
Poaceae	<i>Hordeum brachyantherum</i> ssp. <i>californicum</i>	California barley	perennial graminoid	native	--	--	FACW	SI	GEN
Poaceae	<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	Mediterranean barley	annual graminoid	non-native	--	moderate	FAC	--	GEN
Poaceae	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	mouse barley	annual graminoid	non-native	--	moderate	FAC	--	GEN
Poaceae	<i>Melica californica</i>	California onion grass	perennial graminoid	native	--	--	NL	--	--
Poaceae	<i>Paspalum dilatatum</i>	dallis grass	perennial graminoid	non-native	--	--	FAC	--	--
Poaceae	<i>Phalaris aquatica</i>	harding grass	perennial graminoid	non-native	--	moderate	FACU	--	--
Poaceae	<i>Phalaris paradoxa</i>	hood canary grass	annual graminoid	non-native	--	--	FAC	--	VPA?
Poaceae	<i>Pleuropogon californicus</i> var. <i>californicus</i>	annual semaphore grass	perennial graminoid	native	--	--	OBL	--	VPA?
Poaceae	<i>Poa annua</i>	annual bluegrass	annual graminoid	non-native	--	--	FAC	--	GEN
Poaceae	<i>Polypogon australis</i>	Chilean rabbit's-foot grass	perennial graminoid	non-native	--	--	FACW	--	--
Poaceae	<i>Polypogon monspeliensis</i>	rabbit's-foot grass	annual graminoid	non-native	--	limited	FACW	--	VPA?

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Poaceae	<i>Polypogon viridis</i> [<i>Agrostis viridis</i>]	water beard grass	annual graminoid	non-native	--	--	FACW	--	--
Poaceae	<i>Stipa lepida</i> [<i>Nassella lepida</i>]	foothill needlegrass	perennial graminoid	native	--	--	NL	--	--
Poaceae	<i>Stipa pulchra</i> [<i>Nassella pulchra</i>]	purple needlegrass	perennial graminoid	native	--	--	NL	--	--
Poaceae	<i>Triticum aestivum</i>	bread wheat	annual graminoid	non-native	--	--	NL	--	--
Polemoniaceae	<i>Gilia capitata</i> ssp. <i>capitata</i>	bluehead gilia	annual forb	native	--	--	NL	WI	--
Polemoniaceae	<i>Leptosiphon bicolor</i> [<i>Linanthus bicolor</i>]	true babystars	annual forb	native	--	--	FACU	--	--
Polemoniaceae	<i>Leptosiphon parviflorus</i> [<i>Linanthus parviflorus</i>]	variable linanthus	annual forb	native	--	--	NL	--	--
Polygonaceae	<i>Persicaria amphibia</i> [<i>Polygonum amphibium</i>]	water smartweed	perennial forb	native	--	--	OBL	--	--
Polygonaceae	<i>Persicaria hydropiperoides</i> [<i>Polygonum hydropiperoides</i>]	common smartweed	perennial forb	native	--	--	OBL	--	--
Polygonaceae	<i>Polygonum aviculare</i> ssp. <i>aviculare</i> [<i>Polygonum arenastrum</i>]	dooryard knotweed	perennial forb	non-native	--	--	FAC	--	GEN
Polygonaceae	<i>Polygonum</i> sp.	knotweed	annual or perennial forb	unknown	unknown	unknown	unknown	unknown	unknown
Polygonaceae	<i>Rumex acetosella</i>	common sheep sorrel	perennial forb	non-native	--	moderate	FACU	--	GEN
Polygonaceae	<i>Rumex conglomeratus</i>	clustered dock	perennial forb	non-native	--	--	FACW	--	--
Polygonaceae	<i>Rumex crispus</i>	curly dock	perennial forb	non-native	--	limited	FAC	--	GEN
Polygonaceae	<i>Rumex pulcher</i>	fiddle dock	perennial forb	non-native	--	--	FAC	--	GEN
Polypodiaceae	<i>Polypodium californicum</i>	California polypody	perennial fern	native	--	--	NL	--	--
Portulacaceae	<i>Portulaca oleracea</i>	common purslane	annual forb	non-native	--	--	FAC	--	--
Primulaceae	<i>Dodecatheon hendersonii</i>	shooting stars	perennial forb	native	--	--	NL	--	--
Pteridaceae	<i>Adiantum jordanii</i>	California maidenhair fern	perennial fern	native	--	--	FAC	--	--
Pteridaceae	<i>Pellaea andromedifolia</i>	coffee fern	perennial fern	native	--	--	NL	--	--
Pteridaceae	<i>Pentagramma triangularis</i>	gold back fern	perennial fern	native	--	--	NL	--	--
Ranunculaceae	<i>Delphinium variegatum</i> ssp. <i>variegatum</i>	royal larkspur	perennial forb	native	--	--	NL	--	--
Ranunculaceae	<i>Ranunculus aquatilis</i> var. <i>aquatilis</i>	aquatic buttercup	perennial forb	native	--	--	OBL	--	VPA?
Ranunculaceae	<i>Ranunculus californicus</i>	California buttercup	perennial forb	native	--	--	FAC	--	GEN
Ranunculaceae	<i>Ranunculus lobbii</i>	Lobb's aquatic buttercup	annual forb	native	Rank 4.2	--	OBL	--	VPA?
Ranunculaceae	<i>Ranunculus muricatus</i>	spiny buttercup	perennial forb	non-native	--	--	FACW	--	VPA?
Ranunculaceae	<i>Ranunculus occidentalis</i>	western buttercup	perennial forb	native	--	--	FACW	--	--
Ranunculaceae	<i>Ranunculus orthorhynchus</i> var. <i>bloomeri</i>	Bloomer's beaked buttercup	perennial forb	native	--	--	FACW	--	VPA?
Rhamnaceae	<i>Frangula californica</i>	California coffeeberry	evergreen shrub	native	--	--	NL	--	--

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Rosaceae	<i>Aphanes occidentalis</i>	lady's mantle	perennial forb	native	--	--	NL	--	--
Rosaceae	<i>Holodiscus discolor</i> var. <i>discolor</i>	oceanspray	deciduous shrub	native	--	--	FACU	WI/IN	--
Rosaceae	<i>Prunus</i> sp.	domestic plum	tree	unknown	--	unknown	--	--	--
Rosaceae	<i>Rosa californica</i>	California wildrose	evergreen shrub	native	--	--	FAC	--	--
Rosaceae	<i>Rosa</i> sp.	domestic rose	evergreen shrub	unknown	--	unknown	unknown	--	--
Rosaceae	<i>Rubus armeniacus</i>	Himalayan blackberry	evergreen shrub	non-native	--	high	FACU	--	--
Rosaceae	<i>Rubus ursinus</i>	California blackberry	evergreen shrub	native	--	--	FACU	--	--
Rubiaceae	<i>Galium aparine</i>	stickywilly	annual forb	native	--	--	FACU	--	--
Rubiaceae	<i>Galium murale</i>	yellow wall bedstraw	annual forb	non-native	--	--	NL	--	--
Rubiaceae	<i>Galium trifidum</i>	threepetal bedstraw	perennial forb	native	--	--	FACW	--	--
Rubiaceae	<i>Galium</i> sp.	bedstraw	annual or perennial forb	unknown	unknown	unknown	--	unknown	--
Rubiaceae	<i>Sherardia arvensis</i>	blue fieldmadder	annual forb	non-native	--	--	NL	--	--
Salicaceae	<i>Populus fremontii</i>	Fremont cottonwood	deciduous tree	native	--	--	FACW	--	--
Salicaceae	<i>Salix exigua</i> var. <i>exigua</i>	sandbar willow	deciduous tree	native	--	--	FACW	--	--
Salicaceae	<i>Salix laevigata</i>	red willow	deciduous tree	native	--	--	FACW	--	--
Salicaceae	<i>Salix lasiandra</i> var. <i>lasiandra</i>	yellow willow	deciduous tree	native	--	--	FACW	--	--
Salicaceae	<i>Salix lasiolepis</i>	arroyo willow	deciduous tree	native	--	--	FACW	--	--
Sapindaceae [Aceraceae]	<i>Acer macrophyllum</i>	big leaf maple	deciduous tree	native	--	--	FACU	--	--
Sapindaceae [Hippocastanaceae]	<i>Aesculus californica</i>	California buckeye	deciduous tree	native	--	--	NL	--	--
Saxifragaceae	<i>Lithophragma affine</i>	woodland star	perennial forb	native	--	--	NL	--	--
Scrophulariaceae	<i>Scrophularia californica</i>	California figwort	perennial forb	native	--	--	FAC	--	--
Solanaceae	<i>Solanum americanum</i>	American black nightshade	perennial forb	native	--	--	FACU	--	--
Tamaricaceae	<i>Tamarix</i> sp.	tamarisk	evergreen shrub	non-native	--	unknown	unknown	--	--
Themidaceae [Liliaceae]	<i>Brodiaea elegans</i> ssp. <i>elegans</i>	harvest brodiaea	perennial forb	native	--	--	FACU	--	--
Themidaceae [Liliaceae]	<i>Dichelostemma capitatum</i> ssp. <i>capitatum</i>	bluedicks	perennial forb	native	--	--	FACU	--	VPA?
Themidaceae [Liliaceae]	<i>Muilla maritima</i>	sea muilla	perennial forb	native	--	--	NL	WI	VPA?
Themidaceae [Liliaceae]	<i>Triteleia hyacinthina</i>	white hyacinth	perennial forb	native	--	--	FAC	--	VPA?
Themidaceae [Liliaceae]	<i>Triteleia laxa</i>	lthuriel's spear	perennial forb	native	--	--	NL	--	--
Typhaceae	<i>Typha angustifolia</i>	narrowleaf cattail	perennial forb	non-native	--	--	OBL	--	--
Urticaceae	<i>Urtica dioica</i> ssp. <i>holosericea</i>	hoary nettle	perennial forb	native	--	--	FAC	--	--

FAMILY	SCIENTIFIC NAME	COMMON NAME	LIFE FORM	ORIGIN	RARE STATUS ¹	INVASIVE STATUS ²	WETLAND INDICATOR STATUS ³	SERPENTINE STATUS ⁴	VERNAL POOL STATUS ⁵
Urticaceae	<i>Urtica urens</i>	dwarf nettle	annual forb	non-native	--	--	NL	--	--
Valerianaceae	<i>Plectritis macrocera</i>	longhorn plectritis	annual forb	native	--	--	FACU	--	--
Verbenaceae	<i>Phyla nodiflora</i>	common lippia	perennial forb	native	--	--	FAC	--	--
Verbenaceae	<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	western vervain	perennial forb	native	--	--	FAC	--	--
Violaceae	<i>Viola pedunculata</i>	Johnny jump-up	perennial forb	native	--	--	NL	--	--
Viscaceae	<i>Phoradendron serotinum</i> ssp. <i>macrophyllum</i> [<i>Phoradendron macrophyllum</i>]	bingleaf mistletoe	perennial forb	native	--	--	NL	--	--
Viscaceae	<i>Phoradendron serotinum</i> ssp. <i>tomentosum</i> [<i>Phoradendron villosum</i>]	pine mistletoe	perennial forb	native	--	--	NL	--	--
Woodsiaceae [Dryopteridaceae]	<i>Athyrium filix-femina</i> var. <i>cyclosorum</i>	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

¹Rare 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

²Invasive 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

³Wetland 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

⁴Serpentine 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

⁵Vernal 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	<i>Rana catesbeiana</i>
Amphibian	Sierran tree frog	<i>Pseudacris sierra</i>
Reptile	Western fence lizard	<i>Sceloporus occidentalis</i>
Reptile	Southern alligator lizard	<i>Elgaria multicarinata</i>
Reptile	red-sided garter snake	<i>Thamnophis infernalis</i>
Reptile	common garter snake	<i>Thamnophis sirtalis</i>
Reptile	ring-necked snake	<i>Diadophis punctatus</i>
Reptile	common king snake	<i>Lampropeltis getula californiae</i>
Reptile	gopher snake	<i>Pituophis catenifer</i>
Birds	Canada goose	<i>Branta canadensis</i>
Birds	gadwall	<i>Anas strepera</i>
Birds	American widgeon	<i>Anas americana</i>
Birds	mallard	<i>Anas platyrhynchos</i>
Birds	cinnamon teal	<i>Anas cyanoptera</i>
Birds	Northern shoveler	<i>Anas clypeata</i>
Birds	Northern pintail	<i>Anas acuta</i>
Birds	green-winged teal	<i>Anas cracca</i>
Birds	canvasback	<i>Aythya valisineria</i>
Birds	greater schaup	<i>Aythya marila</i>
Birds	bufflehead	<i>Bucephala albeola</i>
Birds	ruddy duck	<i>Oxyura jamaicensis</i>
Birds	wild turkey	<i>Meleagris gallopavo</i>
Birds	California quail	<i>Callipepla californica</i>
Birds	pied-billed grebe	<i>Podilymbus podiceps</i>
Birds	double-crested cormorant	<i>Phalacrocorax auritus</i>
Birds	great blue heron	<i>Ardea Herodias</i>
Birds	great egret	<i>Ardea alba</i>
Birds	snowy egret	<i>Egretta thula</i>
Birds	turkey vulture	<i>Cathartes aura</i>
Birds	white-tailed kite	<i>Elanus leucurus</i>
Birds	Northern harrier	<i>Circus cyaneus</i>
Birds	sharp-shinned hawk	<i>Accipiter striatus</i>
Birds	Cooper's hawk	<i>Accipiter cooperi</i>
Birds	red-shouldered hawk	<i>Buteo lineatus</i>
Birds	red-tailed hawk	<i>Buteo jamaicensis</i>
Birds	golden eagle	<i>Aquila chrysaetos</i>
Birds	American kestrel	<i>Falco sparverius</i>

CLASS	COMMON NAME	SCIENTIFIC NAME
Birds	American coot	<i>Fulica americana</i>
Birds	killdeer	<i>Charadrius vociferous</i>
Birds	black-necked stilt	<i>Himantopus mexicanus</i>
Birds	greater yellowlegs	<i>Tringa melanoleuca</i>
Birds	Western sandpiper	<i>Calidris mauri</i>
Birds	least sandpiper	<i>Calidris minutilla</i>
Birds	long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Birds	Wilson's snipe	<i>Gallinago delicata</i>
Birds	Caspian tern	<i>Hydroprogne caspia</i>
Birds	rock pigeon	<i>Columba livia</i>
Birds	band-tailed pigeon	<i>Patagioenas fasciata</i>
Birds	mourning dove	<i>Zenaida macroura</i>
Birds	barn owl	<i>Tyto alba</i>
Birds	great horned owl	<i>Bubo virginianus</i>
Birds	burrowing owl	<i>Athene cunicularia</i>
Birds	short-eared owl	<i>Asio flammeus</i>
Birds	Vaux's swift	<i>Chaetura vauxi</i>
Birds	Anna's hummingbird	<i>Calypte anna</i>
Birds	rufous hummingbird	<i>Selasphorus rufus</i>
Birds	Allen's hummingbird	<i>Selasphorus sasin</i>
Birds	Nuttall's woodpecker	<i>Picoides nuttallii</i>
Birds	acorn woodpecker	<i>Melanerpes formicivorus</i>
Birds	downy woodpecker	<i>Picoides pubescens</i>
Birds	Northern flicker	<i>Colaptes auratus</i>
Birds	willow flycatcher	<i>Empidonax traillii</i>
Birds	black phoebe	<i>Sayornis nigricans</i>
Birds	Say's phoebe	<i>Sayornis saya</i>
Birds	Western kingbird	<i>Tyrannus verticalis</i>
Birds	loggerhead shrike	<i>Lanius ludovicianus</i>
Birds	Hutton's vireo	<i>Vireo huttoni</i>
Birds	warbling vireo	<i>Vireo gilvus</i>
Birds	Steller's jay	<i>Cyanocitta stelleri</i>
Birds	Western scrub-jay	<i>Aphelocoma californica</i>
Birds	American crow	<i>Corvus brachyrhynchos</i>
Birds	common raven	<i>Corvus corax</i>
Birds	horned lark	<i>Eremophila alpestris</i>
Birds	tree swallow	<i>Tachycineta bicolor</i>
Birds	violet-green swallow	<i>Tachycineta thalassina</i>

CLASS	COMMON NAME	SCIENTIFIC NAME
Birds	Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Birds	cliff swallow	<i>Petrochelidon pyrrhonata</i>
Birds	barn swallow	<i>Hirundo rustica</i>
Birds	chestnut-backed chickadee	<i>Poecile rufescens</i>
Birds	oak titmouse	<i>Baeolophus inornatus</i>
Birds	bushtit	<i>Psaltriparus minimus</i>
Birds	brown creeper	<i>Certhia americana</i>
Birds	white-breasted nuthatch	<i>Sitta carolinensis</i>
Birds	rock wren	<i>Salpinctes obsoletus</i>
Birds	Bewick's wren	<i>Thryomanes bewickii</i>
Birds	house wren	<i>Troglodytes aedon</i>
Birds	winter wren	<i>Troglodytes troglodytes</i>
Birds	marsh wren	<i>Citothorus palustris</i>
Birds	ruby-crowned kinglet	<i>Regulus calendula</i>
Birds	Western bluebird	<i>Sialia mexicana</i>
Birds	hermit thrush	<i>Catharus guttatus</i>
Birds	American robin	<i>Turdus migratorius</i>
Birds	Northern mockingbird	<i>Mimus polyglottos</i>
Birds	European starling	<i>Sturnus vulgaris</i>
Birds	cedar waxwing	<i>Bombycilla cedrorum</i>
Birds	American pipit	<i>Anthus rubescens</i>
Birds	orange-crowned warbler	<i>Vermivora celata</i>
Birds	yellow warbler	<i>Dendroica petechial</i>
Birds	yellow-rumped warbler	<i>Dendroica coronata</i>
Birds	Wilson's warbler	<i>Wilsonia pusilla</i>
Birds	Western tanager	<i>Piranga ludoviciana</i>
Birds	spotted towhee	<i>Pipilo maculatus</i>
Birds	California towhee	<i>Pipilo crissalis</i>
Birds	lark sparrow	<i>Chondestes grammacus</i>
Birds	savannah sparrow	<i>Passerculus sandwichensis</i>
Birds	grasshopper sparrow	<i>Ammodramus savannarum</i>
Birds	fox sparrow	<i>Passerella iliaca</i>
Birds	song sparrow	<i>Melospiza melodia</i>
Birds	Lincoln's sparrow	<i>Melospiza lincolnii</i>
Birds	white-throated sparrow	<i>Zonotrichia albicollis</i>
Birds	white-crowned sparrow	<i>Zonotrichia leucophrys</i>
Birds	golden-crowned sparrow	<i>Zonotrichia atricapilla</i>
Birds	dark-eyed junco	<i>Junco hyemalis</i>

CLASS		
Birds	red-winged blackbird	<i>Agelaius phoeniceus</i>
Birds	tricolored blackbird	<i>Agelaius tricolor</i>
Birds	Western meadowlark	<i>Sturnella neglecta</i>
Birds	Brewer's blackbird	<i>Euphagus cyanocephalus</i>
Birds	brown-headed cowbird	<i>Molothrus ater</i>
Birds	Bullock's oriole	<i>Icterus bullockii</i>
Birds	house finch	<i>Carpodacus mexicanus</i>
Birds	lesser goldfinch	<i>Carduelis psaltria</i>
Birds	American goldfinch	<i>Carduelis tristis</i>
Birds	house sparrow	<i>Passer domesticus</i>
Mammals	Virginia opossum	<i>Didelphis virginiana</i>
Mammals	skunk (sp.)	<i>Mephitis</i> or <i>Spilogale</i>
Mammals	coyote	<i>Canis latrans</i>
Mammals	raccoon	<i>Procyon lotor</i>
Mammals	black-tailed deer	<i>Odocoileus hemionus</i>
Mammals	California ground squirrel	<i>Spermophilis beecheyi</i>
Mammals	California vole	<i>Microtus californicus</i>
Mammals	deer mouse (sp.)	<i>Peromyscus</i> sp.
Mammals	Botta's pocket gopher	<i>Thomomys bottae</i>
Mammals	black-tailed jackrabbit	<i>Lepus californicus</i>

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				
<i>Allium peninsulare</i> var. <i>franciscanum</i> 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.
<i>Alopecurus aequalis</i> var. <i>sonomensis</i> 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.
<i>Amorpha californica</i> var. <i>napensis</i> 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.
<i>Amsinckia lunaris</i> 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
<i>Antirrhinum virga</i> 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.
<i>Arabis blepharophylla</i> 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.
<i>Arctostaphylos bakeri</i> ssp. <i>bakeri</i> 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.
<i>Arctostaphylos canescens</i> ssp. <i>sonomensis</i> 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.
<i>Arctostaphylos montana</i> ssp. <i>montana</i> 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
<i>Astragalus tener</i> var. <i>tener</i> 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.
<i>Atriplex joaquiniana</i> 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.
<i>Blennosperma bakeri</i> 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.
<i>Brodiaea leptandra</i> 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
<i>Calandrinia breweri</i> 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.
<i>California macrophylla</i> 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.
<i>Castilleja affinis</i> ssp. <i>neglecta</i> 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.
<i>Ceanothus sonomensis</i> 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
<i>Centromadia parryi</i> ssp. <i>parryi</i> pappose tarplant	Rank 1B	Coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland; in vernal 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.
<i>Chloropyron maritimum</i> ssp. <i>palustre</i> 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.
<i>Chloropyron molle</i> ssp. <i>molle</i> soft bird's-beak	FE, SR, Rank 1B	Coastal brackish or salt marshes; located in low-growing saltgrass and pickleweed 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.
<i>Chorizanthe valida</i> 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.
<i>Cirsium hydrophilum</i> var. <i>vaseyi</i> 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
<i>Delphinium bakeri</i> Baker's larkspur	FE; SE; 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.
<i>Delphinium luteum</i> yellow larkspur	FE; SR; 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.
<i>Dirca occidentalis</i> 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.
<i>Downingia pusilla</i> 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
<i>Elymus californicus</i> 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.
<i>Erigeron biolettii</i> 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.
<i>Erigeron greenei</i> 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.
<i>Eriogonum luteolum</i> var. <i>caninum</i> 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.
<i>Fritillaria lanceolata</i> var. <i>tristulis</i> 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
<i>Fritillaria liliacea</i> 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.
<i>Helianthella castanea</i> 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.
<i>Hemizonia congesta</i> ssp. <i>congesta</i> 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.
<i>Hesperolinon congestum</i> 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
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT, SE, 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.
<i>Horkelia tenuiloba</i> 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.
<i>Iris longipetala</i> 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.
<i>Juglans hindsii</i> 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.
<i>Lasthenia burkei</i> Burke's goldfields	FE; SE; 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
<i>Lasthenia conjugens</i> 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.
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> 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.
<i>Legenere limosa</i> 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
<i>Leptosiphon acicularis</i> 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.
<i>Leptosiphon jepsonii</i> 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.
<i>Lessingia hololeuca</i> 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.
<i>Lessingia micradenia</i> var. <i>micradenia</i> 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
<i>Lilaeopsis masonii</i> 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.
<i>Lilium rubescens</i> 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.
<i>Limnanthes vinculans</i> 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.
<i>Lomatium repostum</i> 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
<i>Lupinus sericatus</i> 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.
<i>Micropus amphibolus</i> 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.
<i>Microseris paludosa</i> 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.
<i>Navarretia leucocephala</i> ssp. <i>bakeri</i> 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
<i>Navarretia rosulata</i> 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.
<i>Plagiobothrys mollis</i> var. <i>vestitus</i> 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.
<i>Pleuropogon hooverianus</i> 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.
<i>Ranunculus lobbii</i> Lobb's buttercup	Rank 4	Cismontane woodland, North Coast coniferous forest, valley and foothill grassland, vernal pools; located in mesic, vernal 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
<i>Rhynchospora globularis</i> 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.
<i>Ribes victoris</i> 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.
<i>Senecio aphanactis</i> 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.
<i>Sidalcea calycosa</i> ssp. <i>rhizomata</i> 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.
<i>Sidalcea hickmanii</i> ssp. <i>viridis</i> 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
<i>Streptanthus batrachopus</i> 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.
<i>Streptanthus glandulosus</i> <i>ssp. pulchellus</i> 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.
<i>Symphotrichum lentum</i> 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.
<i>Toxicoscordion fontanum</i> marsh zigzag	Rank 4	Chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, marshes and swamps; located in vernal 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
<i>Trichostema ruygtii</i> 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.
<i>Trifolium amoenum</i> 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.
<i>Trifolium hydrophilum</i> 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.
<i>Triteleia lugens</i> 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.
<i>Viburnum ellipticum</i> 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				
<i>Andrena blennospermatis</i> Blennosperma vernal pool android bee	SAL	Generalist pollinator of common blennosperma (<i>Blennosperma nanum</i> ssp. <i>nanum</i>) and Sonoma sunshine (<i>B. bakeri</i>). 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.
<i>Adella oplerella</i> Opler's longhorn moth	SAL	Grasslands in the Bay Area; cream cups (<i>Platystemon californicus</i>) 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.
<i>Speyeria zerene myrtleae</i> 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 <i>Viola adunca</i> .	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. Present. An undocumented subspecies of <i>Speyeria zerene</i> has been documented from Cougar Mountain adjacent to the Park.
<i>Hydrocharia rickseckeri</i> 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
<i>Syncaris pacifica</i> 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.
<i>Linderella occidentalis</i> 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				
<i>Rana aurora draytonii</i> 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.

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE PARK	RESULTS AND RECOMMENDATIONS
<i>Rana boylei</i> 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.
<i>Ambystoma californiense</i> 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.
<i>Actinemys marmorata</i> 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
<i>Pogonichthys macrolepidotus</i> 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. Additionally, 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
<i>Eucyclogobius newberryi</i> 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
<i>Oncorhynchus mykiss</i> 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

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE PARK	RESULTS AND RECOMMENDATIONS
Birds				
<i>Aquila chrysaetos</i> 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.
<i>Elanus leucurus</i> 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.
<i>Haliaeetus leucocephalus</i> 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
<i>Rallus longirostris obsoletus</i> 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 (<i>Salicornia pacifica</i>), 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.
<i>Laterallus jamaicensis coturniculus</i>	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.
<i>Coccyzus americanus occidentalis</i> 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 (<i>Salix</i> spp.) often mixed with cottonwoods (<i>Populus fremontii</i>), with understory of blackberry (<i>Rubus</i> sp.), nettles (<i>Urtica</i> sp.), or wild grape (<i>Vitis californica</i>).	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.
<i>Athene cunicularia</i> 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
<i>Asio flammeus</i> 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.
<i>Chaetura vauxi</i> 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.
<i>Cypseloides niger</i> 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
<i>Riparia riparia</i> 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.
<i>Contopus cooperi</i> 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.
<i>Lanius ludovicianus</i> 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

SPECIES	STATUS*	HABITAT REQUIREMENTS	POTENTIAL TO OCCUR IN THE PARK	RESULTS AND RECOMMENDATIONS
<i>Dendroica petechia brewsteri</i> 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.
<i>Geothlypis trichas sinuosa</i> 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.
<i>Agelaius tricolor</i> 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
<i>Antrozous pallidus</i> 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 (CNDDDB 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.
<i>Corynorhinus townsendii</i> 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 (CNDDDB 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
<p><i>Taxidea taxus</i> American badger</p>	<p>SSC</p>	<p>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.</p>	<p>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 Petaluma environs (CDFW 2013a).</p>	<p>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.</p>
<p><i>Reithrodontomys raviventris</i> saltmarsh harvest mouse</p>	<p>FE, SE, CFP</p>	<p>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.</p>	<p>No Potential. No pickleweed or saltmarsh habitat found within the Park.</p>	<p>Not Present. No further actions are recommended this species.</p>
<p><i>Sorex ornatus sinuosus</i> Suisun shrew</p>	<p>SSC</p>	<p>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.</p>	<p>No Potential. The Park does not contain tidal marsh habitat necessary to support this species.</p>	<p>Not Present. No further actions are recommended this species.</p>

*** 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 as 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	
<i>Selasphorus</i> 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	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							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	
Creepers, 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	Species	Number
Blackbird, Red-winged	10,835	Warbler, Yellow-rumped	93
Starling, European	6,782	Scrub-Jay, Western	91
Meadowlark, Western	1,710	Harrier, Northern	84
Finch, House	882	Towhee, Spotted	69
Sparrow, Savannah	878	Owl, Barn	62
Sparrow, White-crowned	841	Jay, Steller's	59
Junco, Dark-eyed	758	Woodpecker, Nuttall's	56
Swallow, Barn	631	Teal, Cinnamon	55
Goldfinch, American	628	Thrush, Varied	52
Swallow, Cliff	574	Sparrow, House	49
Blackbird, Brewer's	564	Curlew, Long-billed	46
Goose, Canada	557	Shrike, Loggerhead	46
Coot, American	505	Egret, Great	45
Killdeer	467	Hawk, Red-shouldered	44
Wigeon, American	461	Sparrow, Lincoln's	44
Quail, California	365	Kingbird, Western	38
Pintail, Northern	342	Turkey, Wild	37
Sparrow, Golden-crowned	329	Mockingbird, Northern	37
Swallow, Tree	318	Sparrow, White-throated	37
Bushtit	291	Titmouse, Oak	33
Bluebird, Western	287	Owl, Great Horned	32
Swallow, Violet-green	270	Hummingbird, Allen's	31
Mallard	256	Wren, House	31
Raven, Common	250	Oriole, Bullock's	31
Goldfinch, Lesser	219	Sandpiper, Least	30
Phoebe, Black	212	Kinglet, Ruby-crowned	29
Sparrow, Song	188	Sparrow, Lark	28
Towhee, California	186	Heron, Great Blue	26
Shoveler, Northern	181	Cormorant, Double-crested	25
Dove, Mourning	179	Snipe, Wilson's (Common)	25
Hawk, Red-tailed	176	Woodpecker, Acorn	25
Vulture, Turkey	174	Wren, Bewick's	25
Dowitcher, Long-billed	162	Nuthatch, White-breasted	21
Pigeon, Rock	153	Pelican, American White	19
Bufflehead	146	Woodpecker, Downy	19
Duck, Ruddy	139	Chickadee, Chestnut-backed	18
Pipit, American	133	Eagle, Golden	17
Kestrel, American	130	Yellowlegs, Greater	16
Kite, White-tailed	127	Waxwing, Cedar	16
Duck, Ring-necked	123	Scaup, Lesser	15
Robin, American	123	Hawk, Cooper's	15
Flicker, Northern	110	Cowbird, Brown-headed	15
Gadwall	103	Goose, Greater White-fronted	14
Phoebe, Say's	103	Scaup, Greater	14
Teal, Green-winged	101	Grebe, Pied-billed	13
Crow, American	101	Moorhen, Common	13
Hummingbird, Anna's	100	Swift, Vaux's	12
Canvasback	96	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
<i>Selasphorus</i> 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

Species	Number
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
<i>Selasphorus</i> 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

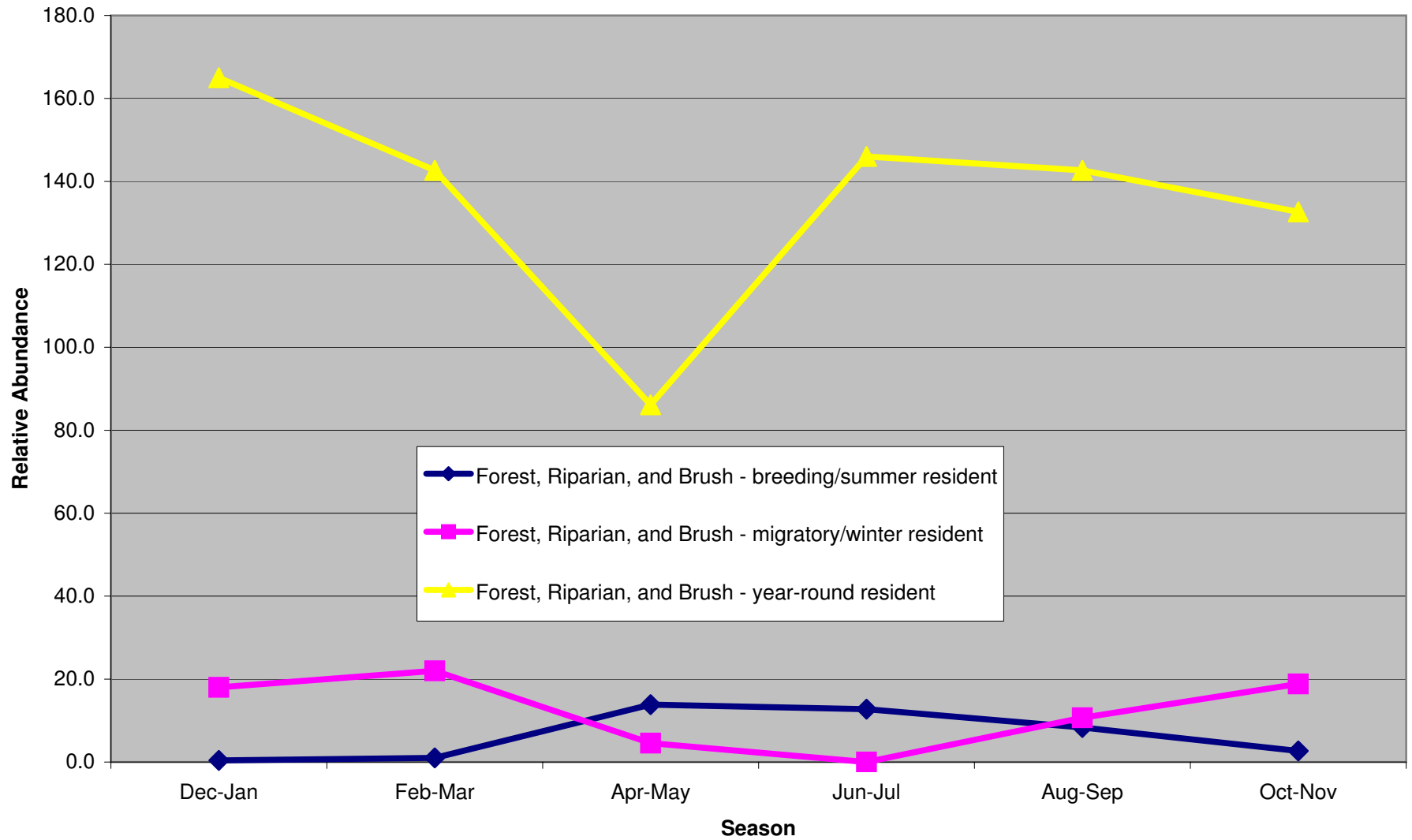


Figure 2: Grassland Guild, Birds of Tolay Lake Regional Park

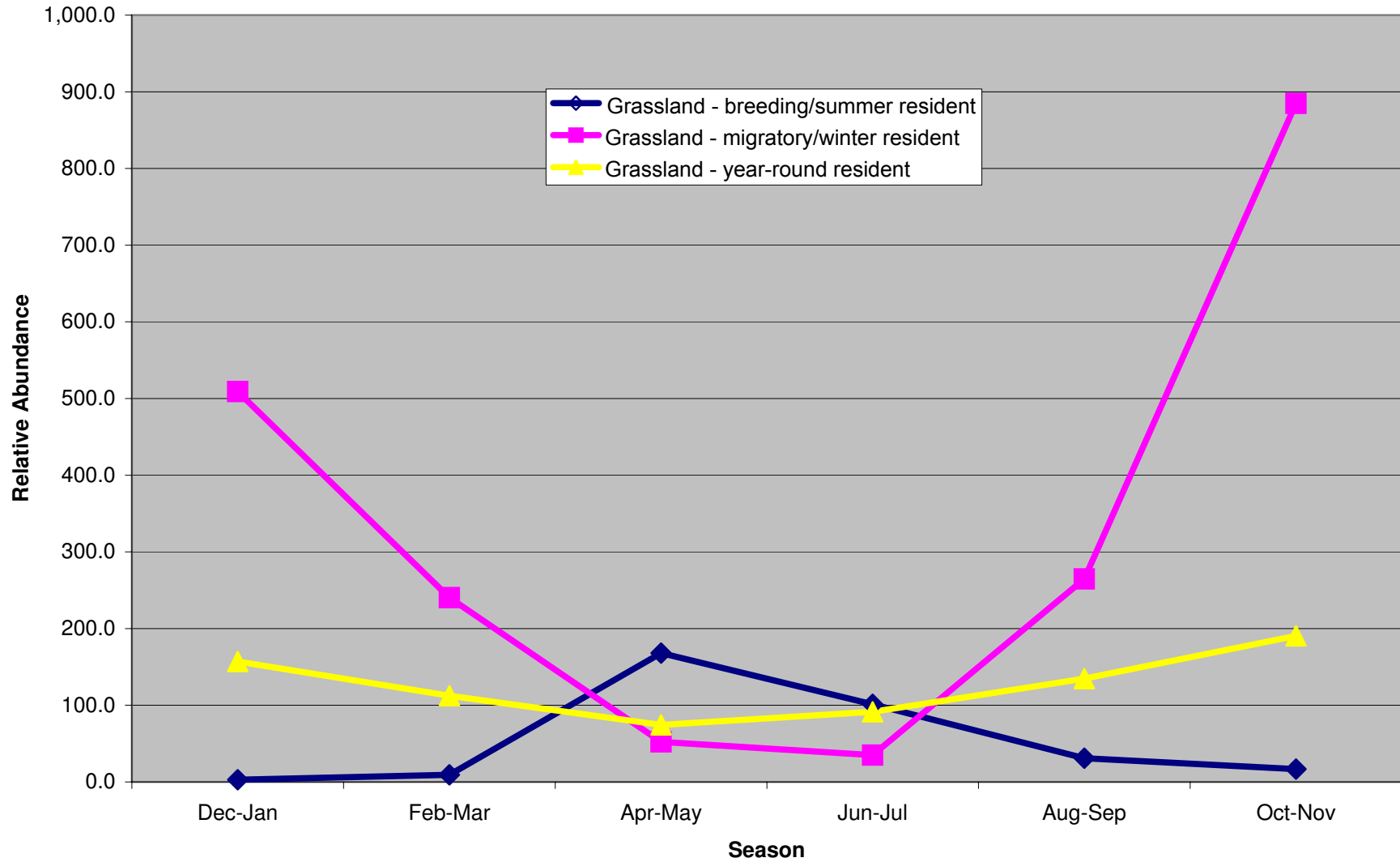


Figure 3: Raptors, Birds of Tolay Lake Regional Park

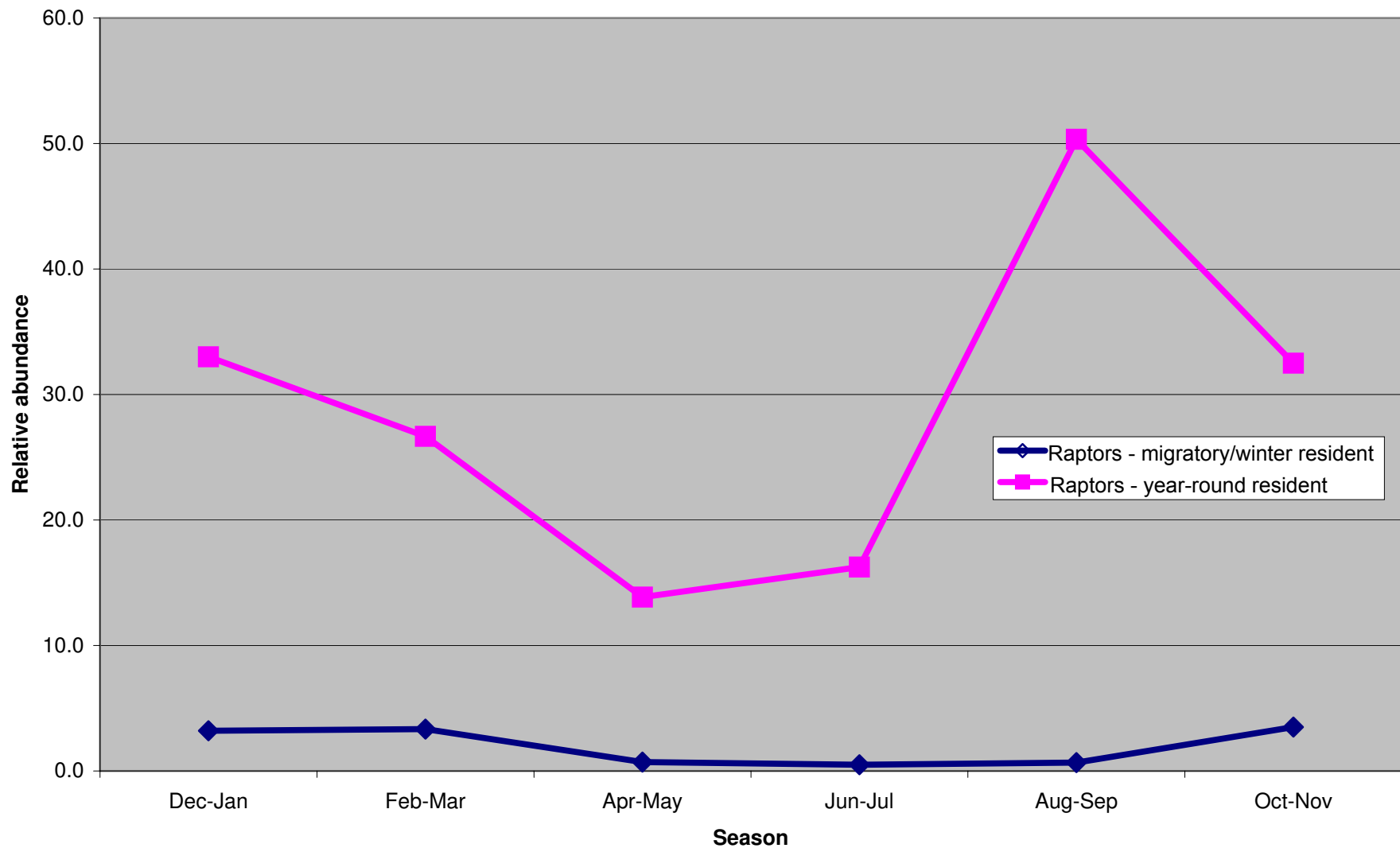


Figure 4: Waterbirds, Birds of Tolay Lake Regional Park

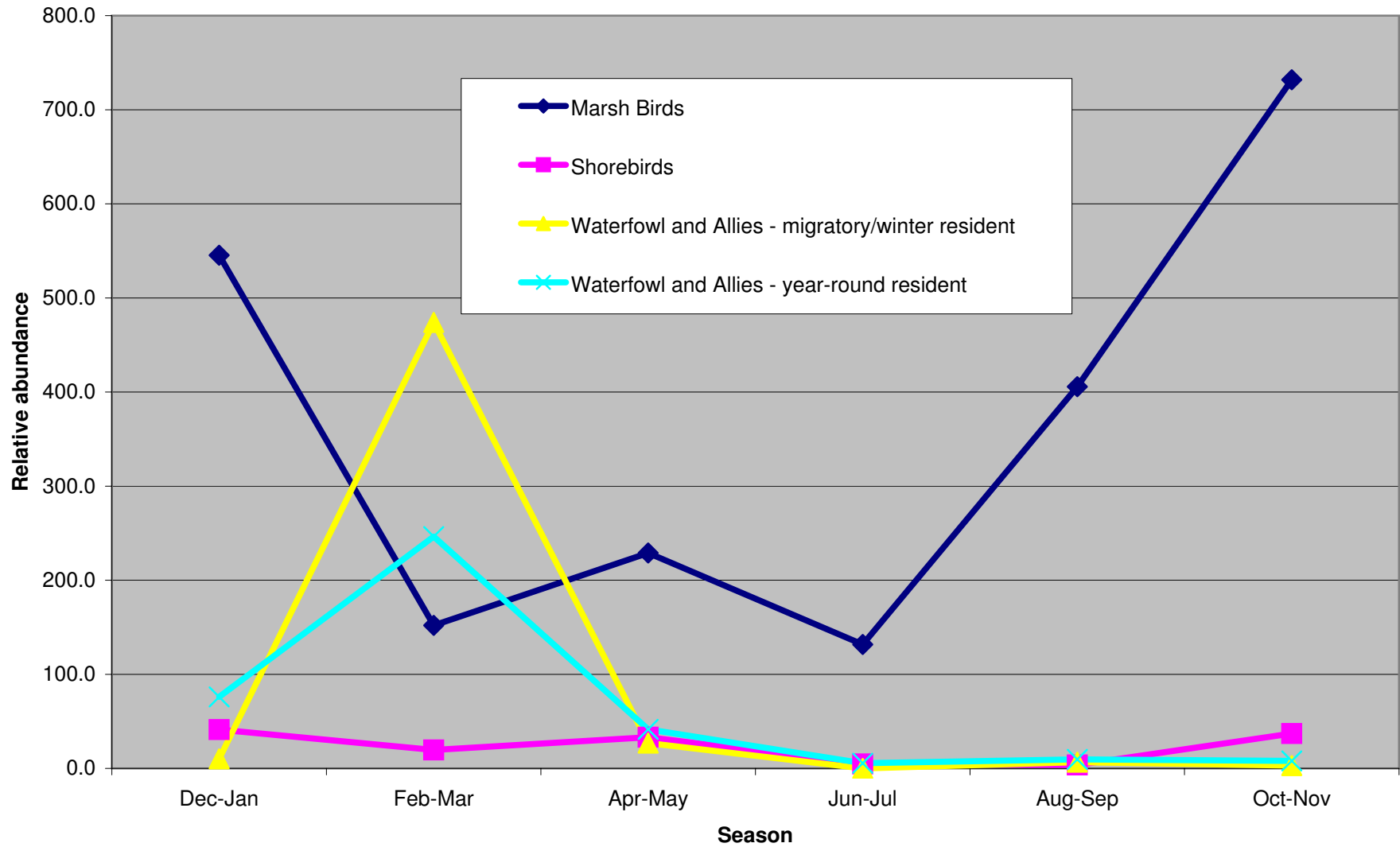


Figure 5: Relative Abundance by Season, Birds of Tolay Lake Regional Park

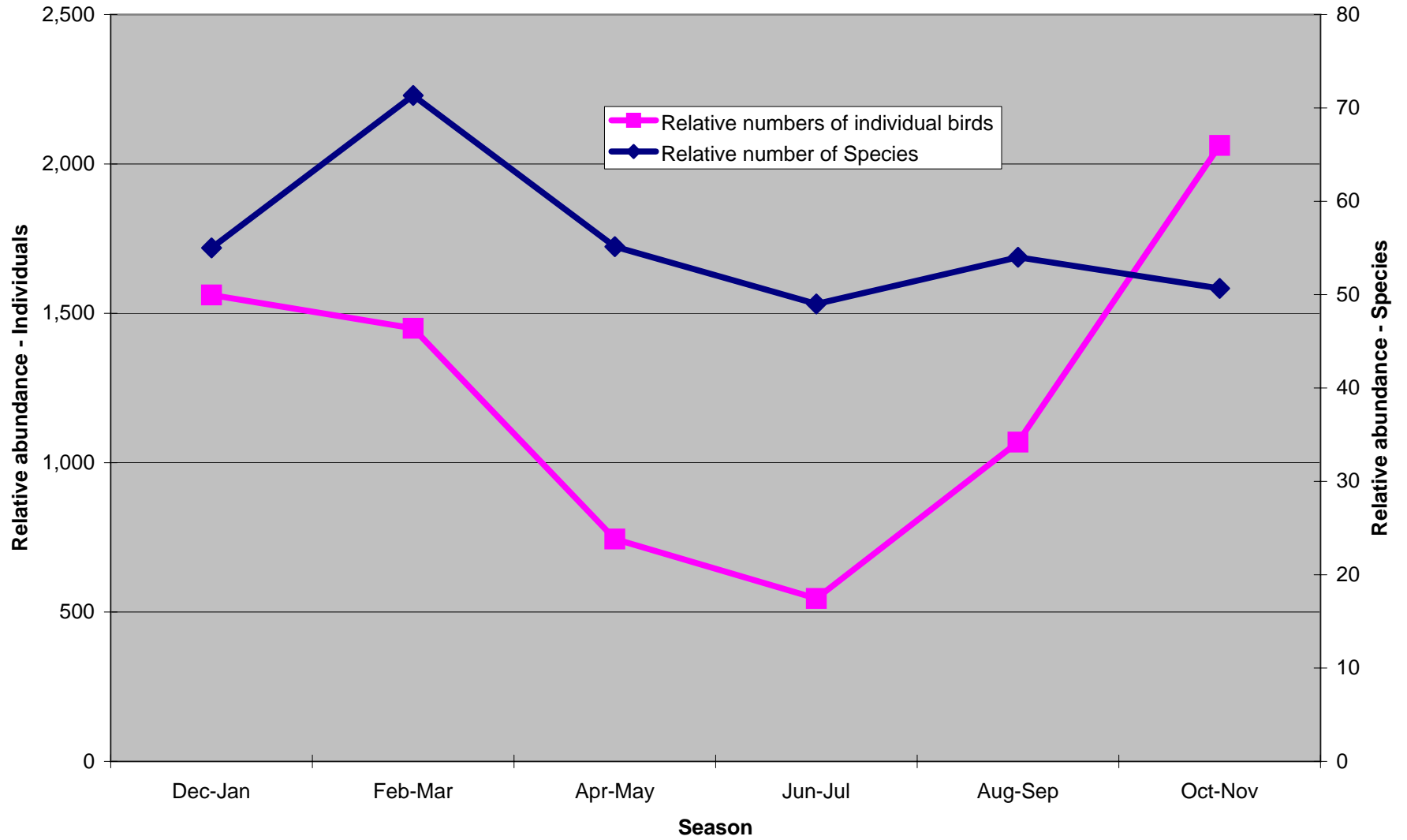
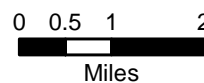




Figure 1. Location and Setting of Tolay Regional Park

Tolay Lake Regional Park
 Sonoma County, California



Date: January 2012
 Map By: Michael Rochelle

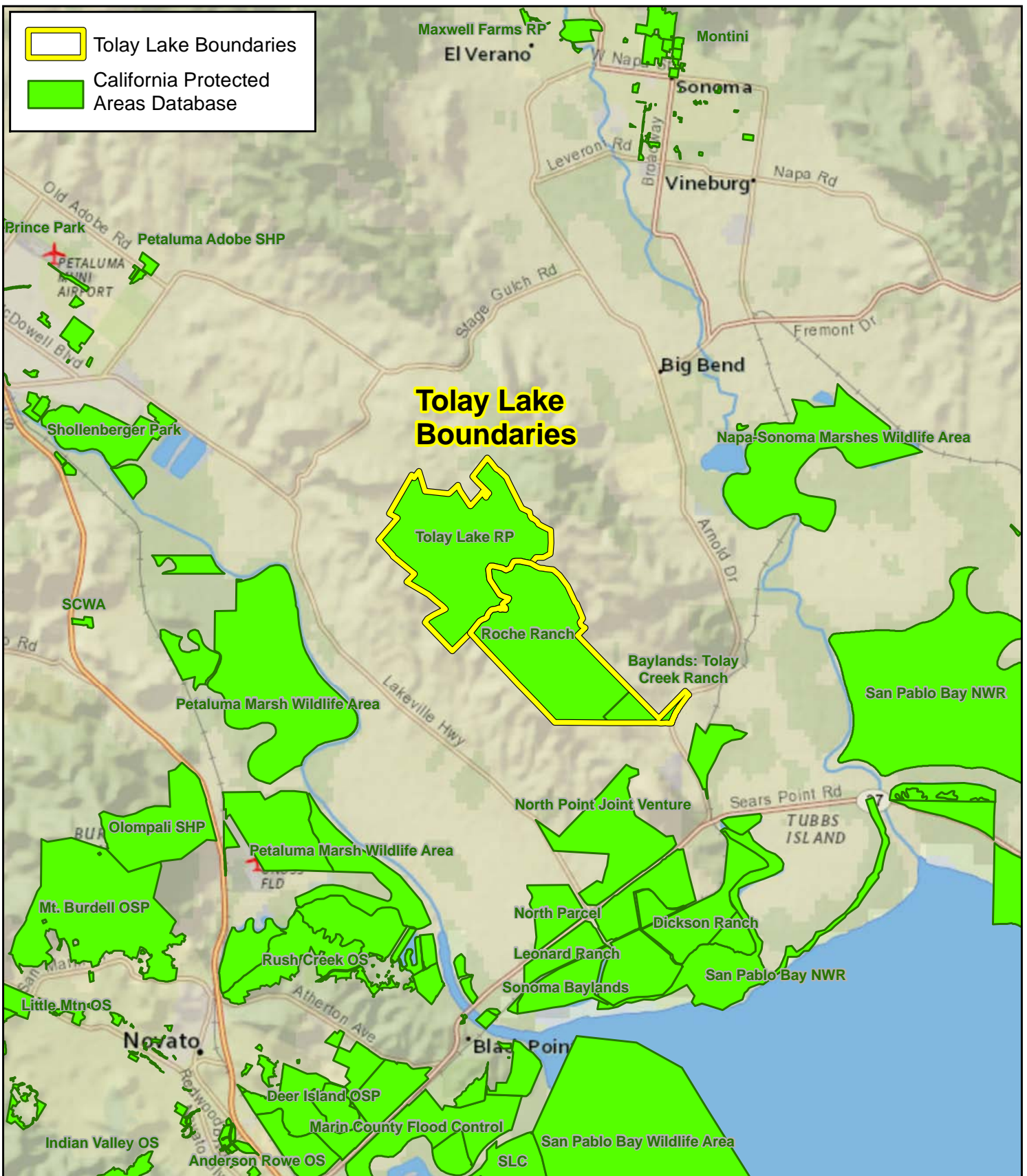
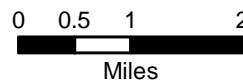


















Figure 2. Conserved Lands in the Tolay Lake Regional Park Region

Tolay Lake Regional Park
Sonoma County, California



Date: March 2013
Map By: Michael Rochelle
Basemap: NatGeo

- | | |
|--|---|
|  Tolay Lake Boundaries |  GoF: GOULDING-TOOMES COMPLEX, 9 TO 50 PERCENT SLOPES |
|  CcA: CLEAR LAKE CLAY LOAM, 0 TO 2 PERCENT SLOPES |  GuF: GULLIED LAND |
|  DbC: DIABLO CLAY, 2 TO 9 PERCENT SLOPES |  HcD: HAIRE CLAY LOAM, 9 TO 15 PERCENT SLOPES |
|  DbD: DIABLO CLAY, 9 TO 15 PERCENT SLOPES |  LaC: LANIGER LOAM, 5 TO 9 PERCENT SLOPES |
|  DbE2: DIABLO CLAY, 15 TO 30 PERCENT SLOPES, ERODED |  LaD: LANIGER LOAM, 9 TO 15 PERCENT SLOPES |
|  DbE: DIABLO CLAY, 15 TO 30 PERCENT SLOPES |  LaE2: LANIGER LOAM, 15 TO 30 PERCENT SLOPES, ERODED |
|  DbF2: DIABLO CLAY, 30 TO 50 PERCENT SLOPES, ERODED |  MoE: MONTARA COBBLY CLAY LOAM, 2 TO 30 PERCENT SLOPES |
|  GID: GOULDING COBBLY CLAY LOAM, 5 TO 15 PERCENT SLOPES |  W: WATER |

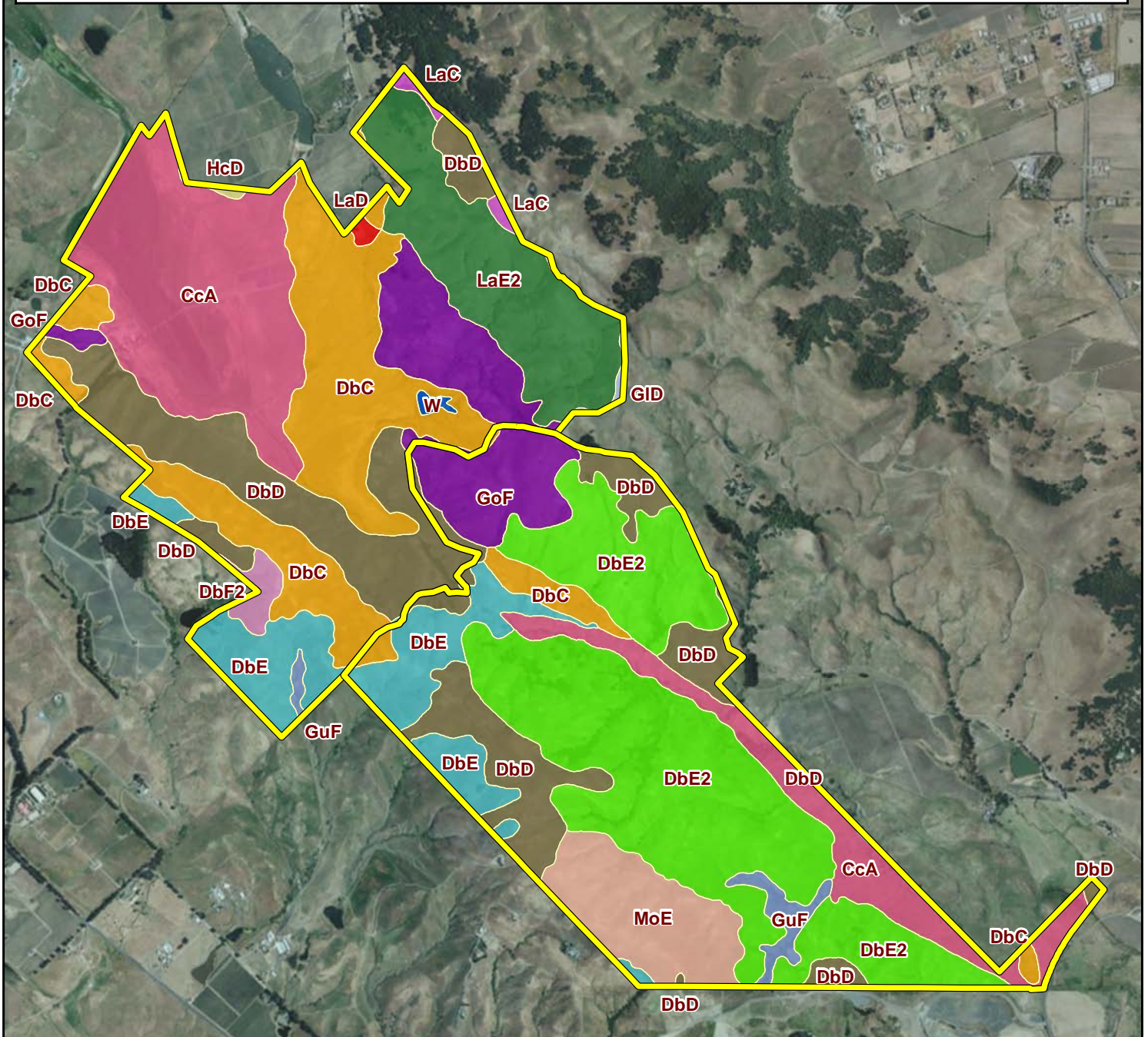
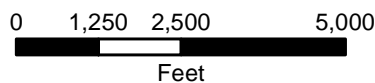
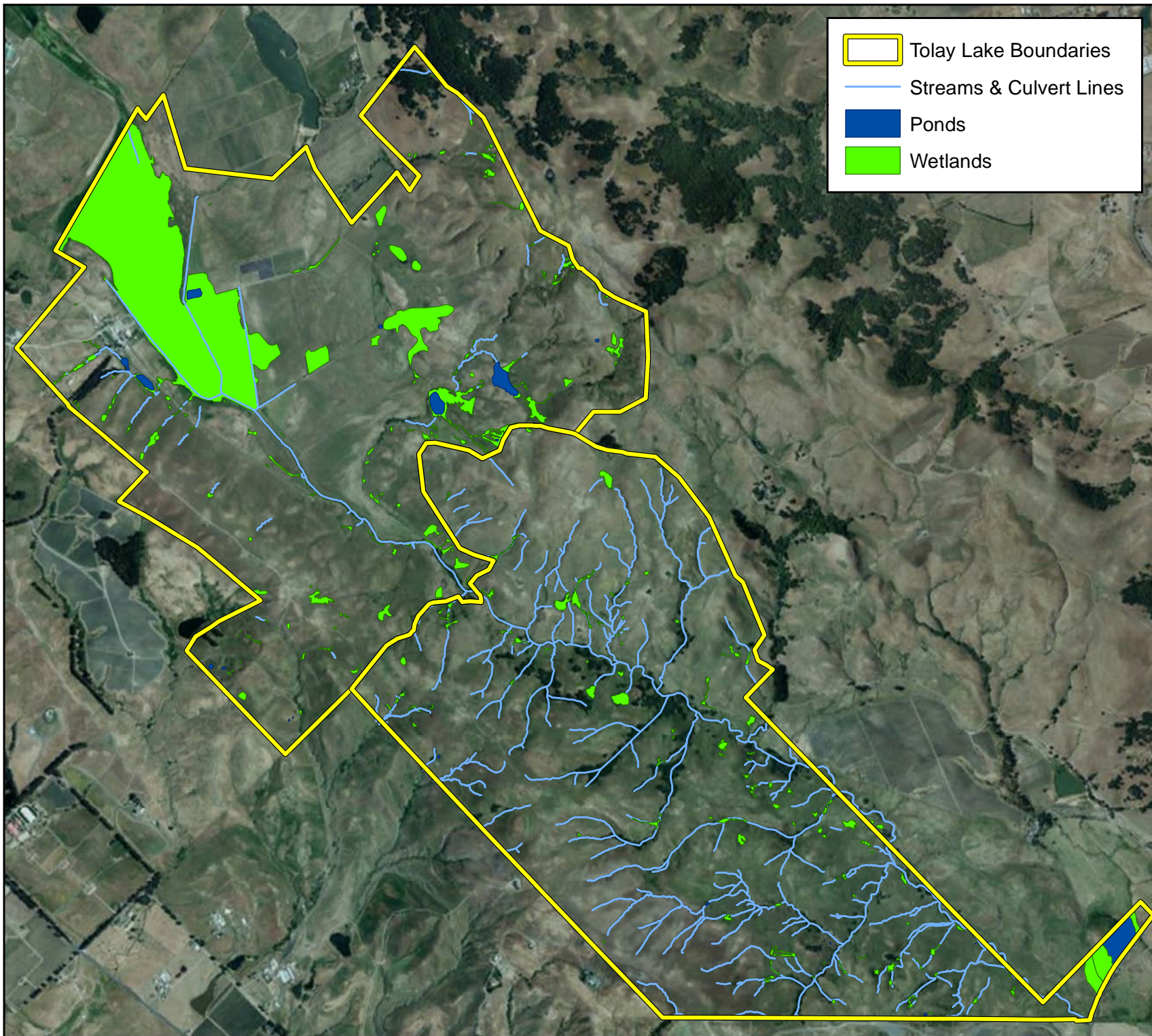






Figure 3. Mapped Soil Units within Tolay Lake Regional Park

Tolay Lake Regional Park
Sonoma County, California



Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010



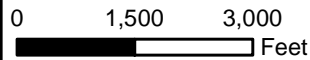
 Tolay Lake Boundaries
 Streams & Culvert Lines
 Ponds
 Wetlands



Tolay Lake
Regional Park

Sonoma County,
California

Figure 4.
Wetlands and
Waters Mapped
in Tolay Lake
Regional Park



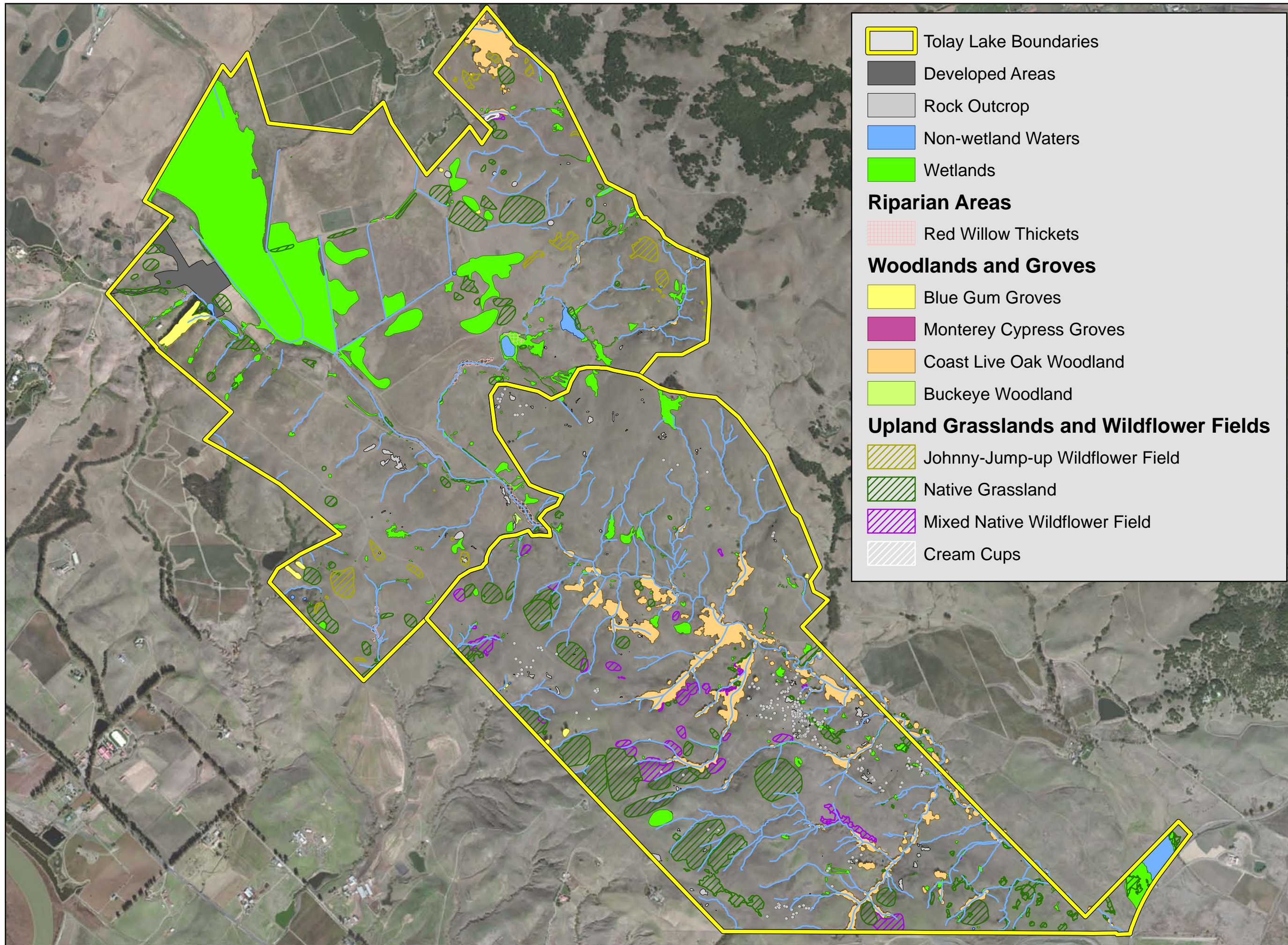
Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Tolay Lake
Regional Park

Sonoma County,
California

Figure 5.

Biological
Communities
within Tolay Lake
Regional Park



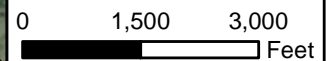
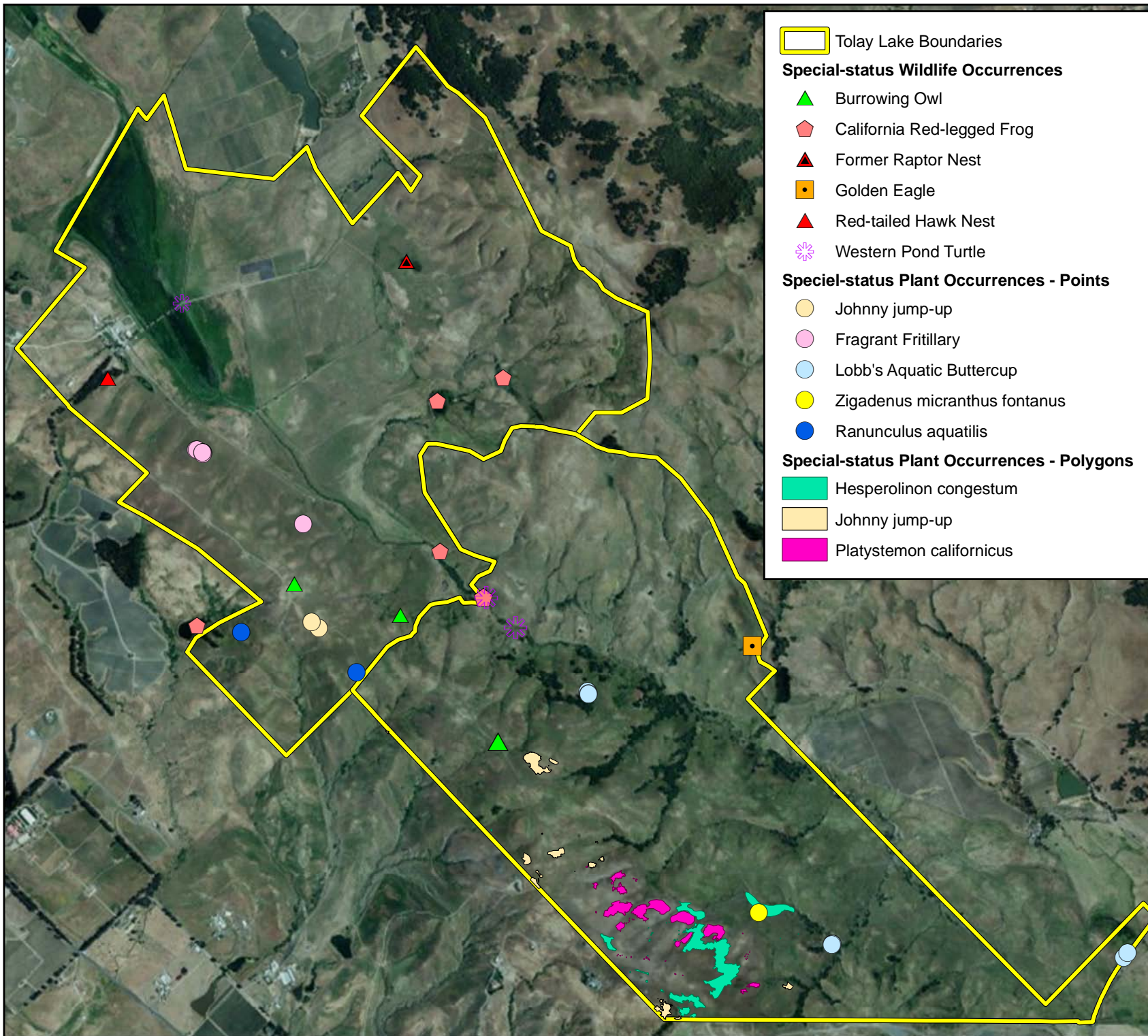
0 1,000 2,000
Feet

Tolay Lake
Regional Park

Sonoma County,
California

Figure 6.

Special-status Plant and Wildlife Species
within Tolay Lake
Regional Park

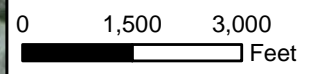
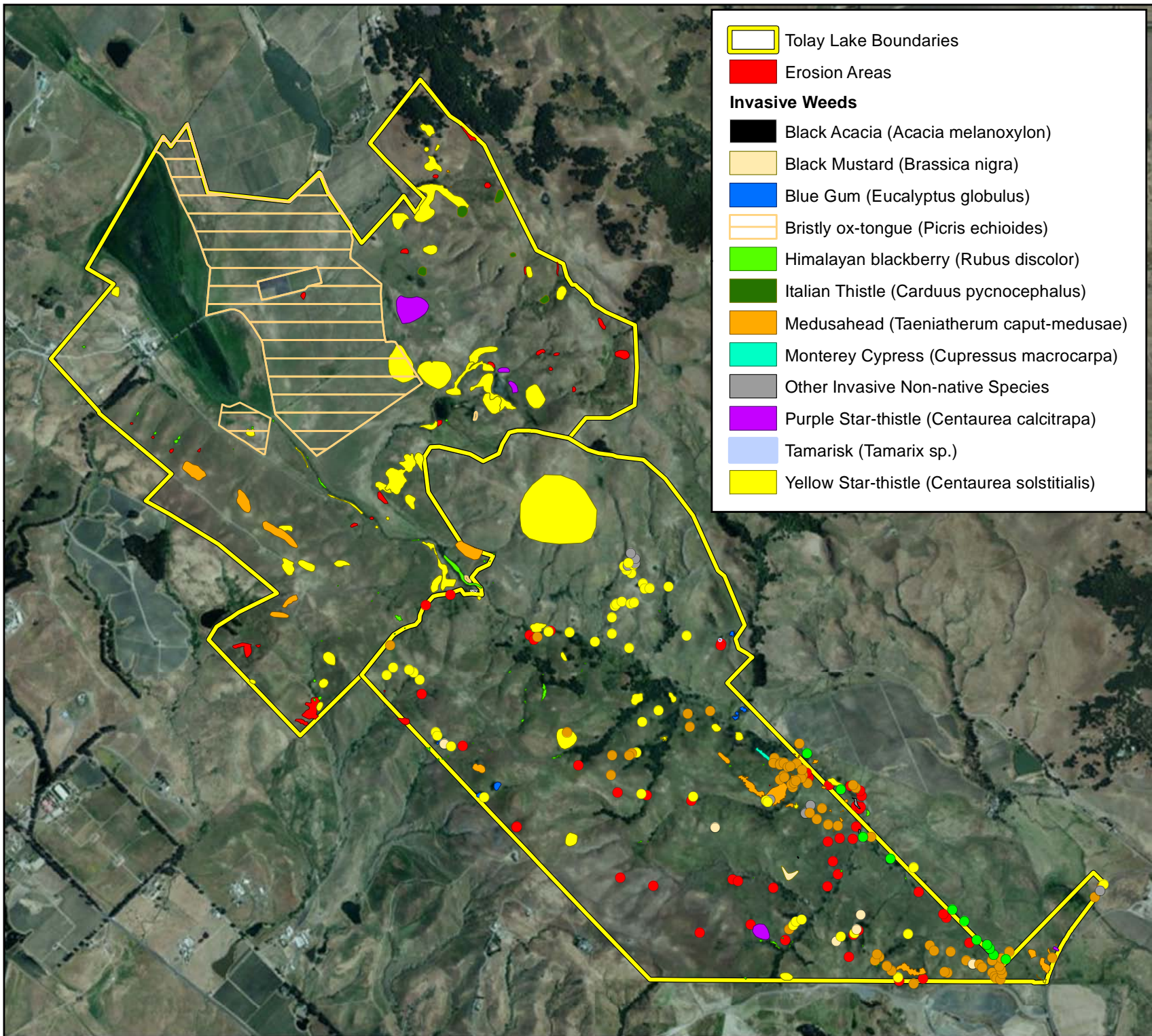


Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

Tolay Lake
Regional Park
Sonoma County,
California

Figure 7.

Invasive Plant
Species and Erosion
within Tolay Lake
Regional Park










Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

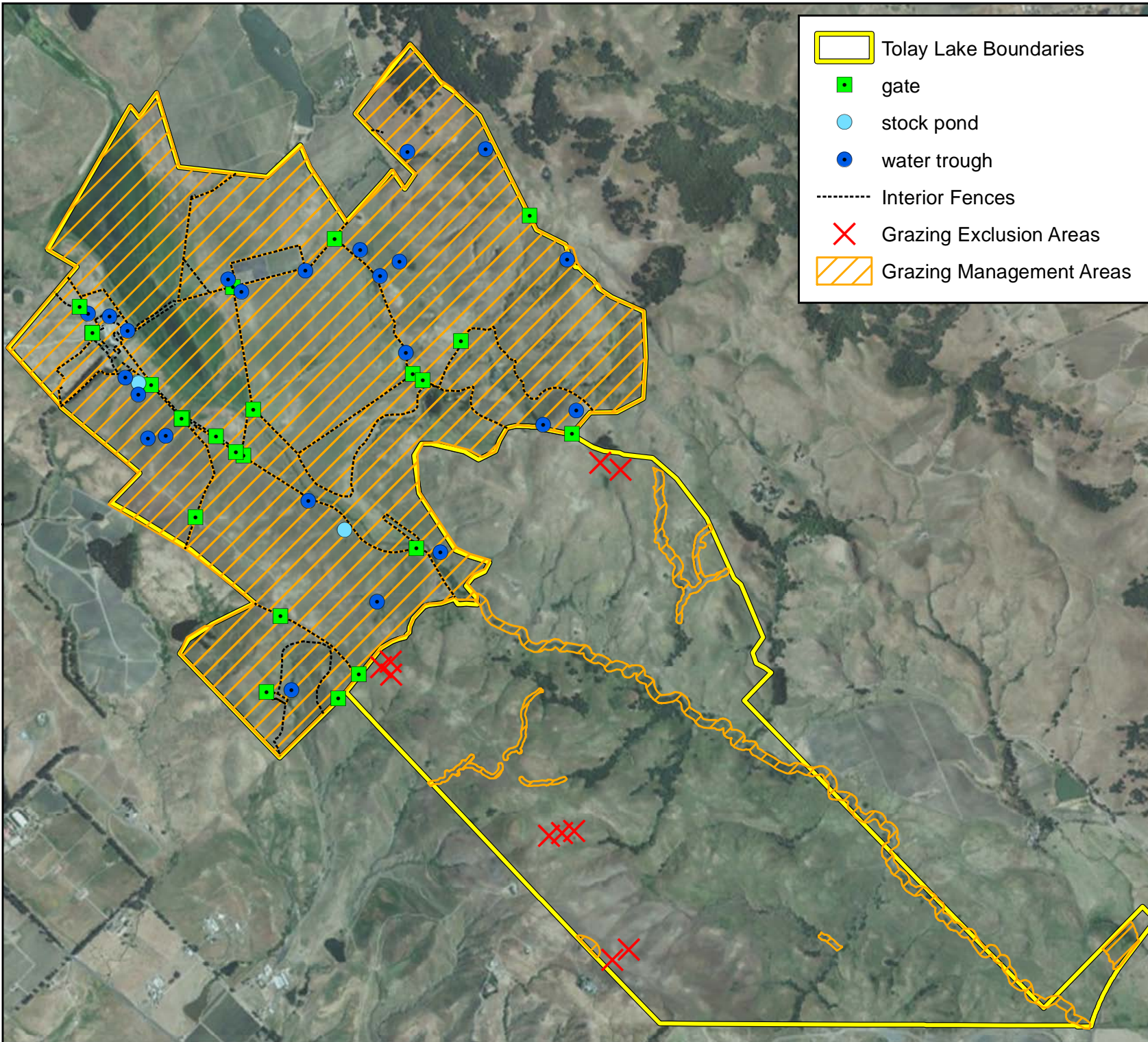
Tolay Lake
Regional Park

Sonoma County,
California

Figure 8.

Grazing Management
and Infrastructure
within Tolay Lake
Regional Park

-  Tolay Lake Boundaries
-  gate
-  stock pond
-  water trough
-  Interior Fences
-  Grazing Exclusion Areas
-  Grazing Management Areas

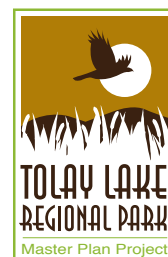


0 1,500 3,000
Feet

Map Date: March 2013
Map By: Michael Rochelle
Aerial: San Francisco 2010

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.



**BIOLOGICAL RESOURCES STUDY
TOLAY LAKE REGIONAL PARK
SONOMA COUNTY, CALIFORNIA**

Submitted to:

Sonoma Regional Parks Department
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Santa Rosa, California 95403

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LSA Project No. SOG0602

LSA

April 2009

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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 *species 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 Gallagher, 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 CNDDDB (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 kelloggii*). 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 (*Sisyrinchium 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*) occurs 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 runoff. 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 (CNDDDB 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 vernal 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 approximately 10 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 (CNDDDB 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 (CNDDDB 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 (CNDDDB 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 tackifier 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 season¹, 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 because 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 Enclosures. The effects of grazing should be examined by establishing fenced grazing enclosures 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. Control can be effected through mechanical or herbicidal means. The drawbacks of the mechanical 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. Glyphosate and triclopyr 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_imp.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

Figure 1: Regional Location

Figure 2: Project Location

Figure 3a: Tolay Lake Regional Park – Biological Resources – North

Figure 3b: Tolay Lake Regional Park – Biological Resources – South

Figure 4a: Location of Selected Weeds and Erosion – North

Figure 4b: Location of Selected Weeds and Erosion – South

Figure 5: Tolay Lake Regional Park – Biological Resources, Cannon Lane and Lakeville Road Areas

Figure 6: Project Location and CRLF Pesticide Injunction

Figure 7a: Tolay Lake Regional Park – Proposed Restoration Areas – North

Figure 7b: Tolay Lake Regional Park – Proposed Restoration Areas – South

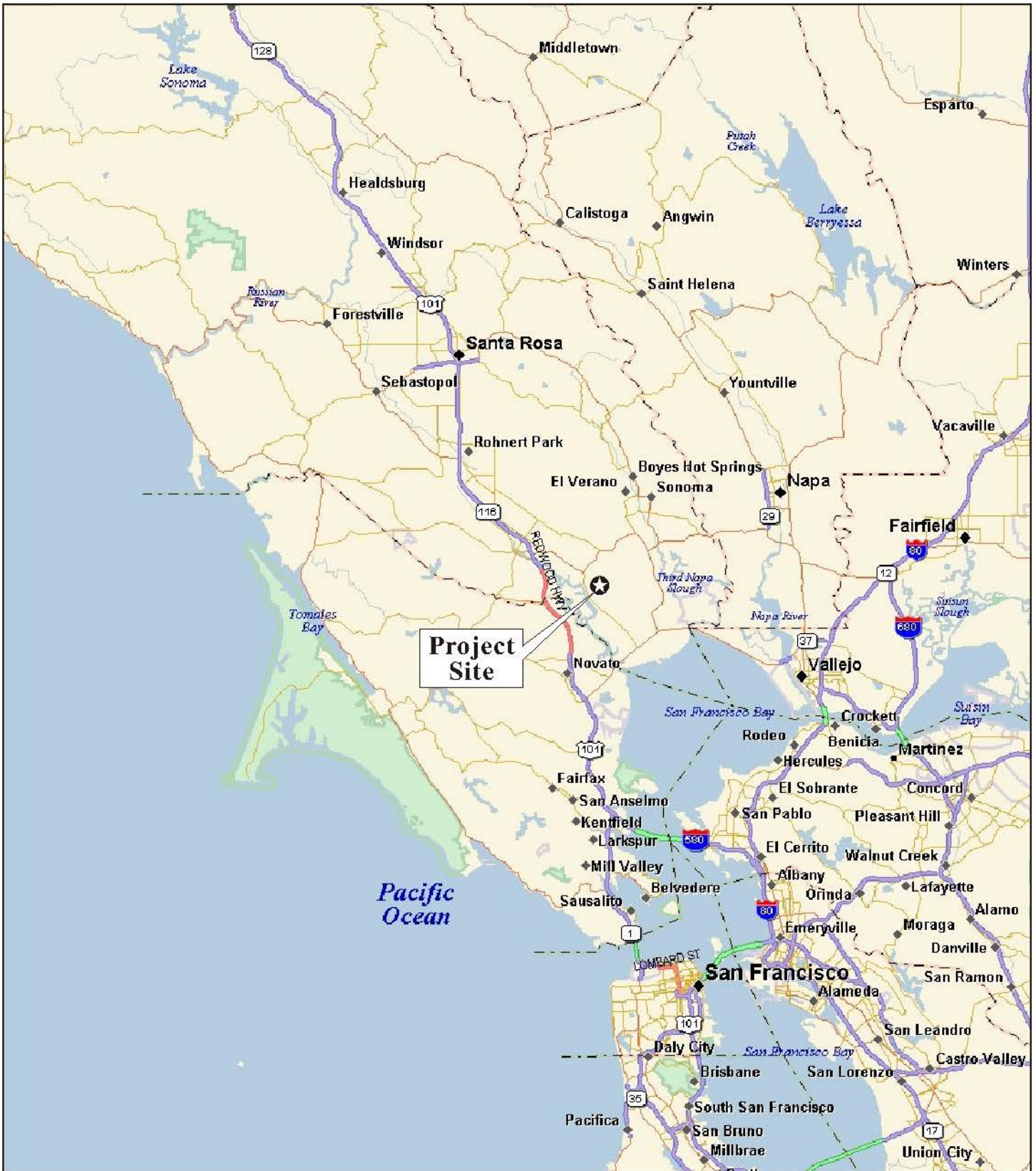
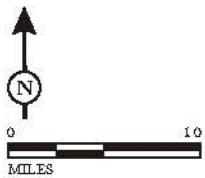


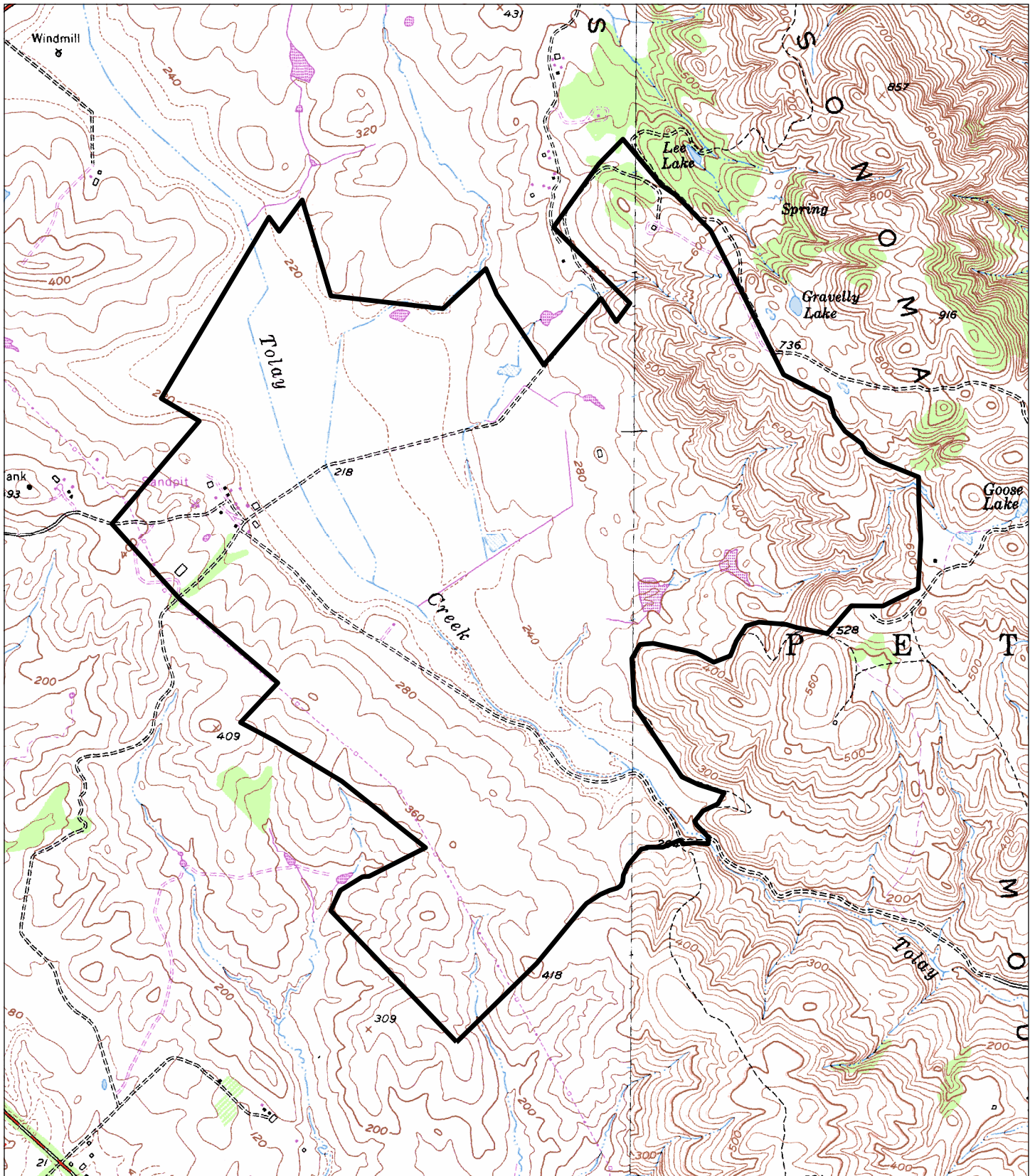
FIGURE 1

Tolay Lake Regional Park
Regional Location

LSA



SOURCE: ©2006 DeLORME, STREET ATLAS USA©2006.



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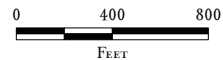
0 500 1,000 2,000
FEET

FIGURE 2

Tolay Lake Regional Park
Project Location

FIGURE 3a
Tolay Lake Regional Park
 Biological Resources

- | | |
|---|--|
|  JOHNNY JUMP-UP |  RED-TAILED HAWK NEST |
|  CREAM CUPS |  FORMER RAPTOR NEST |
|  PERIDERIDIA SP. |  BURROWING OWL |
|  NATIVE GRASSLAND |  WESTERN POND TURTLE |
|  BUCKEYE WOODLAND |  CALIFORNIA RED-LEGGED FROG |
|  OAK WOODLAND |  FRAGRANT FRITILLARY |
|  RIPARIAN WOODLAND |  LOBB'S AQUATIC BUTTERCUP |
|  EUCALYPTUS |  PROJECT BOUNDARY |
|  ROCK OUTCROPS | |
|  WETLAND | |
|  POND | |
|  STREAM SEGMENT | |

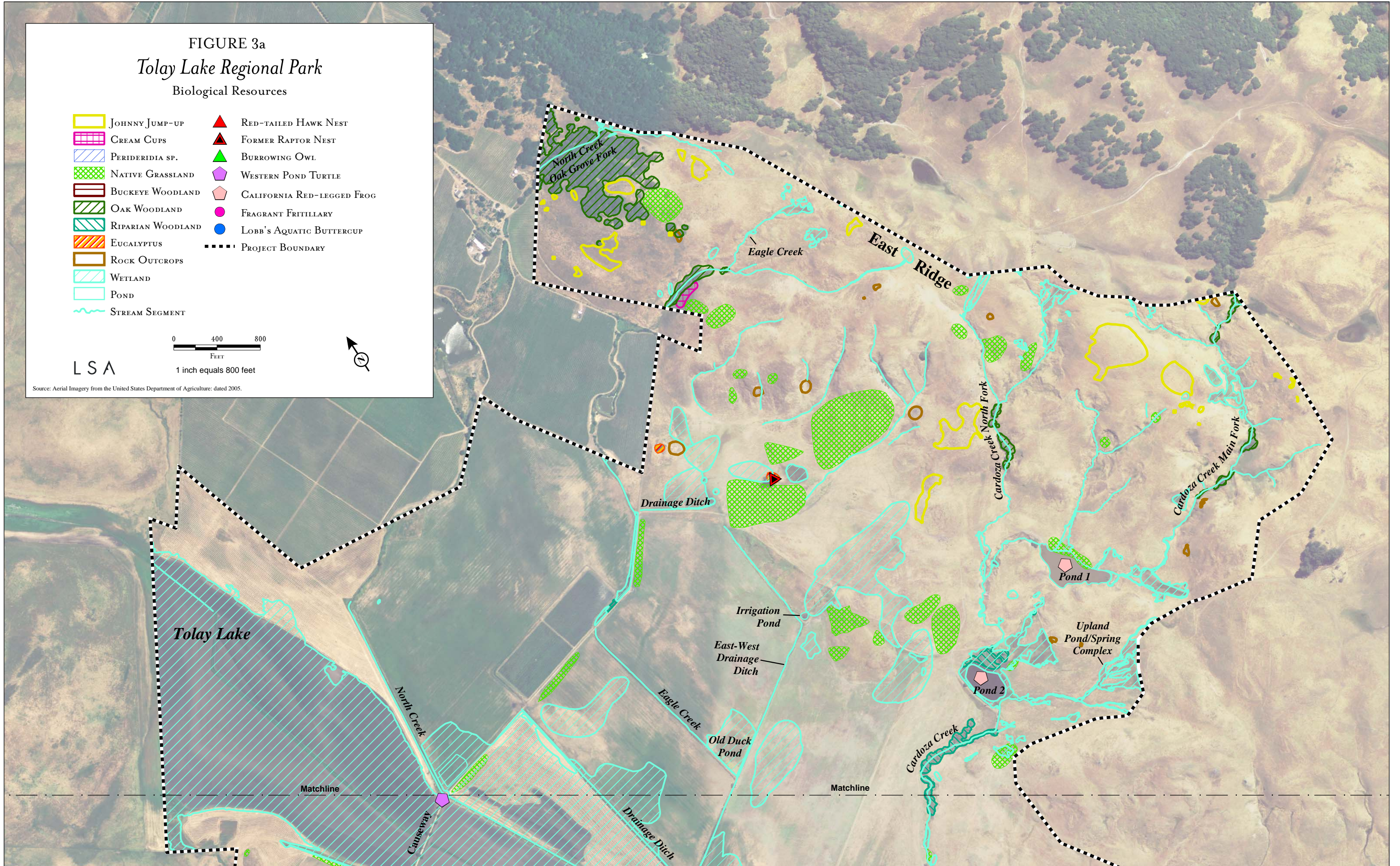


1 inch equals 800 feet



LSA

Source: Aerial Imagery from the United States Department of Agriculture, dated 2005.



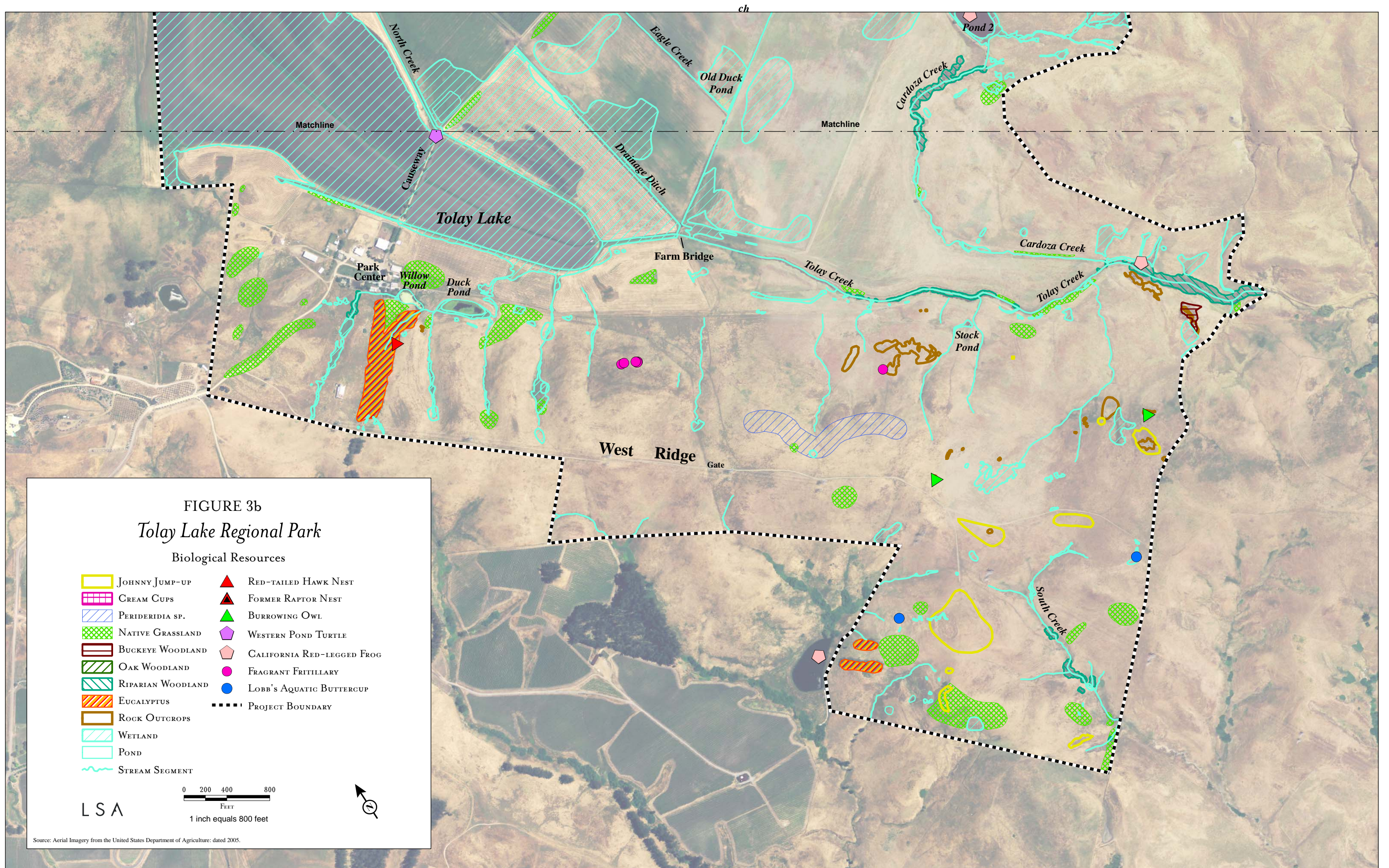


FIGURE 3b
Tolley Lake Regional Park

Biological Resources

- | | | | |
|--|-------------------|--|----------------------------|
| | JOHNNY JUMP-UP | | RED-TAILED HAWK NEST |
| | CREAM CUPS | | FORMER RAPTOR NEST |
| | PERIDERIDIA SP. | | BURROWING OWL |
| | NATIVE GRASSLAND | | WESTERN POND TURTLE |
| | BUCKEYE WOODLAND | | CALIFORNIA RED-LEGGED FROG |
| | OAK WOODLAND | | FRAGRANT FRITILLARY |
| | RIPARIAN WOODLAND | | LOBB'S AQUATIC BUTTERCUP |
| | EUCALYPTUS | | PROJECT BOUNDARY |
| | ROCK OUTCROPS | | |
| | WETLAND | | |
| | POND | | |
| | STREAM SEGMENT | | |





0 200 400 800
FEET
1 inch equals 800 feet

LSA

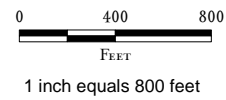


Source: Aerial Imagery from the United States Department of Agriculture; dated 2005.

FIGURE 4a
Tolay Lake Regional Park
 Location of Selected Weeds and Erosion

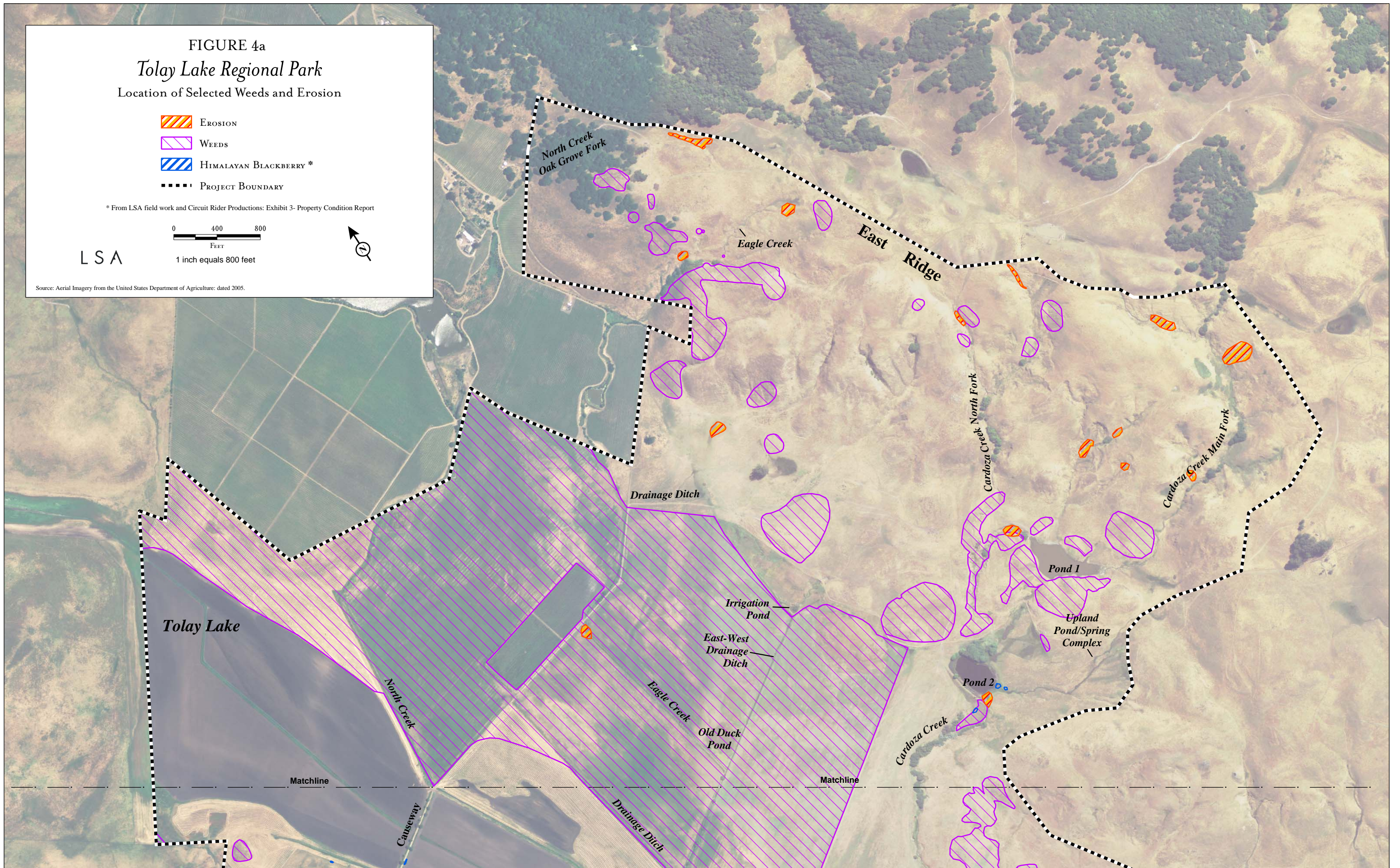
-  EROSION
-  WEEDS
-  HIMALAYAN BLACKBERRY *
-  PROJECT BOUNDARY

* From LSA field work and Circuit Rider Productions: Exhibit 3- Property Condition Report



LSA

Source: Aerial Imagery from the United States Department of Agriculture: dated 2005.



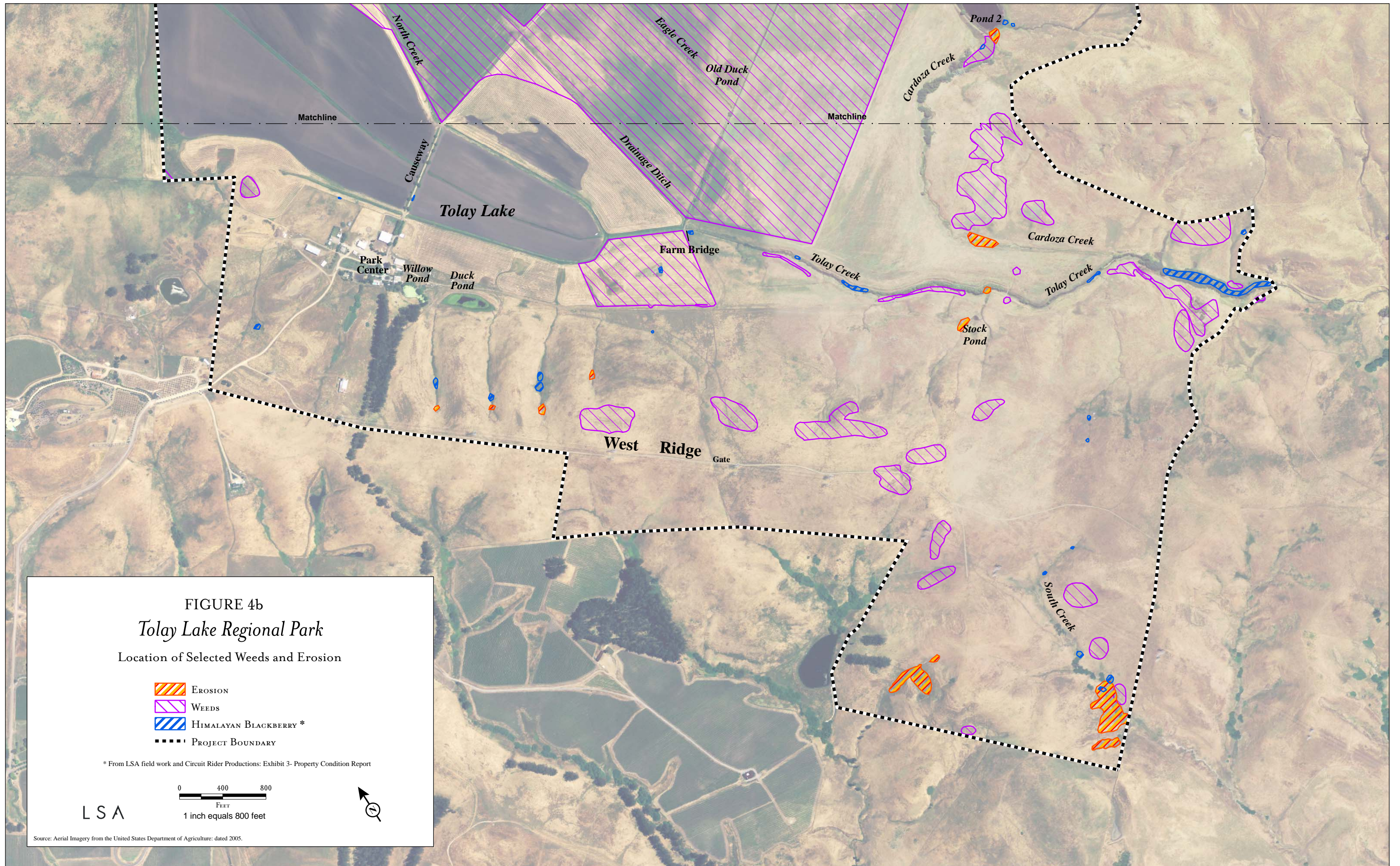






FIGURE 4b
Tolay Lake Regional Park

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.



FIGURE 5
Tolay Lake Regional Park
 Biological Resources, Cannon Lane
 and Lakeville Road Areas

LEGEND		POTENTIAL WETLAND FEATURES	
-----	CANNON/LAKEVILLE SURVEY BOUNDARY	☪	POND
.....	TOLAY LAKE REGIONAL PARK BOUNDARY	⌵	CULVERT
-----		— —	STREAM SEGMENT

0 125 250 500
 FEET
 1 inch equals 500 feet

LSA



Source: Aerial Imagery from GlobeXplorer, dated June 15, 2002.

FIGURE 6a
Tolay Lake Regional Park
 Proposed Restoration Areas

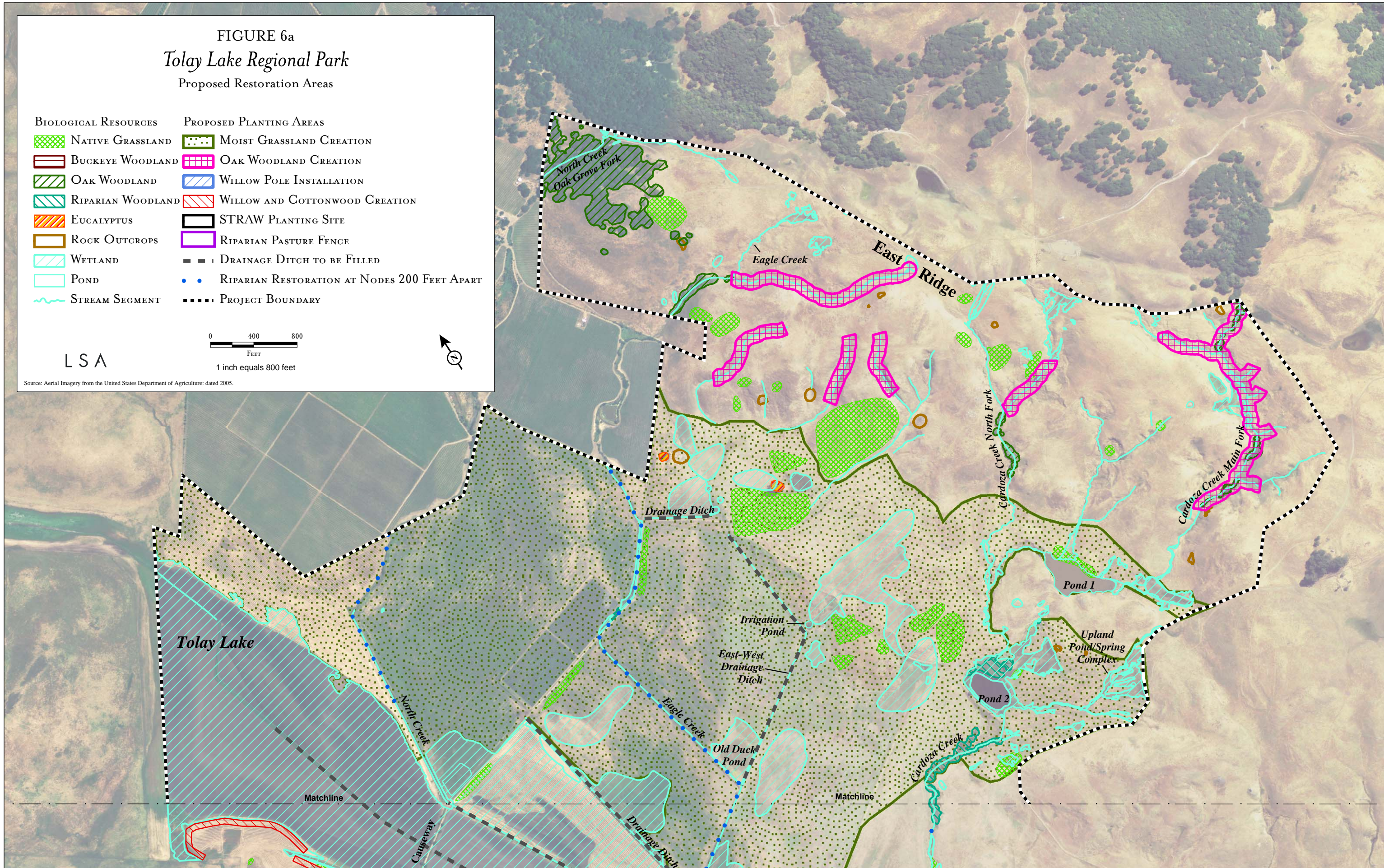
- | BIOLOGICAL RESOURCES | | PROPOSED PLANTING AREAS | |
|----------------------|-------------------|-------------------------|--|
| | NATIVE GRASSLAND | | MOIST GRASSLAND CREATION |
| | BUCKEYE WOODLAND | | OAK WOODLAND CREATION |
| | OAK WOODLAND | | WILLOW POLE INSTALLATION |
| | RIPARIAN WOODLAND | | 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 |

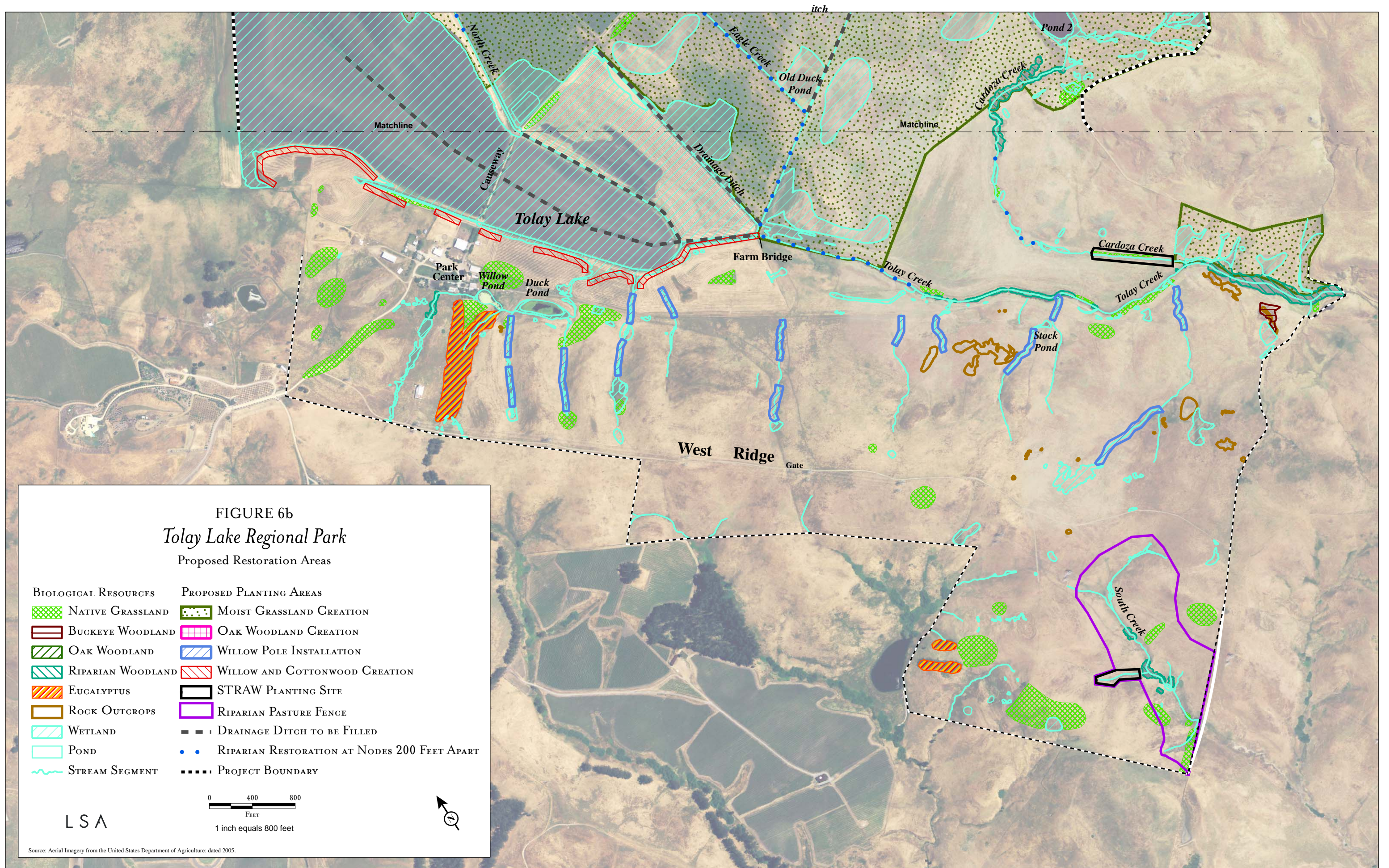
0 400 800
 FEET
 1 inch equals 800 feet



LSA

Source: Aerial Imagery from the United States Department of Agriculture, dated 2005.





TABLES

Table A: Plant Species Observed

Table B: Animal Species Observed

Table C: Active Ingredients Subject to the Pesticide Injunction

Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

Family	Scientific Name	Common Name	Origin*
Alismataceae	<i>Alisma lanceolatum</i>	Water plantain	N
Amaranthaceae	<i>Amaranthus blitoides</i>	Prostrate pigweed	N
Amaranthaceae	<i>Amaranthus retroflexus</i>	Pigweed	I
Anacardiaceae	<i>Toxicodendron diversilobum</i>	Poison oak	N
Apiaceae	<i>Conium maculatum</i>	Poison hemlock	I
Apiaceae	<i>Eryngium armatum</i>	Armed coyote thistle	N
Apiaceae	<i>Lomatium sp.</i>	Biscuitroot	N
Apiaceae	<i>Osmorrhiza chilensis</i>	Sweetroot	N
Apiaceae	<i>Sanicula bipinnatifida</i>	Purple sanicle	N
Apiaceae	<i>Sanicula crassicaulis</i>	Pacific sanicle	N
Apiaceae	<i>Scandix pecten-veneris</i>	Venus' needle	I
Apiaceae	<i>Torilis arvensis</i>	Japanese hedge-parsley	I
Apiaceae	<i>Torilis nodosus</i>	Hedge-parsley	I
Asclepiadaceae	<i>Asclepias fascicularis</i>	Narrow-leaf milkweed	N
Asteraceae	<i>Achillea millefolium</i>	Yarrow	N
Asteraceae	<i>Achyrachaena mollis</i>	Blow wives	N
Asteraceae	<i>Agoseris grandiflora</i>	Agoseris	N
Asteraceae	<i>Anthemis cotula</i>	Mayweed	I
Asteraceae	<i>Artemisia douglasiana</i>	Mugwort	N
Asteraceae	<i>Baccharis pilularis</i>	Coyote brush	N
Asteraceae	<i>Carduus pycnocephalus</i>	Italian thistle	I
Asteraceae	<i>Centaurea calcitrapa</i>	Purple star-thistle	I
Asteraceae	<i>Centaurea solstitialis</i>	Yellow star-thistle	I
Asteraceae	<i>Chamomilla suaveolens</i>	Pineapple weed	I
Asteraceae	<i>Cirsium vulgare</i>	Bull thistle	I
Asteraceae	<i>Cotula coronopifolia</i>	Brass-buttons	N
Asteraceae	<i>Gnaphalium luteo-album</i>	Cudweed	I
Asteraceae	<i>Grindelia camporum</i>	Gumplant	N
Asteraceae	<i>Hemizonia congesta</i> var. <i>congesta</i>	Hayfield tarweed	N
Asteraceae	<i>Hesperervax sparsiflora</i> var. <i>sparsiflora</i>	Erect dwarf-cudweed	N
Asteraceae	<i>Hypochaeris radicata</i>	Hairy cat's ear	I
Asteraceae	<i>Lactuca serriola</i>	Prickly lettuce	I
Asteraceae	<i>Lasthenia californica</i>	California goldfields	N
Asteraceae	<i>Lasthenia glaberrima</i>	Smoth goldfields	N
Asteraceae	<i>Layia gaillardoides</i>	Tidy tips	N
Asteraceae	<i>Madia sativa</i>	Coast tarweed	N
Asteraceae	<i>Microseris douglasii</i>	Douglas microseris	N
Asteraceae	<i>Picris echioides</i>	Bristly ox-tongue	I
Asteraceae	<i>Senecio vulgaris</i>	Common groundsel	I
Asteraceae	<i>Silybum marianum</i>	Milk thistle	I
Asteraceae	<i>Soliva sessilis</i>	South American soliva	I
Asteraceae	<i>Sonchus oleraceus</i>	Common sow thistle	I
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	I
Asteraceae	<i>Tragopogon porrifolius</i>	Oyster plant	I
Asteraceae	<i>Wyethia angustifolia</i>	Mule's ears	N
Asteraceae	<i>Xanthium spinosum</i>	Spiny clotbur	N
Asteraceae	<i>Xanthium strumarium</i>	Cocklebur	N
Boraginaceae	<i>Amsinckia menziesii</i> var. <i>menziesii</i>	Fiddleneck	N
Boraginaceae	<i>Heliotropium curassavicum</i>	Heliotrope	N
Boraginaceae	<i>Plagiobothrys nothofulvus</i>	Rusty popcornflower	N
Boraginaceae	<i>Plagiobothrys stipitatus</i>	Slender popcornflower	N
Brassicaceae	<i>Brassica nigra</i>	Black mustard	I
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's purse	I
Brassicaceae	<i>Cardamine californica</i> var. <i>californica</i>	Toothwort	N
Brassicaceae	<i>Cardamine oligosperma</i>	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	<i>Lepidium nitidum</i>	Peppergrass	N
Brassicaceae	<i>Raphanus raphanistrum</i>	Jointed charlock	I
Brassicaceae	<i>Raphanus sativus</i>	Radish	I
Brassicaceae	<i>Rorippa curvisiliqua</i>	Winter cress	N
Brassicaceae	<i>Rorippa nasturtium-aquaticum</i>	Water cress	N
Brassicaceae	<i>Sinapis arvensis</i>	Charlock	I
Brassicaceae	<i>Sisymbrium officinale</i>	Hedge mustard	I
Callitrichaceae	<i>Callitriche</i> sp.	Water starwort	N
Caprifoliaceae	<i>Symphoricarpos mollis</i>	Creeping snowberry	N
Caryophyllaceae	<i>Cerastium fontanum</i> ssp. <i>vulgare</i>	Mouse-ear chickweed	I
Caryophyllaceae	<i>Cerastium glomeratum</i>	Mouse-ear chickweed	I
Caryophyllaceae	<i>Polycarpon tetraphyllum</i>	Four-leaved allseed	I
Caryophyllaceae	<i>Silene gallica</i>	Windmill pinks	I
Caryophyllaceae	<i>Spergularia rubra</i>	Sand-spurrey	I
Caryophyllaceae	<i>Stellaria media</i>	Common chickweed	I
Chenopodiaceae	<i>Atriplex triangularis</i>	Spearscale	N
Chenopodiaceae	<i>Chenopodium album</i>	Lamb's quarters	I
Convolvulaceae	<i>Calystegia subacaulis</i>	Morning-glory	N
Convolvulaceae	<i>Convolvulus arvensis</i>	Bindweed	I
Crassulaceae	<i>Crassula aquatica</i>	Pygmyweed	N
Crassulaceae	<i>Crassula connata</i>	Sand pygmyweed	N
Cucurbitaceae	<i>Marah fabaceus</i>	California man-root	N
Cuscutaceae	<i>Cuscuta</i> sp.	Dodder	N
Cyperaceae	<i>Carex</i> sp.	Sedge sp 1	N
Cyperaceae	<i>Carex</i> sp.	Sedge sp 2	N
Cyperaceae	<i>Cyperus eragrostis</i>	Nutsedge	N
Cyperaceae	<i>Eleocharis macrostachya</i>	Spikerush	N
Cyperaceae	<i>Scirpus acutus</i> var. <i>occidentalis</i>	Tule	N
Dipsacaceae	<i>Dipsacus fullonum</i>	Wild teasel	I
Driopteridiaceae	<i>Athyrium filix-femina</i>	Western lady-fern	N
Equisetaceae	<i>Equisetum arvense</i>	Common horsetail	N
Equisetaceae	<i>Equisetum laevigatum</i>	Narrow horsetail	N
Ericaceae	<i>Arbutus menziesii</i>	Madrone	N
Euphorbiaceae	<i>Chamaesyce</i> sp.	Rattlesnake weed	N
Euphorbiaceae	<i>Euphorbia peplus</i>	Petty spurge	I
Fabaceae	<i>Lathyrus</i> sp.	Wild pea	N
Fabaceae	<i>Lotus corniculatus</i>	Birdfoot trefoil	I
Fabaceae	<i>Lupinus nanus</i>	Sky lupine	N
Fabaceae	<i>Medicago polymorpha</i>	California burclover	I
Fabaceae	<i>Melilotus officinalis</i>	Yellow sweetclover	I
Fabaceae	<i>Melilotus indica</i>	Sourclover	I
Fabaceae	<i>Thermopsis macrophylla</i>	Yellow false lupine	N
Fabaceae	<i>Trifolium campestre</i>	Hop clover	I
Fabaceae	<i>Trifolium ciliolatum</i>	Tree clover	I
Fabaceae	<i>Trifolium depauperatum</i>	Dwarf sack clover	N
Fabaceae	<i>Trifolium dubium</i>	Little hop clover	I
Fabaceae	<i>Trifolium fragiferum</i>	Strawberry clover	I
Fabaceae	<i>Trifolium fucatum</i>	Sour clover	N
Fabaceae	<i>Trifolium hirtum</i>	Rose clover	I
Fabaceae	<i>Trifolium subterraneum</i>	Subterranean clover	I
Fabaceae	<i>Trifolium variegatum</i>	Whitetip clover	N
Fabaceae	<i>Vicia sativa</i> ssp. <i>sativa</i>	Common vetch	I
Fagaceae	<i>Quercus agrifolia</i> var. <i>agrifolia</i>	Coast live oak	N
Fagaceae	<i>Quercus kelloggii</i>	Black oak	N
Gentianaceae	<i>Centaurium muehlenbergii</i>	Monterey centauray	N

Table A: Plant Species Observed at Tolay Lake Regional Park by LSA Associates in 2006

Family	Scientific Name	Common Name	Origin*
Geraniaceae	<i>Erodium botrys</i>	Broad-leaf filaree	I
Geraniaceae	<i>Erodium cicutarium</i>	Red-stem filaree	I
Geraniaceae	<i>Erodium moschatum</i>	White-stem filaree	I
Geraniaceae	<i>Geranium dissectum</i>	Cut-leaf geranium	I
Geraniaceae	<i>Geranium molle</i>	Dove's foot geranium	I
Hippocastanaceae	<i>Aesculus californica</i>	California buckeye	N
Hydrophyllaceae	<i>Nemophila heterophylla</i>	Variable-leaf nemophila	N
Hydrophyllaceae	<i>Phacelia</i> sp.	Phacelia	N
Iridaceae	<i>Sisyrinchium bellum</i>	Blue-eyed-grass	N
Juncaceae	<i>Juncus balticus</i>	Baltic rush	N
Juncaceae	<i>Juncus bufonius</i> var. <i>bufonius</i>	Toad rush	N
Juncaceae	<i>Juncus effusus</i>	Soft rush	N
Juncaceae	<i>Juncus mexicanus</i>	Mexican rush	N
Juncaceae	<i>Juncus phaeocephalus</i>	Brown-headed rush	N
Juncaginaceae	<i>Lilaea scilloioides</i>	Flowering quillwort	N
Lamiaceae	<i>Lamium purpureum</i>	Red dead-nettle	I
Lamiaceae	<i>Mentha pulegium</i>	Pennyroyal	I
Lamiaceae	<i>Stachys ajugoides</i>	Hedge nettle	N
Lauraceae	<i>Umbellularia californica</i>	California bay	N
Lemnaceae	<i>Lemna</i> sp.	Duckweed	N
Liliaceae	<i>Brodiaea elegans</i>	Harvest brodiaea	N
Liliaceae	<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	Soap plant	N
Liliaceae	<i>Dichelostemma capitatum</i>	Blue dicks	N
Liliaceae	<i>Fritillaria liliacea</i>	Fragrant fritillary	N
Liliaceae	<i>Muilla maritima</i>	Common muilla	N
Liliaceae	<i>Triteleia hyacinthina</i>	Hyacinth brodiaea	N
Liliaceae	<i>Triteleia laxa</i>	Ithuriel's spear	N
Liliaceae	<i>Zigadenus fremontii</i>	Fremont's star lily	N
Limnanthaceae	<i>Limnanthes douglasii</i>	Meadowfoam	N
Lythraceae	<i>Ammannia coccinea</i>	Red ammannia	N
Lythraceae	<i>Lythrum hyssopifolium</i>	Hyssop loosestrife	I
Malvaceae	<i>Abutilon theophrastii</i>	Velvet-leaf	I
Malvaceae	<i>Malva nicaeensis</i>	Bull mallow	I
Malvaceae	<i>Sidalcea malvaeflora</i>	California checker mallow	I
Martyniaceae	<i>Proboscidea lutea</i>	Devil's claw	I
Moraceae	<i>Ficus carica</i>	Edible fig	I
Myrtaceae	<i>Eucalyptus globulus</i>	Blue gum eucalyptus	I
Onagraceae	<i>Camissonia ovata</i>	Sun cup	N
Onagraceae	<i>Clarkia</i> sp.	Fairyfan	N
Onagraceae	<i>Epilobium brachycarpum</i>	Willow herb	N
Onagraceae	<i>Ludwigia</i> sp.	Water-primrose	I
Papaveraceae	<i>Eschscholzia californica</i>	California poppy	N
Papaveraceae	<i>Platystemon californicus</i>	Creamcups	N
Plantaginaceae	<i>Plantago lanceolata</i>	English plantain	I
Plantaginaceae	<i>Plantago subnuda</i>	Naked plantain	I
Poaceae	<i>Avena barbata</i>	Slender wildoats	
Poaceae	<i>Avena fatua</i>	Wild oats	I
Poaceae	<i>Briza minor</i>	Little quaking grass	I
Poaceae	<i>Bromus diandrus</i>	Ripgut brome	I
Poaceae	<i>Bromus hordeaceus</i>	Soft chess brome	I
Poaceae	<i>Crypsis schoenoides</i>	Prickle grass	I
Poaceae	<i>Cynosurus echinatus</i>	Hedgehog dogtail	I
Poaceae	<i>Danthonia californica</i>	California oatgrass	N
Poaceae	<i>Elymus glaucus</i>	Blue wildrye	N
Poaceae	<i>Gastridium ventricosum</i>	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	<i>Holcus lanatus</i>	Common velvet grass	I
Poaceae	<i>Hordeum brachyantherum</i>	Meadow barley	N
Poaceae	<i>Hordeum marinum</i> var. <i>gussoneanum</i>	Mediterranean barley	I
Poaceae	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	Hare barley	I
Poaceae	<i>Leymus triticoides</i>	Creeping wildrye	N
Poaceae	<i>Lolium multiflorum</i>	Italian ryegrass	I
Poaceae	<i>Nassella pulchra</i>	Purple needle-grass	N
Poaceae	<i>Paspalum dilatatum</i>	Dallis grass	I
Poaceae	<i>Phalaris aquatica</i>	Harding grass	I
Poaceae	<i>Phalaris paradoxa</i>	Canary grass	I
Poaceae	<i>Pleuropogon californicus</i>	Semaphore grass	N
Poaceae	<i>Poa annua</i>	Annual bluegrass	I
Poaceae	<i>Polypogon monspeliensis</i>	Annual beard grass	I
Poaceae	<i>Taeniatherum caput-medusae</i>	Medusa head	I
Poaceae	<i>Triticum aestivum</i>	Wheat	I
Poaceae	<i>Vulpia bromoides.</i>	Annual fescue	I
Poaceae	<i>Vulpia myuros</i>	Annual fescue	I
Polygonaceae	<i>Polygonum amphibium</i> ssp. <i>emersum</i>	Water smartweed	N
Polygonaceae	<i>Polygonum arenastrum</i>	Common knotweed	I
Polygonaceae	<i>Polygonum hydropiperoides</i>	Waterpepper	N
Polygonaceae	<i>Rumex acetosella</i>	Sheep sorrel	I
Polygonaceae	<i>Rumex conglomeratus</i>	Clustered dock	I
Polygonaceae	<i>Rumex crispus</i>	Curly dock	I
Polygonaceae	<i>Rumex pulcher</i>	Fiddle dock	I
Polypodiaceae	<i>Polypodium californicum</i>	California polypody	N
Portulacaceae	<i>Calandrinia ciliata</i>	Red maids	N
Portulacaceae	<i>Claytonia exigua</i>	Common montia	N
Portulacaceae	<i>Claytonia perfoliata</i>	Miner's lettuce	N
Portulacaceae	<i>Portulaca oleracea</i>	Common purslane	I
Primulaceae	<i>Anagalis arvensis</i>	Scarlet pimpernel	I
Primulaceae	<i>Centunculus minimus</i>	Chaffweed	N
Primulaceae	<i>Dodecatheon hendersonii</i>	Shooting star	N
Pteridiaceae	<i>Adiantum jordanii</i>	California maidenhair fern	N
Pteridiaceae	<i>Pentagramma triangularis</i>	Goldback fern	N
Ranunculaceae	<i>Ranunculus aquatilis</i>	Water buttercup	N
Ranunculaceae	<i>Ranunculus californicus</i>	California buttercup	N
Ranunculaceae	<i>Ranunculus lobbii</i>	Lobb's aquatic buttercup	N
Ranunculaceae	<i>Ranunculus muricatus</i>	Prickle-fruited buttercup	I
Ranunculaceae	<i>Ranunculus orthorhynchus</i> var. <i>bloomeri</i>	Strait-beaked buttercup	N
Rhamnaceae	<i>Rhamnus californica</i>	California coffeeberry	N
Rosaceae	<i>Aphanes occidentalis</i>	Western lady's mantle	N
Rosaceae	<i>Prunus</i> sp.	Ornamental plum	N
Rosaceae	<i>Rosa</i> sp.	Ornamental rose	N
Rosaceae	<i>Rubus discolor</i>	Himalayan blackberry	I
Rosaceae	<i>Rubus ursinus</i>	California blackberry	N
Rubiaceae	<i>Galium aparine</i>	Goose-grass	I
Rubiaceae	<i>Galium murale</i>	Tiny bedstraw	I
Rubiaceae	<i>Galium trifidum</i>	Sweet scented bedstraw	N
Rubiaceae	<i>Sherardia arvensis</i>	Field madder	I
Salicaceae	<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	N
Salicaceae	<i>Salix exigua</i>	Narrow leaf willow	N
Salicaceae	<i>Salix laevigata</i>	Red willow	N
Salicaceae	<i>Salix lasiolepis</i>	Arroyo willow	N
Salicaceae	<i>Salix lucida</i> ssp. <i>lasiandra</i>	Yellow willow	N
Saxifragaceae	<i>Lithophragma</i> 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	<i>Bellardia trixago</i>	Bellardia	I
Scrophulariaceae	<i>Castilleja attenuata</i>	Valley-tassels	N
Scrophulariaceae	<i>Castilleja exerta</i>	Purple owl's clover	N
Scrophulariaceae	<i>Kickxia elatine</i>	Fluellin	I
Scrophulariaceae	<i>Mimulus aurantiacus</i>	Bush monkeyflower	N
Scrophulariaceae	<i>Mimulus guttatus</i>	Common monkey-flower	N
Scrophulariaceae	<i>Parentucellia viscosa</i>	Parentucellia	I
Scrophulariaceae	<i>Scrophularia californica</i> ssp. <i>californica</i>	California figwort	N
Scrophulariaceae	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	Butter-and-eggs	N
Scrophulariaceae	<i>Triphysaria pusilla</i>	Dwarf owl's clover	N
Scrophulariaceae	<i>Triphysaria versicolor</i> ssp. <i>faucibarbata</i>	Smooth owl's clover	N
Scrophulariaceae	<i>Veronica peregrina</i>	Purslane speedweed	N
Scrophulariaceae	<i>Veronica persica</i>	Persian speedwell	I
Typhaceae	<i>Typha</i> sp.	Cattail	N
Urticaceae	<i>Urtica dioica</i> ssp. <i>holosericea</i>	Hoary nettle	N
Urticaceae	<i>Urtica urens</i>	Dwarf nettle	I
Verbenaceae	<i>Phyla nodiflora</i> var. <i>nodiflora</i>	Garden lippia	N
Violaceae	<i>Viola pedunculata</i>	Wild pansy	N
Viscaceae	<i>Phoradendron villosum</i>	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	<i>Lithobates catesbeiana</i>
sierran treefrog	<i>Pseudacris sierra</i>
REPTILES	
Western fence lizard	<i>Sceloporus occidentalis</i>
Common garter snake	<i>Thamnophis sirtalis</i>
Ring-necked snake	<i>Diadophis punctatus</i>
BIRDS	
Canada goose	<i>Branta canadensis</i>
Gadwall	<i>Anas strepera</i>
American wigeon	<i>Anas americana</i>
Mallard	<i>Anas platyrhynchos</i>
Cinnamon teal	<i>Anas cyanoptera</i>
Northern shoveler	<i>Anas clypeata</i>
Northern pintail	<i>Anas acuta</i>
Green-winged teal	<i>Anas crecca</i>
Canvasback	<i>Aythya valisineria</i>
Greater scaup	<i>Aythya marila</i>
Bufflehead	<i>Bucephala albeola</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Wild turkey	<i>Meleagris gallopavo</i>
California quail	<i>Callipepla californica</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Ardea alba</i>
Snowy egret	<i>Egretta thula</i>
Turkey vulture	<i>Cathartes aura</i>
White-tailed kite	<i>Elanus leucurus</i>
Northern harrier	<i>Circus cyaneus</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Cooper's hawk	<i>Accipiter cooperi</i>
Red-shouldered hawk	<i>Accipiter striatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Golden eagle	<i>Aquila chrysaetos</i>
American kestrel	<i>Falco sparverius</i>
American coot	<i>Fulica americana</i>
Killdeer	<i>Charadrius vociferus</i>

Common Name	Scientific Name
Greater yellowlegs	<i>Tringa melanoleuca</i>
Western sandpiper	<i>Calidris mauri</i>
Least sandpiper	<i>Calidris minutilla</i>
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Wilson's snipe	<i>Gallinago delicata</i>
Caspian tern	<i>Hydroprogne caspia</i>
Rock pigeon	<i>Columba livia</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Mourning dove	<i>Zenaida macroura</i>
Barn owl	<i>Tyto alba</i>
Great horned owl	<i>Bubo virginianus</i>
Burrowing owl	<i>Athene cunicularia</i>
Vaux's swift	<i>Chaetura vauxi</i>
Anna's hummingbird	<i>Calypte anna</i>
Rufous hummingbird	<i>Selasphorus rufus</i>
Allen's hummingbird	<i>Selasphorus sasin</i>
Nuttall's woodpecker	<i>Picoides nuttallii</i>
Downy woodpecker	<i>Picoides pubescens</i>
Northern flicker	<i>Colaptes auratus</i>
Willow flycatcher	<i>Empidonax traillii</i>
Black phoebe	<i>Sayornis nigricans</i>
Say's phoebe	<i>Sayornis saya</i>
Western kingbird	<i>Tyrannus verticalis</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Hutton's vireo	<i>Vireo huttoni</i>
Warbling vireo	<i>Vireo gilvus</i>
Steller's jay	<i>Cyanocitta stelleri</i>
Western scrub-jay	<i>Aphelocoma californica</i>
American crow	<i>Corvus brachyrhynchos</i>
Common raven	<i>Corvus corax</i>
Horned lark	<i>Eremophila alpestris</i>
Tree swallow	<i>Tachycineta bicolor</i>
Violet-green swallow	<i>Tachycineta thalassina</i>
Northern rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Cliff swallow	<i>Petrochelidon pyrrhonata</i>
Barn swallow	<i>Hirundo rustica</i>
Chestnut-backed chickadee	<i>Poecile rufescens</i>
Oak titmouse	<i>Baeolophus inornatus</i>
Bushtit	<i>Psaltriparus minimus</i>
Brown creeper	<i>Certhia americana</i>

Common Name	Scientific Name
Bewick's wren	<i>Thryomanes bewickii</i>
House wren	<i>Troglodytes aedon</i>
Winter wren	<i>Troglodytes troglodytes</i>
Marsh wren	<i>Cistothorus palustris</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Western bluebird	<i>Sialia mexicana</i>
Hermit thrush	<i>Catharus guttatus</i>
American robin	<i>Turdus migratorius</i>
Northern mockingbird	<i>Mimus polyglottos</i>
European starling	<i>Sturnus vulgaris</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
American pipit	<i>Anthus rubescens</i>
Orange-crowned warbler	<i>Vermivora celata</i>
Yellow warbler	<i>Dendroica petechia</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
Wilson's warbler	<i>Wilsonia pusilla</i>
Western tanager	<i>Piranga ludoviciana</i>
Spotted towhee	<i>Pipilo maculatus</i>
California towhee	<i>Pipilo crissalis</i>
Lark sparrow	<i>Chondestes grammacus</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Fox sparrow	<i>Passerella iliaca</i>
Song sparrow	<i>Melospiza melodia</i>
Lincoln's sparrow	<i>Melospiza lincolni</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>
Dark-eyed junco	<i>Junco hyemalis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Tricolored blackbird	<i>Agelaius tricolor</i>
Western meadowlark	<i>Sturnella neglecta</i>
Brewer's blackbird	<i>Euphagus cyanocephalus</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Bullock's oriole	<i>Icterus bullockii</i>
House finch	<i>Carpodacus mexicanus</i>
Lesser goldfinch	<i>Carduelis psaltria</i>
American goldfinch	<i>Carduelis tristis</i>
House sparrow	<i>Passer domesticus</i>
MAMMALS	

Common Name	Scientific Name
Coyote	<i>Canis latrans</i>
Black-tailed deer	<i>Odocoileus hemionus</i>
California ground squirrel	<i>Spermophilus beecheyi</i>
California vole	<i>Microtus californicus</i>
Botta's pocket gopher	<i>Thomomys bottae</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>

* Observers = LSA Associates & Petaluma Wetlands Alliance

Table C: Active Ingredients Subject to the Pesticide Injunction

2, 4-D	Metam sodium
Acephate	Methamidophos
Alachlor	Methidathion
Aldicarb	Methomyl
Atrazine	Methoprene
Azinphos-methyl	Methyl parathion
Bensulide	Metolachlor
Bromacil	Molinate
Captan	Myclobutanil
Carbaryl	Naled
Chloropicrin	Norflurazon
Chlorothalonil	Oryzalin
Chlorpyrifos	Oxamyl
DCPA	Oxydemeton-methyl
DEF	Oxyfluorfen
Diazinon	Paraquat dichloride
Dicofol	Pendimethalin
Diiflubenzuron	Permethrin
Dimethoate	Phorate
Disulfoton	Phosmet
Diuron	Prometryn
Endosulfan	Pronamide
EPTC	Propanil
Esfenvalerate	Propargite
Fenamiphos	Rotenone
Glyphosate	Simazine
Hexazinone	Strychnine
Imazapyr	Telone (1,3-dichlorpropene)
Iprodione	Thiobencarb
Linuron	Triclopyr
Malathion	Trifluralin
Mancozeb	Vinclozolin
Maneb	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 as 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					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	
<i>Selasphorus</i> 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						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	
Creepers, 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	Species	Number
Blackbird, Red-winged	10,835	Warbler, Yellow-rumped	93
Starling, European	6,782	Scrub-Jay, Western	91
Meadowlark, Western	1,710	Harrier, Northern	84
Finch, House	882	Towhee, Spotted	69
Sparrow, Savannah	878	Owl, Barn	62
Sparrow, White-crowned	841	Jay, Steller's	59
Junco, Dark-eyed	758	Woodpecker, Nuttall's	56
Swallow, Barn	631	Teal, Cinnamon	55
Goldfinch, American	628	Thrush, Varied	52
Swallow, Cliff	574	Sparrow, House	49
Blackbird, Brewer's	564	Curlew, Long-billed	46
Goose, Canada	557	Shrike, Loggerhead	46
Coot, American	505	Egret, Great	45
Killdeer	467	Hawk, Red-shouldered	44
Wigeon, American	461	Sparrow, Lincoln's	44
Quail, California	365	Kingbird, Western	38
Pintail, Northern	342	Turkey, Wild	37
Sparrow, Golden-crowned	329	Mockingbird, Northern	37
Swallow, Tree	318	Sparrow, White-throated	37
Bushtit	291	Titmouse, Oak	33
Bluebird, Western	287	Owl, Great Horned	32
Swallow, Violet-green	270	Hummingbird, Allen's	31
Mallard	256	Wren, House	31
Raven, Common	250	Oriole, Bullock's	31
Goldfinch, Lesser	219	Sandpiper, Least	30
Phoebe, Black	212	Kinglet, Ruby-crowned	29
Sparrow, Song	188	Sparrow, Lark	28
Towhee, California	186	Heron, Great Blue	26
Shoveler, Northern	181	Cormorant, Double-crested	25
Dove, Mourning	179	Snipe, Wilson's (Common)	25
Hawk, Red-tailed	176	Woodpecker, Acorn	25
Vulture, Turkey	174	Wren, Bewick's	25
Dowitcher, Long-billed	162	Nuthatch, White-breasted	21
Pigeon, Rock	153	Pelican, American White	19
Bufflehead	146	Woodpecker, Downy	19
Duck, Ruddy	139	Chickadee, Chestnut-backed	18
Pipit, American	133	Eagle, Golden	17
Kestrel, American	130	Yellowlegs, Greater	16
Kite, White-tailed	127	Waxwing, Cedar	16
Duck, Ring-necked	123	Scaup, Lesser	15
Robin, American	123	Hawk, Cooper's	15
Flicker, Northern	110	Cowbird, Brown-headed	15
Gadwall	103	Goose, Greater White-fronted	14
Phoebe, Say's	103	Scaup, Greater	14
Teal, Green-winged	101	Grebe, Pied-billed	13
Crow, American	101	Moorhen, Common	13
Hummingbird, Anna's	100	Swift, Vaux's	12
Canvasback	96	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
<i>Selasphorus</i> 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

Species	Number
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
<i>Selasphorus</i> 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

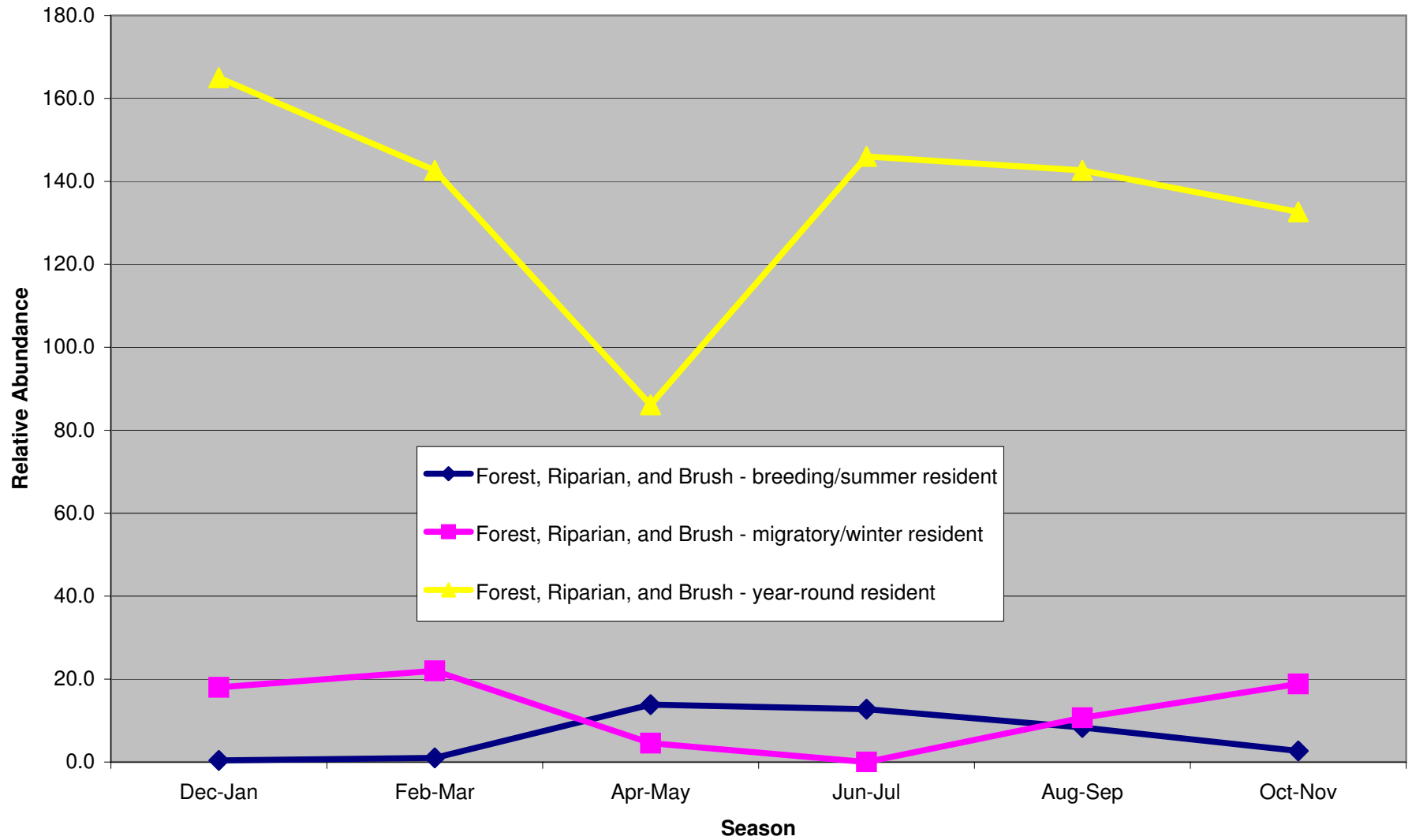


Figure 2: Grassland Guild, Birds of Tolay Lake Regional Park

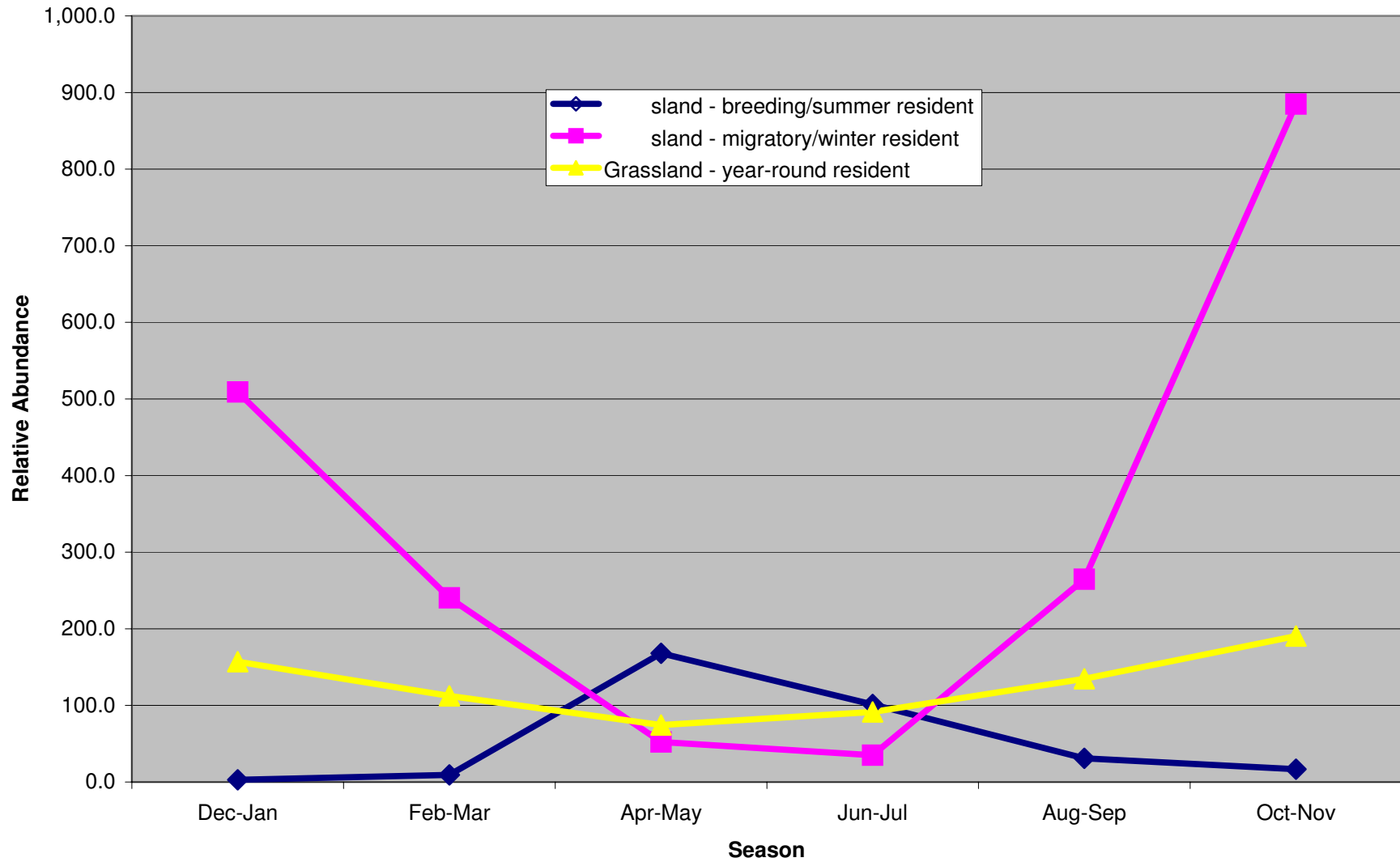


Figure 3: Raptors, Birds of Tolay Lake Regional Park

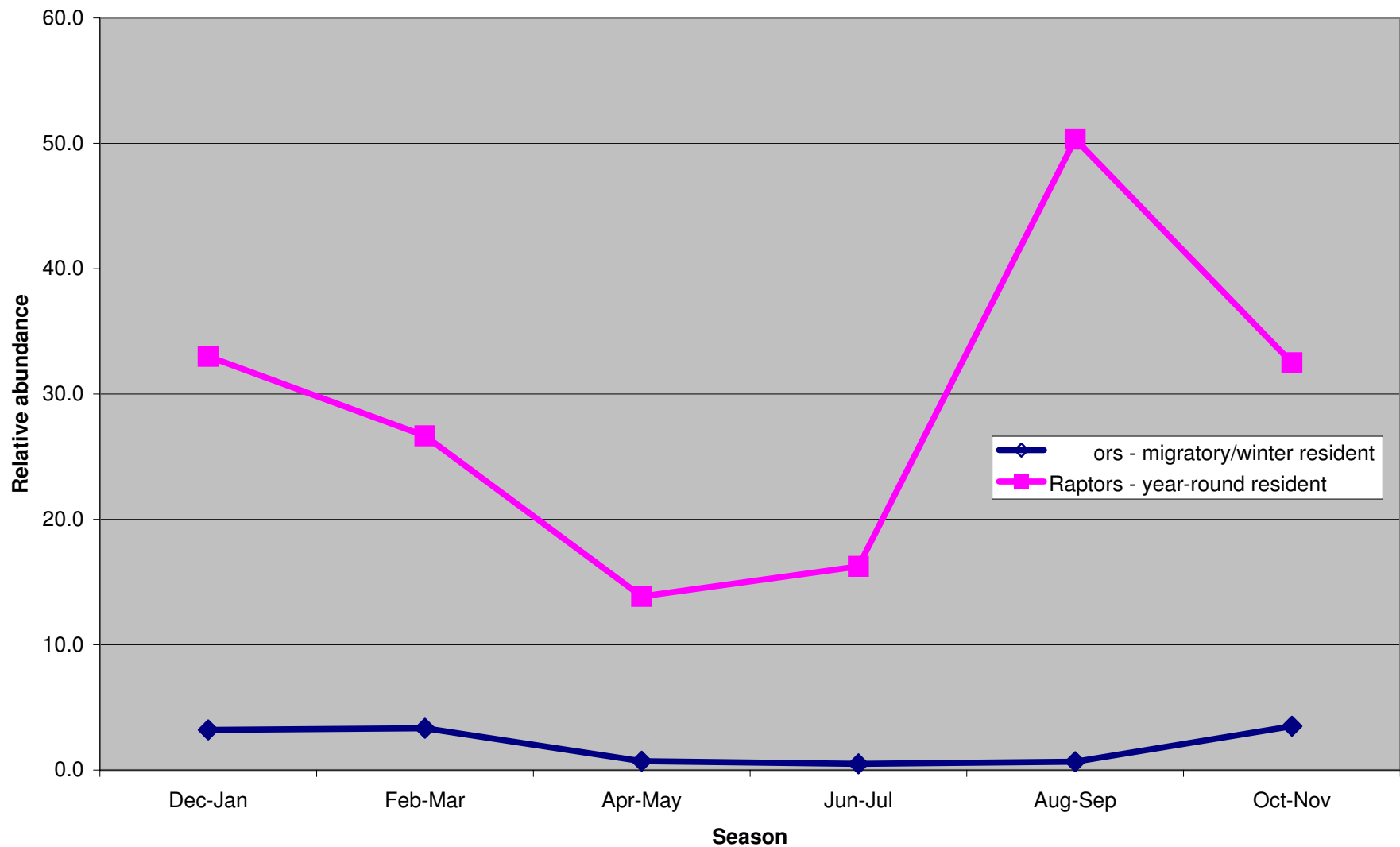


Figure 4: Waterbirds, Birds of Tolay Lake Regional Park

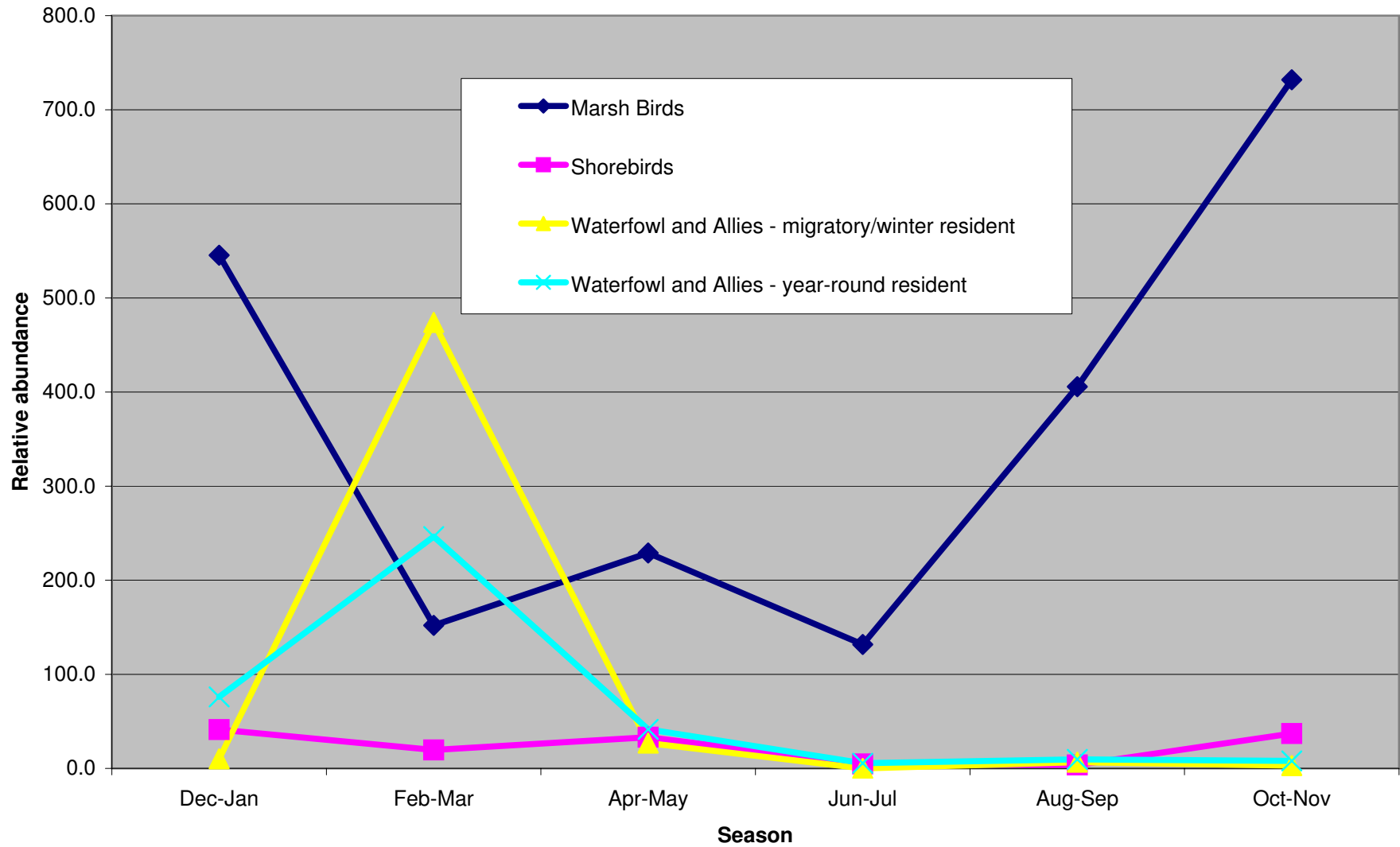
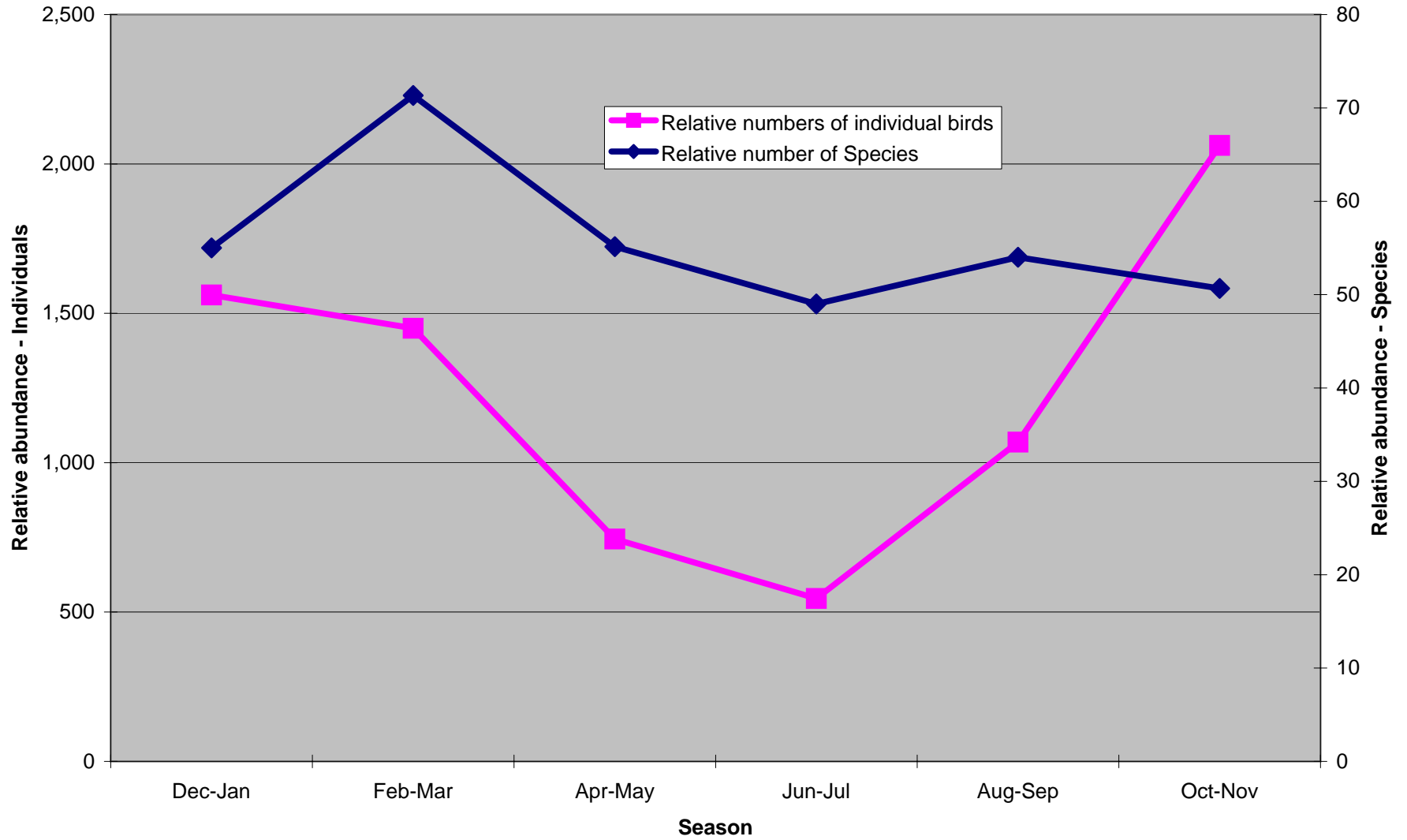


Figure 5: Relative Abundance by Season, Birds of Tolay Lake Regional Park



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.



BIOLOGICAL RESOURCES STUDY
TOLAY CREEK RANCH
SONOMA COUNTY, CALIFORNIA

Submitted to:

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LSA

May 20, 2009

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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 (SCAPOS 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 (SCAPOS 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's 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 warrants monitoring, or taxa that are on the periphery of their range and are threatened with their extirpation in California. 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 (CNDDDB 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 CNDDDB 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 Gallagher, 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 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.

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 1 and 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 CNDDDB (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 and Engineering 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 (GID 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 mélangé 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 is 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 (*Toxicodendron 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 (*Aristolochia 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 (*Platiiodon 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 (*Ranunculus californica*) in patches in the Lower Tolay Valley. Miniature 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 (*Anaxyrus 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 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 (*Xanthium 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 pennyroyal (*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 (*Artemisia 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's 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 CNDDDB 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 CNDDDB 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. *neglecta*), 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 vernal 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 CNDDDB (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 gnaphosid 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 approximately 12 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 concern¹. 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 (CNDDDB 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 boylei*) 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 from 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 (CNDDDB 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 (CNDDDB 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 habitat 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 valuable 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 CNDDDB 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 zigadene should be established in another area of suitable habitat as mitigation. One manner of implementing the mitigation is to collect marsh zigadene 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 zereene 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 introduction of cattle. Likewise, the breadth 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 by the 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 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. Occasional short-term grazing may be necessary to maintain the habitat diversity of Tolay Creek.

This fencing could occur in phases because of the expense involved in fencing the several miles 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 ecological 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 (*Lathyrus 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 by 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 dominant 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 significant 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 species of 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-permanent 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. Nevertheless 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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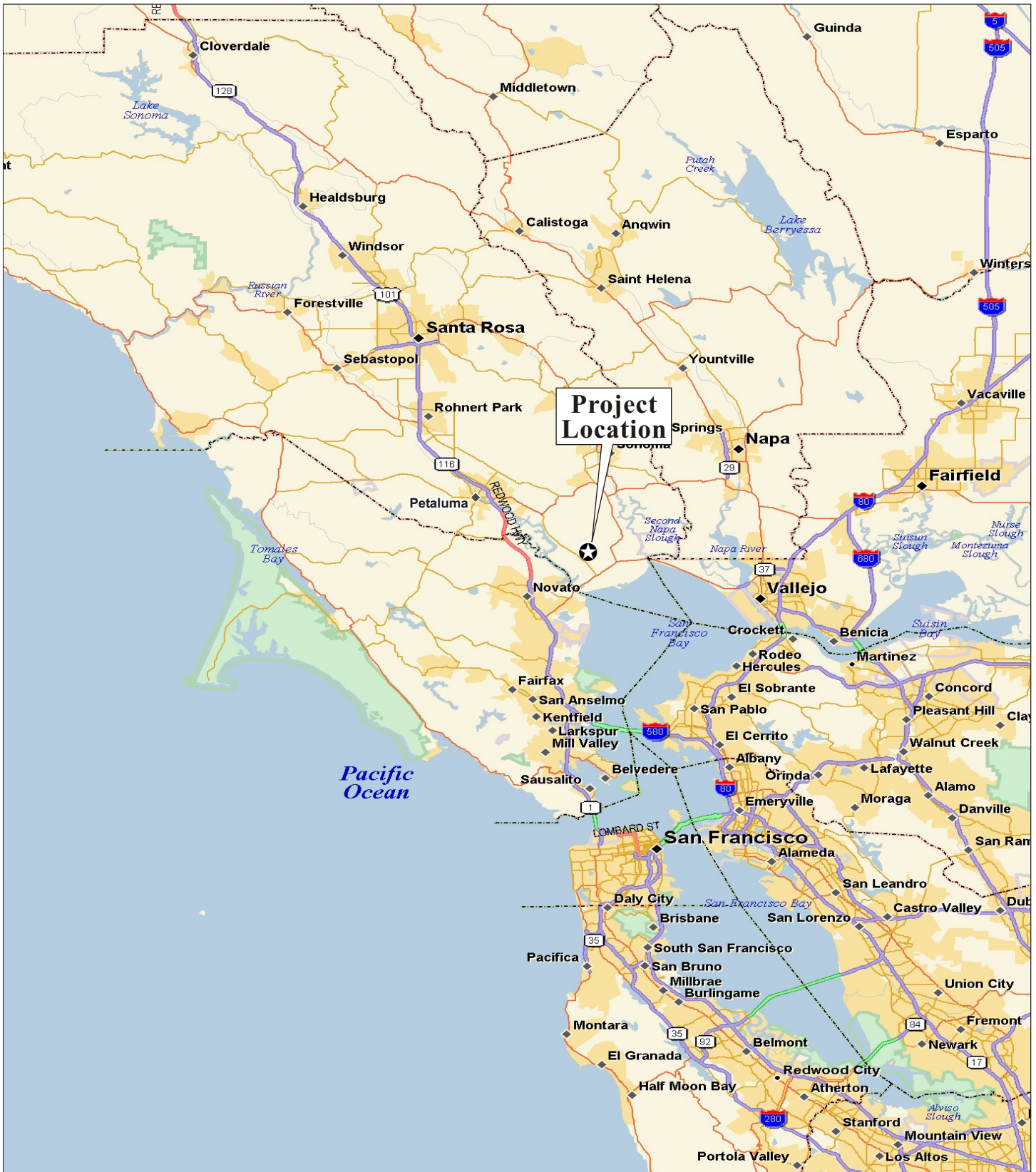
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8.3 PERSONAL COMMUNICATIONS

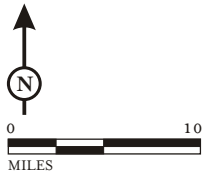
- Sam Bacchini, Biological Consultant, EIP Associates, Sacramento, Conducted field work for Parson (1996)
- Steve Ehret, Park Planner, Sonoma County Regional Parks, Santa Rosa, California
- Matteo Garbelotto, Plant Pathologist, expert on Sudden Oak Death, University of California, Berkeley
- Robert Neale, Stewardship Director, Sonoma Land Trust, Santa Rosa, California
- B.J. Roche, 2007. Roche Ranch Representative

FIGURES

- Figure 1: Project Location and Vicinity
- Figure 2: Project Area
- Figure 3: Adjacent Properties
- Figure 4: Soils
- Figure 5: Vegetation and Habitat Map
- Figure 6: Location of Special-status Species and Habitat
- Figure 7: Restoration and Management Areas
- Figure 8: Non-native Species



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SOURCE: ©2006 DeLORME. STREET ATLAS USA®2006.

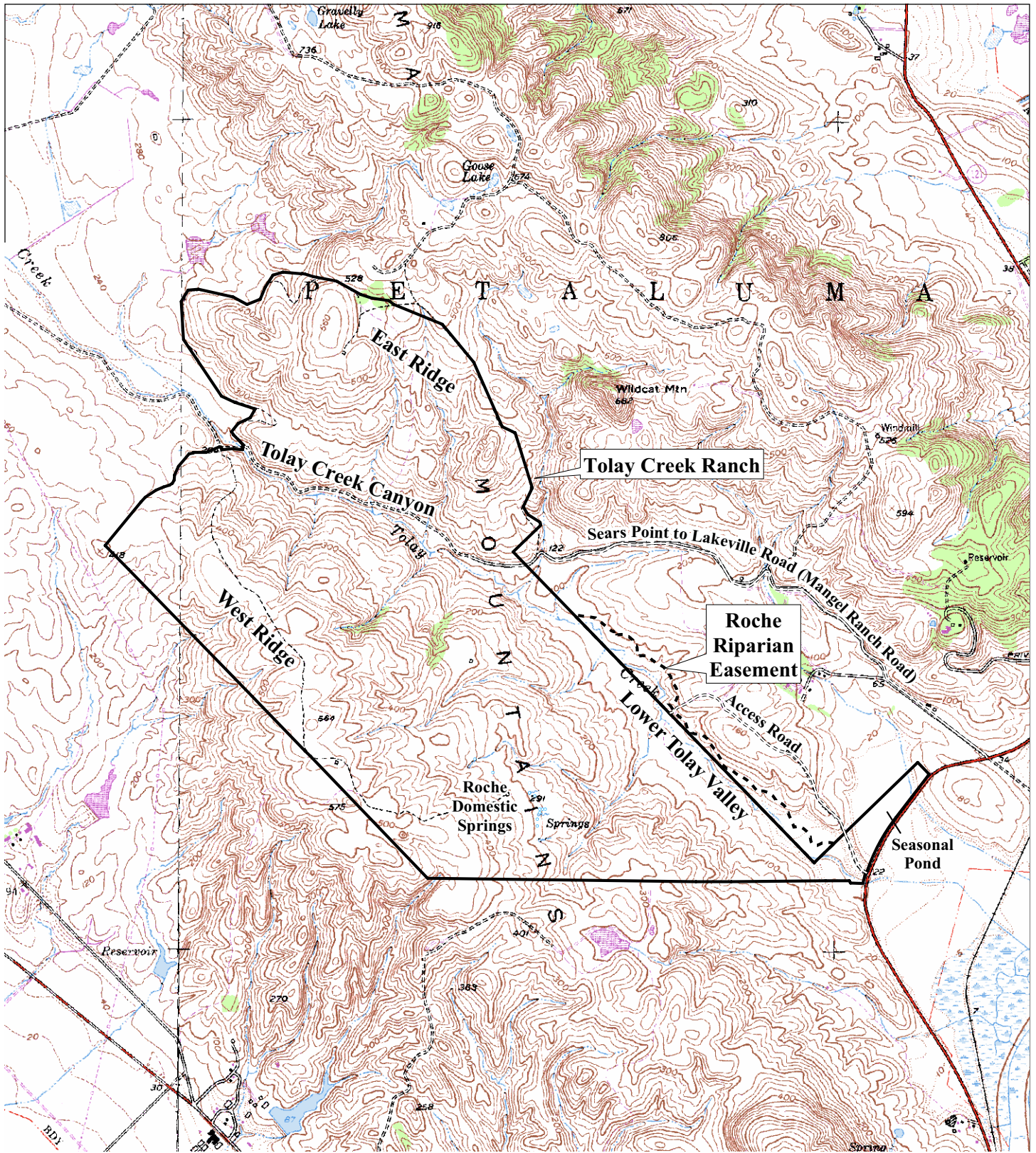
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FIGURE 1

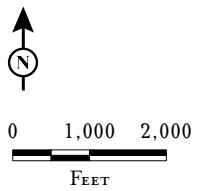
Biological Resources Study

*Tolay Creek Ranch
Sonoma County, California*

Project Location and Vicinity



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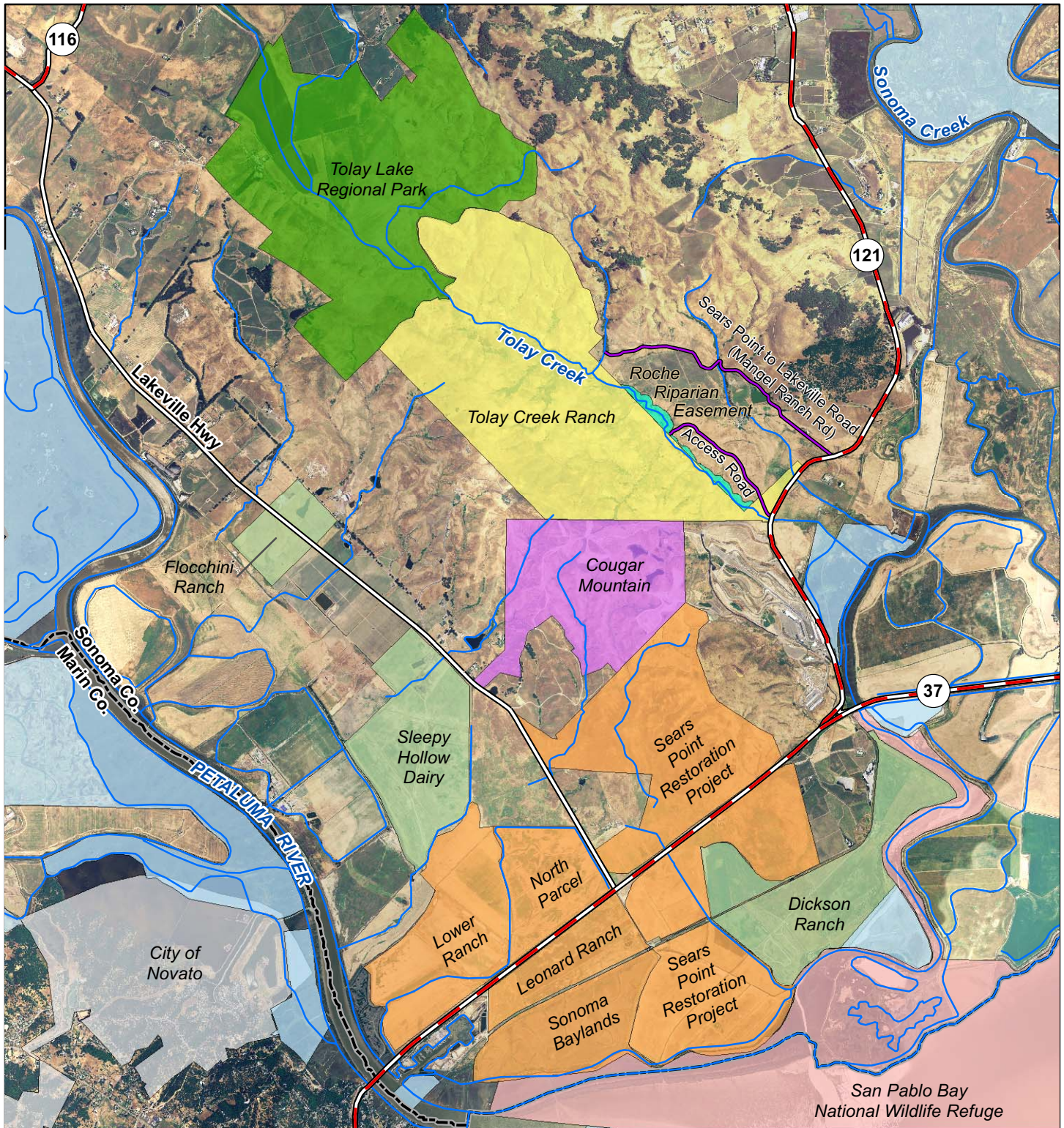


- TOLAY CREEK RANCH BOUNDARY
 - - - ROCHE RIPARIAN EASEMENT BOUNDARY
- STUDY AREA INCLUDES BOTH
TOLAY CREEK RANCH AND
THE ROCHE RIPARIAN EASEMENT

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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






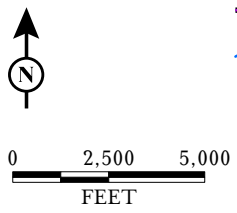
-  HIGHWAYS
-  MAJOR ROADS
-  ROCHE ACCESS ROADS
-  STREAMS
-  TOLAY CREEK RANCH PROPERTY
-  ROCHE RIPARIAN EASEMENT
-  SONOMA COUNTY REGIONAL PARK DEPT.
-  SONOMA COUNTY AG. PRESERVATION AND OPEN SPACE DISTRICT
-  SONOMA COUNTY OPEN SPACE EASEMENT
-  SONOMA LAND TRUST PROTECTED LANDS
-  CALIF. DEPT. OF FISH AND GAME LANDS
-  OTHER PUBLIC LANDS

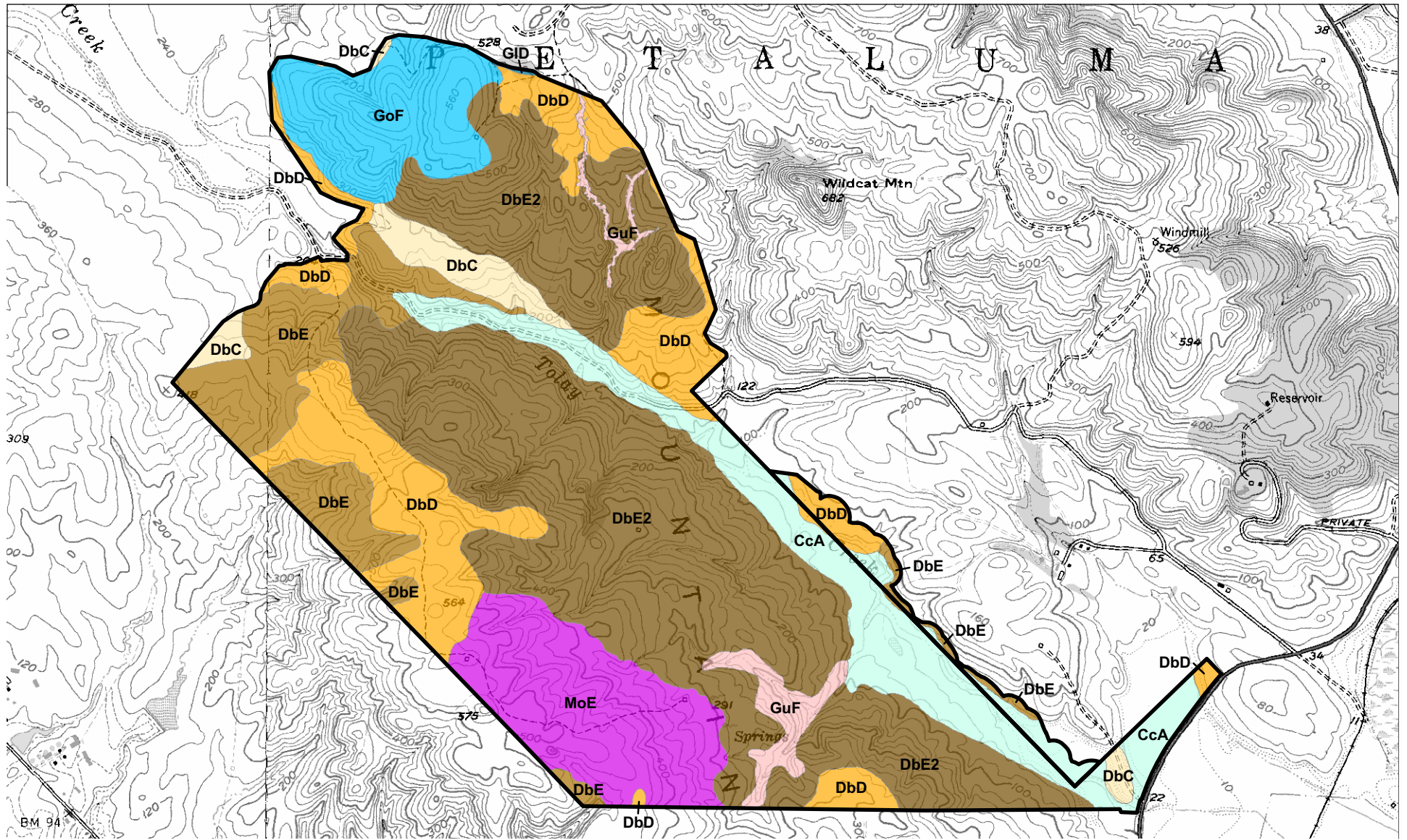
FIGURE 3

*Biological Resources Study
Tolay Creek Ranch
Sonoma County, California*

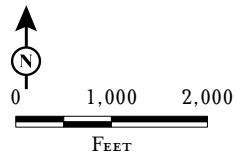
Adjacent Properties



Source: Ray Carlson & Assoc.; Sonoma County Ag Pres. & OS District; Sonoma Land Trust. USDA NAIP 2005. Adapted from Circuit Rider Productions, Inc.
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- | | | | |
|---|--|--|--|
|  | CcA CLEAR LAKE CLAY LOAM, 0-2% SLOPES |  | GID 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 | | |

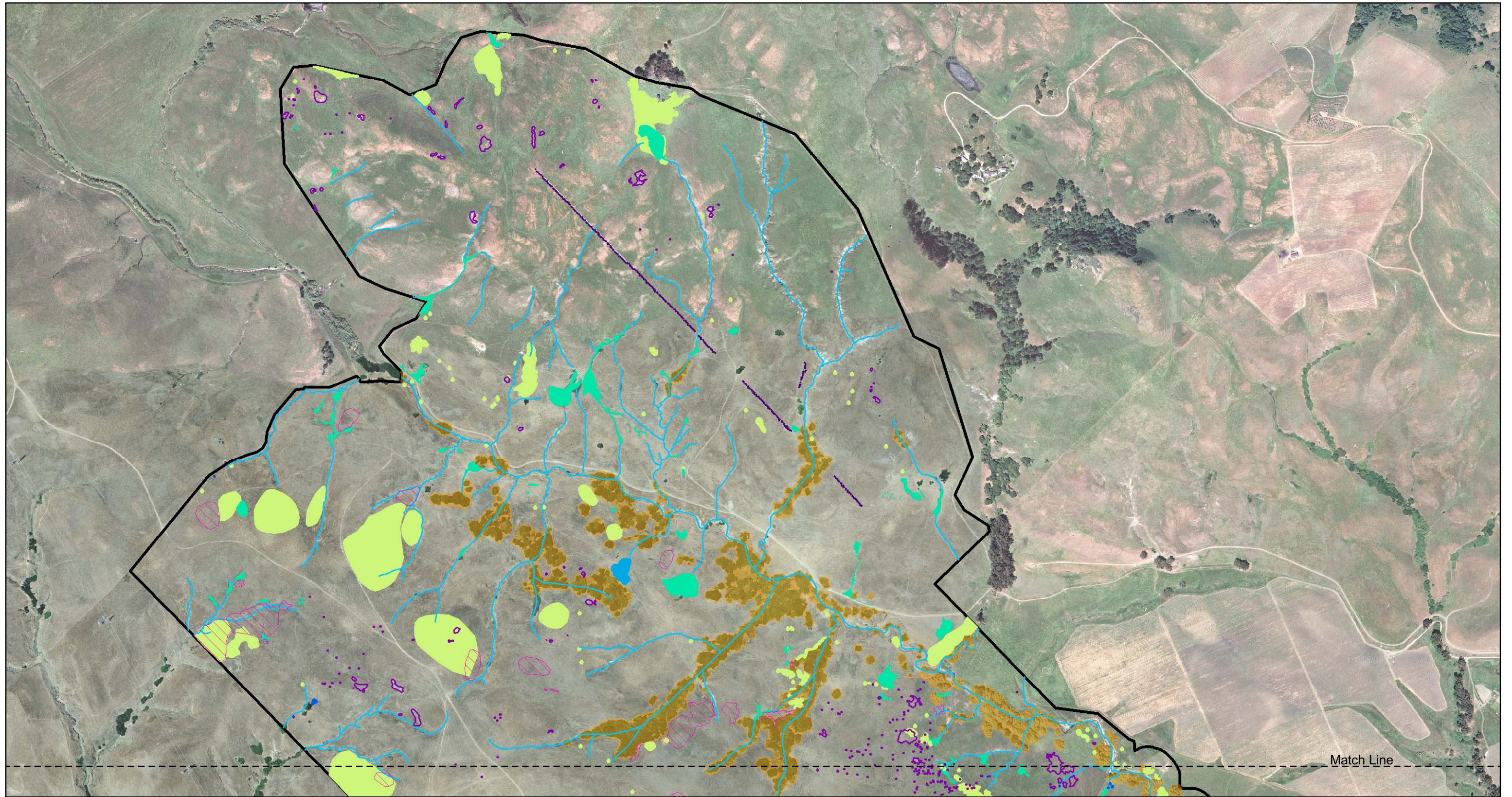
FIGURE 4

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

















Soils



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- | | | | | | |
|---|-----------------------------|---|--|---|---------------------------------------|
|  | GRASSLAND WITH NATIVE FORBS |  | ROCK OUTCROPS |  | VERNAL POOL AND LARGE SEASONAL POND |
|  | NATIVE GRASSLAND |  | ROCK WALL |  | SMALL SEASONAL PONDS AND CREATED POND |
|  | NON-NATIVE GRASSLAND |  | SERPENTINE SOILS
(MONTARA COBBLY CLAY LOAM) |  | WETLAND |
|  | WOODLAND |  | |  | ROCHE DOMESTIC SPRINGS |
| | |  | |  | DRAINAGE |
| | |  | |  | STUDY AREA BOUNDARY |

Match Line

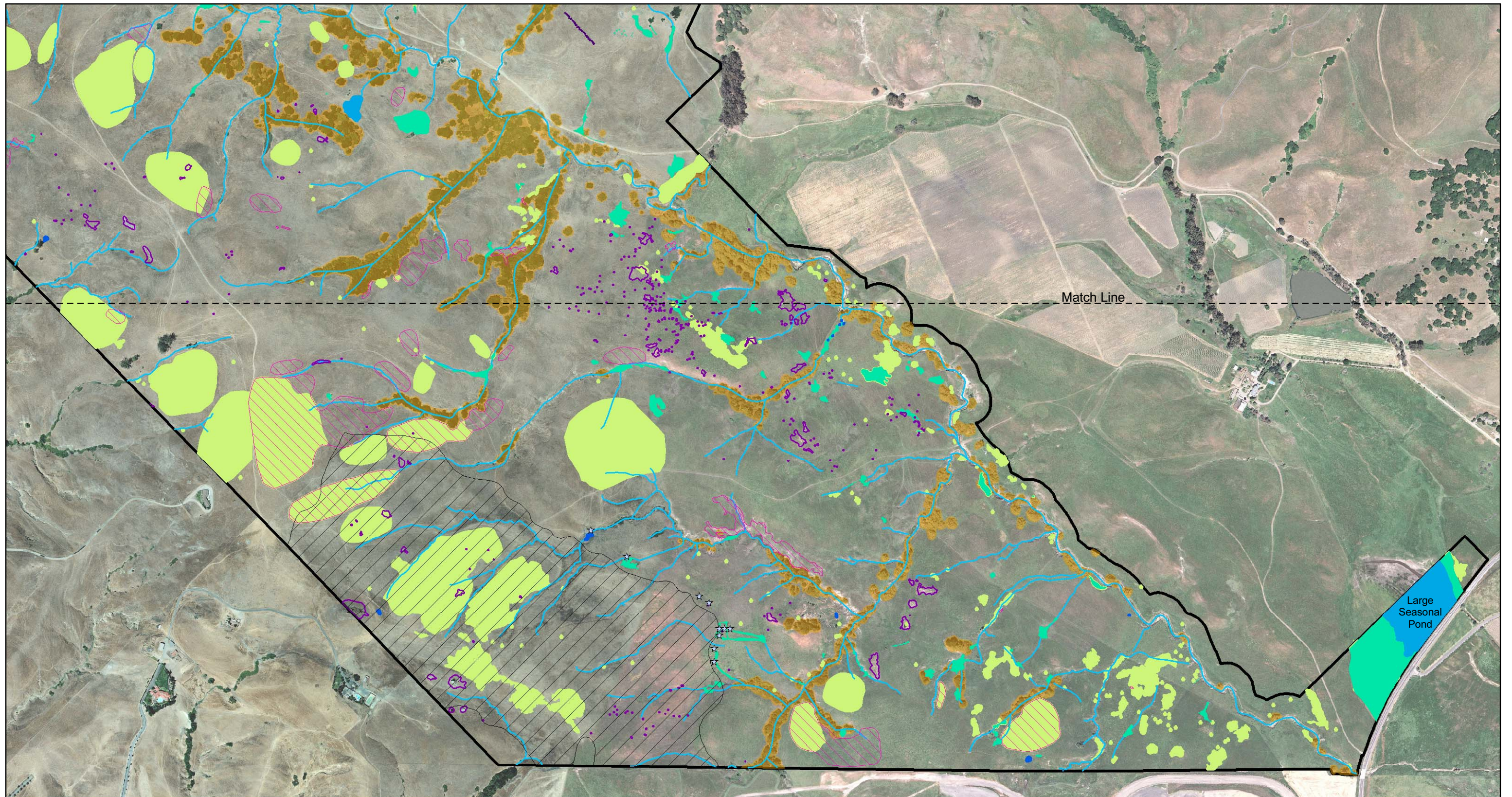
FIGURE 5a

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

Vegetation and Habitat Map



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- | | | | | | |
|---|-----------------------------|---|--|---|---------------------------------------|
|  | GRASSLAND WITH NATIVE FORBS |  | ROCK OUTCROPS |  | VERNAL POOL AND LARGE SEASONAL POND |
|  | NATIVE GRASSLAND |  | ROCK WALL |  | SMALL SEASONAL PONDS AND CREATED POND |
|  | NON-NATIVE GRASSLAND |  | SERPENTINE SOILS
(MONTARA COBBLY CLAY LOAM) |  | WETLAND |
|  | WOODLAND |  | |  | ROCHE DOMESTIC SPRINGS |
| | |  | |  | DRAINAGE |
| | | | | | STUDY AREA BOUNDARY |

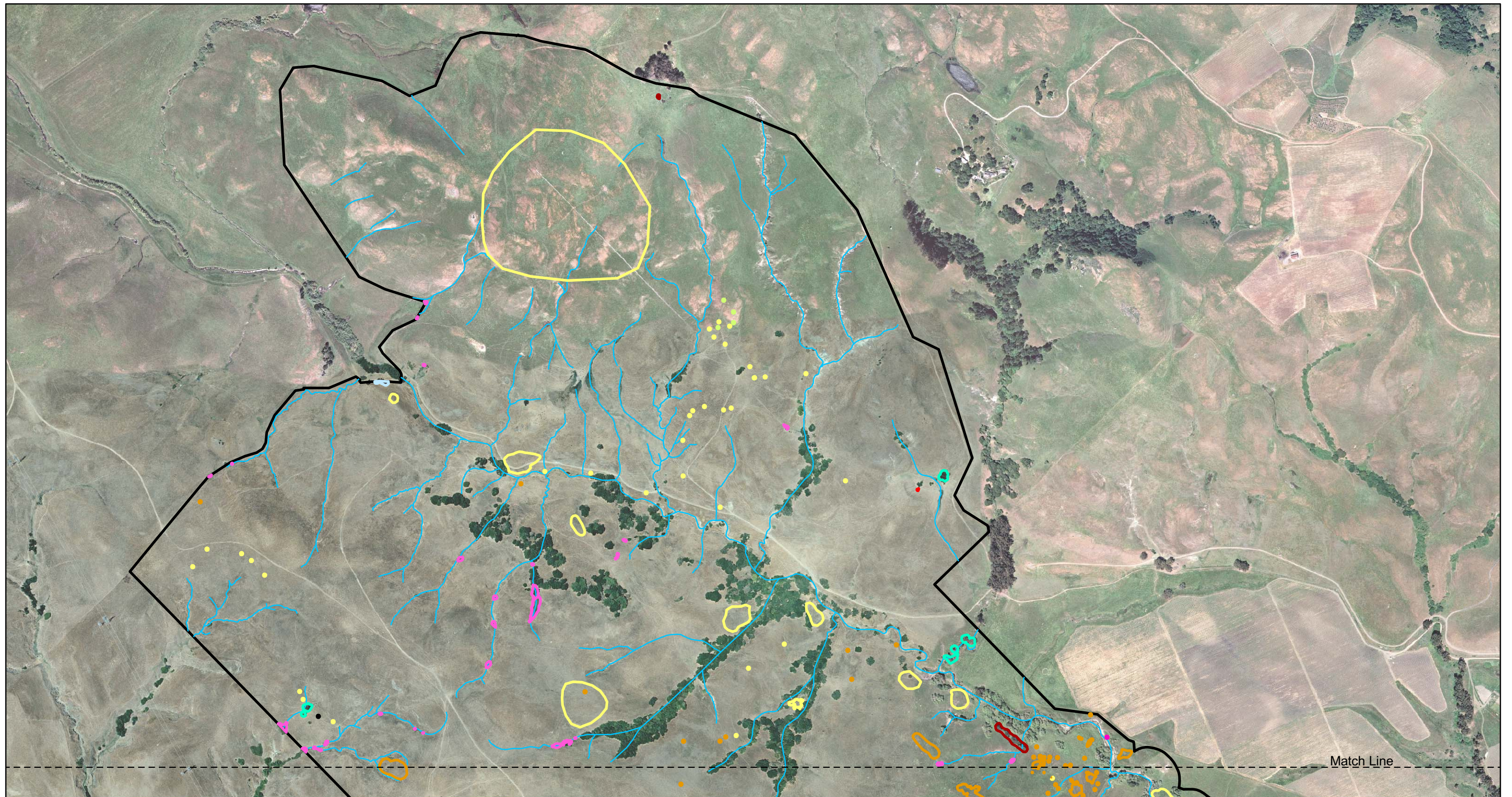
FIGURE 5b

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California






Vegetation and Habitat Map











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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

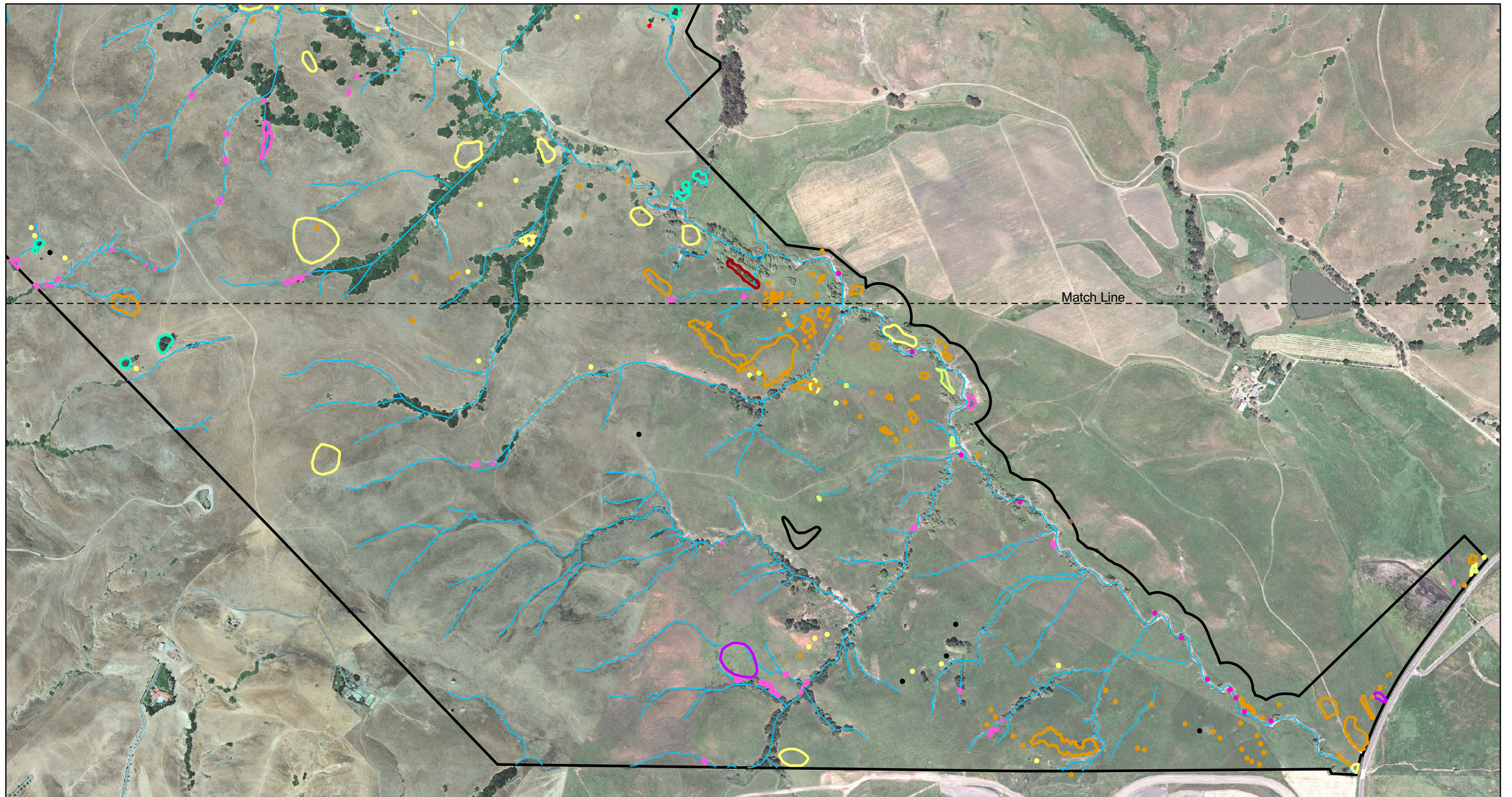
Match Line

FIGURE 6a

Biological Resources Study

Tolay Creek Ranch
Sonoma County, California

Non-native Species



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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

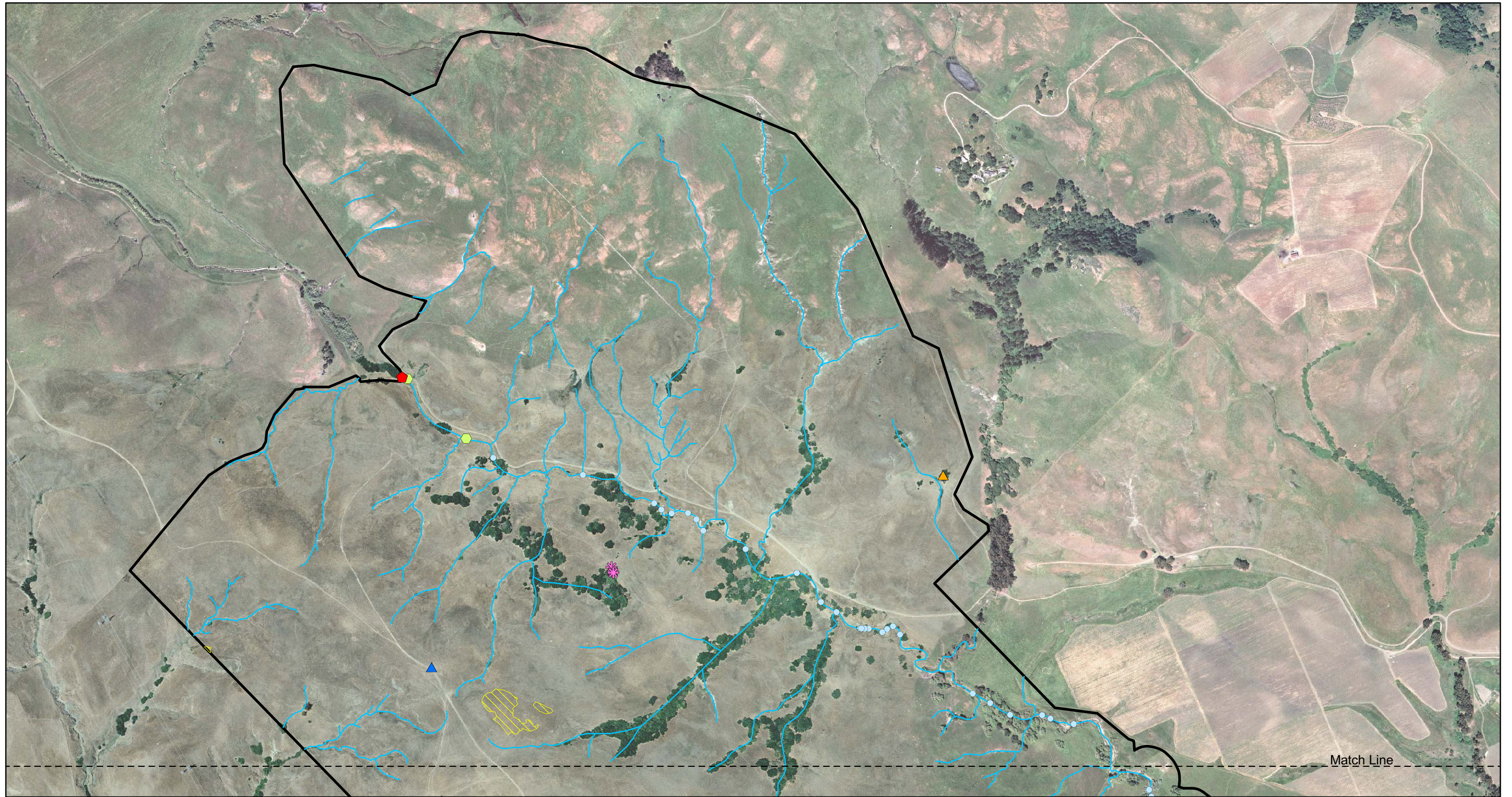
- DRAINAGE
- STUDY AREA BOUNDARY

FIGURE 6b

Biological Resources Study

Tolay Creek Ranch
Sonoma County, California

Non-native Species



LSA



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MARIN WESTERN FLAX (*HESPEROLINON CONGESTUM*)



LOBB'S AQUATIC BUTTERCUP (*RANUNCULUS LOBBI*)



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

Match Line

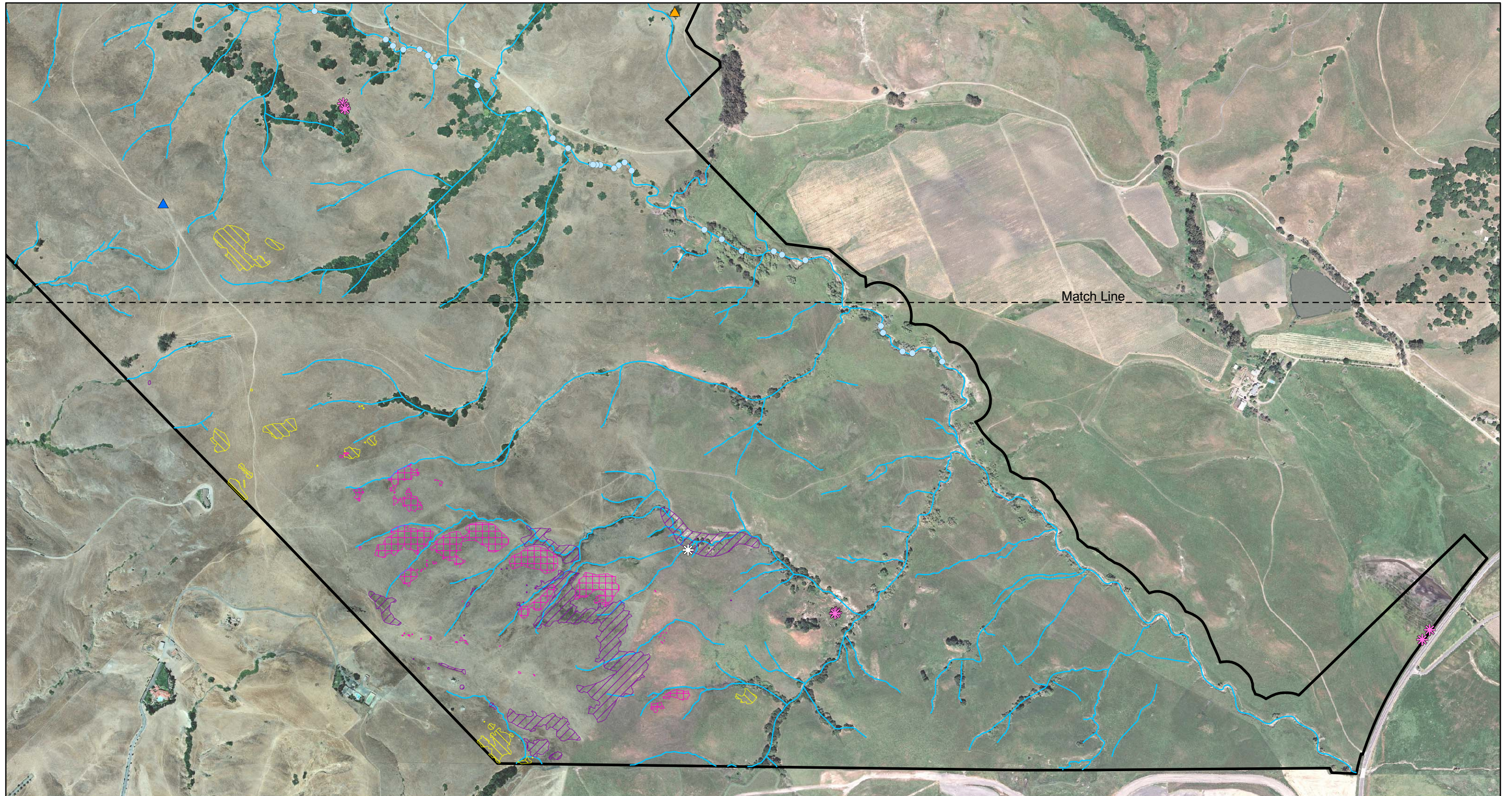
FIGURE 7a

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

Location of Special-status
Species and Habitat



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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

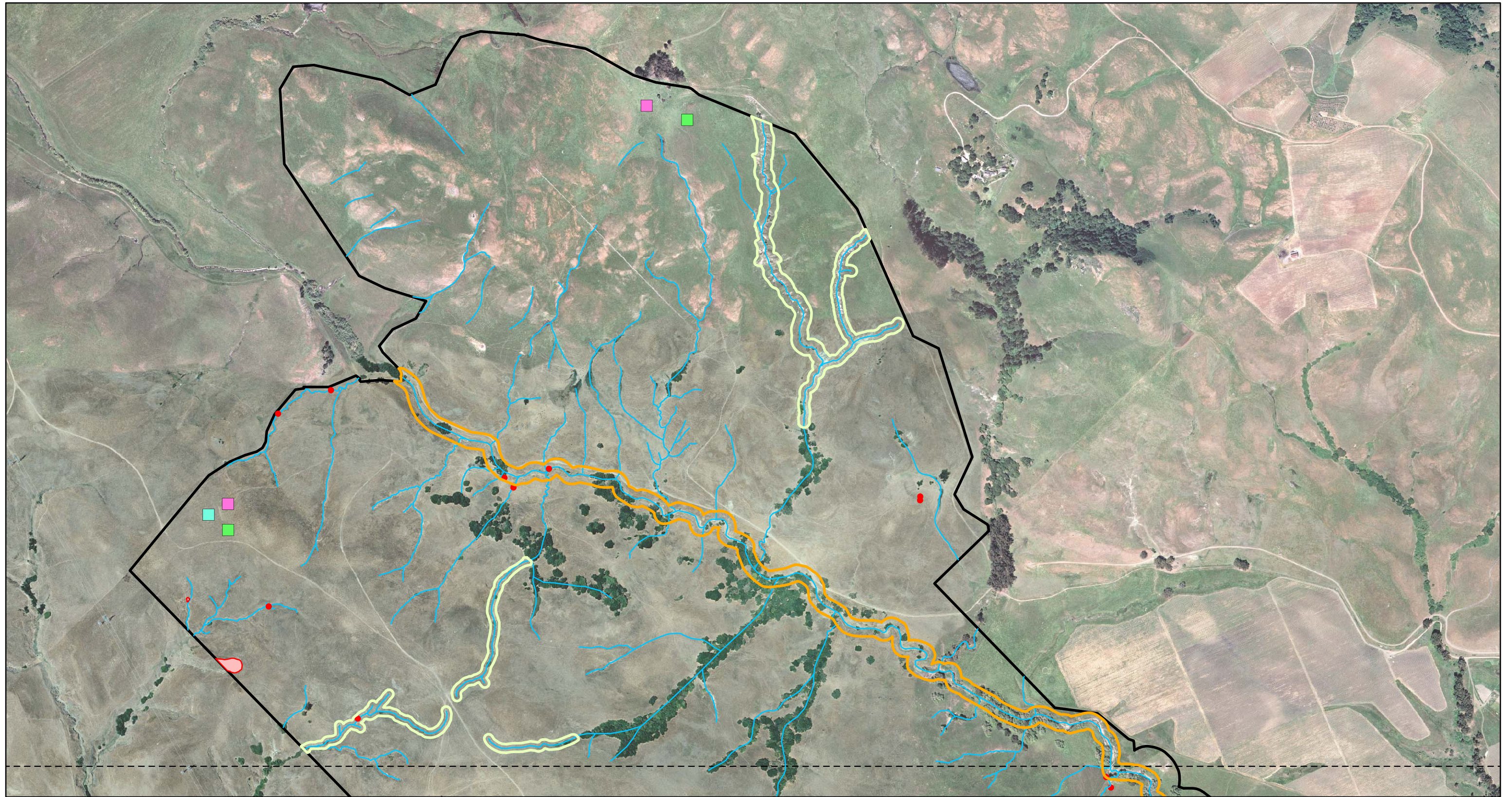
FIGURE 7b

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

Location of Special-status
Species and Habitat



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


- | | | | | | |
|---|---|---|------------------------|---|---------------------|
|  | CANDIDATE OAK WOODLAND RESTORATION AREA |  | NATIVE FORBS |  | DRAINAGE |
|  | GRAZING MANAGEMENT AREA |  | NATIVE GRASSLAND |  | STUDY AREA BOUNDARY |
|  | EROSION MANAGEMENT AREA |  | NATIVE GRASSLAND/FORBS | | |
|  | SEASONAL POND MANAGEMENT AREA |  | NON-NATIVE GRASSLAND | | |

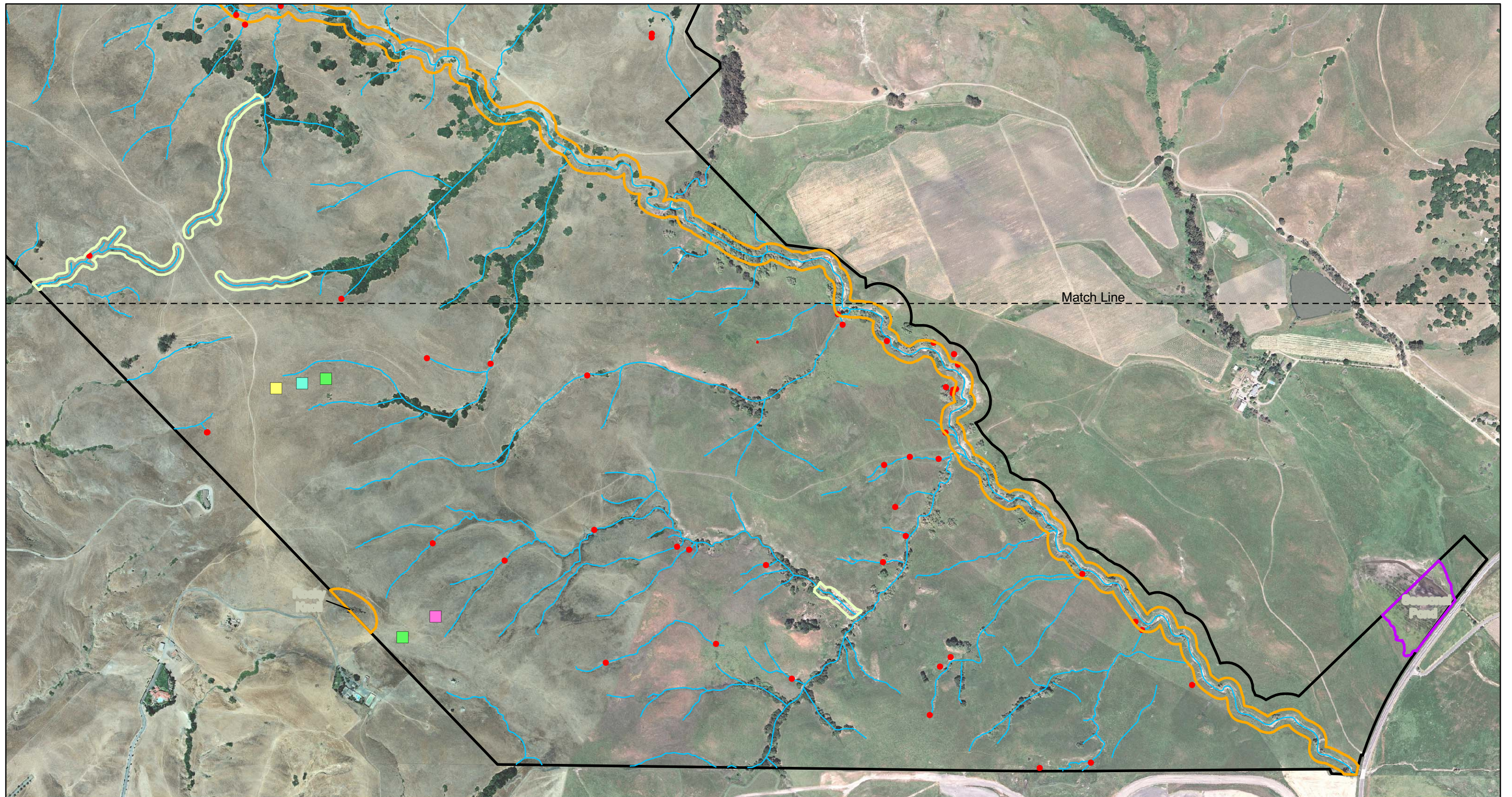
FIGURE 8a

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

Restoration and Management Areas



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

- | | | | |
|---|---|---|---------------------|
|  | CANDIDATE OAK WOODLAND RESTORATION AREA |  | DRAINAGE |
|  | GRAZING MANAGEMENT AREA |  | STUDY AREA BOUNDARY |
|  | EROSION MANAGEMENT AREA | | |
|  | SEASONAL POND MANAGEMENT AREA | | |
| | GRAZING EXCLUSION AREAS | | |
|  | NATIVE FORBS | | |
|  | NATIVE GRASSLAND | | |
|  | NATIVE GRASSLAND/FORBS | | |
|  | NON-NATIVE GRASSLAND | | |

FIGURE 8b

Biological Resources Study

Tolay Creek Ranch

Sonoma County, California

Restoration and Management Areas

TABLES

Table A: Plant Species Observed

Table B: Animal Species Observed

Table A: Plant Species Observed, Tolay Creek Ranch 2008

Family	Scientific Name	Common Name	Native
Aceraceae	<i>Acer macrophyllum</i>	big-leaf maple	yes
Alismataceae	<i>Alisma lanceolatum</i>	water plantain	no
Anacardiaceae	<i>Toxicodendron diversilobum</i>	poison oak	yes
Apiaceae	<i>Conium maculatum</i>	poison hemlock	no
	<i>Daucus pusillus</i>	American wild carrot	yes
	<i>Eryngium aristulatum</i>	coyote thistle	yes
	<i>Foeniculum vulgare</i>	sweet fennel	no
	<i>Hydrocotyle ranunculoides</i>	water pennywort	yes
	<i>Lomatium utriculatum</i>	spring-gold	yes
	<i>Perideridia kelloggii.</i>	yampah	yes
	<i>Sanicula bipinnata</i>	poison sanicle	yes
	<i>Sanicula bipinnatifida</i>	purple sanicle	yes
	<i>Sanicula crassicaulis</i>	Pacific sanicle	yes
	<i>Scandix pecten-veneris</i>	Venus needle	no
	<i>Torilis arvensis</i>	field hedge parsley	no
	<i>Torilis nodosa</i>	knotted hedge parsley	no
Aristolochiaceae	<i>Aristolochia californica</i>	Dutchman's pipe	yes
Asclepiadaceae	<i>Asclepias fascicularis</i>	narrowleaf milkweed	yes
Asteraceae	<i>Achillea millefolium</i>	yarrow	yes
	<i>Agoseris grandiflora</i>	grand mountain dandelion	yes
	<i>Artemisia douglasiana</i>	mugwort	yes
	<i>Aster radulinus</i>	broad leaf aster	yes
	<i>Baccharis pilularis</i>	coyote brush	yes
	<i>Baccharis salicifolia</i>	mule fat	yes
	<i>Blennosperma nanum</i> var. <i>nanum</i>	common blennosperma	yes
	<i>Carduus pycnocephalus</i>	Italian thistle	no
	<i>Centaurea calcitrapa</i>	purple star-thistle	no
	<i>Centaurea melitensis</i>	Maltese star-thistle	no
	<i>Centaurea solstitialis</i>	yellow star-thistle	no
	<i>Cirsium vulgare</i>	bull thistle	no
	<i>Cotula coronopifolia</i>	brass buttons	yes
	<i>Erigeron philadelphicus</i>	Philadelphia daisy	yes
	<i>Gnaphalium stramineum</i>	cotton-batting plant	yes
	<i>Hemizonia congesta</i> ssp. <i>congesta</i>	hayfield tarweed	yes
	<i>Hemizonia congesta</i> ssp. <i>luzulaefolia</i>	hayfield tarweed	yes
	<i>Hesperis matronalis</i> var. <i>sparsiflora</i>	erect hesperserevax	yes
	<i>Hypochaeris glabra</i>	smooth cat's ears	no
	<i>Lactuca saligna</i>	willowleaf lettuce	no
	<i>Lactuca serriola</i>	prickly lettuce	no
	<i>Lasthenia californica</i>	California goldfields	yes
	<i>Lasthenia glaberrima</i>	rayless goldfields	yes
	<i>Layia chrysanthemoides</i> ssp. <i>chrysanthemoides</i>	tidy-tips	yes
	<i>Layia platyglossa</i>	tidy tips	yes
	<i>Madia gracilis</i>	slender tarweed	yes
	<i>Madia sativa</i>	coast tarweed	yes
	<i>Microseris douglasii</i> ssp. <i>tenella</i>	Douglas microseris	yes

Family	Scientific Name	Common Name	Native
	<i>Picris echioides</i>	bristly ox-tongue	no
	<i>Senecio vulgaris</i>	common groundsel	no
	<i>Silybum marianum</i>	milk thistle	no
	<i>Sonchus asper</i>	prickly sow-thistle	no
	<i>Taraxacum officinale</i>	dandelion	no
	<i>Tragopogon porrifolius</i>	oyster plant	no
	<i>Wyethia angustifolia</i>	mule's ears	yes
	<i>Xanthium spinosum</i>	spiny cochlebur	no
	<i>Xanthium strumarium</i>	cochlebur	no
Boraginaceae	<i>Amsinskia menziesii</i> var. <i>menziesii</i>	Menzies' fiddleneck	yes
	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	intermediate fiddleneck	yes
	<i>Heliotropium curassavicum</i>	heliotrope	yes
	<i>Plagiobotrys notofulvus</i>	common popcorn flower	yes
	<i>Plagiobotrys stipitatus</i>	valley popcorn flower	yes
Brassicaceae	<i>Brassica nigra</i>	black mustard	no
	<i>Capsella bursa-pastoris</i>	shepherd's purse	no
	<i>Cardamine californica</i>	California toothwort	yes
	<i>Cardamine oligosperma</i>	little western bitter-cress	yes
	<i>Guillenia lasiophylla</i>	California mustard	yes
	<i>Lepidium nitidum</i>	peppergrass	yes
	<i>Raphanus raphanistrum</i>	jointed charlock	no
	<i>Raphanus sativus</i>	wild radish	no
	<i>Rorippa nasturtium-aquaticum</i>	water cress	yes
	<i>Sisymbrium officinale</i>	hedge mustard	no
	<i>Sinapis arvensis</i>	charlock	no
Campanulaceae	<i>Downingia pulchella</i>	valley downingia	yes
Caprifoliaceae	<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	yes
Caryophyllaceae	<i>Cerastium glomeratum</i>	mouse ear chickweed	no
	<i>Minuartia douglasii</i>	Douglas sandwort	yes
	<i>Sagina</i> sp.	pearlwort	yes
	<i>Silene gallica</i>	windmill pinks	no
	<i>Stellaria media</i>	common chickweed	no
Chenopodiaceae	<i>Atriplex triangularis</i>	spearscale	yes
Convolvulaceae	<i>Calystegia subacaulis</i>	stemless morning glory	yes
	<i>Convolvulus arvensis</i>	bindweed	no
	<i>Cressa truxillensis</i>	alkali weed	yes
Crassulaceae	<i>Crassula connata</i>	sand pygmyweed	yes
Cucurbitaceae	<i>Marah fabaceus</i>	California man-root	yes
Cyperaceae	<i>Bolboschoenus maritimus</i>	prairie bulrush	yes
	<i>Carex</i> sp1	sedge	yes
	<i>Carex</i> sp2	sedge	yes
	<i>Cyperus eragrostis</i>	nutsedge	yes
	<i>Eleocharis macrostachya</i>	spikerush	yes
	<i>Scirpus acutus</i> var. <i>occidentalis</i>	bulrush	yes
	<i>Scirpus americanus</i>	three square	yes
Dipsacaceae	<i>Dipsacus</i> sp.	wild teasel	no
Dryopteridaceae	<i>Dryopteris arguta</i>	wood fern	yes
Equisetaceae	<i>Equisetum laevigatum</i>	smooth scouring rush	yes
	<i>Equisetum telmateia</i> ssp. <i>braunii</i>	giant horsetail	yes

Family	Scientific Name	Common Name	Native
Euphorbiaceae	<i>Chamaesyce</i> sp.	sandmat	?
	<i>Euphorbia crenulata</i>	Chinese cups	yes
Fabaceae	<i>Acacia melanoxylon</i>	blackwood acacia	no
	<i>Astragalus gambellianus</i>	Gambel's milk-vetch	yes
	<i>Glycyrrhiza lepidota</i>	American licorice	yes
	<i>Lathyrus vestitus</i>	sweet pea	yes
	<i>Lotus purshianus</i> var. <i>purshianus</i>	Spanish clover	yes
	<i>Lotus tenuis</i>	narrow-leaf bird's-foot trefoil	no
	<i>Lotus wrangelianus</i>	California lotus	yes
	<i>Lupinus bicolor</i>	miniature lupine	yes
	<i>Lupinus formosus</i> var. <i>formosus</i>	summer lupine	yes
	<i>Lupinus microcarpus</i> var. <i>densiflorus</i>	chick lupine	yes
	<i>Lupinus succulentus</i>	arroyo lupine	yes
	<i>Medicago polymorpha</i>	California burclover	no
	<i>Melilotus indica</i>	yellow sweetclover	no
	<i>Thermopsis macrophylla</i>	false lupine	yes
	<i>Trifolium albopurpureum</i>	rancheria clover	yes
	<i>Trifolium bifidum</i>	notchleaf clover	yes
	<i>Trifolium campestre</i>	hop clover	no
	<i>Trifolium dubium</i>	little hop clover	no
	<i>Trifolium fragiferum</i>	strawberry clover	no
	<i>Trifolium fucatum</i>	bull clover	yes
	<i>Trifolium gracilentum</i>	pinpoint clover	yes
	<i>Trifolium hirtum</i>	rose clover	no
	<i>Trifolium incarnatum</i>	crimson clover	no
	<i>Trifolium microdon</i>	thimble clover	yes
	<i>Trifolium olyanthum</i>	fewflower clover	yes
	<i>Trifolium subterraneum</i>	subterranean clover	no
	<i>Trifolium variegatum</i>	whitetip clover	yes
	<i>Vicia benghalensis</i>	reddish tufted vetch	no
	<i>Vicia sativa</i>	common vetch	no
Fagaceae	<i>Quercus agrifolia</i>	coast live oak	yes
	<i>Quercus lobata</i>	valley oak	yes
Frankeniaceae	<i>Frankenia salina</i>	alkali heath	yes
Gentianaceae	<i>Centaurium muehlenbergii</i>	Muelenberg's centaury	yes
Geraniaceae	<i>Erodium botrys</i>	long beaked filaree	no
	<i>Erodium cicutarium</i>	redstem filaree	no
	<i>Erodium moschatum</i>	white-stem filaree	no
	<i>Geranium dissectum</i>	geranium	no
	<i>Geranium molle</i>	dove's foot geranium	no
Hypocastanaceae	<i>Aesculus californica</i>	California buckeye	yes
Hydrophyllaceae	<i>Nemophila heterophylla</i>	variable-leaf baby-blue-eyes	yes
	<i>Phacelia</i> sp.	phacelia	yes
Iridaceae	<i>Sisyrinchium bellum</i>	blue-eyed grass	yes
Juncaceae	<i>Juncus balticus</i>	Baltic rush	yes
	<i>Juncus bufonius</i>	toad rush	yes
	<i>Juncus effusus</i>	common rush	yes
	<i>Juncus patens</i>	spreading rush	yes
	<i>Juncus phaeocephalus</i>	brown-headed rush	yes

Family	Scientific Name	Common Name	Native
Lamiaceae	<i>Mentha pulegium</i>	pennyroyal	no
	<i>Stachys ajugoides</i>	ajuga hedge nettle	yes
Lauraceae	<i>Umbellularia californica</i>	California bay	yes
Liliaceae	<i>Brodiaea elegans</i>	harvest brodiaea	yes
	<i>Calochortus luteus</i>	gold nuggets	yes
	<i>Calochortus venustus</i>	butterfly mariposa lily	yes
	<i>Chlorogalum pomeridianum</i> var. <i>pomeridianum</i>	soap plant	yes
	<i>Dichelostemma capitatum</i>	blue dicks	yes
	<i>Triteleja laxa</i>	Ithuriel's spear	yes
	<i>Zigadenus fremontii</i>	death camas	yes
	<i>Zigadenus micranthus</i> var. <i>fontanus</i>	death camas	yes
Linaceae	<i>Hesperolinon congestum</i>	Marin western flax	yes
Lythraceae	<i>Lythrum hyssopifolia</i>	loosestrife	no
Malvaceae	<i>Malvella leprosa</i>	alkali mallow	yes
	<i>Sidalcea malvaeflora</i>	California checker bloom	yes
Myrtaceae	<i>Eucalyptus globulus</i>	blue gum eucalyptus	no
Onagraceae	<i>Camissonia ovata</i>	suncups	yes
	<i>Clarkia purpurea</i>	winecup clarkia	yes
	<i>Epilobium brachycarpum</i>	willowherb	yes
Papaveraceae	<i>Eschscholzia californica</i>	California poppy	yes
	<i>Platystemon californicus</i>	creamcups	yes
Plantaginaceae	<i>Plantago erecta</i>	California plantain	yes
	<i>Plantago lanceolata</i>	English plantain	no
	<i>Plantago major</i>	common plantain	no
	<i>Plantago subnuda</i>	coast plantain	yes
Poaceae	<i>Agrostis exarata</i>	spike bentgrass	yes
	<i>Agrostis viridis</i> var. <i>scabrida</i>	water bent grass	no
	<i>Avena barbata</i>	slender wildoats	no
	<i>Avena fatua</i>	wild oats	no
	<i>Brachypodium distachyon</i>	false brome	no
	<i>Bromus diandrus</i>	ripgut brome	no
	<i>Bromus hordeaceus</i>	soft chess	no
	<i>Crypsis schoenoides</i>	swamp-timothy	no
	<i>Cynodon dactylon</i>	Bermuda grass	no
	<i>Cynosurus echinatus</i>	hedgehog dogtail	no
	<i>Danthonia californica</i>	California oatgrass	yes
	<i>Distichlis spicata</i>	saltgrass	yes
	<i>Elymus multisetus</i>	big squirreltail grass	yes
	<i>Elymus glaucus</i>	blue wildrye	yes
	<i>Festuca arundinacea</i>	tall fesque	no
	<i>Glyceria</i> sp.	glyceria	no
	<i>Holcus lanatus</i>	velvet grass	no
	<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>	meadow barley	yes
	<i>Hordeum brachyantherum</i> ssp. <i>californicum</i>	California barley	yes
	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	hare barley	no
<i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	Mediterranean barley	no	
<i>Lolium multiflorum</i>	Itaian ryegrass	no	
<i>Melica californica</i>	California melic	yes	
<i>Nassella lepida</i>	foothill needle grass	yes	

Family	Scientific Name	Common Name	Native
	<i>Nassella pulchra</i>	purple needle grass	yes
	<i>Phalaris aquatica</i>	harding grass	no
	<i>Phalaris paradoxa</i>	hood canarygrass	no
	<i>Pleuropogon californicus</i>	California semaphore grass	yes
	<i>Poa annua</i>	annual bluegrass	no
	<i>Polypogon australis</i>	Chilean rabbitfoot grass	no
	<i>Polypogon monspeliensis</i>	rabbitfoot grass	no
	<i>Taeniatherum caput-medusae</i>	medusahead	no
	<i>Vulpia myuros</i>	annual fescue	no
Polemoniaceae	<i>Gilia capitata</i>	globe gilia	yes
	<i>Linanthus bicolor</i>	bi-colored linanthus	yes
	<i>Linanthus parviflorus</i>	common linanthus	yes
Polygonaceae	<i>Polygonum arenastrum</i>	common knotweed	no
	<i>Polygonum</i> sp.	aquatic knotweed	?
	<i>Rumex acetosella</i>	sheep sorrel	no
	<i>Rumex crispus</i>	curly dock	no
	<i>Rumex pulcher</i>	fiddle dock	no
Polypodiaceae	<i>Polypodium californicum</i>	California polypody	yes
Portulacaceae	<i>Calandrinia ciliata</i>	red maids	yes
	<i>Claytonia perfoliata</i>	miner's lettuce	yes
Primulaceae	<i>Anagallis arvensis</i>	scarlet pimpernel	no
	<i>Dodecatheon hendersonii</i>	shooting star	yes
Pteridiaceae	<i>Adiantum jordanii</i>	California maidenhair fern	yes
	<i>Pellaea andromedifolia</i>	coffee fern	yes
	<i>Pentagramma triangularis</i>	goldback fern	yes
Ranunculaceae	<i>Delphinium variagatum</i>	royal larkspur	yes
	<i>Ranunculus aquatilis</i>	water buttercup	yes
	<i>Ranunculus californicus</i>	California buttercup	yes
	<i>Ranunculus lobbii</i>	Lobb's aquatic buttercup	yes
	<i>Ranunculus muricatus</i>	prickly-fruited buttercup	no
	<i>Ranunculus occidentalis</i>	western buttercup	yes
	<i>Ranunculus orthorhynchus</i> var. <i>bloomeri</i>	straight-beaked buttercup	yes
Rhamnaceae	<i>Rhamnus californica</i>	California coffeeberry	yes
Rosaceae	<i>Aphanes occidentalis</i>	western lady's mantle	yes
	<i>Holodiscus discolor</i>	ocean spray	yes
	<i>Rosa californica</i>	California rose	yes
	<i>Rubus discolor</i>	Himalayan blackberry	no
	<i>Rubus ursinus</i>	California blackberry	yes
Rubiaceae	<i>Galium aparine</i>	goose-grass	no
	<i>Galium</i> sp.	bedstraw	yes
Salicaceae	<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	yes
	<i>Salix exigua</i>	narrowleaf willow	yes
	<i>Salix laevigatus</i>	red willow	yes
	<i>Salix lasiolepis</i>	arroyo willow	yes
Saxifragaceae	<i>Lithophragma affine</i>	woodland star	yes
Scrophulariaceae	<i>Bellardia trixago</i>	bellardia	no
	<i>Castilleja densiflora</i>	Purple owl's clover	yes
	<i>Castilleja exserta</i>	Purple owl's clover	yes
	<i>Castilleja rubicunda</i> ssp. <i>lithospermoides</i>	cream sacs	yes

Family	Scientific Name	Common Name	Native
	<i>Collinsia heterophylla</i>	Chinese houses	yes
	<i>Mimulus aurantiacus</i>	bush monkey flower	yes
	<i>Mimulus guttatus</i>	common monkey flower	yes
	<i>Parentucellia viscosa</i>	yellow parentucellia	no
	<i>Scrophularia californica</i> ssp. <i>californica</i>	California figwort	yes
	<i>Triphysaria pusilla</i>	dwarf owl's clover	yes
Solanaceae	<i>Solanum americanum</i>	small-flowered nightshade	yes
Tamaricaceae	<i>Tamarix</i> sp.	tamarisk	no
Typhaceae	<i>Typha angustifolia</i>	narrow-leaved cattail	yes
Urticaceae	<i>Urtica dioica</i>	stinging nettle	yes
Valerianaceae	<i>Plectritis macrocera</i>	long-spur plectritis	yes
Verbenaceae	<i>Phyla nodiflora</i>	common lippia	yes
	<i>Verbena lasiostachys</i>	western vervain	yes
Violaceae	<i>Viola pedunculata</i>	Johnny jump-up	yes
Viscaceae	<i>Phoradendron macrophyllum</i>	big-leaf mistletoe	yes

? Native status cannot be determined because species unknown

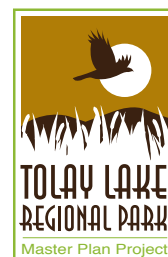
Table B: Animal Species Observed at Tolay Creek Ranch in 2008

Common Name	Scientific Name
AMPHIBIANS	
sierran treefrog	<i>Pseudacris sierra</i>
REPTILES	
western fence lizard	<i>Sceloporus occidentalis</i>
southern alligator lizard	<i>Elgaria multicarinata</i>
red-sided garter snake	<i>Thamnophis sirtalis</i>
common king snake	<i>Lampropeltis getula californiae</i>
gopher snake	<i>Pituophiscatenifer</i>
BIRDS	
Canada goose	<i>Branta canadensis</i>
American wigeon	<i>Anas americana</i>
mallard	<i>Anas platyrhynchos</i>
cinnamon teal	<i>Anas cyanoptera</i>
northern shoveler	<i>Anas clypeata</i>
green-winged teal	<i>Anas crecca</i>
wild turkey	<i>Meleagris gallopavo</i>
California quail	<i>Callipepla californica</i>
great egret	<i>Ardea alba</i>
snowy egret	<i>Egretta thula</i>
turkey vulture	<i>Cathartes aura</i>
white-tailed kite	<i>Elanus leucurus</i>
northern harrier	<i>Circus cyaneus</i>
red-shouldered hawk	<i>Accipiter striatus</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
golden eagle	<i>Aquila chrysaetos</i>
American kestrel	<i>Falco sparverius</i>
killdeer	<i>Charadrius vociferus</i>
black-necked stilt	<i>Himantopus mexicanus</i>
greater yellowlegs	<i>Tringa melanoleuca</i>
Wilson's snipe	<i>Gallinago delicata</i>
mourning dove	<i>Zenaida macroura</i>
Nuttall's woodpecker	<i>Picoides nuttallii</i>
acorn woodpecker	<i>Melanerpes formicivorus</i>
northern flicker	<i>Colaptes auratus</i>
black phoebe	<i>Sayornis nigricans</i>
Say's phoebe	<i>Sayornis saya</i>

Common Name	Scientific Name
western scrub-jay	<i>Aphelocoma californica</i>
American crow	<i>Corvus brachyrhynchos</i>
common raven	<i>Corvus corax</i>
horned lark	<i>Eremophila alpestris</i>
violet-green swallow	<i>Tachycineta thalassina</i>
white-breasted nuthatch	<i>Sitta carolinensis</i>
rock wren	<i>Salpinctes obsoletus</i>
western bluebird	<i>Sialia mexicana</i>
American robin	<i>Turdus migratorius</i>
northern mockingbird	<i>Mimus polyglottos</i>
spotted towhee	<i>Pipilo maculatus</i>
California towhee	<i>Pipilo crissalis</i>
lark sparrow	<i>Chondestes grammacus</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
grasshopper sparrow	<i>Ammodramus savannarum</i>
song sparrow	<i>Melospiza melodia</i>
golden-crowned sparrow	<i>Zonotrichia atricapilla</i>
dark-eyed junco	<i>Junco hyemalis</i>
red-winged blackbird	<i>Agelaius phoeniceus</i>
western meadowlark	<i>Sturnella neglecta</i>
Brewer's blackbird	<i>Euphagus cyanocephalus</i>
Bullock's oriole	<i>Icterus bullockii</i>
house finch	<i>Carpodacus mexicanus</i>
American goldfinch	<i>Carduelis tristis</i>
MAMMALS	
skunk (sp.)	<i>Mephitis</i> or <i>Spilogale</i>
coyote	<i>Canis latrans</i>
black-tailed deer	<i>Odocoileus hemionus</i>
California ground squirrel	<i>Spermophilis beecheyi</i>
California vole	<i>Microtus californicus</i>
deer mouse (sp.)	<i>Peromyscus</i> sp.
Botta's pocket gopher	<i>Thomomys bottae</i>
black-tailed jackrabbit	<i>Lepus californicus</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
RANGELAND RESOURCES STUDY**

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LSA Project No. SOG0601 Task 8

LSA

March 13, 2009

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A: Definitions of Range Management Terms

B: Range Analysis – Interim Pastures

C: Range Analysis – Proposed Pastures

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FIGURES

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Figure 2: Study Area

Figure 3: Grazing Use Pattern 2006

Figure 4: Soils

Figure 5: Major Weed Infestations, Eroded Areas, and Interim Pasture Configurations

Figure 6: Sensitive Biological Resources and Interim Pasture Configurations

Figure 7: Interim Pasture Configurations and Existing Range Improvements

Figure 8: Sensitive Biological Resources and Long-term Pasture Configurations

Figure 9: Long-term Pasture Configurations and Existing and Proposed Range Improvements

TABLES

(All tables are at the end of the report after figures)

Table A: Interim Rangeland Management Plan Summary

Table B: Grazing Carrying Capacities, Interim Pasture Configurations

Table C: Long-term Rangeland Management Plan Summary

Table D: Grazing Carrying Capacities, Long-term Pasture Configurations

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 hordeaceus*).

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 (*Sisyrinchium 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 kelloggii*). 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 (*Zygadenus 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 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 Enclosures. The non-governmental organization Bay Institute sponsored the Students and Teachers Restoring a Watershed (STRAW) Project. STRAW has installed grazing enclosure fences to protect revegetation projects. A STRAW enclosure is located on the ridge in the Southwest Hills Pasture, and another enclosure 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 as sustaining 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 enclosure, 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 reseeded 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 enclosure 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 disking 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	<i>Bromus carinatus</i>
Three-weeks fescue	<i>Vulpia microstachys</i>

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	<i>Danthonia californica</i>
Meadow barley	<i>Hordeum brachyantherum</i>
Creeping wildrye (plugs only)	<i>Leymus triticoides</i>
California semaphore grass	<i>Pleuropogon californicum</i>

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	<i>Elymus glaucus</i>
California melic	<i>Melica californica</i>
Torrey melic	<i>Melica torreyana</i>
Purple needlegrass	<i>Nassella pulchra</i>

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.

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Cardoza, Marvin. Former Cardoza Ranch Owner and Grazing Tenant. Personal communication with Richard Nichols, LSA Associates, 2006.

Mohring, Glenn. H and L Mohring. Grazing Tenant. Personal communication with Richard Nichols, LSA Associates, 2007.

FIGURES

Figure 1: Regional Location

Figure 2: Study Area

Figure 3: Grazing Use Pattern 2006

Figure 4: Soils

Figure 5: Major Weed Infestations, Eroded Areas, and Interim Pasture Configurations

Figure 6: Sensitive Biological Resources and Interim Pasture Configurations

Figure 7: Interim Pasture Configurations and Existing Range Improvements

Figure 8: Sensitive Biological Resources and Long-term Pasture Configurations

Figure 9: Long-term Pasture Configurations and Existing and Proposed Range Improvements

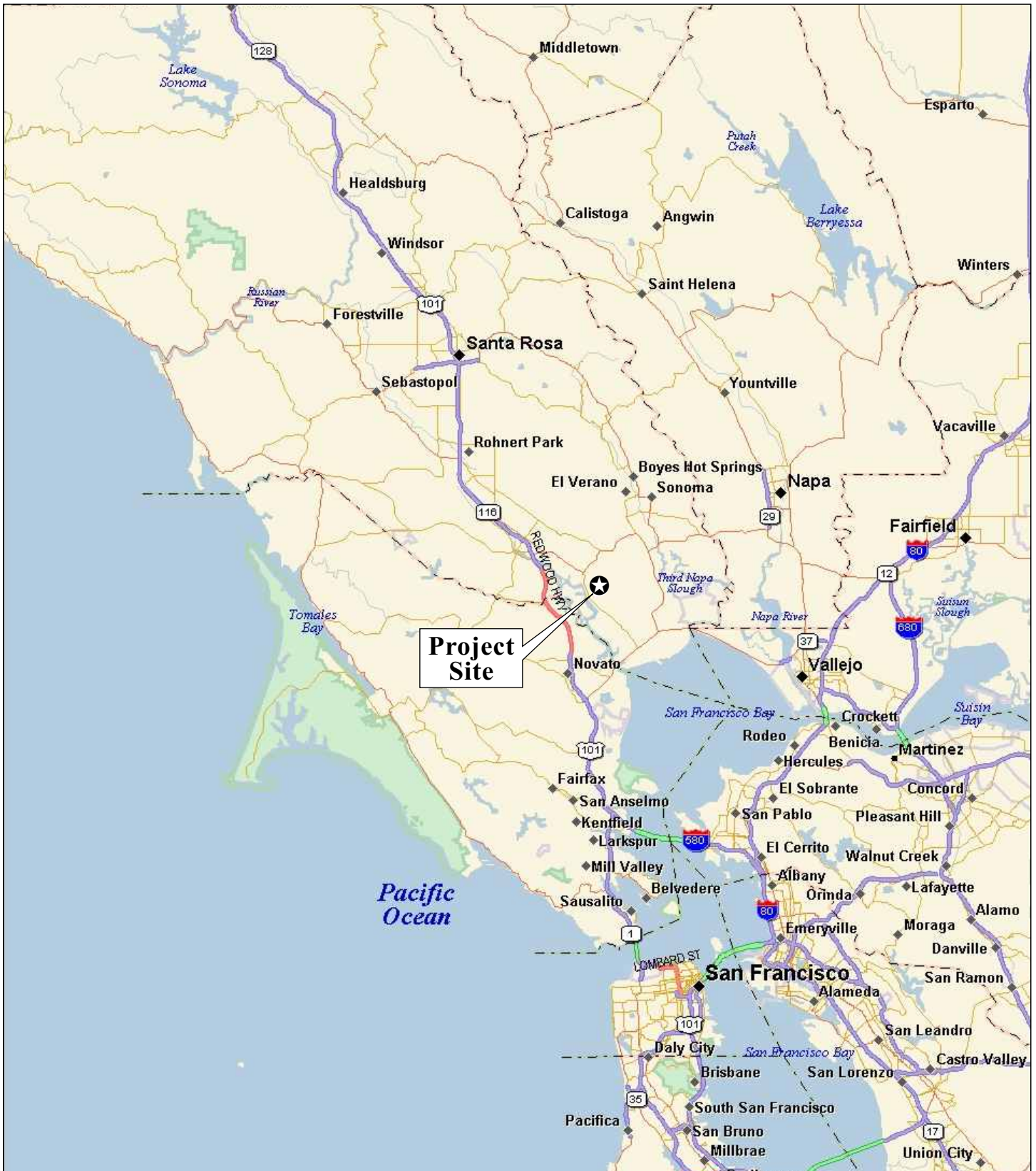
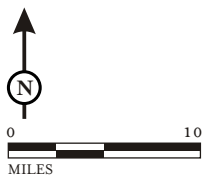


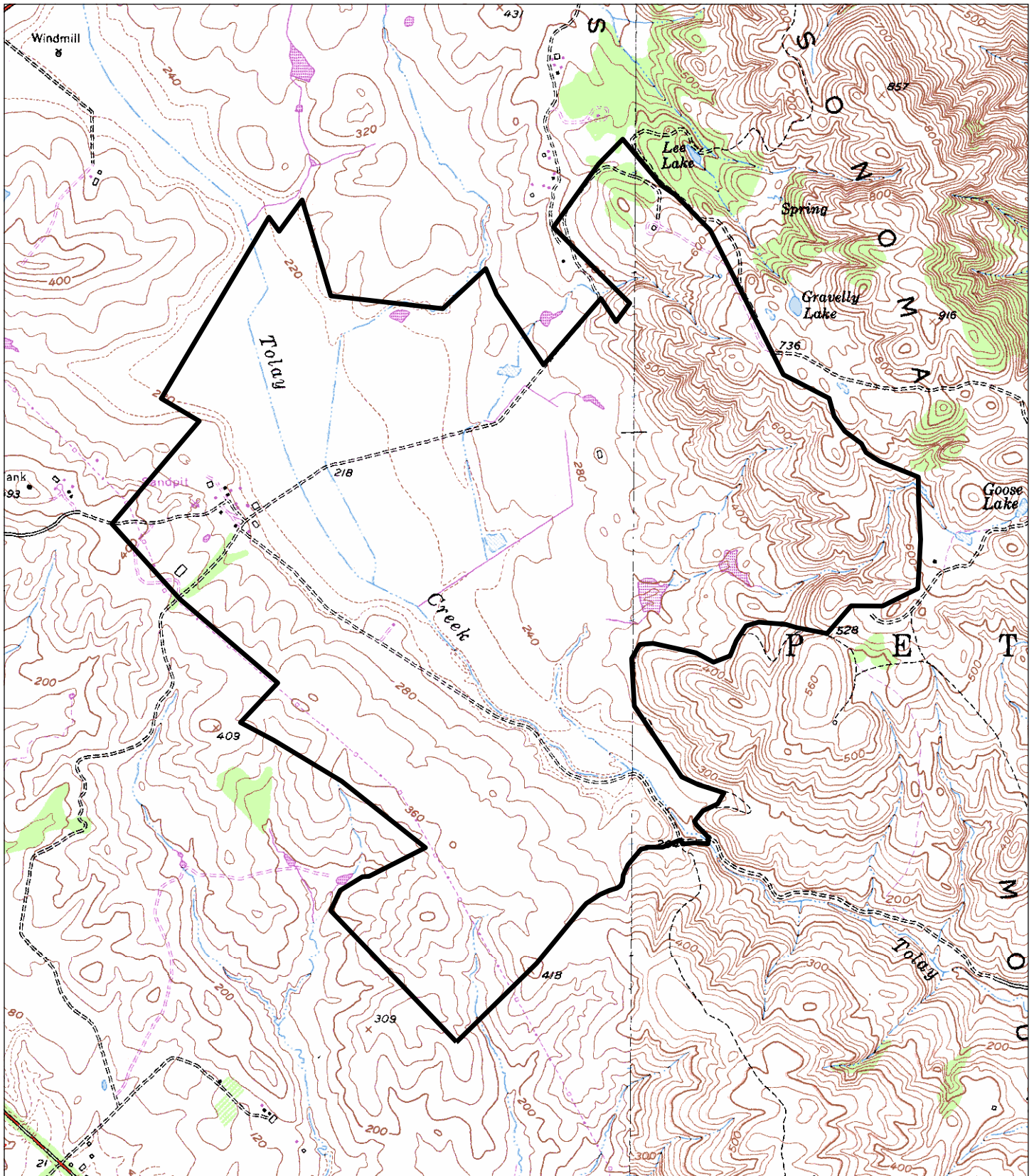
FIGURE 1

*Tolay Lake Regional Park
Rangeland Resources Study*
Regional Location

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SOURCE: ©2006 DeLORME. STREET ATLAS USA©2006.



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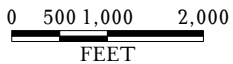
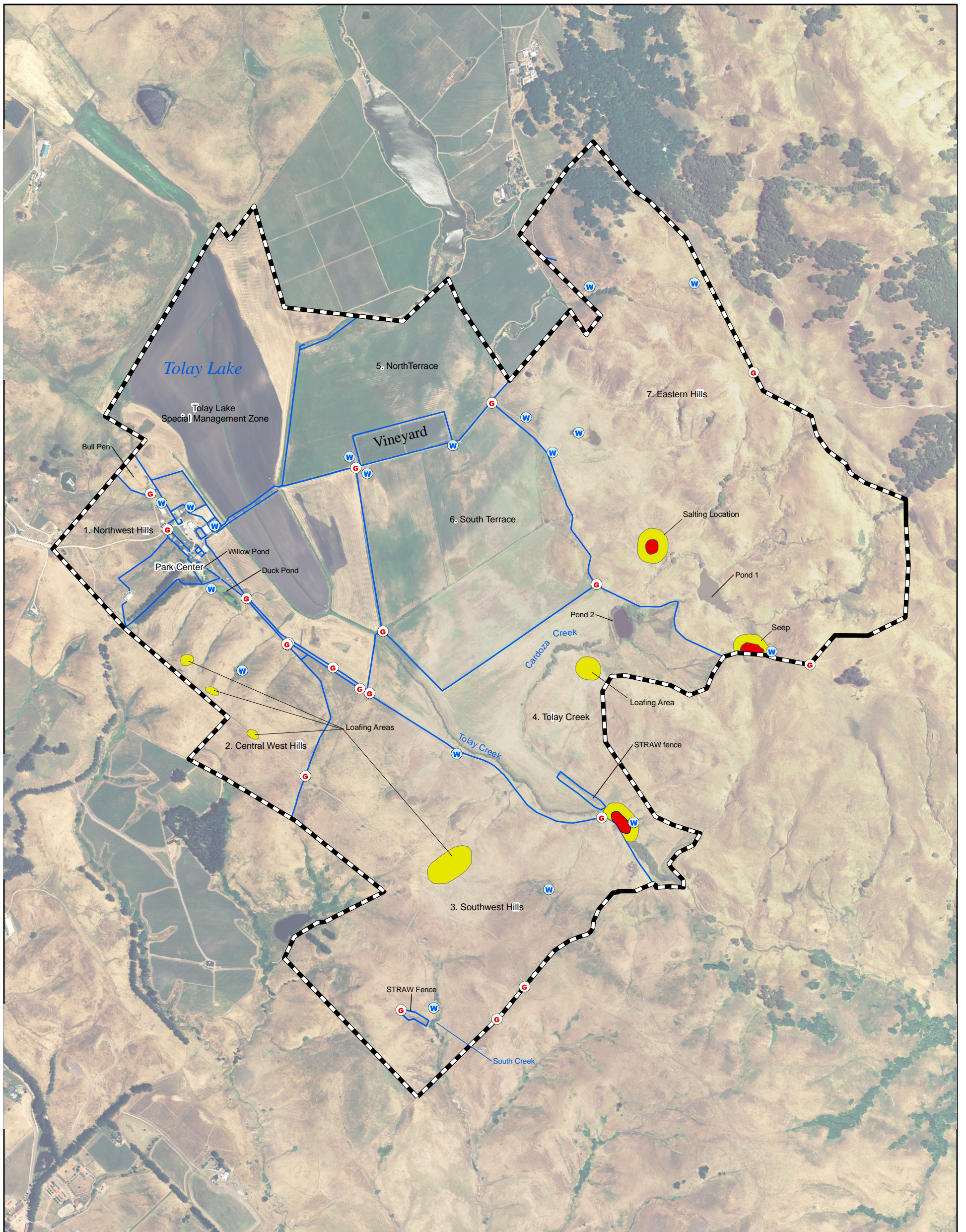


FIGURE 2

Tolay Lake Regional Park
Rangeland Resources Study

Study Area

SOURCE: USGS 7.5-minute Topos Petaluma (1980) and Sears Point (1968).
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FIGURE 3

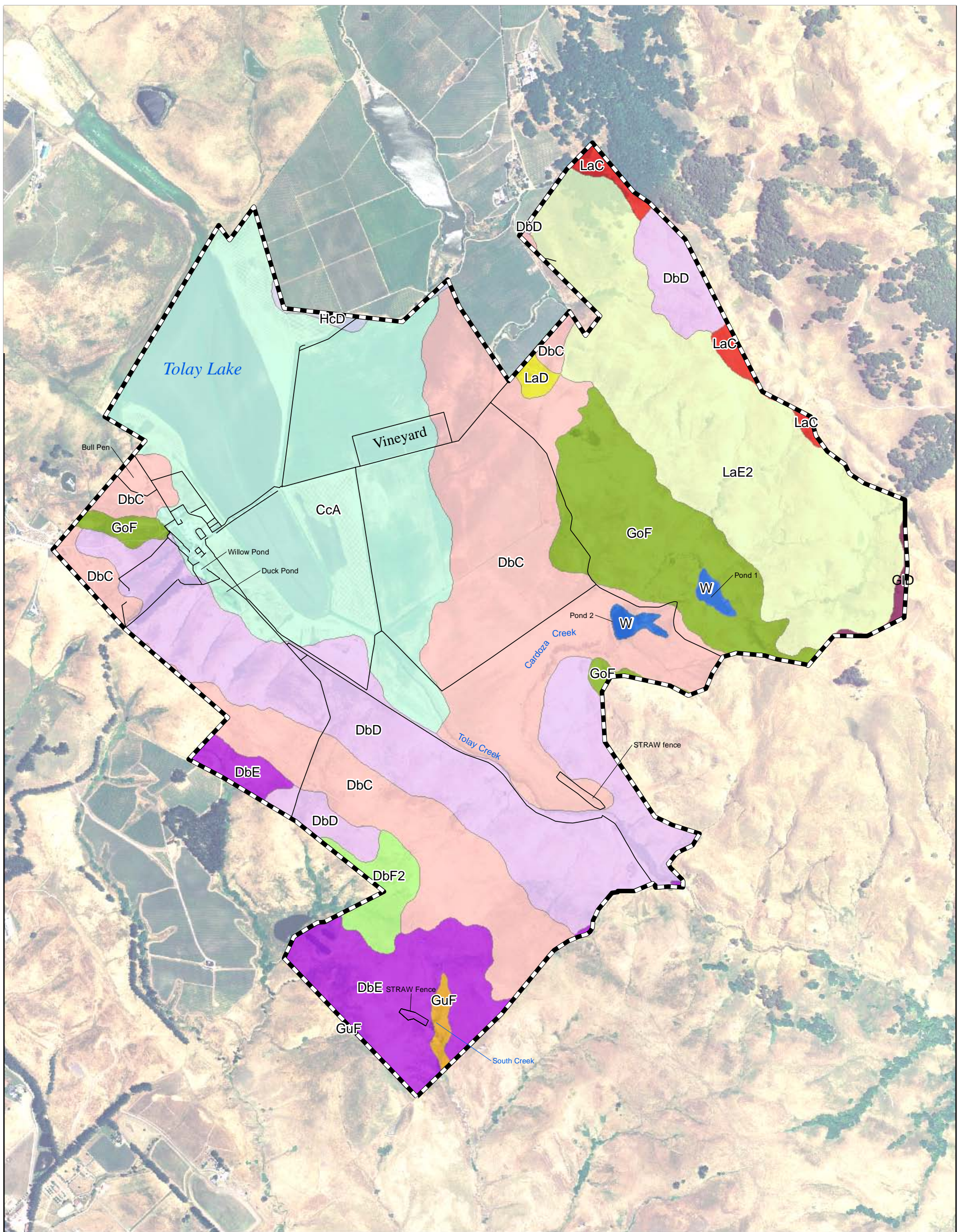
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|-----------------------------------|----------------------------------|
| TOLAY LAKE REGIONAL PARK BOUNDARY | AREA OF HIGH GRAZING INTENSITY |
| LONG-TERM MANAGEMENT AREAS | AREA OF MEDIUM GRAZING INTENSITY |
| EXISTING FENCE | AREA OF LOW GRAZING INTENSITY |
| EXISTING GATE | |
| EXISTING WATER TROUGH | |



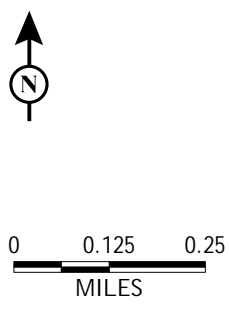
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Rangeland Resources Study
Tolay Lake Regional Park

Grazing Use Pattern 2006



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 Tolay Lake Regional Park Boundary Perimeter Fence
 Existing Fence

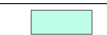









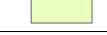

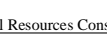
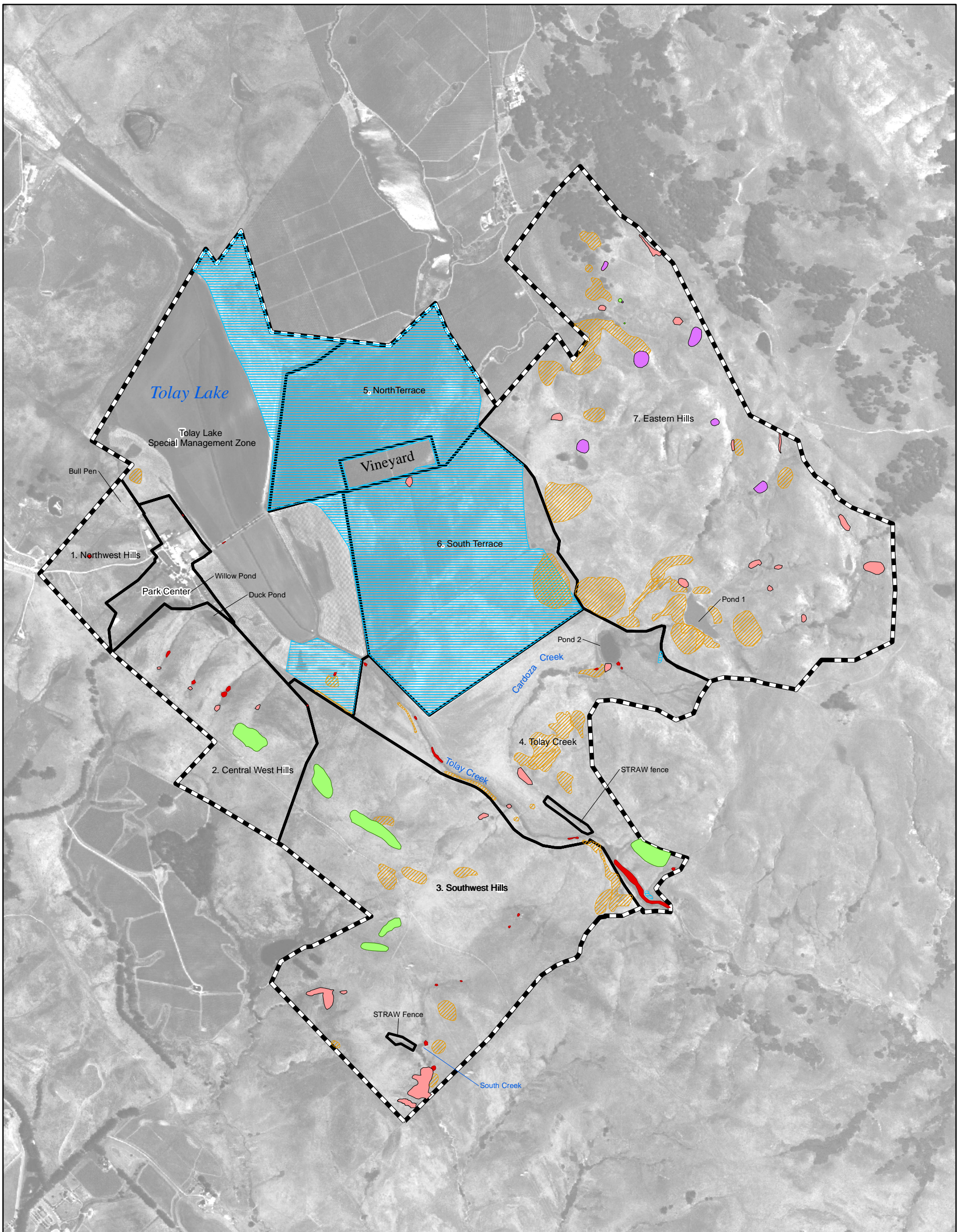
Color	Map Unit	Soil Map Unit
	CcA	Clear Lake Clay Loam, 0-2% slopes
	DbC	Diablo Clay, 2-9% slopes
	DbD	Diablo Clay, 9-15% slopes
	DbE	Diablo Clay, 15-30% slopes
	DbF2	Diablo Clay, 30-50% slopes, eroded
	GID	Goulding Cobbly Clay Loam, 5-15% slopes
	GoF	Goulding-Toomes Complex, 9-50% slopes
	GuF	Gullied 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

FIGURE 4

*Rangeland Resources Study
Tolay Lake Regional Park*

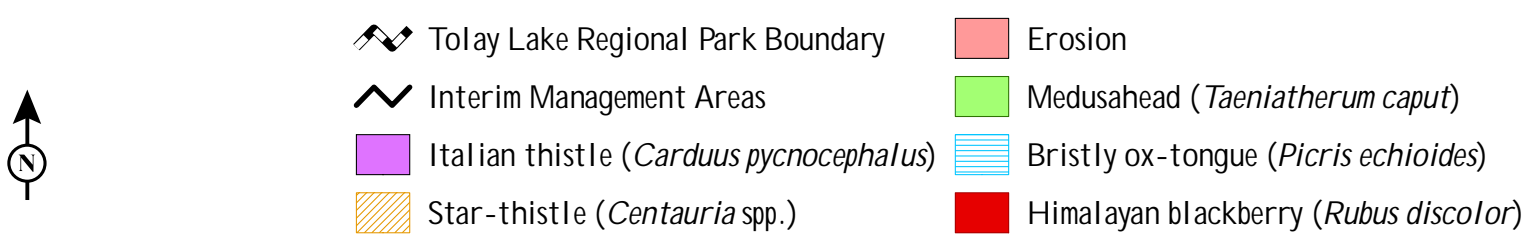
Soils

Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005), Soil Data modified from the Natural Resources Conservation Service
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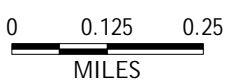


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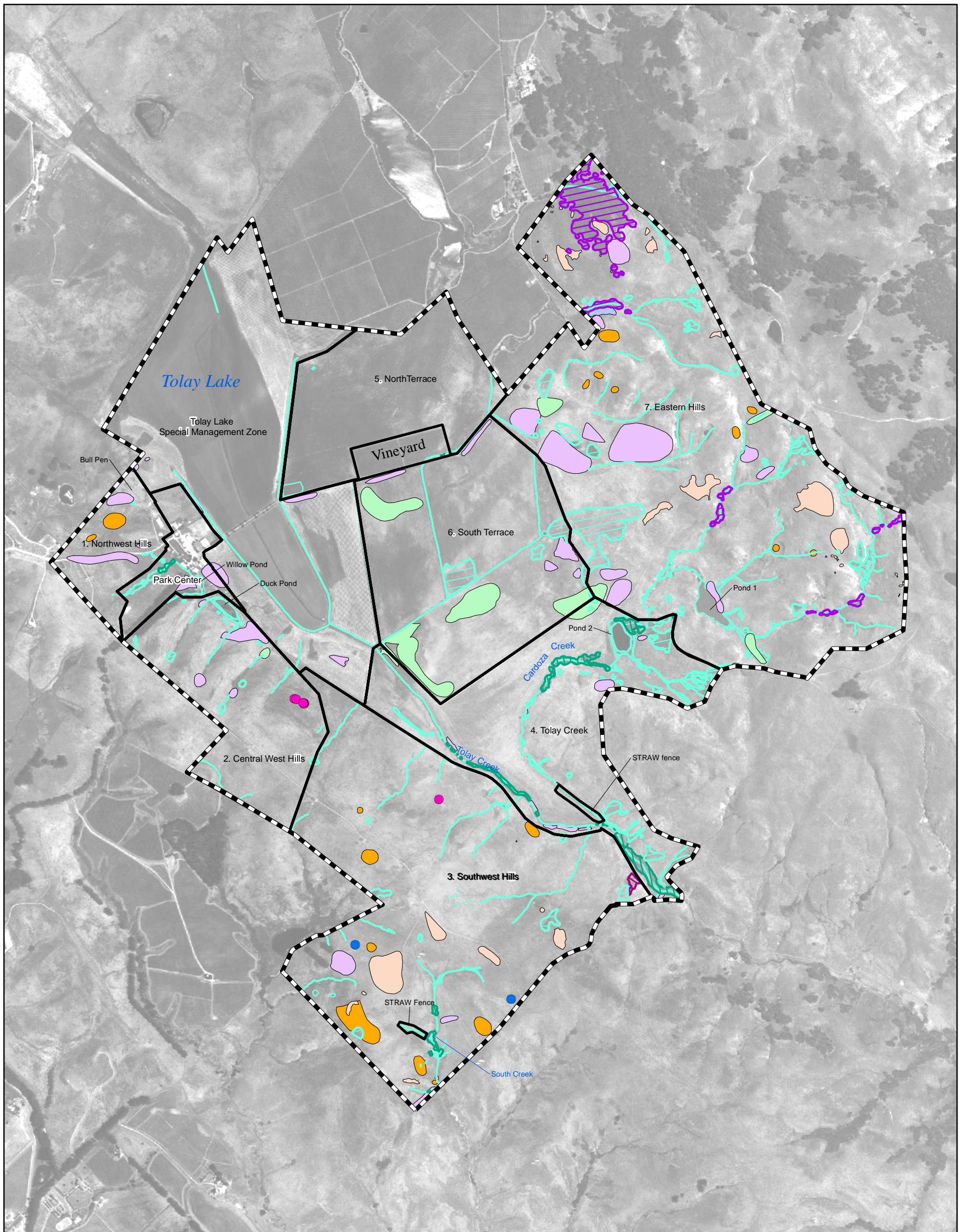
FIGURE 5



*Rangeland Resources Study
Tolay Lake Regional Park*



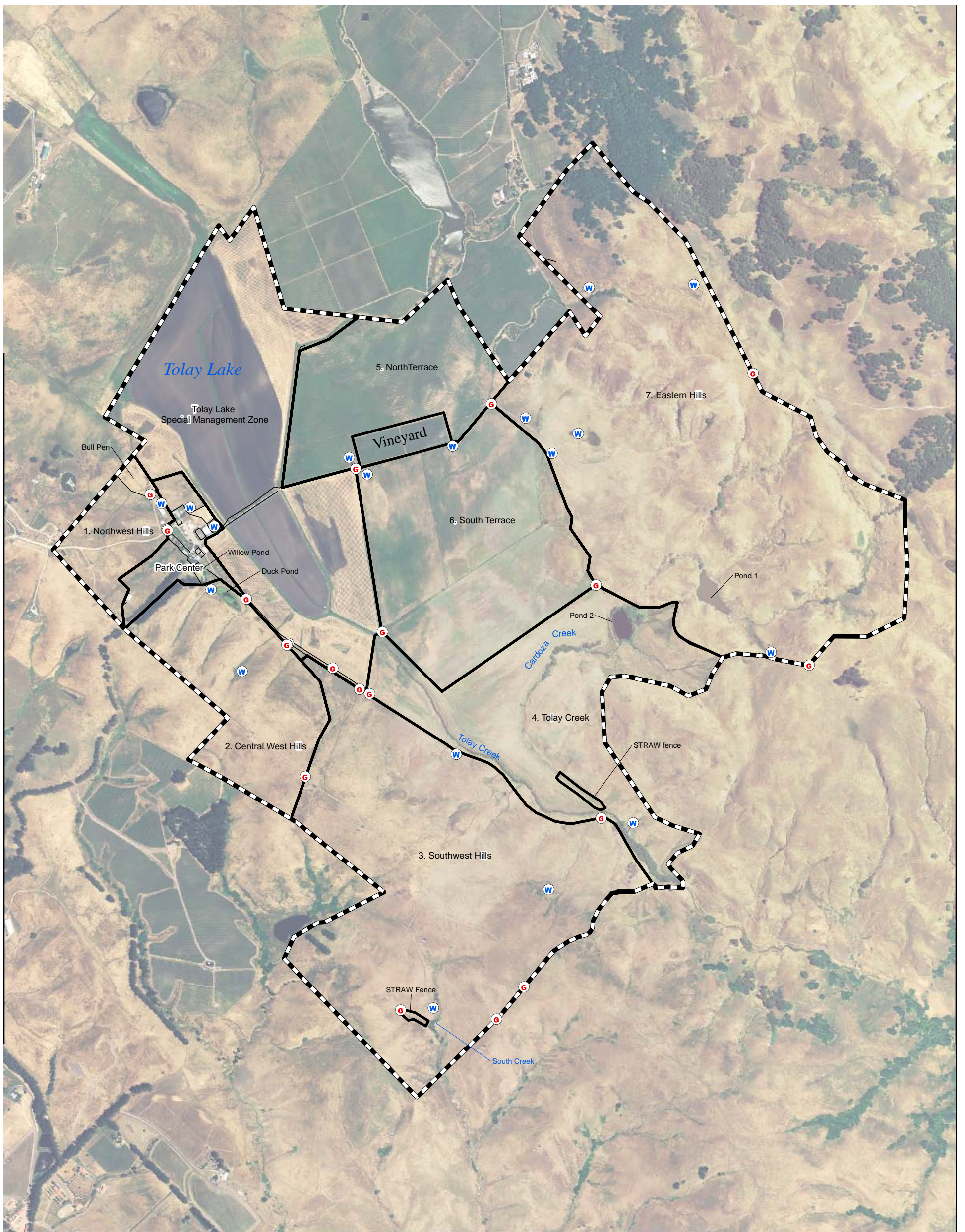
Major Weed Infestations,
Eroded Areas, and Interim
Pasture Configurations



LSA

FIGURE 6





L S A

FIGURE 7

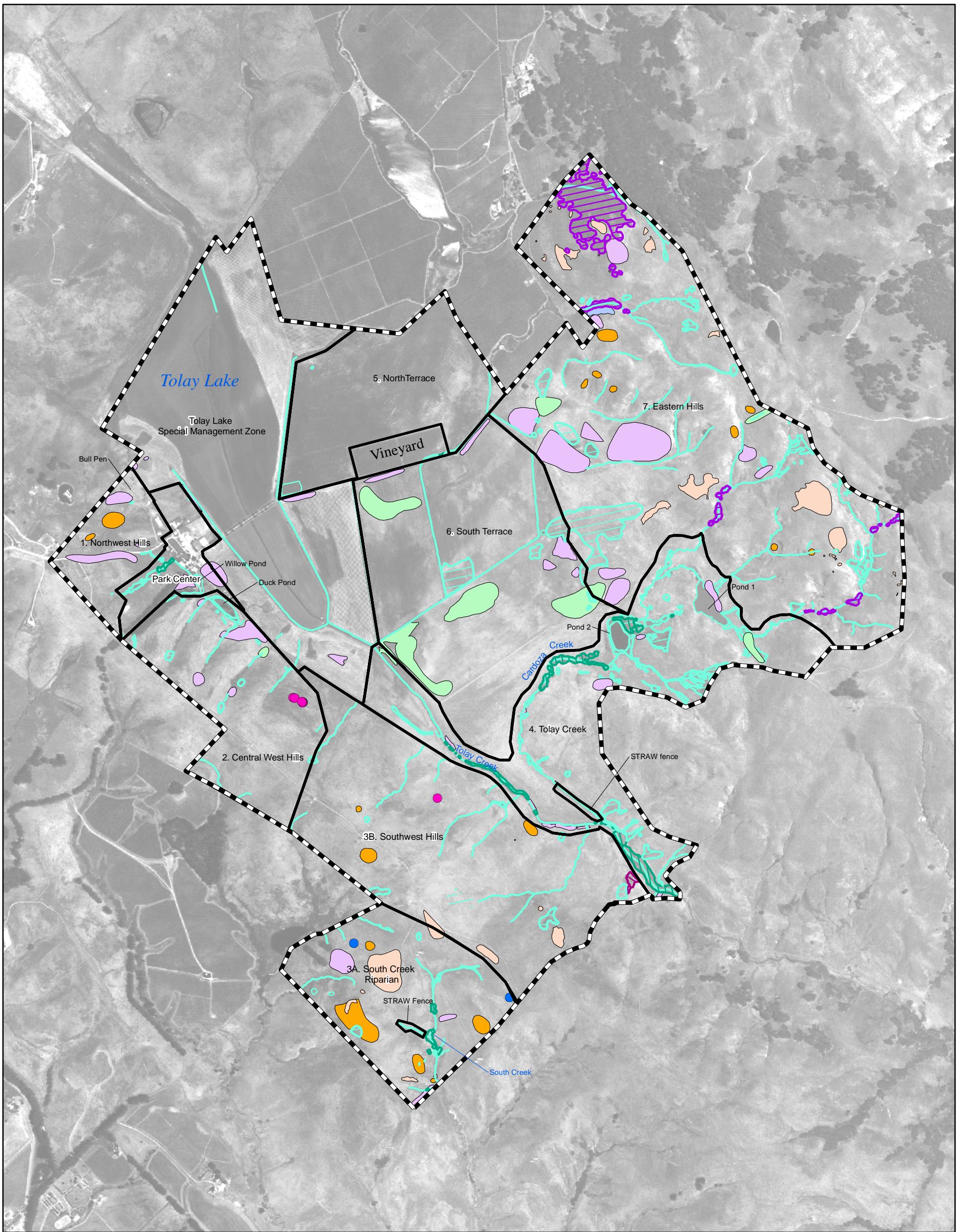


0 0.125 0.25
MILES

- Tolay Lake Regional Park Boundary
- Interim Management Areas/Existing Fences
- Existing Fences
- Existing Gate
- Existing Water Trough

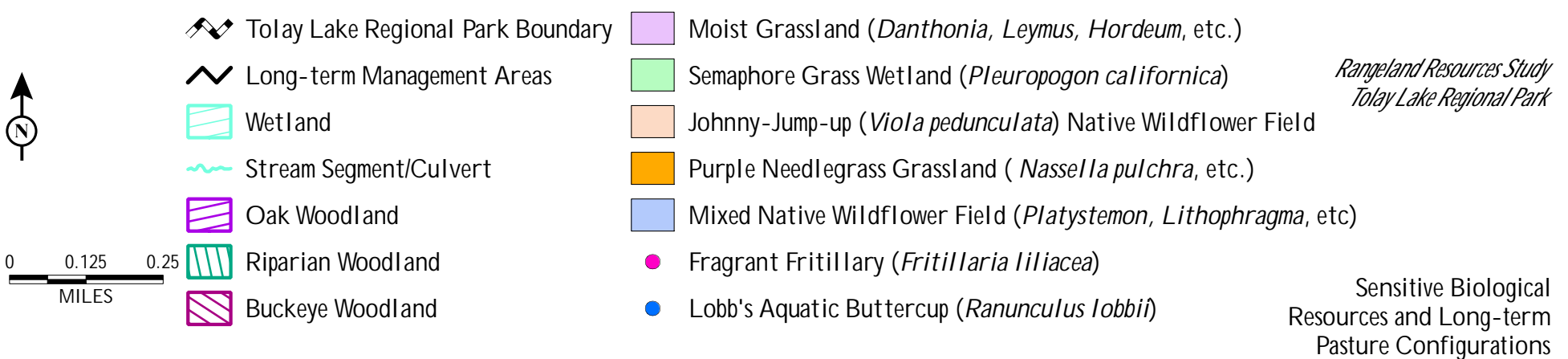
*Rangeland Resources Study
Tolay Lake Regional Park*

Interim Pasture Configurations
and Existing Range Improvements



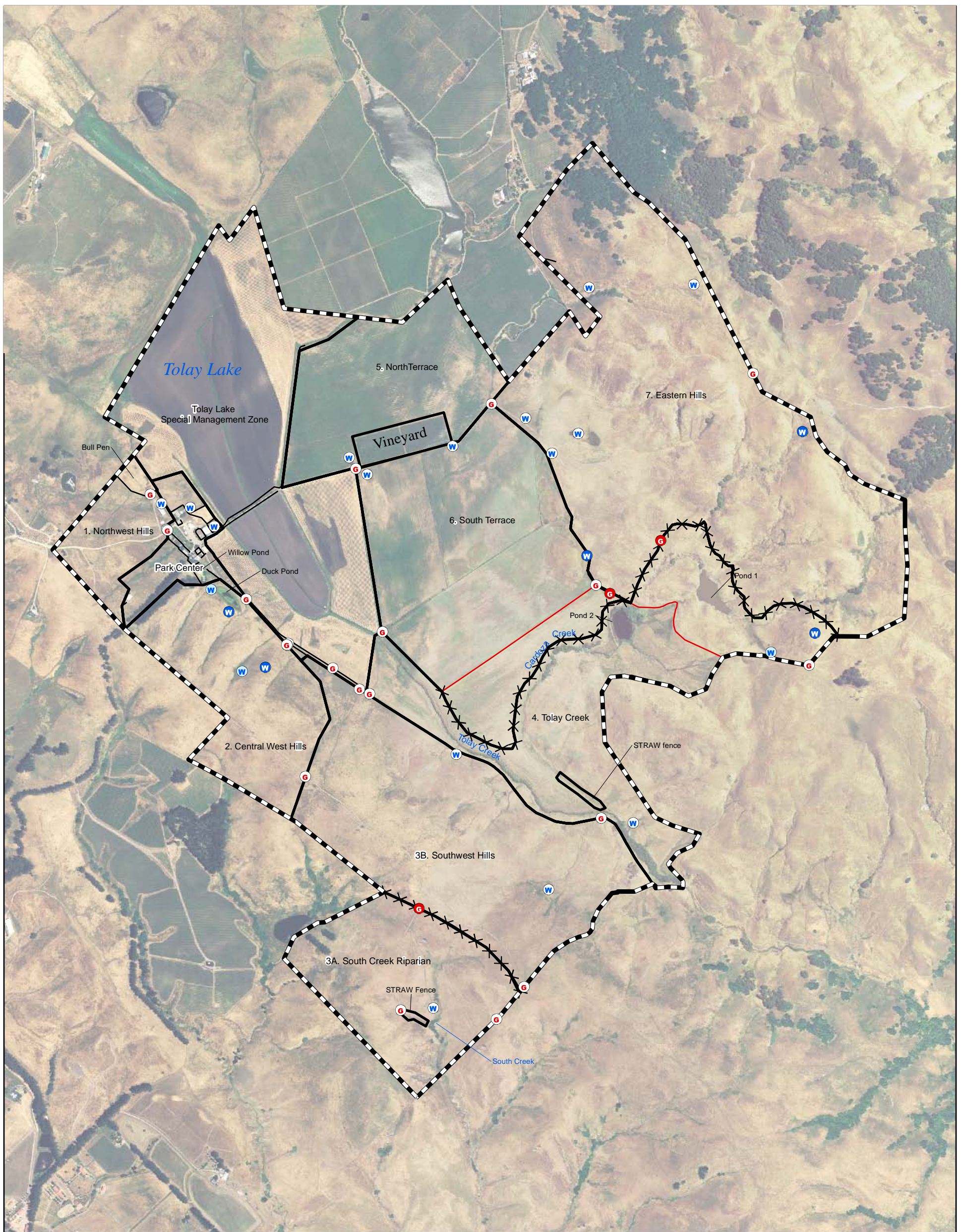
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FIGURE 8



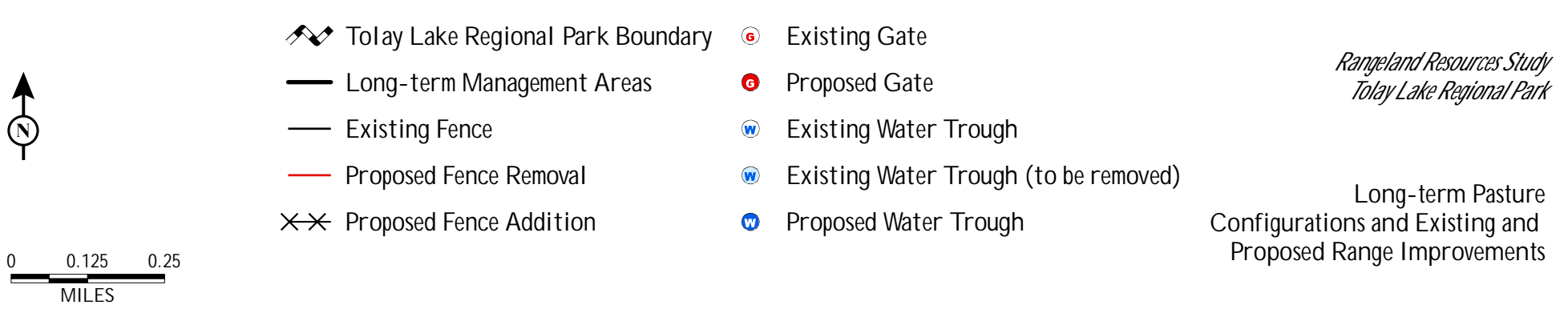
Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)

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L S A

FIGURE 9



Source: Aerial Photo from the USDA, National Agriculture Imagery Program (2005)
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TABLES

Table A: Interim Rangeland Management Plan Summary

Table B: Grazing Carrying Capacities, Interim Pasture Configurations

Table C: Long-term Rangeland Management Plan Summary

Table D: Grazing Carrying Capacities, Long-term Pasture Configurations

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 Sensitivity 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 portion 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	<i>CcA</i>	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	<i>DbC</i>	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	<i>DbD</i>	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	<i>DbE</i>	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	<i>DbF2</i>	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Goulding Cobbly Clay Loam, 5-15% slopes	<i>GID</i>	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	<i>GoF</i>	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Gullied Land	<i>GuF</i>	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Haire clay loam, 9-15% slopes	<i>HcD</i>	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	<i>LaC</i>	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	<i>LaD</i>	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	<i>LaE2</i>	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Water	<i>W</i>	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	<i>CcA</i>	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	<i>DbC</i>	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	<i>DbD</i>	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	<i>DbE</i>		3,600	2,700	1,800	4.0	2.8	1.7	0.0	0.0	0.0
Diablo clay, 30-50% slopes, eroded	<i>DbF2</i>		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Goulding Cobbly Clay Loam, 5-15% slopes	<i>GID</i>		3,600	2,700	1,800	4.0	2.8	1.7	0.0	0.0	0.0
Goulding-Toomes complex, 9-50% slopes	<i>GoF</i>		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Gullied Land	<i>GuF</i>		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Haire clay loam, 9-15% slopes	<i>HcD</i>	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	<i>LaC</i>		2,400	1,800	1,200	2.4	1.7	0.9	0.0	0.0	0.0
Laniger loam, 9-15% slopes	<i>LaD</i>		2,400	1,800	1,200	2.4	1.7	0.9	0.0	0.0	0.0
Laniger loam, 15-30% slopes, eroded	<i>LaE2</i>		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Water	<i>W</i>		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total		264.4							1047.7	743.8	439.9