BIOLOGICAL RESOURCES STUDY
TOLAY LAKE REGIONAL PARK
SONOMA COUNTY, CALIFORNIA

Submitted to:

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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 s*pecies of special concern* and *special plants* may be considered significant under CEQA.

1.4.9 California Native Plant Society

The non-governmental California Native Plant Society (CNPS) has developed lists of plants of concern in California (CNPS 2001).

- A CNPS List 1A plant is a species, subspecies, or variety that is considered to be extinct.
- A List 1B plant is considered rare, threatened, or endangered in California and elsewhere.
- A List 2 plant is considered rare, threatened, or endangered in California but is more common elsewhere.
- A List 3 plant is potentially endangered but additional information on taxonomy, rarity, and endangerment is needed.
- A List 4 plant has a limited distribution but is presently not endangered. Impacts to List 1B and List 2 plants are frequently considered significant under CEQA, depending on the lead agency.

Plants on lists 1A, 1B, and 2 typically qualify for coverage under CEQA based on the policy of the lead agency. Plants on Lists 3 and 4 may be evaluated on a case-by-case basis to determine significance thresholds under CEQA.

Hydrophytic plant species are listed by the U.S. Fish and Wildlife Service in *National List of Plant Species That Occur in Wetlands* (Reed 1988). The *National List* identifies five categories of plants according to their frequency of occurrence in wetlands. The categories are:

Obligate wetland plants (OBL)	Plants that occur almost always in wetlands.
Facultative wetland plants (FACW)	Plants that usually occur in wetlands.
Facultative plants (FAC)	Plants that are equally likely to occur in wetlands or non-wetlands.
Facultative upland plants (FACU)	Plants that usually occur in uplands.
Obligate upland plants (UPL)	Plants that occur almost always in non-wetlands.

An area is considered to meet the hydrophytic vegetation criterion when more than 50 percent of the dominant species in each stratum (e.g., tree, shrub, and herb) present are in the obligate wetland, facultative wetland, or facultative categories.

Hydric soils are defined by criteria set forth by the National Technical Committee for Hydric Soils (NTCHS). These criteria are given in the *Wetlands Delineation Manual* (Environmental Laboratory 1987) and are based on depth and duration of soil saturation. Hydric soils are commonly identified in the field by using indirect indicators of saturated soil, technically known as redoximorphic features. These features are caused by anaerobic, reduced soil conditions that are brought about by prolonged soil saturation. The most common redoximorphic features are distinguished by soil color, which is strongly influenced by the frequency and duration of soil saturation. Hydric soils tend to have dark (low chroma) colors which are often accompanied by reddish mottles (iron mottles), reddish stains on root channels (oxidized rhizospheres), or gray colors (gleying).

Under natural conditions, development of hydrophytic vegetation and hydric soils are dependent on a third characteristic, wetland hydrology. The wetland hydrology criterion is met if the area experiences inundation or soil saturation to the surface for a period equal to at least 5 percent of the growing season (about 14 days in the project area) in a year of average rainfall. In most cases, this criterion can only be measured directly by monitoring of the site through an entire wet season. In practice, the hydrological status of a particular area is usually evaluated using indirect indicators. Some of the indicators that are commonly used to identify wetland hydrology include recent sediment deposits, surface scour, and oxidized rhizospheres around living roots.

2.2.2 Field Methodology

LSA surveyed the study areas on June 2, 5, and July 12, 13, and 16, 2006, to identify potential wetlands and other waters of the United States. A scale of 1 inch equals 200 feet aerial ortho-photo map of the property and a GPS unit with approximately 39-inch (1 meter) accuracy were used in the field for mapping purposes. Areas determined by LSA to meet Clean Water Act jurisdictional criteria are mapped on Figures 3a and 3b. It should be noted results may have been affected by the fact that

2.0 METHODS

2.1 PLANT SURVEYS

Prior to initiating field work, LSA reviewed the CDFG's California Natural Diversity Data Base (CNDDB) and relevant environmental documents (Parsons 1996) for records of special-status species in the area of Tolay Lake. Based on this review, a list of 30 special-status plant species was compiled for focusing survey efforts. This list documented blooming periods and habitat affinities of special-status plant species. Aerial photos and global positioning (GPS) technology were used for mapping vegetation types, habitats, and special-status species occurrences.

LSA botanists Clint Kellner, Greg Gallaugher, Tim Milliken, and Zoya Akulova participated in the botanical surveys of the Tolay Lake site. Early season surveys (March 22, 23, and 30, May 5, 8, and 24) were conducted by a team of three or four botanists and late season surveys (July 28, August 6, August 21, November 5, 2006, and January 19, 2007) were conducted by one or two botanists. Additional surveys were conducted on a single day in March 2007 and March 2008. The stand of fragrant fritillaries was checked on April 1 2008 by a team of 3 botanists. The surveys were conducted by walking 100 to 200-foot-wide transects in the core areas of the site and in areas that provided potentially suitable habitat for special-status plants. Areas outside of core areas were less intensively surveyed. Late season surveys were conducted by checking the habitats of late blooming special-status plant species such as pappose tarweed (*Centromadia parryi* ssp. *parryi*) and other species associated with seeps or wetlands.

The special-status fragrant fritillary (*Fritillaria liliacea*) often grows in association with the common Fremont's star lily (*Zigadenus fremontii*), and populations of the star lily were examined for fragrant fritillary. This included walking 20-foot wide transects through stands of Fremont's star lily.

Plants were identified using dichotomous keys in the Jepson Manual (Hickman 1993), and Flora of Sonoma County (Best et al.1996). Plants collected in the field were also identified by comparing them to images from Calphotos and Google Images, and pressed specimens housed at the UC Berkeley and Jepson herbaria.

2.2 WETLANDS

2.2.1 Wetland Identification Methodology

Field investigations of potential wetlands occurring on the property were conducted using the routine determination method given in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). This methodology entails examination of specific sample points within potential wetlands for hydrophytic vegetation, hydric soils, and wetland hydrology. By the federal definition, all three of these parameters must be present for an area to be considered a wetland. The amount of information collected at each sample point was sufficient to characterize the wetlands. Formal jurisdictional delineation data sheets were completed for selected sample points and were used to characterize the different types of wetlands at Tolay Lake Regional Park.

the previous year's rainfall was approximately 35 inches, approximately 7 inches above average. Rainfall in 2005 was unusually high and only rivaled that of 1982, 1986, 1995, and 1997. On the other hand, the area had not received significant rain since mid-April in 2006.

Prior to the wetland field survey, LSA reviewed aerial photographs, previous wetland characterization maps by Parsons (1996) and Circuit Rider Productions (2006, with field work completed in 2005), and field notes and maps from LSA's botanical field surveys of March and May 2006. Field surveys in June and July verified the 2006 wetland status of areas previously identified during LSA's botanical surveys of March and May. Some smaller seasonal wetlands, 0.1 acre or less, may have been missed.

Wetlands and other waters potentially subject to regulation were identified predominantly by the presence of basins, ditches or other depressed topographic features, and by the presence of hydrophytic vegetation. Sample points for potential wetland areas were not recorded on data sheets, but were investigated at multiple locations to establish the presence and boundaries of potential wetlands. The three routine determination criteria were investigated: the presence and wetland indicator category of hydrophytic plant species; wetland hydrology indicators such as surface water, saturated soil, oxidized rhizospheres, and matting from seasonal ponding; and hydric soil indicators such as oxidized rhizospheres, redoximorphic mottling, dark value, and low chroma. The diagnostic wetland indicators used for particular potential wetland locations were recorded in field notes.

Drainage features were considered to be potentially jurisdictional if they contained water at the time of the survey, exhibited scour, shelving, a low-flow channel, debris deposits at the side of the channel, or otherwise showed evidence of prolonged flow.

Potential wetland boundaries were mapped using three different methods: 1) by following vegetation and land forms; 2) tracing features on the aerial ortho-photo; and/or 3) using the GPS.

2.3 ANIMAL SURVEYS

LSA wildlife biologists Matt Ricketts and Rebecca Doubledee conducted reconnaissance-level surveys on March 23 (both), May 2 (Ricketts only), June 8 (Ricketts only), and August 29, 2006 (Doubledee only). Surveys consisted of traversing selected areas of the site by foot while recording animal observations in field notes and noting areas of particular habitat value on aerial photos. These selected areas included representative examples of the existing habitats (e.g., oak woodland, grassland, riparian woodland) of Tolay Lake Regional Park. Portions of the site covered on each survey date are summarized below.

The primary intent of the March 23 survey was to gather information on wintering waterbird use of Tolay Lake and to check the site's aquatic features for California red-legged frogs (*Rana draytonii*), western pond turtles (*Actinemys marmorata*), and other amphibians and reptiles. The waterbird use of Tolay Lake was surveyed with a spotting scope from the knoll off the northwestern corner of the lake. Other areas visited during the March 23 survey included the "Oak Grove" (i.e., the oak woodland on the East Ridge at the northeastern corner of the site), the Eagle Creek drainage, the pasture and isolated blue gum (*Eucalyptus globulus*) trees on the gently sloping area west of the East Ridge, the east-west drainage ditch, and the ornamental vegetation and large grove of blue gum trees in the Park Center.

During the March 23 visit, Ms. Doubledee surveyed the majority of the prominent water features on the property for California red-legged frogs, western pond turtles, and other wildlife species during daylight hours. The survey method included walking along the banks of each water feature first scanning the banks with binoculars, then surveying with the naked eye and listening for the sound of frogs jumping into the water. The main water features surveyed during the March 23 visit by Ms. Doubledee included the entire length of Tolay Creek on the property, the small Stock Pond at the southern portion of the West Ridge, Cardoza Creek between the confluence with Tolay Creek and Pond 1, Pond 1, Pond 2, the small pond that occurs in the eastern portion of the farmed area, the East-West Drainage Ditch that is tributary to Eagle Creek, the portion of Tolay Lake adjacent to the causeway, Willow Pond, and Duck Pond near the Park Center.

The May 2 survey focused on the riparian habitat along Tolay Creek, Cardoza Creek below Pond 2, and Pond 2. The survey also included the grasslands along the base of the West Ridge, grasslands north of Cardoza Creek, scattered rock outcrops near Cardoza Creek, and oak trees within Cardoza Creek.

The June 8 survey entailed re-examining Tolay Creek for riparian passerines (i.e., songbirds), checking the isolated blue gum trees on the gently sloping area west of the East Ridge for nesting raptors and surveying the West Ridge and the drainages in the southwestern site corner (e.g., South Creek) for wildlife.

The August 29 survey was also conducted only during daylight hours and focused on surveying for recently metamorphosed California red-legged frogs within waterbodies that remained inundated. Areas surveyed included South Creek, the small Stock Pond at the southern portion of the West Ridge, Tolay Creek east of the small Stock Pond, Cardoza Creek between the confluence with Tolay Creek and Pond 1, Pond 1, Pond 2, the small Irrigation Pond that occurs in the eastern portion of the farmed area and Pond 4 near the Park Center. In addition, an off-site farm pond just west of the southern portion of the West Ridge was surveyed with binoculars.

Volunteers from the Petaluma Wetlands Alliance have been conducting surveys of the birds of Tolay Lake Regional Park since April of 2006. They have conducted 28 surveys to date, and their information has been incorporated into this report. In addition, volunteers of the Raptor Project (Thiessen and Wilson 2007) have noted raptor activity on 4 days in 2007. Their results are also incorporated into this report. (These on-going survey efforts provide valuable data for park management.)

Nomenclature used in this report for amphibians and reptiles conforms to Crother (2008), while nomenclature for mammals conforms to Baker et al. (2003). Nomenclature for special-status species conforms to the CNDDB (2006). Scientific names of bird species are not provided in the text because English vernacular names are standardized in the American Ornithologists' Union (AOU) *Check-list of North American Birds* (AOU 1998).

3.0 VEGETATION AND WILDLIFE VALUES

3.1 WOODLAND

3.1.1 Botanical Values

Oak Woodland. Oak woodland occurs in a relatively large stand on the top of the East Ridge and in smaller stands in the draws (gullies) on the East Ridge (Figure 3a). This community is dominated by coast live oak (*Quercus agrifolia*) and California bay (*Umbellularia californica*) with scattered madrone (*Arbutus menziesii*) and black oak (*Quercus kellogii*). A number of large California bay trees also occur in the woodland on the East Ridge. The coast live oak trees on the East Ridge are very large with many trunk diameters averaging or exceeding 4 feet diameter at breast height (4.5 feet from ground). Tree height averages 30 feet or less. Main branches exceeding 2 feet in diameter have broken from some of the oak trees, while other trees have the intact round canopy of a mature tree.

Understory consists primarily of herbaceous species with few woody plants. Heavy levels of year-round cattle grazing, in the past, have likely eradicated most shrubs. Herbaceous species in the understory include miner's lettuce (*Claytonia perfoliata*), bedstraw (*Galium aparine*), Pacific sanicle (*Sanicula crassicaulis*), and nemophila (*Nemophila heterophylla*). Down wood and rocky substrate covers much of the surface in oak woodland on the East Ridge. Table A provides a list of the plant species observed within Tolay Lake Regional Park.

Buckeye Woodland. Buckeye woodland occurs in a small stand on a rock outcrop at the base of the West Ridge near Tolay Creek at the southern boundary of the park (Figure 3b). This woodland is dominated by California buckeye (*Aesculus californica*) with an understory of weedy plant species such as dwarf nettle (*Urtica urens*), Italian thistle (*Carduus pycnocephalus*), and yellow star-thistle (*Centaurea solstitialis*). Mistletoe (*Phoradendron villosum*) is common on the branches of the buckeye trees.

Blue Gum Trees. A grove of blue gum trees occurs in the Park Center area of Tolay Lake Regional Park (Figure 3b). A smaller stand occurs on the west-facing slope of the southern portion of the West Ridge, and isolated blue gum trees occur on the base of the East Ridge (Figure 3a). These trees are large and provide a complete canopy cover. The understory of these groves is largely absent because of heavy loads of litter (fallen branches and exfoliating bark).

The large eucalyptus stand near the Park Center is associated with the Cardoza Ranch and thus has historical significance. The historical significance is currently undetermined regarding the two large eucalyptus trees growing at the base of the East Ridge and the small stand of eucalyptus growing on the western edge of the West Ridge, because their association with the Cardoza Ranch is not known (LSA 2008).

3.1.2 Wildlife Values

Oak woodlands are one of the most species-rich wildlife habitats in California, primarily due to their production of acorns, which are an important food source for a variety of wildlife (CalPIF 2002). The ecological relationship between birds and oaks can often be reciprocal when species such as western scrub-jay and Steller's jay disperse acorns. Large oak trees also provide cover and nest sites for both cup-nesting and cavity-nesting birds, and are used as caching sites for the storage of acorns by acorn woodpeckers (CalPIF 2002). Such trees also provide nest sites for raptors. A pair of red-tailed hawks was seen by LSA performing courtship flights over the Oak Grove on March 23, and likely nest in the area. Behavior consistent with nesting red-tailed hawks was also observed at the eucalyptus grove near the Park Center. Figure 3b shows the estimated location of the nest.

Although not seen by LSA, a pair of golden eagles is also known to frequent the Oak Grove area of Tolay Lake Regional Park (Steve Ehret pers. comm.). Several bird species observed in the Oak Grove were not seen in other portions of the site, indicating its unique habitat value. Species in this category include band-tailed pigeon, Steller's jay, oak titmouse, brown creeper, winter wren, and spotted towhee. Table B provides a list of animal species observed by LSA at Tolay Lake Regional Park in 2006. For an in-depth analysis of the bird usage of Tolay Lake Regional Park, please see the Appendix where we analyze data collected by volunteers for the Petaluma Wetland Alliance (PWA).

Mature trees and snags provide potential roost sites for bat species known to occur in the region, although not detected by LSA. These species include Yuma myotis (*Myotis yumanensis*), little brown myotis (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and pallid bat (*Antrozous pallidus*). Black-tailed deer (*Odocoileus hemionus*), while not restricted to oak woodlands, browse upon the foliage provided by the lower tree branches and take shelter there. Other mammal species likely to use this habitat include northern raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), and striped skunk (*Mephitis mephitis*). Feral pigs (*Sus scrofa*) are occasionally observed off-site in oak woodland adjacent to the East Ridge, but have not yet been observed on Tolay Lake Regional Park.

Oak woodlands typically occur on north-facing and east-facing slopes, where precipitation is concentrated and moisture is lost less rapidly to evaporation (Block and Morrison 1998). As a result of these relatively dense and moist conditions, salamanders often occur in oak woodlands on north-facing slopes. Although not detected by LSA, salamander species typically observed in oak woodlands within this region include California slender salamander (*Batrachoseps attenuatus*), and arboreal salamander (*Aneides lugubris*). Common reptiles expected within oak woodland include the western skink (*Plestiodon skiltonianus*), southern alligator lizard (*Elgaria multicaranata*), ring-necked snake (*Diadophis punctatus*), and sharp tailed snake (*Contia tenuis*). Down branches and rock outcrops provide cover for the animals inhabiting the oak woodland.

3.2 RIPARIAN VEGETATION

3.2.1 Botanical Values

Tolay Creek and Cardoza Creek support the most developed stands of riparian woodland at Tolay Lake Regional Park with the largest stands at the southern portion of the park along Tolay Creek (Figure 3b). Other watercourses support single willows or small stands composed of a few trees.

Riparian woodland is dominated by various combinations of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), yellow willow (*Salix lucida* ssp. *lasiandra*), and sandbar willow (*Salix exigua*), with scattered cottonwood (*Populus fremontii* ssp. *fremontii*), coast live oak, California bay, California buckeye, and non-native wild plums (*Prunus* sp).

Native shrubs are largely absent from the riparian woodland apparently due to heavy year-round browsing by cattle. Himalayan blackberry (*Rubus discolor*), an invasive non-native vine, which is resistant to cattle browsing, occurs in some riparian areas.

3.2.2 Wildlife Values

Riparian areas are generally recognized as an important wildlife habitat (Faber 2003) and have been identified as the most important habitats for landbirds in California (Manley and Davidson 1993, cited in RHJV 2004). Several species depend on riparian habitats for their entire breeding cycle (e.g., yellow warbler), while many others use them for roosting and foraging during the winter (e.g., yellow-rumped warblers) or during migration (e.g., western tanager).

Based on observations by LSA and volunteers from PWA, no riparian-obligate passerines (e.g., yellow-breasted chat) are currently known to breed in the riparian habitat on-site, despite the relatively well developed and extensive willow vegetation along Tolay and Cardoza creeks. Although the specific reasons for the lack of riparian-obligate birds are unknown, the on-site riparian corridors may be too narrow to support breeding populations of such species. Red-winged blackbirds and song sparrows were the two most abundant species along both creeks, with red-winged blackbirds occurring along the entire length of Tolay Creek.

LSA observed a single warbling vireo and orange-crowned warbler at Tolay Creek on May 2, and PWA volunteers observed three Wilson's warblers on May 7, 2007 and an orange-crowned warbler on April 21 and May 7, 2007. Although these species could possibly breed in the riparian vegetation, breeding has not been confirmed. PWA also observed yellow warblers and a willow flycatcher on September 17, 2006 but these birds were likely migrants. PWA observed a number of Bullock's orioles at Tolay Lake in 2007 and LSA observed a single Bullock's oriole on May 2 and June 8, 2006 in riparian habitat. Bullock's orioles nest in the eucalyptus at the base of the East Ridge.

Although no stick nests were found in 2006, the dense willows and occasional emergent cottonwood potentially provide nest sites for raptors. Other birds that use riparian woodland include mourning dove, Anna's hummingbird, downy woodpecker, northern flicker, black phoebe, tree swallow, bushtit, Bewick's wren, ruby-crowned kinglet (winter), hermit thrush (winter), American robin, yellow-rumped warbler (winter), spotted towhee, California towhee, white-crowned sparrow (winter), golden-crowned sparrow (winter), and house finch. Although most of these species also occur in non-riparian habitats, the dense foliage of riparian woodland provides particularly good habitat.

Riparian habitats also function as movement corridors and foraging habitat for mammals, including those mentioned in the oak woodland section above. Additional mammal species that may occur in riparian woodland include common gray fox (*Urocyon cinereoargenteus*) and Virginia opossum (*Didelphis virginiana*).

3.3 GRASSLANDS

3.3.1 Botanical Values

Native Grasslands. Native grasslands are sensitive biological resources because little of the original native California grassland remains in low elevation areas of California, including Tolay Lake Regional Park. Communities dominated by native grasses and graminoids that occur in Tolay Lake Regional Park (Figures 3a and b) include moist grasslands, and needlegrass grasslands.

Moist grasslands are noted as unique features in and around Tolay Lake (Goals Project 1999). Moist grasslands vary in species composition depending on moisture levels. The wettest areas (often meeting the criteria of jurisdictional wetlands) support California semaphore grass (*Pleuropogon californicus*), sedges (*Carex* spp.), and rushes (*Juncus* spp.). Other moist grasslands may not be saturated or inundated long enough to meet the wetland criterion, but support native grass species that require relatively high summer moisture levels such as creeping wildrye (*Leymus triticoides*), meadow barley (*Hordeum brachyantherum*), and California oatgrass (*Danthonia californica*).

For the purposes of this report, stands of meadow barley and California oat grass are considered a native grassland because of their characteristic "bunch" growth habit (that is characteristic of a native bunch grass) and because they grow in dryer areas than the majority of wetland plant species. Stands of sedges and rushes were mapped as wetlands because they grow in areas that are saturated or inundated for relatively long periods of time. Meadow barley, California oat grass, and a mosaic of meadow barley, California oat grass, sedges, and rushes were mapped as moist grasslands. Stands of California semaphore grass and areas dominated by both California semaphore grass and rushes were mapped as California semaphore grass wetland. Moist grasslands and California semaphore grass wetlands are common in the north central portion of the park east of Tolay Lake (Figure 3a).

A second native grass community occurs on slopes exhibiting the driest conditions. These occur as small stands of purple needlegrass (*Nassella pulchra*), often in association with California oat grass. Needlegrass grassland occurs in scattered small stands throughout Tolay Lake Regional Park, but more commonly in the south-eastern portion (Figure 3a).

Non-Native Grasslands. Non-native grasslands at Tolay Lake Regional Park are dominated by Italian ryegrass (*Lolium multiflorum*) and medusahead (*Taeniatherum caput-medusae*). Italian ryegrass is dominant in spring and early summer throughout the whole site. Later in summer, medusahead becomes dominant in large areas, especially on the West Ridge. Medusahead grows in less extensive stands on the East Ridge and central part of Tolay Lake Regional Park. Other non-native grass species include wild oats (*Avena fatua, Avena barbata*), barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome (*Bromus diandrus*), and soft chess (*Bromus hordeacous*). Some non-native grass species occur sparsely in wetland areas, for instance, annual canary grass (*Phalaris paradoxa*) and swamp timothy (*Crypsis schoenoides*).

Non-native grasslands include many other weedy species including broad-leaf filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), common vetch (*Vicia sativa* ssp. *nigra*), geranium (*Geranium molle*), shepherd's needle (*Scandix pecten-veneris*), rose clover (*Trifolium hirtum*), subterranean clover (*Trifolium subterraneum*), and milk thistle (*Silybum marianum*). These species do not form large stands but grow sparsely among the grasses. Small amounts of wheat (*Triticum aestivum*) continued to persist in some parts of the cultivated fields.

Non-native grasslands support numerous native wildflowers including Ithuriel's spears (*Triteleia laxa*), white brodiaea (*Triteleia hyacinthina*), Fremont's star lily, blue-eyed grass (*Sisyrinchum bellum*), California poppy (*Eschscholzia californica*), cream cups (*Platystemon californicus*), sun cups (*Camissonia ovata*), soap plant (*Chlorogalum pomeridianum*), California checker mallow (*Sidalcea malvaeflora*.), Johnny jump-up (*Viola pedunculata*), morning-glory (*Calystegia subacaulis*), false lupine (*Thermopsis macrophylla*), mule ears (*Wyethia angustifolia*), and yampah (*Perideridia kelloggii*.).

Invasive Plant Species. Medusahead, Italian thistle, bristly ox-tongue (*Picris echioides*), yellow star-thistle, and purple star-thistle (*Centaurea calcitrapa*) are the most common non-native invasive plants at Tolay Lake Regional Park. Large stands of these weeds occur throughout the site, especially in the central part (Figures 4a and 4b). Bristly ox-tongue covers large areas in the central part of the site, especially in the formerly cultivated areas east of Tolay Lake. From these formerly cultivated areas, bristly ox-tongue has colonized the adjacent grasslands. Milk thistle, another invasive species, is less common at Tolay Lake Regional Park. Other non-native weed species that are less invasive and grow relatively sparsely on the site include bull thistle (*Cirsium vulgare*), jointed charlock (*Raphanus raphanistrum*), and dandelion (*Taraxacum officinale*).

3.3.2 Wildlife Values

Grasslands constitute the most widespread habitat type at Tolay Lake Regional Park. In addition to common bird species such as western meadowlark, grasslands on the site are likely to support breeding grasshopper sparrows and horned larks judging by the observation of a pair of horned larks and singing male grasshopper sparrows (LSA obs.). Both of these species are more restricted in their distribution and together indicate high-quality, diverse grasslands with horned larks preferring short grass and bare areas while grasshopper sparrows preferring comparatively tall grass habitats. Grasslands also provide foraging habitat for raptor species such as red-tailed hawk, northern harrier, white-tailed kite, American kestrel, great horned owl, and barn owl, which feed on the small mammals that occur in grasslands (see below). Other local bird species that spend a large portion of their life cycle within or adjacent to grasslands include turkey vulture, loggerhead shrike, western kingbird, Say's phoebe, American crow, Savannah sparrow, and red-winged blackbird. Five swallow species (tree, violet-green, northern rough-winged, barn, and cliff) were observed on site in 2006, most of which were seen foraging over the grasslands on either side of the dirt road that parallels the eastern side of the West Ridge.

The grasslands of Tolay Lake Regional Park are likely to support several species of small mammals such as deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californica*), Botta's pocket gopher (*Thomomys bottae*), and western harvest mouse (*Reithrodontomys megalotis*). Grasslands also provide suitable foraging habitat for bat species, northern raccoon, and striped skunk. Skunks would forage in the grasslands while raccoon would forage in the ponds, seeps, and other wet areas of Tolay Lake Regional Park.

Black-tailed jackrabbit (*Lepus californicus*) and coyote (*Canis latrans*) are known to occur on the site, and spend the majority of their time foraging or resting in grasslands. The jackrabbit would comprise a major prey item for the carnivores that occur at Tolay Lake Regional Park. Brush rabbits (*Sylvilagus bachmani*) were not observed at the park. A limiting factor for this species is the small

amount of shrubby cover. With additional cover, rabbit and other small mammals could occur on-site in greater numbers than currently and provide a greater prey base for the carnivores.

The California ground squirrel (*Spermophilus beecheyi*) creates burrows that are used by a wide variety of animals including reptiles, amphibians, insects, arachnids, and snails. Because of this and their importance as prey for foxes, coyotes, golden eagles, and other raptors, the California ground squirrel has a positive influence on the diversity of animal species in grasslands.

California ground squirrels experience natural fluctuations in their population numbers at Tolay Lake and the adjacent ranches according to Jenette Cardoza, the owner of the Cardoza Ranch (Steve Ehret pers. comm.). They were often observed on two areas of the West Ridge, and LSA observed a small number of holes and scat near a rock outcrop at the base of the East Ridge. Their current population numbers are very low at Tolay Lake Regional Park. Given the extensive suitable habitat for ground squirrels and the past favorable land management regime of intensive grazing, the scarcity of ground squirrels on the site could be the result of a low point of a natural population fluctuation and/or intense predation by a suite of predators.

Common reptiles typically found in grasslands in this region include western fence lizards (*Sceloporus occidentalis*), gophersnakes (*Pituophis catenifer*), and northern American racers (*Coluber constrictor*). Grassland areas adjacent to seasonal wetlands in this area could also support the sierran treefrog (*Pseudacris sierra*) [formerly Pacific treefrog], and western toad (*Anaxyrus boreas*).

3.4 TOLAY LAKE

Tolay Lake has been greatly altered in historic times by the removal of its natural dam, construction of drainage ditches, the straightening, widening, and deepening of Tolay Creek to drain Tolay Lake, diverting North Creek around Tolay Lake, and farming the bottom of Tolay Lake. These activities have reduced the size and duration of ponding of Tolay Lake and greatly altered the flora of the lake.

Review of Kammon Hydrology and Engineering (2003), Ducks Unlimited (2005), Hanson (1999), and the supplemental information included in the water rights application 30558 submitted to the State Water Resources Control Board provided background information on the amount of water contained in Tolay Lake. These accounts indicate that Tolay Lake was perennial during years of high rainfall and extended to Stage Gulch Road prior to the breaching of the dam sometime after 1859. Tolay Lake will still extend nearly to Stage Gulch Road in wet years, as it did in 2006.

Tolay Lake will become inundated any time between December and February in a typical year. Ponding remains until April or early May. The Cardoza's pumped water out of the lake in April or May to begin their farming operations. Some isolated pools in the lake bottom that were not connected to the channel of Tolay Creek, remained ponded longer.

A relatively large amount of water seems to have been passing through the Tolay Lake watershed based on these reports. The observation of water in Tolay Creek in August and November 2006 by LSA staff confirms that water is present nearly year-round, during wet years, in Tolay Creek despite a dry Tolay lakebed. Furthermore, Parsons (1996) indicates that 1 acre-foot of water is present in

Tolay Creek in the late summer during dry years and that 2 acre-feet are present in Tolay Creek during average years and wet years.

Tolay Lake is now a large, shallow basin divided by excavated drainages into a series of formerly cultivated agricultural fields. A mosaic of ponded areas, wetland vegetation, and upland areas occurs at the edge of Tolay Lake, and disturbance from former farming activities has made it difficult to determine the natural pattern of vegetation. Nevertheless, a slight break in the slope of the formerly cultivated field appears to indicate the historic shoreline along a portion of the eastern shore of Tolay Lake.

There have been several studies of the hydrology of Tolay Lake in preparation of developing plans for its restoration (Kamman 2003). A variety of lake alternative restoration scenarios have been developed, but the precise details of each of the alternatives have not yet been selected (Ducks Unlimited 2005).

3.4.1 Botanical Values

The lake bottom is bare of vegetation while ponded and is dominated by cultivated vegetation when it was farmed. Under fallow conditions it supports a variety of plant species as it dries. Native plant species that appear along the lakeshore in the late spring including slender popcorn flower (*Plagiobothrys stipitatus*), water-starwort (*Callitriche* sp.), purslane speedwell (*Veronica peregrina*), hyssop loosestrife (*Lythrum hyssopifolium*), and common monkey-flower (*Mimulus guttatus*). In the summer a variety of native and non-native weedy species emerge in the dry bottom of the lake. A dense monoculture of water smartweed (*Polygonum amphibium* ssp. *emersum*) occurrs in Tolay Lake south of the causeway. North of the causeway, water smartweed grew mixed with mayweed (*Anthemis cotula*), spearscale (*Atriplex triangularis*), willowherb (*Epilobium pygmaeum*), velvet-leaf (*Abutilon theophrastii*), devil's claw (*Proboscidea lutea*), swamp timothy, red ammannia (*Ammannia coccinea*), heliotrope (*Heliotropium curassavicum*), common purslane (*Portulaca oleracea*), and water plantain (*Alisma lanceolatum*).

Wetlands upslope of the ponded area of Tolay Lake are dominated by hyssop loosestrife, meadow barley, popcorn flower, and California semaphore grass. Common non-native species in this area include Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), spiny-fruit buttercup (*Ranunculus muricatus*), curly dock (*Rumex crispus*), field bindweed (*Convolvulus arvensis*), mustard (*Brassica* sp.), and charlock (*Sinapis arvensis*). Above a wrack line of flotsam deposited during the previous winter by the high water elevation in Tolay Lake, the vegetation shifts to dominance by Italian ryegrass and prickly ox-tongue, facultative species (occurring with equal probability in wetlands and uplands) that are common in the grasslands surrounding Tolay Lake.

3.4.2 Wildlife Values

Tolay Lake is a major wintering area for migratory waterfowl (Steve Ehret pers. comm.; LSA obs.). The large size and shallow depth of the lake attracts large numbers of dabbling ducks and other waterbirds. The accessible vegetation growing on the lake bottom provides forage for over-wintering waterfowl. Eleven duck species, eight of them dabblers, were observed by LSA and PWA

volunteers in 2006. These species included gadwall, American widgeon, mallard, cinnamon teal, northern shoveler, northern pintail, green-winged teal, canvasback, greater scaup, bufflehead, and ruddy duck. Other water bird species observed on the lake include Canada goose, pied-billed grebe, double-crested cormorant, American coot, and Caspian tern. Wading birds such as great blue heron, great egret, and snowy egret forage along the lake margins as well as within the seasonally flooded fields adjacent to and east of the lake. These shallow wetlands also provide foraging habitat for wintering and migrating shorebirds such as killdeer, greater yellowlegs, least sandpiper, western sandpiper, and long-billed dowitcher.

Mammals primarily use Tolay Lake as a source of drinking water. Several of the common reptiles typically found in the surrounding grassland habitat may also use the lake for drinking water.

The importance of Tolay Lake as habitat for invertebrates is not known. The seasonal nature of the lake reduces macro-invertebrate diversity. Bats and swallows are likely to forage for adult insects flying over Tolay Lake. Tolay Lake also provides suitable breeding habitat for Pacific treefrogs and western toads. Due to the seasonal nature of the Lake, it is not suitable breeding habitat for American bullfrogs *(Lithobates catesbiana)* although bullfrogs probably travel to Tolay Lake from upstream reservoirs and adjacent areas. California red-legged frogs may be able to breed in protected areas of Tolay Lake if water remains until July.

3.5 SEEPS AND SPRINGS

3.5.1 Botanical Values

Seasonal to perennial wetland seeps and springs occur on many of the slopes within the study area. These areas do not have a significant surface watershed and show no evidence of being the result of surface runoff. The hydrology of these seeps and springs appears to be the result of groundwater flowing from cracks in the underlying bedrock or from the "daylighting" of water that is flowing down slope above the soil's contact with bedrock. Some of these seeps and springs are extensive, especially those that occur near Pond 2 (Figure 3a). Permanent springs produce flowing surface water and support wetland vegetation including soft rush (*Juncus effusus*), iris-leaf rush (*Juncus xiphioides*), common monkey-flower, water cress (*Rorippa nasturtium-aquaticum*), spiny-fruit buttercup, and straight-beaked buttercup (*Ranunculus orthorhynchus* var. *bloomeri*). Permanent seeps support green vegetation during the dry season. Permanent seeps were dominated by brown-headed rush (*Juncus phaeocephalus*), common monkey-flower, and pennyroyal (*Mentha pulegium*). Seasonal seeps provide a relatively short wet season hydrology. Depending on the amount of rainfall, these seeps may dry by the end of May in a dry year and by the end of June in a wet year. Their dominant surface feature is the presence of brown-headed rush. Trampling by cattle has reduced the cover of some seeps and appears to have reduced the numbers of some species (such as straight-beaked buttercup) that grow in the seeps.

3.5.2 Wildlife Values

Birds, mammals, and reptiles would all be expected to frequent the seeps for drinking water. Cover would be provided within the dense growth of rushes and other vegetation. Shrews would be expected to occur within the seeps where they would conduct the majority of their foraging. Bird

species such as killdeer, great egret, and Wilson's snipe are more likely to forage within the wet areas of seeps and springs than in the drier adjacent grassland habitats.

The use of seeps and springs by amphibians largely depends on the seasonal duration of the seep. Seasonal seeps that have relatively short wet season hydrology, may aid in the dispersal of adult frogs. Nevertheless, permanent seeps and springs are more useful to amphibians during the summer months and common amphibian species, such as Pacific treefrogs and western toads are likely to use these areas in the summer. Pacific treefrogs may breed in the livestock watering troughs that are fed by some of the springs. Trampling by cattle may reduce the wildlife value of the seeps by degrading the quality of water and reducing cover. Nevertheless, grazing by cattle may reduce the weed cover of seeps.

3.6 VERNAL POOLS AND SEASONAL WETLANDS

3.6.1 Botanical Values

Seasonal wetlands occur on the flat top of the West Ridge and on shallow slopes and swales of the East Ridge (Figures 3a and 3b). Hydrology of these features is provided by direct rainfall and run-off. The seasonal wetlands of the West Ridge occur on level, impermeable soils or a shallow soil over impermeable bedrock. Small seasonally wet areas above these impermeable substrates are dominated by armed coyote thistle (*Eryngium armatum*).

Two small and shallow vernal pools occur on the crest of the West Ridge near the southern boundary of the park (Figure 3b). Because they are shallow, they would be expected to dry sometime between March and May on any given year. Plant species include Mediterranean barley, armed coyote thistle, Lobb's aquatic buttercup (*Ranunculus lobbii*), and water-starwort.

Certain seeps have created conditions resulting in rotational land slumps. Soil water, along with some surface runoff, collects in seasonal ponds above these rotational land slumps. These seasonal ponds are dominated by rabbit's-foot grass, brown-headed rush, creeping spike rush (*Eleocharis macrostachya*), smooth rush, white water buttercup (*Ranunculus aquatilis*), Lobb's aquatic buttercup, and flowering quillwort (*Lilaea scillioides*). Annual miner's lettuce and spiny-fruit buttercup also occur in these seasonal ponds in the spring.

Several small seasonal wetlands occur on shallow slopes or swales on the East Ridge that appear to concentrate runoff sufficiently to saturate the soil and support hydrophytic plant species. These wetlands are interesting because their water source derives from both surface hydrology and seepage from groundwater. These habitats support soft rush, brown-headed rush, annual water miner's lettuce (*Montia fontana*), and common monkeyflower.

The relatively level portion of the site that is east of Tolay Lake that was formerly cultivated, supports large seasonal wetlands that are ponded in the spring and support California semaphore grass, meadow foam (*Limnanthes douglasii*), and white-tip clover (*Trifolium variegatum*). In summer, these areas become dry and are invaded by non-native grasses and weeds. Other types of California semaphore grass wetlands occur in areas where rushes are co-dominant. In these areas the California semaphore grass grows in saturated soils or where there are small ponded areas on the order of a few feet wide or less.

Seasonal wetlands occur in drainages that cross beneath Cannon Lane and in low areas located beside Lakeville Road (Figure 5). The wetlands near Lakeville Road are connected to salt marshes surrounding the Petaluma River and support saline-adapted species such as the non-native brass buttons (*Cotula coronopifolia*).

3.6.2 Wildlife Values

The wildlife values discussed in Section 3.5.2 (*Seeps and Springs*) are also relevant for vernal pools and seasonal wetlands. The large seasonal wetlands that remain ponded into the spring provide suitable breeding habitat for Pacific treefrogs and western toads. Common garter snakes (*Thamnophis sirtalis*) and terrestrial garter snakes (*Thamnophis elegans*) would also be expected to occur in and adjacent to seasonal wetlands. Garter snakes predominantly feed on fish, toads, frogs, salamanders, and their larvae. In wet years, portions of two large seasonal wetland areas on the eastern side of Tolay Creek, towards the southern edge of the property, retain enough ponded water to provide hydration habitat for bullfrogs. They can be expected to dry early in years of low rainfall.

3.7 PONDS

Ponds have been developed on Tolay Lake Regional Park for watering cattle, irrigating crops, and for other human uses. These ponds are located at the base of the West Ridge and at the base of the East Ridge (Figure 3a and 3b).

Two small reservoirs, Pond 1 and Pond 2, at the base of East Ridge are supplied by a combination of seasonal surface runoff and seasonal and perennial springs. Pond 1 receives runoff from a large area up-slope, from seeps, and from the headwaters of the Main Fork of Cardoza Creek. Pond 2 receives overflow from Pond 1, flow from the North Fork of Cardoza Creek, and water from two large seep/spring complexes.

The Willow Pond and Duck Pond, near the Park Center, are supplied by springs located in the eastern side of the park. Over a mile of pipes brings water to these ponds. Duck Pond receives overflow from Willow Pond. A small Stock Pond occurs at the southern portion of the West Ridge. A small Irrigation Pond at the base of the East Ridge receives water from a drainage ditch. The Old Duck Pond consists of a shallow basin surrounded by a low berm, where inundation is a result of direct rainfall and a seasonally elevated water table.

3.7.1 Botanical Values

The northeastern shoreline of Pond 2 supports a broad band of cattails and tules surrounded by a small but well developed riparian woodland. Wetland vegetation along the shore of Pond 1 includes prostrate amaranthus (*Amaranthus blitoides*), spiny clotbur (*Xanthium spinosum*), and strawberry clover (*Trifolium fragiferum*). The rapid drawdown of the water level in Pond 1 for irrigation likely precludes the establishment of substantial amounts of wetland vegetation.

The surface of Willow Pond is covered with duckweed (*Lemna* sp.). The vegetation of Duck Pond is dominated by the noxious weedy water primrose (*Ludwigia* sp.). The water primrose grows through the shallow portions of the pond and nearly reaches the middle of the pond by the middle of autumn.

The small Stock Pond supports several species of rush and short herbaceous species. The Irrigation Pond is ringed with a dense band of cattails and the Old Duck Pond supports a dense stand of creeping spikerush.

3.7.2 Wildlife Values

The habitat values of ponds are similar to those of seeps, springs, and seasonal wetlands, but are likely to receive more wildlife use by virtue of their greater size and presence of standing water. Pond 2, in particular, provides open water habitat for species such as American coot, pied-billed grebe, cinnamon teal, and mallard. Stands of cattails and tules at Pond 2 and the Irrigation Pond also provide habitat for passerines such as black phoebe, marsh wren, song sparrow, and Lincoln's sparrow.

The ponds on the property likely provide breeding habitat for native Pacific treefrogs and western toads, which also makes them likely habitat for common garter snakes and terrestrial garter snakes. Ponds 1 and 2, the Irrigation Pond in the eastern portion of the farmed area, and the Duck Pond are all perennial and contained introduced bullfrogs. Ponds 1 and 2 also contain non-native mosquito fish (*Gambusia affinis*). The Willow Pond is perennial but no bullfrogs were observed during the site visits. This pond is shaded and is dominated by duckweed making it less likely to support bullfrogs. The Old Duck Pond may be perennial during wet years and it supported bullfrogs in 2006. All of the ponds on the property could provide habitat for California red-legged frogs and western pond turtles, if the ponds were not occupied by bullfrogs or mosquito fish. The presence of introduced bullfrogs does not necessarily exclude the presence of these two species, but it can have a significant effect on their abundance.

3.8 STREAMS

3.8.1 Tolay Creek

Tolay Creek extends approximately 1.25 miles downstream of Tolay Lake before exiting the southern boundary of Tolay Lake Regional Park. South of Tolay Lake, Tolay Creek is contained within a defined, incised channel of 4 to 10 feet in depth with a channel width of 10 to 20 feet. Much of this channel appears to have been straightened or deepened by excavation for the purpose of draining Tolay Lake for agriculture. Berms of dredged spoils are visible at multiple locations along the channel. Most of the channel supports hydrophytic plants and flows all year. Portions of the channel contained standing or flowing water into early November 2006 although other portions dried by August. Tolay Creek typically dries completely in the dry season approximately 3 miles downstream from Tolay Lake Regional Park (LSA obs.).

The vegetation of Tolay Creek consists of water smartweed and small stands of cattails and tules that form a complete cover over the creek between Tolay Lake and the Farm Bridge, 700 feet downstream of the lake. Non-native poison hemlock (*Conium maculatum*) grows on the upper edge of the banks. This portion of Tolay Creek could potentially provide suitable habitat for California red-legged frogs and western pond turtles, although none were observed during the March or August surveys.

Downstream of the bridge, cattle graze in the channel of Tolay Creek resulting in a more diverse and open vegetation, including cattails, tules, water smartweed, curly dock, water cress, and various species of native rushes. Juvenile bullfrogs were observed in the portion of Tolay Creek, just above

the confluence with Cardoza Creek. Arroyo willow and red willow occur as single individuals scattered 1,900 feet downstream of Tolay Lake. These willows merge into a narrow band about a half mile downstream from Tolay Lake. A relatively wide band of riparian vegetation grows along Tolay Creek beginning about a mile downstream from the lake. The southern most stretch of Tolay Creek on the property, downstream of the confluence with Cardoza Creek, supports the largest area of riparian woodland. A braided series of channels flows through willows and dense stands of Himalayan blackberries in this area. At least one California red-legged frog was previously recorded at this location (Parsons 1996), although none were observed during this study. This entire portion of Tolay Creek contains suitable habitat for California red-legged frogs. The dense riparian cover and cooler temperatures makes it less suitable for introduced bullfrogs and none were observed here during surveys. Nevertheless, one adult bullfrog was observed in a seep adjacent to Tolay Creek.

3.8.2 North Creek – Oak Grove Fork

The North Creek – Oak Grove Fork originates on the eastern slope of East Ridge and crosses the northern corner of the project site before leaving Tolay Lake Regional Park. North Creek later re-enters the site as a channelized ditch that flows along the eastern edge of Tolay Lake. The Oak Grove Fork starts as a slumped gully without wetland characteristics, and then flows through approximately 600-feet of channel with wetland vegetation and seeps, followed by an approximately 700-foot reach without wetland characteristics underneath the canopy of oak woodland. The channel of the Oak Grove Fork appears unmodified except for a small bridge crossing.

3.8.3 Cardoza Creek

The Main Fork of Cardoza Creek upstream of Pond 1 supports brown-headed rush in the channel and California figwort (*Scrophularia californica*), creeping snowberry (*Symphoricarpos mollis*), California coffeeberry (*Rhamnus californica*), poison oak (*Toxicodendron diversilobum*), and narrow horsetail (*Equisetum laevigatum*) on the banks. Scattered coast live oak and willow trees grow along the Main Fork of Cardoza Creek.

The North Fork of Cardoza Creek, upstream of the confluence of the channel draining Pond 1, does not support wetland vegetation. Scattered buckeye and bay trees grow along banks of the North Fork. The Pond 1 spillway is a deeply incised constructed channel that joins the north fork of Cardoza Creek upstream of Pond 2. The banks of this channel and the outfall of Pond 1 are actively eroding and are in need of repair to reduce downstream sedimentation.

The streambed between Pond 1 and Pond 2 has been bypassed due to the construction of the dam for Pond 1. This former streambed flows during winter and spring but is reduced to a large wetland seep during the summer. One adult bullfrog was observed in a plunge pool in the streambed between Pond 1 and Pond 2.

Pond 2 discharges onto a concrete-lined spillway that concentrates flows causing erosion of the channel several hundred yards downstream to the confluence with the Main Fork of Cardoza Creek. The end of the spillway is undercut and large chunks of the spillway have fallen into the deeply eroded channel. Old automobile bodies and large blocks of cement have been added to the banks of the eroded channel to prevent erosion. Large willow trees have grown along the banks emerging

through the car bodies. Although the spillway is eroding, the channel bottom appears to be stabilized because it has attained a stable elevation upstream from the Main Fork of Cardoza Creek. The banks of the channel are overly steep and portions are actively eroding into the channel. The former Cardoza Creek channel upstream of the juncture with the Pond 2 spillway channel and below the dam to Pond 2 no longer shows evidence of wetland or stream characteristics but does support riparian woodland predominantly composed of sandbar willow.

3.8.4 Eagle Creek

The extreme headwaters of Eagle Creek are mapped as a series of seeps and channels supporting wetland vegetation including brown-headed rush and soft rush. A few coast live oak and bay trees occur along the upstream part of the creek. Eagle Creek contained standing water at its confluence with Tolay Creek as late as August in 2006, although this was an extraordinary wet year and not typical.

3.8.5 Un-named Streams

Numerous small drainages flow toward Tolay Lake and Tolay Creek from the West Ridge in the southwest portion of the project site. Many of these streams were flowing as late as August and November of 2006, but may flow less in dryer years. Channel characteristics of these streams range from relatively narrow segments without wetland characteristics to wider segments consisting of a defined channel with adjacent wetland vegetation dominated by brown-headed rush and common monkey-flower. These varying channel characteristics are caused by changes in gradient, underlying bedrock, and the occurrence of seeps.

3.9 ROCK OUTCROPS

Rock outcrops provide habitat for native plants and animals. Rock outcrops are often surrounded by shallow soils that support a higher proportion of native plant species than adjacent grasslands. Some of the rock outcrops, however, are heavily used by cattle for rubbing and support ruderal plants typical of disturbed areas. Rock outcrops of the East Ridge have the most diversity of native plant species including shooting star (*Dodecatheon hendersonii*), California polypody (*Polypodium californicum*), California maidenhair fern (*Adiantum jordanii*), clarkia (*Clarkia* sp.), phacelia (*Phacelia* sp.), and woodland star (*Lithophragma* sp.).

Rock outcrops have been used by the burrowing owl at Tolay Lake Regional Park. Other wildlife species are likely to use rock outcrops for dens or observation posts.

4.0 SPECIAL-STATUS SPECIES

A variety of special-status species and sensitive habitat types occur at Tolay Lake Regional Park. Special-status species observed during field work or otherwise known to occur on-site include fragrant fritillary, Lobb's aquatic buttercup, California linderiella (*Linderiella occidentalis*), California red-legged frog, western pond turtle, golden eagle, burrowing owl, and Grasshopper sparrows.

Habitat for several species of special-status insects occurs at Tolay Lake Regional Park. This habitat consists of cream cups, the food plant of Opler's longhorn moth (*Adela oplerella*), and ponds that could be used by Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*). Johnny jump-up, the food plant of an unnamed subspecies of zerene silverspot butterfly (*Speyeria zerene*), occurs at Tolay Lake Regional Park and the butterfly may also occur there.

Red-tailed hawks are not a special-status species, but their nest area at Tolay Lake Regional Park is considered sensitive. California horned larks were formerly a special-status species and have been recently placed on the CDFG watch list. Because this change is recent we include a write-up for them.

Sensitive habitats that occur at Tolay Lake Regional Park are oak woodlands, riparian woodlands, buckeye woodlands, native grasslands, wetlands, and rock outcrops (Figures 3a and 3b).

4.1 PLANTS

4.1.1 Known Occurrences of Special-status Plants

Two special-status plant species described below have been observed at Tolay Lake Regional Park. The fragrant fritillary and Lobb's aquatic buttercup should be avoided by park plans to the extent possible, especially because they only occur on-site in a few locations.

Fragrant Fritillary. Fragrant fritillary is a CNPS list 1B species and is on CDFG's list of Special Vascular Plants, Bryophytes and Lichens. It has no federal status. It occurs in two locations on the east-facing portion of the West Ridge. Approximately fifteen plants were observed with Fremont's star lily at a northern location (designated by two dots on Figure 3b) and a single plant grew with non-native annual grasses at a southern location (designated by one dot on Figure 3b) on March 22, 2006. Approximately 13 fragrant fritillary plants were observed in March of 2007 at the northern location and no fragrant fritillary plants were observed at the southern location. On April 1, 2008, hundreds of fragrant fritillary plants were observed at the northern location. Fragrant fritillary grows from a bulb and, along with Fremont's star lily, can be one of the first wildflowers to bloom in the spring beginning in February. Nevertheless, it appears that it blooms somewhat later at Tolay Lake Regional Park.

Lobb's Aquatic Buttercup. Lobb's aquatic buttercups is a CNPS list 4 species and is on CDFG's list of Special Vascular Plants, Bryophytes and Lichens. It has no federal status. It grows in shallow pools in the spring. Their white flowers and leaves float on the surface of the water. It was found in a seasonal pool at the base of a slump and a vernal pool on the top of the West Ridge.

Yampah. Gairdner's yampah, (*Perideridia gairdneri* ssp. *gairdneri*), a CNPS List 4 species potentially occurs at Tolay Lake Regional park. It looks very similar to and can grow with Kellogg's yampah (*Perideridia kelloggii*), a common species that grows on the West Ridge. Gairdner's yampah grows in moist grassland areas, adobe flats, and grassland areas beneath pine trees (Best et al. 1996). In Sonoma County, Gairdner's yampah occurs much west and north of Tolay Lake Regional Park mostly from the Laguna de Santa Rosa westward to the coast. Kellogg's yampah is common and grows in grassland including adobe flats and serpentine (Best et al. 1996).

4.1.2 Potential Occurrences of Special-status Plants

The following plant species are not known to occur within Tolay Lake Regional Park, but are known from the vicinity. They were not found during surveys and they are unlikely to occur within the park.

Franciscan onion. Franciscan onion (*Allium peninsulare* var. *franciscanum*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on clay soils, often on serpentine, and on dry hillsides at an elevation between 330 and 1,000 feet. It is not likely to occur because serpentine is absent from Tolay Lake Regional Park and it was not found during surveys of suitable habitats.

Sonoma alopecurus. Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), federal endangered, CNPS List 1B, and CDFG Special Plant occurs in wet areas, vernal pools, marshes and riparian banks. It is not likely to occur within the site because it was not found during surveys in suitable habitats.

Napa false indigo. Napa false indigo (*Amorpha californica* var. *napensis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in openings in forest, or woodland, and/or chaparral vegetation at an elevation between 500 and 6,500 feet. It is not likely to occur in the site because it was not found during surveys of openings within woodland habitats.

Bent-flowered fiddleneck. Bent-flowered fiddleneck (*Amsinckia lunaris*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in woodland and grassland habitats. It is not likely to occur within Tolay Lake Regional Park because it was not found during surveys.

Alkali milk-vetch. Alkali milk-vetch (*Astragalus tener* var. *tener*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on alkali flats, flooded areas of annual grassland, in playas, or in vernal pools at an elevation between 1 and 550 feet. It is not likely to occur within Tolay Lake Regional Park because alkaline soils are absent and because it was not found during surveys.

Sonoma sunshine. Sonoma sunshine (*Blennosperma bakeri*), federal and State Endangered and CNPS List 1B, occurs in vernal pools and swales at an elevation between 30 and 330 feet. It is not likely to occur at Tolay Lake Regional Park because it was not found during surveys.

Narrow-anthered California brodiaea. Narrow-anthered California brodiaea (*Brodiaea californica* var. *leptandra*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in broad-leaved upland forest, chaparral, and lower montane coniferous forest at an elevation between 360 and 3,000 feet. Most of the observations were from areas beside scrub or chaparral (CNDDB 2006). It is not likely to occur on the site because it was not found during surveys within suitable habitats.

Round-leaved filaree. Round-leaved filaree (*California* (*Erodium*) *macrophyllum*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in grasslands on clay soil between an elevation of 50 and 4,000 feet. It is not likely to occur on the site because it was not found during the surveys of the grassland areas.

Pappose tarplant. Pappose tarplant (*Centromadia parryi* ssp. *parryi*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in vernally mesic, often alkaline sites at an elevation between 6 and 1,400 feet. It is not likely to occur within Tolay Lake Regional Park because alkaline soils are absent and it was not found during surveys of other habitats.

Sonoma spineflower. Sonoma spineflower (*Chorizanthe valida*), federal and State endangered and CNPS List 1B, occurs in sandy soil at an elevation between 30 and 160 feet. It is not likely to occur within the site because sandy soils are absent.

Yellow larkspur. Yellow larkspur (*Delphinium luteum*), federal endangered, State rare, and CNPS List 1B, occurs on north-facing rocky slopes at an elevation up to 330 feet. It is not likely to occur on the site because suitable habitat appears to be missing.

Western leatherwood. Western leatherwood (*Dirca occidentalis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on brushy slopes and mesic sites; mostly in mixed evergreen and foothill woodland communities at an elevation between 100 and 1,800 feet. It is not likely to occur in the site because its mesic scrub habitat is absent and it was not observed during surveys.

Dwarf downingia. Dwarf downingia (*Downingia pusilla*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in vernal lake and pool margins at an elevation between 1 and 1,600 feet. It is not likely to occur in the site because it was not found during surveys of vernal pools or other seasonally ponded areas.

Marin western flax. Marin western flax (*Hesperolinon congestum*), federal and State threatened and CNPS List 1B, occurs in serpentine barrens and serpentine grassland and chaparral at an elevation between 100 and 1,200 feet. It is not likely to occur at Tolay Lake Regional Park because serpentine is absent.

Burke's goldfields. Burke's goldfields (*Lastenia burkei*), federal and State endangered and CNPS List 1B, occurs in vernal pools and swales at an elevation between 50 and 1,900 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas or the saturated soil of wetlands.

Contra Costa goldfields. Contra Costa goldfields (*Lastenia conjugens*), federal endangered, CNPS List 1B, and CDFG Special Plant, occurs in vernal pools, swales, low depressions, and open grassy

areas at an elevation between 1 and 1,500 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas or the saturated soils of wetlands.

Legenere. Legenere (*Legenere limosa*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in the beds of vernal pools at an elevation between 1 and 3,000 feet. It is not likely to occur in the site because it was not found during surveys of ponded areas.

Jepson's leptosiphon. Jepson's leptosiphon (*Leptosiphon jepsonii*), CNPS List 1B, CDFG Special Plant and no federal Status, occurs on grassy slopes of volcanic or serpentine substrates at an elevation between 300 and 1,600 feet. It is not likely to occur within the site because serpentine is absent and it was not found during surveys in suitable habitats.

Sebastopol meadowfoam. Sebastopol meadowfoam (*Limnanthes vinculans*), federal and State endangered and CNPS List 1B, occurs in swales, wet meadows, vernal pools, and marshy areas in valley oak savanna. Soil types include poorly drained soil of clay and sandy loam at an elevation between 50 and 400 feet. It is not likely to occur at Tolay Lake Regional Park because it was not observed during surveys of the vernal pools and other wet areas of the site.

Marsh microseris. Marsh microseris (*Microseris paludosa*), CNPS List 1B, CDFG Special Plant and no federal status, occurs in grassland areas between an elevation of 15 and 1,000 feet. It is not likely to occur within the site because it was not found during surveys in suitable habitats.

Baker's navarretia. Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), CNPS List 1B, CDFG Special Plant and no federal status, occurs in vernal pools and swales on adobe or alkaline soils at an elevation between 15 and 3,000 feet. It is not likely to occur at Tolay Lake Regional Park because it was not found during surveys of vernal pools or other ponded and wet areas.

Marin County navarretia. Marin County navarretia (*Navarretia rosulata*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in dry open rocky places and sometimes on serpentine at an elevation between 600 and 2,000 feet. It is not likely to occur at Tolay Lake Regional Park because it was not observed during surveys of rocky areas. In addition, rocky areas were often trampled by cows and supported a weedy flora.

Petaluma popcorn-flower. Petaluma popcorn-flower (*Plagiobothrys mollis* var. *vestitus*), CNPS List 1A, CDFG Special Plant, and no federal status, is known from a single specimen collected in the late 1800s from Petaluma. It is thought to occur in wet sites in grasslands or the edges of coastal marshes at a probable elevation between 30 and 150 feet. It is not likely to occur because it was not found during surveys of wet areas of Tolay Lake Regional Park.

North Coast semaphore grass. North Coast semaphore grass (*Pleuropogon hooverianus*), State threatened, CNPS List 1B, and no federal status, occurs in wet, grassy, and usually shady areas, and sometimes in freshwater marshes at an elevation between 30 and 4,000 feet. It is not likely to occur on the site because it was not found during surveys of wet and ponded areas. A similar species, California semaphore grass was observed in a number of areas in the central portion of Tolay Lake Regional Park.

Point Reyes checkerbloom. Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs in freshwater marshes near the coast usually at an elevation between 15 and 240 feet. It is not likely to occur in the site because it was not observed during surveys of wet areas.

Marin checkerbloom. Marin checkerbloom (*Sidalcea hickmanii* ssp. *viridis*), CNPS List 1B, CDFG Special Plant, and no federal status, occurs on serpentine or volcanic soils and sometimes appears after burns. Its elevational range varies between sea level and 1,400 feet. It is not likely to occur on the site because serpentine soils are absent.

Oval-leaved viburnum. Oval-leaved viburnum (*Viburnum ellipticum*), CNPS List 2, CDFG Special Plant, and no federal status, occurs in chaparral, cismontane woodland, and lower montane coniferous forest at an elevation between 705 and 4,600 feet. It was not found during surveys and is therefore not likely to occur at Tolay Lake Regional Park.

4.2 INSECTS AND CRUSTACEANS

The special-status species of insects discussed below are not known from Tolay Lake Regional Park, but are known from nearby areas. The food plants for both species of lepidoptera occur at Tolay Lake Regional Park: cream cups (food plant for Opler's longhorn moth) and Johnny jump-up (food plant for an un-named subspecies of zerene silverspot butterfly). Ponds that could be used by Ricksecker's water scavenger beetle also occur at Tolay Lake Regional Park. The crustacean, California linderiella, is a species of fairy shrimp that has been observed in Tolay Lake.

4.2.1 Opler's Longhorn Moth

Opler's longhorn moth is on the CDFG Special Animal list but has no federal status. It feeds on the flowers of cream cups, and the adult moths are usually observed resting on the petals of cream cups. Opler's longhorn moth was observed on Sonoma Land Trust's Baylands Property, approximately 5 miles south. A large stand of cream cups grows mid-slope on the northern part of the East Ridge. Opler's longhorn moth could occur at Tolay Lake Regional Park because of the occurrence of its food plant.

4.2.2 Zerene Silverspot Subspecies

An un-named subspecies of the zerene silverspot occurs on the Baylands Property just south of Tolay Lake Regional Park. This taxon has no federal or State status. The larvae of the zerene silverspot feed upon violets. Johnny jump-up commonly grows on both the East and West ridges of Tolay Lake Regional Park. This un-named subspecies of silverspot butterfly is likely to be very uncommon and therefore a resource that should be protected. This butterfly could occur at Tolay Lake Regional Park because of the occurrence of its food plant and because it occurs nearby at the Baylands Property.

4.2.3 Ricksecker's Water Scavenger Beetle

Ricksecker's water scavenger beetle is on the CDFG Special Animal list but has no federal status. It is an aquatic insect that is known from only a few localities in the San Francisco Bay Area. The

closest known locality to Tolay Lake Regional Park is approximately10 miles further north on Sonoma Mountain. Due to the limited amount of scientific information currently available on the status and distribution of the Ricksecker's water scavenger beetle, we are unable to assess its potential occurrence at Tolay Lake Regional Park. Ricksecker's water scavenger beetles occur in ponds where their predaceous larvae remain on vegetation near the shore. Little else is known regarding Ricksecker's water scavenger beetles. Habitat for Ricksecker's water scavenger beetles occurs in Tolay Lake, Pond 1, Pond 2, Duck Pond, Willow Pond, and the permanent and semi-permanent stock ponds within Tolay Lake Regional Park.

4.2.4 California Linderiella

California linderiella is on the CDFG Special Animal list but has no federal status. It is the most common fairy shrimp in California and is found in 39 locations in the Great Central Valley and in the Coast Range from Mendocino to Ventura counties (Eng et al. 1990, Erickson and Belk 1999). California linderiella was observed in Tolay Lake (Sam Bacchini pers. comm.).

California fairy shrimp inhabit clear to tea-colored, often vegetated ephemeral or temporary pools of lightly turbid fresh water (vernal pools) that form in the cool, wet months of the year (Helm 1998, Erickson and Belk 1999). The pools inhabited by California fairy shrimp range in size from one square meter in sandstone depressions to 40 hectares in Boggs Lake, but typically occupy reasonably large pools (Erickson and Belk 1999).

California fairy shrimp swim or glide upside down by means of beating movements that pass along their 11 pairs of swimming legs in a wave-like motion from head to tail. The diet of California fairy shrimp consists of algae, bacteria, protozoa, rotifers, and bits of organic detritus (Pennak 1989).

Female California fairy shrimp carry their eggs in an oval or elongate brood sac on their abdomen. Eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Federal Register 1994). Resting (summer) eggs are known as cysts and are capable of withstanding heat, cold, and prolonged dry periods. The cyst bank in the soil may be comprised of cysts from several years of breeding (Donald 1983). As the vernal pools refill with rainwater, in the same or subsequent seasons, some of the cysts may hatch and the cycle repeats itself.

4.3 AMPHIBIANS

4.3.1 California Red-Legged Frog

Legal Status. California red-legged frog was federally listed as threatened on May 23, 1996 (USFWS 1996) and is a CDFG species of special concern. The USFWS published a recovery plan (USFWS 2002) identifying core areas and priority watersheds for focused recovery efforts. Tolay Lake Regional Park falls within the Petaluma Creek-Sonoma Creek Core Recovery Area, which was designated because it currently supports frogs, may serve as a source of frogs that colonize adjacent areas, and provides connectivity to core recovery areas to the east and west. The conservation needs identified for this area include protecting existing populations, reducing impacts of urban development, and protecting, restoring, and creating breeding and dispersal habitat.

Pesticide Injunction. The Center for Biological Diversity (CBD) filed a lawsuit in Federal District Court for the Northern District of California, alleging that EPA failed to comply with section 7(a)(2) of the Endangered Species Act by not ensuring that its registration of 66 named pesticide active ingredients will not affect the California red-legged frog, a federally-listed Threatened species. The Court, EPA, and CBD agreed to a Stipulated Injunction that 1) establishes deadlines for the EPA to determine the effect of the 66 pesticides on the California red-legged frog, 2) affects the use of these pesticides in selected counties including Sonoma County, and 3) requires the drafting of a bilingual brochure on the California red-legged frog and pesticides.

The injunction applies to areas designated as critical habitat for CRLF and in specified areas outside of critical habitat. Tolay Lake Regional Park is not located within designated critical habitat but a small portion is located within one of the non-critical habitat areas covered by the injunction (Figure 6). The injunction is not a blanket ban on the use of these 66 pesticides (Table C) within the covered areas. The ban applies only to specified buffers in the portions of these areas which meet the definition of primary constituent habitat elements in the April 13, 2006 CRLF Critical Habitat designation published in the Federal Register. These are 1) Aquatic breeding habitat, 2) Non-breeding aquatic habitat, and 3) Upland habitat (natural areas within 200' of breeding and non-breeding aquatic habitat).

The injunction prohibits the use of these materials within 60 feet of these aquatic habitat areas. Beyond 60 feet out to a distance of 200 feet these pesticides may be used for localized spot treatments using a handheld device. Beyond 200 feet there are no restrictions on method of application.

Habitat Characterization. The habitat types that the California red-legged frog occupies are diverse and include ephemeral ponds, intermittent streams, seasonal wetlands, springs, seeps, permanent ponds, perennial creeks, constructed aquatic features, marshes, lagoons, riparian corridors, blackberry (*Rubus* spp.) thickets, non-native annual grasslands, and oak savannas (USFWS 2002), several of which occur within Tolay Lake Regional Park. Breeding occurs within ponds in streams, stock ponds, or other types of ponds. The egg and tadpole stages are limited to a variety of aquatic habitats.

Limiting Factors. The occurrence of introduced bullfrogs limits the suitability of aquatic habitat at Tolay Lake Regional Park for the California red-legged frog. Several researchers have attributed the decline and extirpation of California red-legged frogs throughout their range to the introduction of bullfrogs and predatory fishes (Hayes and Jennings 1986). The presence of California red-legged frogs has been negatively correlated with the presence of bullfrogs (Fisher and Shaffer 1996) and bullfrog adults have been observed preying on tadpole, juvenile, and adult California red-legged frogs. Bullfrogs were observed in all suitable aquatic habitat features listed above except in the small Stock Pond at the southern portion of the West Ridge and the southern portion of South Creek. The stock pond just beyond the western border of Tolay Lake Regional Park, with the historic California red-legged frog record, was surveyed with binoculars from the park boundary and was filled with several thousand juvenile bullfrogs in August 2006. Many of these juvenile bullfrogs will disperse onto Tolay Lake Regional Park.

Potential Habitat at the Park. Potential habitat for California red-legged frogs occurs in Tolay Creek (particularly the riparian vegetation along the southern portion of the creek), Pond 1, Pond 2, the small Stock Pond located at the southern portion of the West Ridge, the Irrigation Pond that occurs in the eastern portion of the farmed area, Duck Pond and potentially the southern portion of

South Creek, just before it exits Tolay Lake Regional Park. Nevertheless, the value of this habitat for California red-legged frogs is greatly reduced by the occurrence of bullfrogs throughout the park and by fish in Pond 1, Pond 2, and the Duck Pond.

Tolay Creek mostly varies between 3 and 6 feet wide and is mostly covered by an overstory of willow trees at its downstream end. It is perennial or nearly perennial in wet years only and provides 1) cover during both the rainy season and dry season, 2) hydration habitat, and 3) may provide breeding habitat in a few pools or areas of slowly flowing water.

South Creek is similar to Tolay Creek and provides similar potential habitat for California red-legged frogs. In years of low rainfall, these creeks may not provide habitat for breeding red-legged frogs. Pond 1 is a small reservoir that supports little shoreline vegetation. It provides hydration habitat and breeding habitat for California red-legged frogs although bullfrogs and mosquito fish also occur in Pond 1. Pond 2 is ringed by cattails and willow trees both of which would provide cover for California red-legged frogs. Pond 2 also provides hydration habitat for California red-legged frogs. Bullfrogs, sunfish, and mosquito fish occur in this pond which would limit breeding potential for California red-legged frogs.

The small Stock Pond is created by a dam across a small watercourse and is also fed by a seep. Cover is limited to stands of spikerush. This pond provides cover, hydration habitat, and breeding habitat for California red-legged frogs.

The Irrigation Pond supports a thick band of cattails at its edge that could provide cover for California red-legged frogs. This pond would also provide summer hydration habitat and breeding habitat for California red-legged frogs, although bullfrogs were observed there.

The Duck Pond appears to be permanently inundated and supports a dense growth of water primrose. Nevertheless, in years past, this pond was completely drained (Steve Ehret pers. comm.). This pond could support hydration and breeding habitat for California red-legged frog although bullfrogs were abundant.

Observations of California Red-legged Frog. California red-legged frogs have been observed on and adjacent to Tolay Lake Regional Park, in the riparian vegetation in Tolay Creek at the southern end of the park (Parsons 1996), and within Pond 1 and Pond 2 (Steve Ehret pers comm.). California red-legged frogs have also been noted within a stock pond and tributary to Tolay Creek within a half mile up-stream of the northern boundary of Tolay Lake Regional Park (CNDDB 2006). The frogs were actually observed at various locations within the tributary and could conceivably occur in Tolay Creek at the northern boundary of Tolay Lake Regional Park. California red-legged frogs are also known to occur in a stock pond beyond the western boundary of Tolay Lake Regional Park (Parsons 1996), and approximately 10 recently metamorphosed and 1 sub-adult California red-legged frogs were observed in ponds beneath riparian vegetation in Tolay Creek downstream from the park boundary (Sam Bacchini pers. comm.). These locations include the pond immediately downstream (south) of the boundary of Tolay Lake Regional Park.

No California red-legged frogs were observed during LSA's field visits. The surveys were conducted during the day when there is less chance of success of encountering California red-legged frogs, as compared to a combination of day-time and night-time surveys (Fellers and Kleeman 2006). California red-legged frogs appear to be sparse at Tolay Lake Regional Park, if not extirpated, and

that is the most likely reason for not encountering them during surveys. Even with a robust survey effort, we may not observe California red-legged frogs at the park.

Although California red-legged frogs were not observed during surveys by LSA, they potentially occur at Tolay Lake Regional Park at a low density. They have been known from Tolay Lake Regional Park in the past and because habitat has not appeared to have changed, they potentially continue to occur there. Although bullfrogs significantly reduce the quality of habitat for California red-legged frogs, they are known to occur in areas with large numbers of bullfrogs. Because of these reasons, the USFWS is likely to consider the California red-legged frog to occupy habitat at Tolay Lake Regional Park.

Conclusion. LSA did not detect California red-legged frogs on our surveys, although the species is known from past surveys. This indicates that the species is currently either present in extremely low numbers or has become extirpated. Suitable physical habitat is present on the property to support California red-legged frogs. However, habitat suitability is substantially compromised by the presence of fish, which predate on the egg and larval stages of the California red-legged frog, the enormous population of bullfrogs, which predate on larvae and adults, and perennial waterbodies that provide breeding and hydration habitat for bullfrogs. More exhaustive surveys, than those conducted by LSA in 2006, could confirm the negative presence of California red-legged frogs or detect a remnant population.

Regardless of the results of even exhaustive surveys, if they were to be conducted and if no California red-legged frogs were detected, the USFWS would still likely consider California red-legged frogs present on the park property on the basis of past records and the continued presence of potentially suitable physical habitat. For management purposes, LSA recommends that the Regional Parks Department consider the California red-legged frog as a potentially present species.

4.4 REPTILES

4.4.1 Western Pond Turtle

Western pond turtle is a California species of special concern and has no federal status. Western pond turtles have been previously observed in Tolay Lake (Parsons 1996) and in a pond in Tolay Creek immediately downstream of the southern boundary of Tolay Lake Regional Park. They occur along the shore of waterbodies and on floating debris. Egg laying occurs in soft or sandy soil, often a considerable distance from any body of water. The limiting resources for the species are the aquatic and the egg-laying habitats.

Potentially suitable habitat includes Tolay Lake, Tolay Creek, Pond 1, Pond 2, the Irrigation Pond, Duck Pond, and Willow Pond. The occurrence of introduced bullfrogs limits the suitability of aquatic habitat at Tolay Lake Regional Park for the western pond turtles. Adult western pond turtles are frequently observed in ponds with introduced bullfrogs, but bullfrogs prey on juvenile turtles which can lead to population declines.

No pond turtles were observed during the LSA surveys. Based on previous sightings of turtles and the presence of potentially suitable habitat, western pond turtles are likely still present in low densities at Tolay Lake Regional Park.

4.5 BIRDS

4.5.1 White-tailed Kite

White-tailed kite is a state fully protected species and has no federal status. This species requires open habitats (e.g., grasslands, agricultural fields, marshes) for foraging and dense-topped trees or shrubs for nesting. The diet of white-tailed kites consists almost entirely of mice and voles (Peeters and Peeters 2005). Although no nests were found during our 2006 surveys, suitable nesting habitat is present and numerous white-tailed kites have been observed on site.

4.5.2 Golden Eagle

Golden eagles are a state fully protected species and have no federal Status. They nest in trees or cliffs and forage in grasslands. Major food items consist of the California ground squirrel and a variety of rabbit species. Golden eagles have been observed (Steve Ehret pers. comm.; LSA field observations) flying over and perching on the site. Although nesting was not observed by LSA, suitable nesting habitat is present in the eucalyptus and perhaps coast live oak trees.

Golden eagles are frequently observed (10 of 28 field visits by PWA volunteers) flying over Tolay Lake Regional Park. Five active nests of golden eagles apparently occur in the Tolay Lake area (Janet Thiessen pers. comm.), which may account for the frequent observations. They are often observed near the East Ridge. Because of the remote location of the East Ridge and because of the oak trees that grow within and beyond the property boundary of Tolay Lake Regional Park, the most likely location of a nest is in the vicinity of the East Ridge. Optimal nest locations appear to be in trees midway down a north- or east-facing slope or other areas that shelter the nest from strong wind. Golden eagles do not tend to nest on the tops of ridges (Peeters and Peeters 2005). The Oak Grove on the East Ridge extends from the top of the ridge down the west-facing slope and thus provides suitable nesting habitat, but nesting behavior was not observed by LSA.

Golden eagles usually build or repair a few nests prior to choosing one nest to use (Peeters and Peeters 2005). They may not use the same nest every year and will alternate use of several nests. Some pairs of golden eagles may not nest every year (Peeters and Peeters 2005). Golden eagles are thought to nest on an adjacent property to Tolay Lake Regional Park (Steve Ehret pers.comm) and based on our field observations, they do not appear to have nested this year at Tolay Lake Regional Park.

4.5.3 Burrowing Owl

Burrowing owls are a state species of special concern but have no federal status. They are known from the grasslands of Tolay Lake Regional Park (Steve Ehret pers. comm. and LSA obs.). Single individuals are regularly observed at rock outcrops during the winter and spring and occasionally summer indicating use by dispersing juvenile or over-wintering birds. The owls prefer short grass and respond well to areas that are regularly grazed. This species is dependent on burrows as nest sites and as year-round shelter. The owls typically use burrows created by small mammals, although the

owls may subsequently modify the burrows for their own uses. The owls readily occupy constructed burrows. The sensitive period for nesting burrowing owls is between February and September 1.

4.5.4 California Horned Lark

California horned larks are on the CDFG watch list and have no federal Status. A pair had been observed (LSA obs.) on-site and most likely nest in grasslands at Tolay Lake Regional Park. California horned larks occur in grasslands with short grass. A suitable buffer should be developed for any nests encountered. Depending on the circumstances, buffers can range in width from 50 to 100 feet. Because California horned larks can occur in any portion of the grassland at Tolay Lake Regional Park, specific observations are not indicated on Figures 3a and 3b.

4.5.5 Grasshopper Sparrow

Grasshopper sparrows are considered a second priority state species of special concern (Unitt 2008). Grasshopper sparrows are uncommonly found nesting in the taller grass of grasslands. Because grasshopper sparrows can occur in any portion of the grassland at Tolay Lake Regional Park, specific observations are not indicated on Figures 3a and 3b.

4.5.6 Nesting Birds

Although they are not considered special-status species, almost all native birds and their nests are protected by the federal MBTA and the California Fish and Game Code. Species confirmed as nesting on the site include red-tailed hawk (nesting pair observed in the grove of blue gum trees in the Park Center) and western meadowlark (nest found while walking along Tolay Creek on May 2), although there are undoubtedly many more.

4.6 MAMMALS

4.6.1 American Badger

American badger is a state species of special concern that occurs in open areas, including dry grasslands. Because of its semifossorial habits, it requires friable soils in open, uncultivated ground suitable for burrowing. It also requires healthy populations of ground squirrels and pocket gophers, its two primary prey items (Jameson and Peeters 2004). Although there are no records of this species in the immediate vicinity of Tolay Lake, suitable habitat conditions are present in the hillier portions of the site, particularly along the East and West ridges and at the southern site corner. Large holes that could have been made by a badger were observed at Tolay Lake Regional Park (Steve Ehret pers. comm.).

4.6.2 Townsend's Big-Eared Bat

Townsend’s big-eared bat (*Corynorhinus townsendii*) is a state species of special concern. Although this species occurs in a wide variety of habitats throughout California (CNDDB 2006), it is extremely sensitive to human disturbance as it roosts in the open (i.e., from walls or ceilings of old buildings).

Nursery colonies have been found in caves, mine shafts, and buildings (Jameson and Peeters 2004). No roosts of this species are known from the immediate vicinity of Tolay Lake, but several old farm buildings on and in the vicinity of the site represent potential habitat. In addition, Townsend's big-eared bats roosting in the region may forage over the site at night.

4.6.3 Pallid Bat

Pallid bat (*Antrozous pallidus*) is a state species of special concern. It is somewhat more common than other special-status bats, occurring throughout most of California at elevations below 6,500 feet (Jameson and Peeters 2004). The pallid bat feeds mostly on flightless arthropods and they have been observed flying low (6 to 36 inches) to the ground searching for prey. After locating their prey, they will drop to the ground, grab the prey in their mouth, and fly to a feeding roost to consume the prey. (Texas Parks and Wildlife 1997). Roosting occurs in fissures in cliffs, abandoned buildings, bird boxes, and under bridges (Jameson and Peeters 2004). Several roosts of this species are known from the general vicinity of Tolay Lake (CNDDB 2006), and suitable roosting habitat (i.e., old farm buildings) is present on site. As such, this species has moderate potential to occur on the project site.

5.0 IMPACTS AND MITIGATION

5.1 RESTORATION OF TOLAY LAKE

Although specific objectives and methods for restoring Tolay Lake have not yet been defined, the overall goal is to increase the area and period of inundation. This would likely result in the establishment of riparian vegetation and freshwater marsh vegetation around the lakeshore. Restoration of Tolay Lake could result in the following potentially significant impacts to biological resources (beneficial and adverse). Implementation of the following mitigation measures would help achieve the goal of enhancing biological resources in the long-term.

5.1.1 Beneficial Impacts

Beneficial Impact 1: The restoration of Tolay Lake could increase the extent of freshwater marsh, seasonal wetland, and riparian habitat. The restoration of Tolay Lake is likely to create a body of water that is permanent or semi-permanent. This could potentially provide the hydrology necessary for maintaining cattails and tules, seasonal wetlands, and willow-cottonwood riparian woodland around the lakeshore. Such freshwater wetlands have been greatly reduced in California, and the creation of new ones would be a major benefit to general wildlife habitat values. Presumably California red-legged frogs and western pond turtles would benefit from the restoration of Tolay Lake because water would be retained in the lake for a longer duration than is the current situation. If water were to be retained into the middle of July (but preferably August or early September), then California red-legged frogs may breed in Tolay Lake. However, prolonging the period of inundation could also encourage bullfrogs, which eat both California red-legged frogs and small western pond turtles.

Beneficial Impact 2: The restoration of Tolay Lake would result in an increase in the quality of the water of Tolay Creek. The bottom of Tolay Lake has been regularly cultivated after water is pumped from the lakebed in April or May. The absence of disking will reduce the amount of suspended sediment and loose soil particles in Tolay Lake. With a reduction of sediment, the quality of the water in Tolay Lake would improve with a corresponding reduction of sedimentation of Tolay Creek and San Pablo Bay.

Beneficial Impact 3: The restoration of Tolay Lake would increase the recharging of ground water. Tolay Lake was typically inundated for half the year or less beginning anytime between December and February and lasting until April or early May when the lake was pumped dry. After pumping, those portions of Tolay Lake that were not connected to the channel of Tolay Creek, remained ponded until they evaporated or the ground water fell. Pumping would not occur under the current and proposed management of Tolay Lake Regional Park and the lake would remain inundated for a longer period of time. After restoration, the increased duration of inundation of Tolay Lake is likely to result in a greater amount of water infiltrating into the ground water table.

Filling in the drainage ditches, if that becomes part of the park plan, (both within and outside of Tolay Lake) is also likely to increase ground water recharge by retaining water on-site rather than draining it from the site. An increase in the recharging of the ground water table may result in an increase in the dry-season flow of Tolay Creek downstream from the lake.

An increase in the dry season flow of Tolay Creek is likely to benefit wildlife by providing a source of water later in the season. This water would be used for drinking and hydration habitat in the case of amphibians. If water were to be retained late in the season into July but preferably into August or early September, then breeding could occur by California red-legged frogs.

5.1.2 Adverse Impacts

Adverse Impact 1: Potential reduction of habitat available to foraging shorebirds. Shorebirds, or short-legged wading birds, overwinter on beaches, estuaries, and shallow bodies of water such as Tolay Lake. Shorebirds that have been observed using Tolay Lake include killdeer, long-billed dowitcher, greater yellowlegs, least sandpiper, and western sandpiper. These shorebirds forage at the shallow edges of Tolay Lake during the winter and during the spring and fall migration. Such foraging areas are important for shorebirds because much of their winter foraging habitat has been lost to urban and agricultural development. Foraging areas that are used during the spring and fall migrations are particularly important to allow the birds to rest and regain their fat stores prior to continuing the migration.

The proposed restoration of Tolay Lake will likely result in a large increase in shallow ponded areas. Portions of these shallow areas that remain wet for a substantial amount of time may become overgrown with cattails. The upper portion of the lake shore may not be ponded long enough for the growth of cattails and could be available for foraging by shorebirds. Shorebirds do not use areas dominated by cattails. Any loss of shorebird foraging habitat would be minor because data to date indicate that shorebird use is not substantial. With the exception of killdeer (and dowitcher for one observation), shorebird use has been limited to a few individuals of a few species.

> **Mitigation Measure 1.** If needed, new shorebird foraging habitat could be created in the nearly flat lower terrace areas east of Tolay Lake by restoring seasonal wetlands. These formerly cultivated fields become saturated and pond water during the rainy season. Grading could be used to create seasonal ponds that would provide wintering and migrating habitat for shorebirds.

Adverse Impact 2: Potential temporary increase in sediment during and immediately following construction. Earth-moving activities would be necessary for deepening Tolay Lake, creation of islands, restoration of the dam on Tolay Creek, realignment of the ditches that drain Tolay Lake, raising the causeway across Tolay Lake, and constructing the berm at the northern property line to avoid flooding private property upstream of Tolay Lake Regional Park.

Any earth-moving activity would remove vegetation and expose the surface of the soil, which could result in an increase of suspended sediment in Tolay Lake. This suspended sediment could become deposited in Tolay Creek once water leaves the lake and flows downstream. This would create a temporary adverse impact until vegetation covers the exposed soil surface.

Mitigation Measure 2. Best management practices should be implemented to reduce the amount of sediment generated. If more than a minor amount of sediment would be generated, based on the size and location of the construction, straw bales, silt fence, or curtain could be installed to contain the sediment within the construction area. Areas exposed to waves or surface flows could be mulched with straw and tackifer or covered with straw, coir, or jute erosion control blankets depending on the circumstances.

5.1.3 Impacts to Instream Uses

Adverse Impact 3: Potential adverse effects of Tolay Lake restoration on in-stream uses and associated wildlife, riparian vegetation, and wetland values. (See Section 3.4 - *Tolay Lake* and Section 3.8 - *Streams* of this report for existing conditions treated in greater detail than the summary presented below.) Adequate amounts of water and its persistence into the dry season are critical for the success of restoration of riparian vegetation and wildlife values to Tolay Creek. The effect of restoring the dam to Tolay Lake is not known on downstream flows of Tolay Creek. Flows may decrease because a restored dam prevents downstream flow in Tolay Creek, or flows may increase because of an increased height of the water table due to increased infiltration from a restored Tolay Lake. Nevertheless, summer flows would continue to enter Tolay Creek from Eagle Creek and the un-named watercourses of the West Ridge. Cardoza Creek, a major tributary to Tolay Creek, would join Tolay Creek downstream of the proposed dam. Its contribution to the hydrology of Tolay Creek is substantial and would be unaffected by the dam.

Water volumes appear to be adequate to support the enhancement and restoration of the vegetation and wildlife values of Tolay Creek after the restoration of Tolay Lake. Furthermore impacts are not anticipated to existing wildlife (including the California red-legged frog), riparian vegetation, and wetland values from the restoration of Tolay Lake for the following reason. Water will continue to enter Tolay Creek, at a minimum from tributaries. Willow trees currently grow in Cardoza Creek, which is dryer than Tolay Creek. Willow trees grow in streams dryer than Tolay Creek, and Tolay Creek would continue to be wetter than the dry creeks supporting willow trees. For these reasons, the restoration of Tolay Lake and the resultant alteration of flows in Tolay Creek would not appear to appreciably alter the opportunity to enhance the vegetation of Tolay Creek.

A salmonid fishery does not appear to be associated with Tolay Creek (Leidy et al. 2005a, b). Therefore impacts to salmonids would be nonexistent. Central California coast steelhead (*Oncorhynchus mykiss*), may utilize the lower reaches of Tolay Creek, but would not be able to access the creek above Highway 37 due to a barrier to fish passage.

Earthwork associated with the restoration of Tolay Lake could affect ground nesting birds.

Mitigation Measure 3. Several species of ground nesting birds could nest in the lake bed of Tolay Lake. Prior to construction during the nesting season (before July 31), preconstruction surveys should be conducted to ensure that nests are not damaged. If nesting birds are observed within 50 to 100 feet of the proposed grading, then construction should be diverted to areas beyond the buffer until the young birds have fledged. The width of this buffer could vary based on recommendations by a qualified wildlife biologist depending on the circumstances at the nest.

5.2 FACILITIES AT UPLAND RESERVOIRS

Adverse Impact 4: Potential direct adverse impact to wetlands and wildlife habitat depending on placement of picnic areas. Large perennial seeps occur in the vicinity of Pond 2 that provide habitat for a variety of wildlife. Locating picnic areas within or beside the seeps could directly remove wetland habitat and could result in the loss of cover for wildlife. Wetlands could be affected directly by construction of picnic areas and associated spur trails.

> **Mitigation Measure 4.** Picnic areas and trails at Ponds 1 and 2 should be located outside of wetlands to allow wildlife access. If it is not feasible to completely avoid wetlands, the footprint of these facilities should be minimized to the extent possible to reduce wetland impact.

Adverse Impact 5: Potential indirect impacts to wildlife at Pond 1 or 2 from an increased presence of people in picnic areas and fishing piers. The presence of people would affect common species of wildlife that are known and/or expected to occur at Ponds 1 and 2. People would access these ponds by one or more proposed fishing piers. Human disturbance would cause waterfowl to seek shelter or fly away. Repeated flushing of waterfowl could deplete energy reserves necessary for successful migration.

Both these ponds have bass and sunfish. Restocking the ponds with the non-native bass and sunfish is not proposed as part of the project. Fishing is not likely to affect the California red-legged frog at these ponds, because the existing fish in the ponds most likely prey on any existing California red-legged frogs, eggs, or tadpoles. This predation would result in, at best, a low density of California red-legged frogs, and the frogs do not tend to breed in lakes that contain fish.

> **Mitigation Measure 5.** Piers should be strategically sited (such as in clusters on one side of a pond) to allow for a portion of those ponds to be inaccessible to humans, thereby allowing for areas of refuge for waterfowl. Picnic areas should be located away from the ponds and on the same side as the fishing piers, if possible. Signage should be installed to educate the public regarding sensitive resources. Portions of the ponds and associated wetlands should be fenced off from public access or at least posted to ensure adequate undisturbed refuge for wildlife.

Adverse Impact 6: Potential unnatural increase in common predators that are attracted to left-overs. Common predators such as striped skunks, raccoons, and Virginia opossums are attracted to areas that accumulate leftover food. An increased number of these predators could result in an unnatural localized reduction of prey species.

> **Mitigation Measure 6.** Mitigation would entail placement of signs at the reservoirs and other destinations that would state that garbage should be packed out of the area. These signs would emphasize the importance of removing leftovers from these areas. Garbage receptacles, which would be serviced regularly by park staff, especially on weekends and holidays, would be located at the trail heads.

Adverse Impact 7: Potential direct adverse impact to wetland vegetation from the placement of fishing piers. The placement of fishing piers at the edge of Pond 1 and/or Pond 2 would result in the

direct removal of wetland. Wetland would be permanently removed by the placement of the piers and temporary impacts to wetlands would occur from construction.

> **Mitigation Measure 7.** The proposed restoration of the wetlands at Tolay Lake Regional Park would more than compensate for the permanent and temporary impacts to wetland from the installation of fishing piers.

Adverse Impact 8: Potential increase in fishing-related trash that harms wildlife. Discarded fishing lines, hooks, and weights could harm wildlife that mistakenly ingest this trash or get caught by it.

> **Mitigation Measure 8.** Informational signs should be developed to inform the public of the risk of to wildlife and to urge them remove their trash. Park staff should regularly inspect and clean fishing areas.

5.3 SPILLWAY REPAIR

Prior land owners constructed two dams on Cardoza Creek creating two small reservoirs (Pond 1 and Pond 2). Flows were diverted by spillways below the dams from the historic watercourse of Cardoza Creek, and have cut new channels to the North Fork of Cardoza Creek (from Pond 1) and the Main Fork of Cardoza Creek (from Pond 2). These new channels are eroding the spillways and downcutting. This has left the banks overly steep and subject to mass wasting (a process in which entire sections of bank slough off into the bottom of the channel). Erosion of the spillways should be repaired to prevent instability of the dams. Proposed removal of concrete blocks, automobile bodies, and other objects that were placed for erosion control by previous landowners could accelerate erosion by clearing vegetation and disturbing soil.

Beneficial Impact 5: Potential beneficial impact from reduced erosion and downstream sedimentation. The existing dam outlet structures discharged water from Pond 1 and Pond 2 at the approximate level of the ponds, much higher than the natural channel bottom of Cardoza Creek. This caused the erosion of the outlets down to the elevation of the former channel. Although the channel bottom appears stable, these steep cuts at the discharge points of both ponds has caused downcutting and sloughing, which are sources of sediment into Cardoza Creek. Stabilizing the outlet structures and their downstream channels at Pond 1 and Pond 2 would result in a reduction of this sedimentation. This would improve the health of downstream habitat by reducing the amount of vegetation and channel bottom buried by sediment.

Adverse Impact 9: Temporary adverse impact to willow riparian habitat from repair of the spillway of Pond 1 and Pond 2, and from the removal of automobiles, riprap, and other debris from the channels. Willow vegetation will need to be removed for construction to stabilize the outlets of Pond 1 and Pond 2 and for removal of debris.

Mitigation Measure 9. Replacing the willow trees, or alternatively merely trimming them to the base, would mitigate the temporary impact to riparian vegetation from spillway repair and debris removal. Best management practices should be implemented to reduce the amount of sediment entering Cardoza Creek from these activities. The proposed restoration of riparian vegetation to

Tolay Lake Regional Park would more than mitigate for the temporary impact of willow removal at the spillways of Ponds 1 and 2.

5.4 PUBLIC USE TRAILS, PICNIC AREAS, AND VISTA AREAS

Potential impacts include the direct reduction of sensitive resources and indirect impacts to sensitive wildlife from the presence of people on trails, picnic areas, or vista areas.

Adverse Impact 10: Adverse impact to wetlands, watercourses, native grasslands, riparian woodland, buckeye woodland, and oak woodland from construction of recreational facilities. Construction of park facilities such as trails, vista areas, and picnic sites could result in the direct fill of wetlands and watercourses. Installation of these facilities could also indirectly impact wetlands by diverting or restricting water flows.

Construction of park facilities could also displace native grasslands and woodlands (riparian, oak, and buckeye). Construction could indirectly impact these habitats through alteration of hydrology or compaction of soils. The roots of oak trees could be particularly affected by compaction, resulting in increased susceptibility to attack by fungi and other pathogens.

> **Mitigation Measure 10.** Recreational facilities should be located to avoid impacts to sensitive habitats such as wetlands, native grasslands, riparian woodland, buckeye woodland, and oak woodland where possible. Trail crossings of these habitats should be designed to minimize impacts. Picnic and vista areas should be located away from sensitive resources, if possible, or should be reduced in size to lessen impacts. Unavoidable losses of acreage of native grasslands, riparian habitats, and wetlands should be replaced on a 2:1 basis through habitat creation. The proposed restoration program would most likely result in a large increase in native grasslands and wetlands, which would more than compensate for impacts from park facilities.
>
> Any trails in oak woodlands should be located outside of the root zone in a manner that avoids as much damage as possible. Trails within oak woodlands should also be designed without excavation to the extent possible to avoid damage to roots.

Adverse Impact 11: Removal of the farm bridge could result in the temporary generation of sediment into Tolay Creek. The Farm Bridge is likely to be removed in the course of restoring Tolay Lake. This removal could disturb the steep banks of Tolay Creek, resulting in bank erosion and increased sediment into Tolay Creek.

> **Mitigation Measure 11.** Best management practices should be used to reduce erosion and sedimentation for activities within the bed and banks of creeks.

Adverse Impact 12: Construction of park facilities could impact special-status plants and special-status butterfly/moth food plants. Fragrant fritillary at two locations on the West Ridge and Lobb's aquatic buttercup at two pools on the West Ridge could be affected by construction of park facilities. Cream cups (food plant of Opler's longhorn moth) and the Johnny jump-up (food plant of a rare subspecies of zerene fritillary butterfly) could also be affected by the installation of park facilities.

Mitigation Measure 12. Trails and other park facilities should be planned to avoid occurrences of fragrant fritillary, Lobb's aquatic buttercup, cream cups and Johnny jump-up to the extent possible.

Adverse Impact 13: Construction of trails, picnic areas, vista areas, and the retrofitting of bridges over Tolay Creek or other watercourses could directly affect special-status and other protected wildlife species. In addition to the removal of habitat, construction activities could directly result in mortality or injury to special-status and other protected wildlife species (such as birds protected by the MBTA).

The construction and human use of picnic facilities, trails, or viewing areas within ¼ mile of a nest is likely to disturb nesting golden eagles while nesting. Habitat use by California red-legged frogs, western pond turtles, burrowing owls, other raptors, California horned larks, grasshopper sparrows, and other birds could also be affected by park facilities. Construction and use of trails, roads, or other facilities within 300 feet of the red-tailed hawk nest in the blue gum grove near the Park Center could potentially cause stress and nest abandonment.

Mitigation Measure 13a-Golden eagle nest. Surveys should be conducted to determine the location of the eagle nest in order to more precisely assess impacts. If the nest is within ¼ mile of proposed park facilities, a seasonal closure of part of the East Ridge during nesting season may be appropriate. Nesting can occur between February and August but generally occurs some time between March and June or July. The specifics of this closure would depend on the distance of park facilities to the nest, the sensitivity of this particular pair of golden eagles to humans, and the presence of any cover or natural vegetation screen between the nest and park facilities.

Mitigation Measure 13b-California red-legged frog and western pond turtle. Picnic areas are proposed near Pond 1 and Pond 2 where there is an upland pond spring complex, seeps, and other types of wetlands. The picnic areas and spur trails should avoid these seeps, springs, and seasonal wetlands, which could be habitat of California red-legged frogs and western pond turtles in the vicinity of Ponds 1 and 2 and where the wetlands are extensive. Avoidance of wetlands elsewhere in Tolay Lake Regional Park is also recommended to protect potential frog and turtle habitat. Trail crossings should be designed to minimize disturbance to wetlands and watercourses.

Native shrubs could be planted in a manner such as to screen frogs and turtles from human disturbance and to discourage human entry into the wetlands. Preconstruction surveys, by a qualified biologist, should be conducted prior to trail construction in suitable California red-legged frog and western pond turtle habitat. Depending on the regulatory context and the potential for impacts to California red-legged frogs, consultation with the USFWS may be advised. Additional mitigation may require buffers, monitoring, fencing, and/or replacement of affected habitat. Habitat for California red-legged frogs and western pond turtles created as part of the restoration program for Tolay Lake Regional Park would also help mitigate impacts.

Mitigation Measure 13c-Burrowing owl. Trails and other park facilities should be located away from burrows occupied by burrowing owls. CDFG Guidelines (CDFG 1995) call for buffer widths of 250 feet during the breeding season (February – September 1) and 160 feet during the non-breeding season between disturbance and burrowing owl nests. Although no breeding activities were observed during this season, breeding could occur in the future. Prior to constructing trails, pre-construction surveys would be necessary to preclude impacts to burrowing owls and design mitigation measures.

Mitigation Measure 13d-Other bird species. California horned larks, grasshopper sparrows, and other ground nesting birds could nest virtually anywhere in the grassland areas of Tolay Lake Regional Park. Prior to constructing trails during the nesting season (before July 31), preconstruction surveys should be conducted to ensure that nests are not damaged. If nesting birds are observed within 50 to 100 feet of the proposed trail or park feature, then construction should be diverted to areas beyond the buffer until the young birds have fledged. The width of this buffer could vary based on recommendations by a qualified wildlife biologist depending on the circumstances at the nest.

Adverse Impact 14: Human use of trails, picnic areas, vista areas, and other park facilities could alter habitat use and movement by wildlife. Many species of wildlife are sensitive to the presence of humans. Locating trails and other facilities along riparian areas, at Pond 2, and other areas where there is cover used by wildlife could adversely affect wildlife use of those areas. Repeated use of trails or other park facilities in a particular area may reduce use of those areas by wildlife.

Riparian areas are known for their habitat value for migratory songbirds including use as nesting areas. Locating a trail within a songbird nesting area may result in disruption of breeding activity, and a reduction of the habitat value of the riparian woodlands.

Mitigation Measure 14a. Trails, picnic areas, and vista areas should be located to minimize disturbance to wildlife. Proposed restoration of a dense cover of shrubs would facilitate wildlife movement throughout the park, provide additional refuges for wildlife, increase wildlife use of the park, and increase the diversity of wildlife. This measure would offset impacts to wildlife that are dependent on cover provided by shrubs.

Mitigation Measure 14b. Impacts of trails in riparian habitat could be mitigated by habitat restoration at a minimum of 1:1 ratio. Widening and lengthening existing riparian habitat containing trails would further mitigate impacts.

5.5 PARK CENTER FACILITIES

Adverse Impact 15: Special-status species of bats may be affected by the upgrade of the facilities at the Park Center. Although bats were not observed at Tolay Lake Regional Park, several species of special-status bats are known from the general vicinity of the park and they could colonize existing buildings in the future. Bats, roosting in park buildings, could be killed or injured and roosting habitat adversely affected during renovation or demolition of park buildings .

Mitigation Measure 15. Surveys should be conducted for roosting bats prior to construction. If special-status bat species are found roosting in buildings that are proposed for construction or demolition, new roosting structures can be constructed and bats excluded from the existing roost.

Adverse Impact 16: Potential impacts to barn owls could occur during the upgrading of buildings at the Park Center. Barn owls occupy at least two structures at the Park Center and they remain present in the barn after being viewed by hundreds of visitors during the Fall Festival. Although nests were not observed, barn owls could nest there prior to the upgrade. Construction during the nesting season[1], at the Park Center could result in direct injury to eggs, young, or adult barn owls. Human activity close to an active nest could result in the abandoning of the nest. If an active nest is abandoned, then eggs and/or young would perish.

Mitigation Measure 16. Preconstruction surveys should be conducted in buildings suitable for roosting and nesting of barn owls. If barn owls are nesting, construction should be deferred on that structure until the young fledge.

5.6 CANNON LANE

Adverse Impact 17: Road widening and construction of a turning lane onto Lakeville Highway would result in losses of jurisdictional wetlands along Cannon Lane. Several watercourses cross Cannon Lane that support wetland vegetation. Road construction along Cannon Lane and Lakeville Highway would require filling of wetlands and watercourses. These could also cause addition of sediment into adjacent waterbodies and watercourses.

Mitigation Measure 17. The proposed restoration and creation of wetlands within Tolay Lake Regional Park may compensate for the loss of wetlands along Cannon Lane and Lakeville Road. In order to meet the "in kind" replacement regulatory requirement, creation of new watercourses may be required for some of the road improvement activities. Best management practices should be implemented during construction to minimize sedimentation.

Adverse Impact 18: Road construction would require the removal of several large blue gum trees growing beside Cannon Lane. The widening of Cannon Lane would result in the removal of blue gum trees which provide potential perching and nesting substrate for raptors. Removal of these trees during the nesting season could affect nesting birds.

Mitigation Measure 18. Proposed planting of native trees for oak and riparian woodland restoration would more than compensate for losses of non-native blue gum trees. Removal of the blue gum trees should be conducted outside of the nesting season of March through August, to avoid impacts to breeding birds.

[1] Note, barn owls can have a protracted breeding season.

5.7 FENCING AND GRAZING MANAGEMENT PROGRAM

Beneficial Impact 6: Implementing the grazing management plan would have a beneficial effect on biological resources. The grazing management plan will result in a beneficial impact to plants and wildlife because it is designed to enhance the biological resources of Tolay Lake Regional Park. Grazing will reduce thatch and weeds thereby encouraging native plants to compete with non-native species. The grazing management plan is also designed to enhance the wetlands by allowing grazing in the spring but excluding grazing in the summer, when cattle are attracted to wetlands. This would reduce the effects of trampling of the seeps and springs and improve the biological values of these wetlands. See the Rangeland Resources Study (LSA 2009) for more details.

Adverse Impact 19: Installing fences, watering troughs, and other infrastructure related to the management of grazing could adversely affect biological resources. Installing fences, water troughs, pipelines and other livestock facilities could impact native grasslands, wetlands, and special-status species. Impacts could include direct loss or displacement of habitat or indirect impacts due to livestock trampling.

> **Mitigation Measure 19.** Fences and water troughs should not be located in areas that would adversely affect biological resources. Water troughs should be located away from wetlands and other sensitive resources. See the Rangeland Resources Study (LSA 2009) for more details.

6.0 MANAGEMENT GUIDELINES AND RESTORATION RECOMMENDATIONS

The specific condition of the vegetation present at Tolay Creek Ranch prior to the arrival of Europeans is not known. Kuchler (1977) depicts the Tolay Lake region as grassland on the map of the *Natural Vegetation of California*. The current limited shrub and tree cover and the absence of stumps or logs at Tolay Lake Regional Park or Tolay Creek Ranch supports Kuchler (1977). In addition, Diablo Clay (underlain by calcareous fine-grained sandstone, clayey shale, and weathered siltstone) and Clearlake Clay (underlain by alluvium) are common soils of Tolay Lake Regional Park and primarily support grassland vegetation (USDA 1972). The Goulding-Toomes complex (underlain by metamorphosed basic igneous and weathered andesitic basalt for Goulding and andesitic basalt and volcanic breccia for Toomes) is less common than the Diablo soils, but also supports grassland (USDA 1972).

The woodland at Tolay Creek Ranch was probably never well developed and primarily, but not entirely, restricted to the drainages and rocky outcrop areas. For areas in the vicinity of Tolay Creek Ranch that formerly supported woodland, the loss of trees is likely the result of cutting and the subsequent grazing that reduce recruitment of new trees. Upon cessation of grazing, portions of the grasslands of Tolay Creek Ranch may become woodland as have portions of the East Bay hills. Nevertheless at Tolay Lake Regional Park oak woodland occurs along portions of Cardoza Creek and East Creek and at Tolay Creek Ranch, oak woodland occurs in the drainages and rocky outcrop areas. This pattern of oak woodland is characteristic of areas that had been formerly woodland and are currently heavily grazed. Upon cessation of grazing, the grasslands of Tolay Lake Regional Park may become woodland as have portions of the East Bay hills.

In particular, the shrub layer is most notably underdeveloped at the park due to historic land use practices of grazing and agriculture. Likewise the animals associated with mid-canopy and shrub habitats are least well represented at Tolay Lake Regional Park, compared to the presumably original natural condition. Planting sub-tree willow riparian corridors and creating the conditions for the regeneration of shrubs and other understory vegetation by release from grazing and/or prescribed grazing are the most immediate and practical restoration opportunities for Tolay Lake Regional Park, which would yield the greatest cost-to-benefit results. Restoration of this mid-level vegetation layer would produce substantial benefits in terms of native plant regeneration, enhancement of a large variety of wildlife dependent on shrub cover and foraging habitat, and aesthetic improvements.

Habitat restoration options can be categorized into short-term activities that can be implemented relatively rapidly and long-term activities that require detailed study and considerable financing. These short-term activities are those that tend to be relatively simple to implement and the long-term activities are those that are relatively complex.

Short-term restoration activities include the riparian plantings carried out by the volunteer group STRAW (Students and Teachers Restoring a Watershed) in two areas of the park. Restoration of the shrub component of the understory of riparian and oak woodlands, to provide cover for wildlife, is a

short-term activity that could occur by planting shrubs or by fencing selected areas. Installation of fencing around riparian areas for grazing management is also a relatively simple restoration and management measure that can be accomplished in the short-term with minimal funding for fence materials and volunteer labor. The grazing lessee could also provide labor with the incentive of a reduction in grazing fees. Examples of long-term restoration activities at Tolay Lake Regional Park include designing and implementing a program for the restoration of moist grasslands, restoring the bed and bank, natural meanders, and natural vegetation to the channelized watercourses, and repairing the spillways of Ponds 1 and 2.

This section was designed in conjunction with the recommendations of the Rangeland Resources Study (LSA 2009). Coordination with the Rangeland Resource Study was necessary to develop an implementation strategy for the restoration program to ensure that the recommendations of both plans are compatible especially with regard to grassland restoration, enhancing the populations of special-status species, restoration of oak woodlands and riparian areas, and control of invasive species. Many of the restoration actions that are discussed below involve ground-disturbing activities be they use of earth-moving equipment to re-contour selected watercourses or use of a trowel to plant acorns. Any ground-disturbing activity could potentially disturb cultural resources and the Cultural Resource Study (LSA 2008) provides treatment options to avoid or minimize impacts. Ground-disturbing activities will be avoided on sites known to contain sensitive cultural resources.

Ground-disturbing activities may also promote the colonization of an area by non-native species. A challenge for the success of restoration is maintaining non-natives at a low density. This is especially important for Tolay Lake Regional Park because of the large amount of bristly ox-tongue and other invasive species. Control of invasive species should be a part of the restoration activities.

6.1 RESTORATION OF SELECTED HABITATS

6.1.1 Oak Woodland

The Oak Grove on the East Ridge and oak woodland along Cardoza Creek (Figure 3a) do not show evidence of recent regeneration judging from the absence of seedlings and saplings (Steve Ehret pers. comm., LSA obs.). Coast live oak has been documented as not adequately regenerating in some areas because of a combination of factors including livestock and wildlife herbivory and competition with dense stands of non-native grasses (McCreary 2001). In addition, oaks may establish seedlings and saplings only during years with unusual weather conditions of summer moisture.

It is likely that oak woodland was never very abundant at Tolay Lake Regional Park based on the presence of Diablo, Clear Lake, and Goulding-Toomes complex soil types that usually support grassland. The Langier soils are underlain by rhyolite or rhyolitic tuff and support oak woodlands on a small portion of the East Ridge and on areas just east of Tolay Lake Regional Park. Establishing oak woodland at Tolay Lake Regional Park should therefore be done on a very limited scale.

Regeneration of oak woodlands should be monitored, and oaks planted if monitoring shows an absence of natural regeneration of new oak stands in drainages. Oak trees may be planted on slopes above watercourses, such as the upper reaches of both forks of Cardoza Creek to reduce slope failure and reduce sedimentation (Figure 7a). Eagle Creek and a few un-named watercourses also present opportunities for oak woodland creation along with some of the draws on the mid slope of the East

Ridge (Figure 7a). Cardoza Creek and Eagle Creek were selected for the restoration of Oak Woodland because small stands of oaks already occur along these creeks. The upper reaches of some of the un-named watercourses of the East Ridge were also selected to provide an increase in cover for wildlife. The entire reaches of these watercourses were not selected for oak woodland restoration in order to provide open creek side habitat which is also valuable.

Planting could be done using container plants or acorns. Management of livestock grazing as discussed in the Rangeland Resources Study (LSA 2009) should be implemented to encourage oak regeneration.

Sudden oak death (*Phytophthora ramorum*) is known from southern Sonoma County and may possibly colonize Tolay Lake Regional Park at some point in the future. Coast live oak exhibiting symptoms of sudden oak death were observed along Tolay Creek on Tolay Creek Ranch south of Tolay Lake Regional Park. If the coast live oaks were to become infected by sudden oak death, restoration should include establishing single-species stands of coast live oak, without an understory. Current research indicates that coast live oaks acquire sudden oak death from other species of plants (M. Garbelletto, pers. comm.) and a mixed stand of oaks and bays would result in the more resistant bays providing a reservoir for the pathogen and providing a way for the pathogen to infect oaks. The sudden oak death pathogen does not appear to be able to infect coast live oak trees from nearby coast live oak trees. Other species of nearby trees and shrubs are required for the pathogen to infect coast live oak.

6.1.2 Watercourses and Riparian Woodlands

Some of the watercourses at Tolay Lake Regional Park have been straightened (North Creek, Eagle Creek, and the upper reach of Tolay Creek). Restoration options could include re-contouring the entire straightened reaches of these watercourses, re-contouring small portions of these watercourses, or leaving the watercourses as straight ditches. Planting willow and cottonwood trees could be conducted in conjunction with any of these options.

Riparian woodlands occur along both Tolay Creek and Cardoza Creek with the riparian woodland corridor reaching its widest extent along the lower reach of Tolay Creek. The ideal restoration scenario would be to establish riparian vegetation along the entire length of Tolay Creek to the same width as the lower reach. This would require widening the channel and laying back the banks to make them less steep. Restoration of riparian woodland and associated stream channels could be conducted in the short-term or in the long-term depending upon the amount of earthwork needed for re-creating sinuous channels. The Rangeland Resources Study (LSA 2009) also addresses restoration of riparian areas.

Short-Term Actions.

- **Riparian Nodes.** The short-term restoration approach would entail planting a series of "restoration nodes" along Eagle, North, Cardoza, and Tolay creeks (Figures 6a and 6b). These nodes would serve to provide habitat and as sources of propagules for colonization of the unvegetated portions of the watercourses.

For example, each node could consist of 10 seedlings or willow cuttings planted 10 feet apart at elevations appropriate for establishing hydrophytic vegetation along a 100-foot long reach of stream. The nodes would be spaced 200 or more feet apart. For maximum biological value, the restoration approach should keep portions of the watercourse free of woody riparian cover to provide edge and open water habitat. Fencing would be necessary to protect the plantings from cattle unless grazing could be deferred in that management unit to allow for establishment. Substantial benefit to wildlife values of Tolay Lake Regional Park would occur as a result of establishing riparian vegetation in these drainages.

LSA recommends planting of riparian nodes as a high priority restoration alternative. Planting may be done in a phased manner with installation of only a few nodes each year.

- **Willow Pole Installation.** Another short-term restoration activity would entail installing willow poles in the semi-permanent drainages of the West Ridge. Willow poles would be placed at the edge of the perennially moist soil of selected reaches of several of the drainages of the West Ridge. The entire length of some drainages and some reaches of selected drainages would remain open to provide valuable herbaceous wetland habitat (Figure 7b). Grazing would be managed to allow the willow to grow without severe browsing.

  LSA recommends this alternative as the highest priority short-term restoration action at Tolay Lake Regional Park. We believe that the restoration of the West Ridge drainages as shown on Figure 7b would yield the greatest benefit to aesthetics, native plant regeneration, and wildlife habitat enhancement for the least relative cost.

Long-Term Actions.

- **Laying-down Channelized Banks.** A longer-term approach would entail laying down the banks along the straightened portion of Eagle and Tolay creeks to simulate the meanders that formerly existed in these drainages. That is, the banks would be re-contoured at selected locations, but the channel would be left unaltered. The creek channels would not be rerouted.

  The majority of Eagle Creek had been straightened but only a 1,000-foot section of Tolay Creek below the Farm Bridge had been straightened. Downstream of the straightened portion, Tolay Creek has been deepened, although some meanders appear to remain. Laying back the banks of this portion of Tolay Creek would allow the establishment of a wider band of riparian vegetation. Implementing the long-term approach for Tolay and Eagle creeks would not preclude the short-term approach for Cardoza Creek, North Creek, and the un-straightened portions of Eagle and Tolay creeks.

  A benefit of re-contouring these creeks would be the ability to establish a greater width of riparian vegetation on the banks of these creeks. Currently the banks are steep and would support a narrow width of riparian vegetation. The long-term approach would require engineering design and permitting for grading activities. A storage area for the excavated fill would need to be designated. Riparian nodes could then be planted along the recreated creek channels as described above.

  Re-contouring would cause major short-term impacts in terms of removal of existing riparian

vegetation, disruption of wildlife, aesthetic impacts associated with the construction project, compaction of soil from the introduction of heavy equipment, potential for the introduction of noxious weeds, pioneering of temporary construction access roads and lay-down areas, and down stream sedimentation.

- **Rerouting Straightened Channels.** The straightened creeks could be rerouting to approximate the original meanders. Careful consideration should be given to implementation of this restoration alternative in terms of costs and benefits. Alteration of existing channels is a major capital undertaking. This undertaking requires detailed hydrologic studies to determine design parameters and even to assess whether there would be hydrologic benefits as a result of the alterations.

  The environmental and financial costs of such an undertaking may not be justified by the benefits accrued. LSA recommends intermediate measures short of rerouting channels, particularly laying-down the banks of deeply incised streams but leaving the channel intact (above). There are major financial and environmental costs entailed in channel reconstruction. The alternative of only laying down the banks is less costly in all respects than channel reconstruction and would achieve comparable environmental benefits by extending the width of the riparian corridor.

- **Lake Shoreline Revegetation.** Riparian vegetation could also be planted along the Tolay Lake shoreline (Figure 7b). The western shore would be the best location for the trees because the steeper bank would allow the roots to be closer to water as the lake dries. Riparian species recommended for this area would be Fremont cottonwood, red willow, yellow willow, arroyo willow, sandbar willow, and California buckeye. The goal would be to establish a multi-layered canopy along the western edge of the lake. The top layer would consist of cottonwood trees, red and yellow willows would occupy the intermediate layer, and arroyo willow would compose the woody understory. Sandbar willow, arroyo willow, and California buckeye would also grow at the dryer edge of the riparian area. California blackberry and shrubs consisting of creeping snowberry, coffeeberry, and coyote brush would be planted as groundcover. Plantings should be discontinuous as shown on Figure 7b to allow for views of the lakes and to create a mosaic of habitat types for wildlife.

- **Fencing South Creek.** South Creek supports small but well developed stands of riparian vegetation although a shrubby understory is absent. Fencing the area around South Creek, from the rest of the West Ridge, will allow better management of grazing, thereby allowing the understory to become re-established.

6.1.3 Purple Needlegrass Grassland

Purple needlegrass grows in low density stands on the lower slopes of the West and East ridges. See the Rangeland Resources Study (LSA 2009) for details on restoration and management of these grasslands.

6.1.4 Moist Grasslands

Restoration of moist grasslands over much of the formerly cultivated low terraces east of the restored Tolay Lake shoreline would provide high value habitat, which is otherwise of limited extent, and would provide native cover to resist invasion by non-native weeds (Figures 6a and 6b). The wettest

areas could be restored to semaphore grass, rushes, and sedges. Drier areas could be restored to creeping wildrye, meadow barley, and California oat grass. Existing wetlands and native grasslands that occur within the moist grassland creation area (Figures 6a and 6b) would be enhanced by control of non-native species by managing the grazing or other means.

Fill Drainage Ditches. Existing drainage ditches should be filled in conjunction with the restoration of the moist grasslands (Figures 6a and 6b). The ditches had been excavated to drain soils in preparation for tillage when the property was being farmed. An increase in the extent and duration of soil saturation would increase the likelihood of success of restoring the moist grasslands.

Bristly Ox-Tongue Control. The fallow ungrazed fields on the low terraces east of Tolay Lake now support a dense growth of bristly ox-tongue, a noxious and invasive weed. The high density of ox-tongue is a source of abundant seeds that facilitate its spread onto adjacent grazed areas. Prior to restoring moist grasslands, bristly-ox tongue and other invasive weeds should be controlled. The Rangeland Resources Study (LSA 2009) describes in greater detail control of these weeds and methods of restoring and managing moist grasslands. The Cultural Resources Study (LSA 2008) discusses mitigation measures for any impacts of these techniques on cultural resources.

Grazing Exclosures. The effects of grazing should be examined by establishing fenced grazing exclosures in selected areas. In this manner, the vegetation in grazed and ungrazed plots could be compared. Monitoring of the grazing regime will help inform management strategies. Grassland monitoring and adaptive management concepts are described in greater detail in the Rangeland Resources Study (LSA 2009).

6.2 WILDLIFE ENHANCEMENT

6.2.1 California Red-legged Frog

Bullfrog Control. The value of California red-legged frog habitat is substantially reduced at Tolay Lake Regional Park due to the occurrence of bullfrogs. Because of the complexity of the habitats within the park, the large size of the park, and existing off-site bullfrog sources for recolonization, bullfrog control throughout the entire park is not recommended at this time. Nevertheless, removal of bullfrogs on a trial basis, from isolated ponds such as the Irrigation Pond, Old Duck Pond, and possibly the Stock Pond could provide insight on the effectiveness of bullfrog control and resulting breeding by California red-legged frogs. If bullfrog control is successful on a trial basis, then it could be expanded and ponds designed to support breeding habitat of California red-legged frogs could be constructed. Bullfrogs would be monitored yearly and controlled as appropriate, unless experience dictates otherwise.

Habitat Enhancement. California red-legged frogs can breed in seasonal waterbodies whereas bullfrogs require permanent waterbodies. Breeding ponds for California red-legged frogs should be shallow and seasonally inundated. Ponds could be created in the fallow fields on the low terraces among restored moist grasslands. Selected ponds could also be created adjacent to existing springs near Pond 2 and on the East Ridge. Spike rush and other shoreline vegetation should be established on the breeding ponds to provide cover for the frogs. An alternative approach is to not create any more habitats that did not naturally occur at Tolay Lake Regional Park (such as artificial ponds) and enhance suitable existing ponds for the reproduction of California red-legged frogs.

Grazing could be used to manage the vegetation of these breeding ponds. Year-round heavy grazing can virtually eliminate freshwater marsh and riparian vegetation reducing cover for frogs and increasing the likelihood of predation. Elimination of grazing, on the other hand, can result in dense stands of cattails that reduce habitat diversity. The optimal condition for red-legged frogs is a mosaic of open water, freshwater marsh, and riparian vegetation. This condition can be created by managing the timing and intensity of livestock grazing as described in the *Tolay Lake Rangeland Resources Study* (LSA 2009).

Recommendation. While bullfrog control may be undertaken on an experimental basis in selected locations at Tolay Regional Park (above), we recommend that this action be given a low priority. The bullfrog population both on the park property and adjacent to the park is enormous. Even if all the bullfrogs were temporarily eliminated on the park property, Tolay Creek would provide a ready corridor for re-infestation from neighboring properties. In short, the costs of bullfrog control would be very high and the likelihood of success would be very low.

A substantially more cost effective approach to encouraging California red-legged frogs is habitat enhancement. California red-legged frogs can co-exist with bullfrogs if there is a mosaic of wetland habitat types, especially seasonal wetlands that provide sufficient cover for the former species. Habitat enhancement is also more assured of implementation success than bullfrog control and has great ancillary benefits to other wildlife and plants.

6.2.2 Western Pond Turtle

Western pond turtles would use the larger and more permanent bodies of water such as Pond 1 and Pond 2. They would also be expected to use the restored Tolay Lake. Providing rafts or logs for sunning in the center or at the margins of Pond 1, Pond 2, and the restored Tolay Lake would improve basking areas and be of benefit to western pond turtles. Western pond turtles were also observed in large pools of Tolay Creek immediately downstream of Tolay Lake Regional Park.

6.2.3 Burrowing Owl

A few burrowing owls are regularly observed at Tolay Lake Regional Park in the vicinity of rock outcrops suitable for refuge. The park does not appear to be optimal breeding habitat which is perhaps due to climatic factors. Burrows suitable for nesting by burrowing owls are limited in extent at the park, in part due to the small numbers of California ground squirrels. The burrowing owls can use the burrows of other types of animals besides ground squirrels (such as foxes), and burrowing owls have been observed using holes in rock outcrops at Tolay Lake Regional Park. Creation of artificial burrows suitable for nesting by burrowing owls could be considered in the short-term. In the long-term, proper range management may encourage an increase in the number of ground squirrels, which create burrows that are used by burrowing owls.

6.2.4 Mammals

Tolay Lake Regional Park consists of extensive areas of grasslands that provide little woody cover. The shrubby understory vegetation of the oak and riparian woodland is virtually absent due to past

grazing practices. Cover is limited to a few stands of Himalayan blackberry and a limited amount of wetland vegetation in seeps, ditches, and ponds. Increasing cover would likely increase mammalian diversity and the abundance of raccoon, striped skunk, Virginia opossum, gray fox, and coyote. An increase of rabbits could also increase the numbers and diversity of predators at Tolay Lake Regional Park.

Increasing cover could be accomplished by fencing riparian to prevent grazing by cattle. The grazing program for the downstream portion of Tolay Creek, Cardoza Creek, Pond 1,Pond 2, and South Creek is designed to reduce channel erosion and increase woody understory and wetland vegetation (LSA 2009).

Tolay Lake Regional Park should be managed to allow the colonies of California ground squirrels to expand. This will increase the diversity of the grassland fauna that uses the squirrel burrows for refuge. California ground squirrels are also important prey species and may be important in maintaining predator diversity.

6.3 NON-NATIVE PLANT SPECIES CONTROL

A number of invasive non-native species occur in sufficient density at Tolay Lake Regional Park to warrant control. Target species are bristly ox-tongue, yellow star-thistle, purple star-thistle, medusahead grass, water smartweed, water primrose, Italian thistle, milk thistle, poison hemlock, and Himalayan blackberry. Of these noxious species, priority should be given to eradication of water primrose. In addition, both acacia and blue gum should be managed. Control of invasive species typical of grasslands (bristly ox-tongue, yellow and purple star-thistle, Italian thistle, milk thistle, and medusahead) are addressed in the Rangeland Resources Study (LSA 2009).

6.3.1 Water Primrose

Background. Water primrose is a perennial species that appears to grow only in the Duck and Willow ponds (Figure 7b). It began to grow in April or May and covered much of the surface of the Duck Pond by November 2006. In addition, it has recently colonized the Willow Pond (Ehret pers. comm.). Only a small area in the center of the Duck Pond remained free of vegetation. Water primrose is an emergent species with much of its biomass growing above the surface of the water.

Water primrose colonized the Duck Pond in 2004 (Marvin Cardoza pers. comm.). It should be controlled before it becomes inadvertently established in Tolay Creek and other areas of Tolay Lake Regional Park. It will displace native species and its decomposition will contribute to the eutrophication of waterbodies.

As an example at another location, the Laguna de Santa Rosa Foundation initiated a control program in 2005 in which they sprayed a glyphosate-based herbicide on water primrose (Sears et al. 2006, Laguna de Santa Rosa Foundation 2006). The treatment killed approximately 75 percent of the plants. The incomplete kill is believed in part to be due to incomplete application of the herbicide because of the dense growth of the plant. As a result, an earlier start date, June 15 instead of July 15 was scheduled for 2006 in order to treat the plant at a lesser density.

Herbicides were effective in areas of deep water and areas that had dried out. They were not effective in areas of shallow water (Meisler et al. 2008). In addition, mechanical equipment that was designed to scoop out the water primrose also proved to be an effective measure of control with spot spraying in areas where re-growth occurred.

Recommended Control Measures. Contol can be effected through mechanical or herbicidal means. The drawbacks of the mechanicl removal are the use of equipment in small and relatively shallow pools and the high cost of the mechanical equipment. The drawback of using herbicides is the uncertainty of the requirement for a permit from the North Coast Regional Water Quality Control Board (RWQCB). The RWQCB requires permits for application of certain herbicides in waters of the United States containing surface waters. It is unclear if permits are required when surface water is absent.

The input of spring water into the Duck Pond and Willow Ponds should be ceased until the water primrose is removed from the ponds. These two ponds should be allowed to naturally dry out. Pumping the ponds out may occur if surveys indicate that the California red-legged frog has not colonized either of these ponds. Once these ponds have dried, a survey for California red-legged frogs should be carried out if not previously completed.

The water primrose should be sprayed with a suitable herbicide after the ponds have thoroughly dried. Glyposhate and tryclopyr have been used in the Laguna de Santa Rosa (Meisler et al. 2008). Repeated treatments may need to occur to achieve complete control. The ponds should remain dry until control is achieved. If the water primrose were to reappear after the ponds are filled, then the ponds should be allowed to dry and treatments begun anew.

In conclusion, eradication of water primrose should be a high and immediate priority, because this plant is highly invasive and could spread beyond the Duck Pond to Tolay Creek. Once in the creek, it would be nearly impossible to control and would cause inestimable environmental damage. (See http://www.lagunadesantarosa.org/programs_rp_isc_lmp.shtml for the environmental damage water primrose is causing in the Laguna de Santa Rosa.)

6.3.2 Water Smartweed

Water smartweed is a perennial species that covered the surface of the dried bed of Tolay Lake when fallow in 2006 and Tolay Creek immediately below the lake (Figures 6a and 6b). It also occurs further downstream in Tolay Creek and upstream of Tolay Lake. Water smartweed grows from perennial roots in the late spring and is the dominant cover by the time that the lake is dry. It may grow so thickly as to inhibit the foraging of ducks in Tolay Lake.

Cultivation of the dried bed of Tolay Lake resulted in cutting the roots and spreading them throughout the lake bed. This contributed to the dominance of water smartweed within Tolay Lake. Because of its widespread distribution, it would be nearly impossible to remove water smartweed from Tolay Lake Regional Park.

Recommendations include monitoring the cover of water smartweed in Tolay Lake. If the cover of water smartweed impedes the use of the lake by wildlife, then treatment options should be considered. At least two options are available for control of water smartweed in Tolay Lake. The first option

would entail grazing Tolay Lake. Cattle could be provided with seasonal access to Tolay Lake in order to reduce the density of water smartweed. If cattle do not provide sufficient control, then a glyphosate-based herbicide could be used (cf. Midwest AquaCare [2006] and Texas A&M University [2006]).

6.3.3 Poison Hemlock

Poison hemlock grows in relatively small stands along the upper banks of Tolay Creek, along the bank of Eagle Creek, and possibly in other areas of Tolay Lake Regional Park. Poison hemlock typically excludes other species from occurring within its dense single-species stands. This weed tends to grow in areas that have been previously disturbed.

Recommendations would be to control by cutting in late spring. Because poison hemlock is an annual plant, removal just before seed set should result in a nearly complete control of the current year's growth. Follow-up control will be necessary until the residual seeds in the soil have been depleted.

6.3.4 Himalayan Blackberry

Himalayan blackberry grows most often in the understory of riparian areas where it forms an impenetrable stand among the lower branches and trunks of the willow trees. It also grows as compact stands in a few grassland areas and at the head of unvegetated watercourses. When in riparian situations, it dominates the understory, appears to spread, and may exclude other plant species. Himalayan blackberry, however, provides excellent cover for wildlife especially considering the relative absence of cover at Tolay Lake Regional Park.

Control could be by either hand removal or use of goats. Control should be phased such that alternative understory plant species would be established nearby prior to removal of a stand or portion of a stand of Himalayan blackberry. In this manner, cover would be maintained for wildlife. We recommend that control of Himalayan blackberry be given a low priority.

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7.3 PERSONAL COMMUNICATIONS

Sam Bacchini, Biological Consultant, EIP Associates, Sacramento, Conducted field work for Parson (1996)

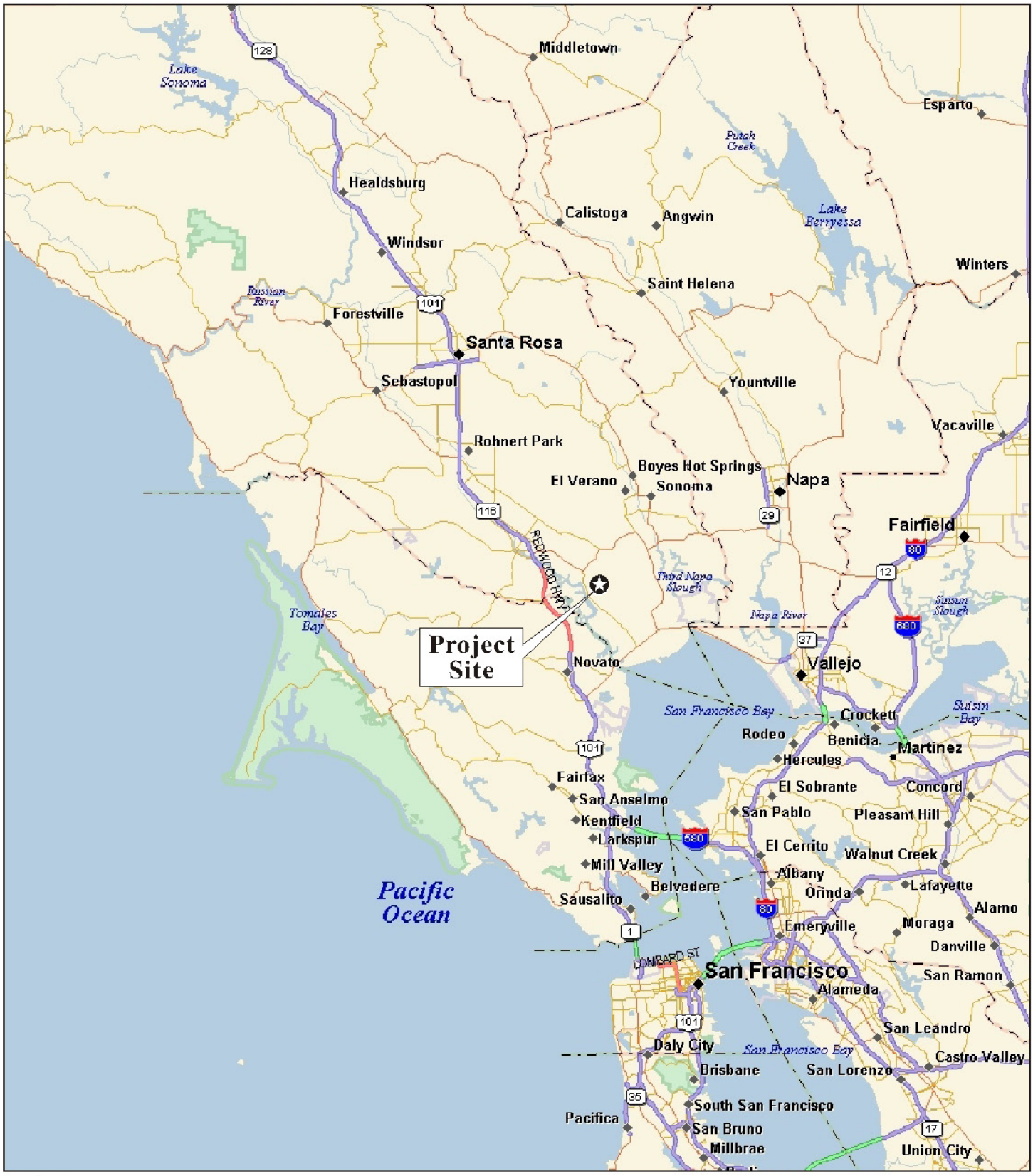
Marvin Cardoza, Rancher, Tolay Lake, California

Steve Ehret, Park Planner, Sonoma County Regional Parks, Santa Rosa, California

Matteo Garbelotto, Plant Pathologist, expert on Sudden Oak Death, University of California, Berkeley

Janet Thiessen, volunteer for The Raptor Project

FIGURES



LSA

FIGURE 1

Tolay Lake Regional Park

Regional Location

N

0 10

MILES

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

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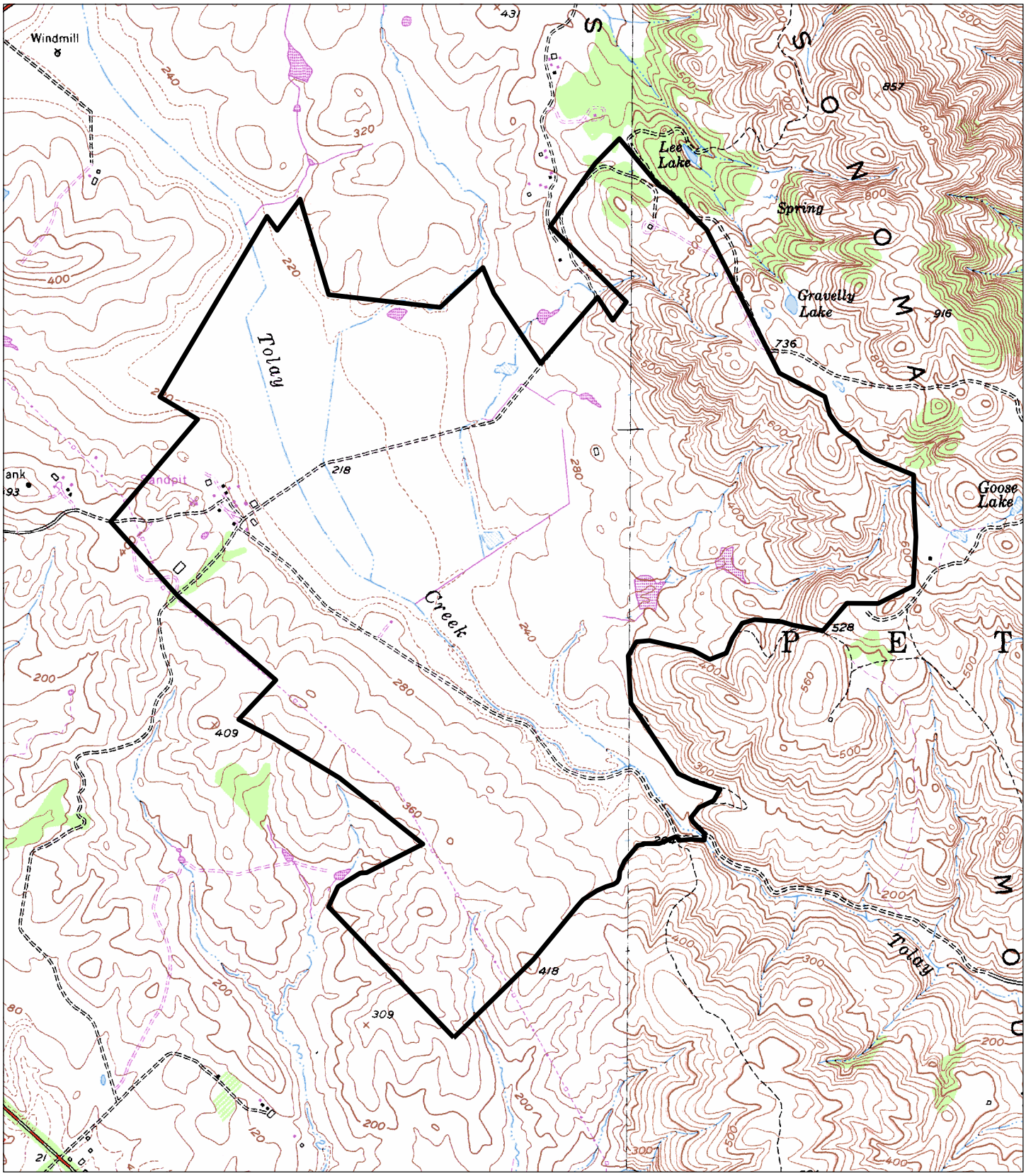

LSA

FIGURE 2

Tolay Lake Regional Park

Project Location

N

0 500 1,000 2,000

FEET

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

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FIGURE 3a

Tolay Lake Regional Park

Biological Resources

- Johnny Jump-up
- Cream Cups
- Peridiridia sp.
- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment
- Red-tailed Hawk Nest
- Former Raptor Nest
- Burrowing Owl
- Western Pond Turtle
- California Red-legged Frog
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Project Boundary

0 400 800
Feet

1 inch equals 800 feet

LSA

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

North Creek
Oak Grove Fork
Eagle Creek
East Ridge
Cardoza Creek North Fork
Cardoza Creek Main Fork
Drainage Ditch
Pond 1
Irrigation Pond
East-West Drainage Ditch
Upland Pond/Spring Complex
Pond 2
Tolay Lake
North Creek
Eagle Creek
Old Duck Pond
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch

I:\SOG0602\GIS\Maps\Biological Resources\Figure3a-Biological Resources_north.mxd (02/23/2007)

North Creek
Eagle Creek
Old Duck Pond
Pond 2
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch
Tolay Lake
Farm Bridge
Park Center
Willow Pond
Duck Pond
Tolay Creek
Cardoza Creek
Tolay Creek
Stock Pond
West Ridge
Gate
South Creek

FIGURE 3b

Tolay Lake Regional Park

Biological Resources

- Johnny Jump-up
- Cream Cups
- Perideridia sp.
- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment
- Red-tailed Hawk Nest
- Former Raptor Nest
- Burrowing Owl
- Western Pond Turtle
- California Red-legged Frog
- Fragrant Fritillary
- Lobb's Aquatic Buttercup
- Project Boundary

LSA

0 200 400 800
Feet

1 inch equals 800 feet

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

I:\SOG0602\GIS\Maps\Biological Resources\Figure3b_Biological Resources.mxd (02/23/2007)

FIGURE 4a

Tolay Lake Regional Park

Location of Selected Weeds and Erosion

Erosion

Weeds

Himalayan Blackberry *

Project Boundary

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

0 400 800

Feet

LSA

1 inch equals 800 feet

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

North Creek
Oak Grove Fork
Eagle Creek
East Ridge
Cardoza Creek North Fork
Cardoza Creek Main Fork
Drainage Ditch
Pond 1
Irrigation Pond
Upland Pond/Spring Complex
East-West Drainage Ditch
Pond 2
Tolay Lake
North Creek
Eagle Creek
Old Duck Pond
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch

I:\SOG0602\GIS\Maps\Biological Resources\Figure4a-Location of Weeds&Erosion_north.mxd (02/23/2007)

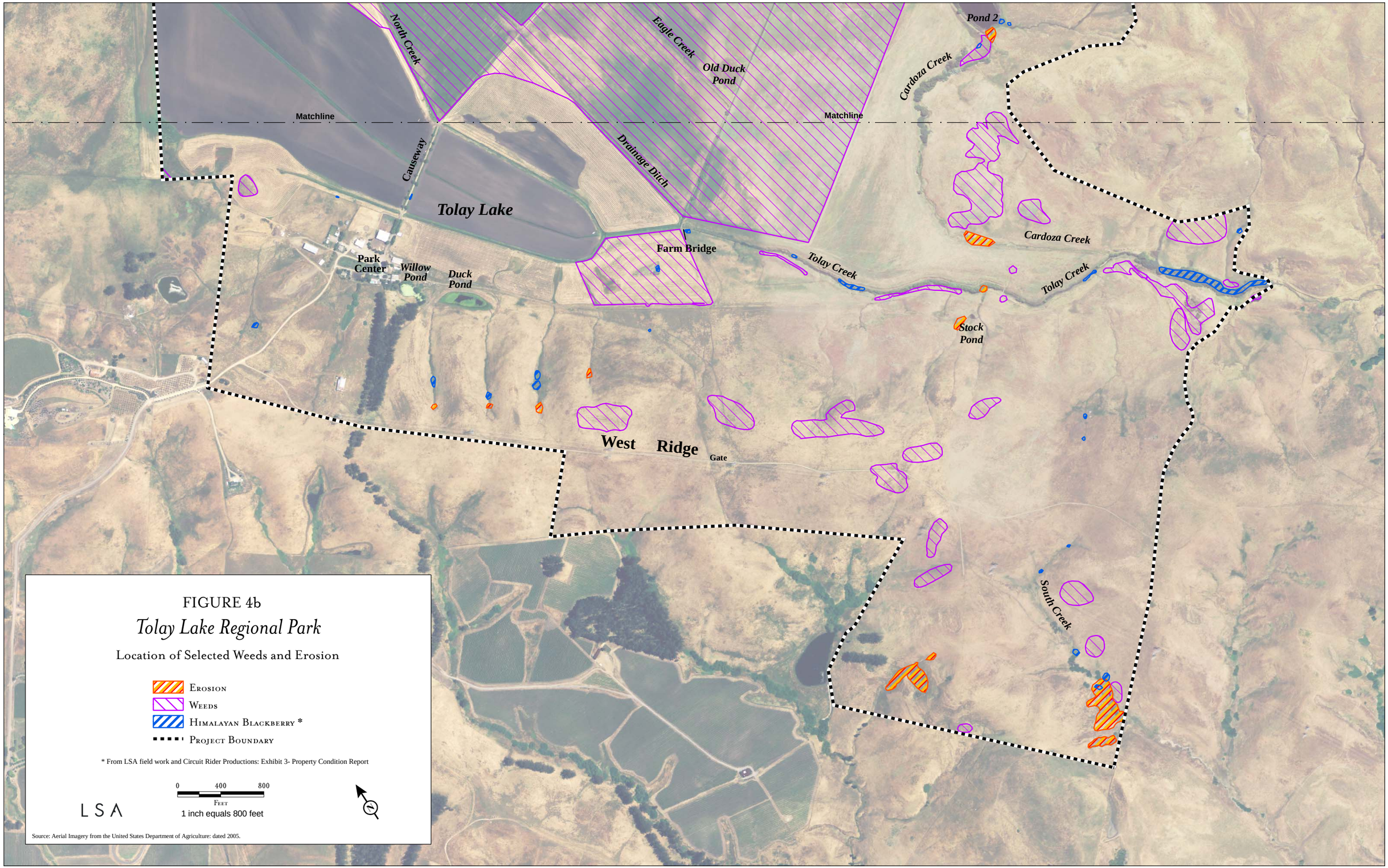

FIGURE 4b

Tolay Lake Regional Park

Location of Selected Weeds and Erosion

- Erosion
- Weeds
- Himalayan Blackberry *
- Project Boundary

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

0 400 800

Feet

1 inch equals 800 feet

LSA

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

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FIGURE 6a

Tolay Lake Regional Park

Proposed Restoration Areas

Biological Resources

- Native Grassland
- Buckeye Woodland
- Oak Woodland
- Riparian Woodland
- Eucalyptus
- Rock Outcrops
- Wetland
- Pond
- Stream Segment

Proposed Planting Areas

- Moist Grassland Creation
- Oak Woodland Creation
- Willow Pole Installation
- Willow and Cottonwood Creation
- STRAW Planting Site
- Riparian Pasture Fence
- Drainage Ditch to be Filled
- Riparian Restoration at Nodes 200 Feet Apart
- Project Boundary

0 400 800
Feet

1 inch equals 800 feet

LSA

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

North Creek
Oak Grove Fork
Eagle Creek
East Ridge
Cardoza Creek North Fork
Cardoza Creek Main Fork
Drainage Ditch
Pond 1
Irrigation Pond
East-West Drainage Ditch
Upland Pond/Spring Complex
Pond 2
Tolay Lake
North Creek
Eagle Creek
Old Duck Pond
Cardoza Creek
Matchline
Matchline
Causeway
Drainage Ditch

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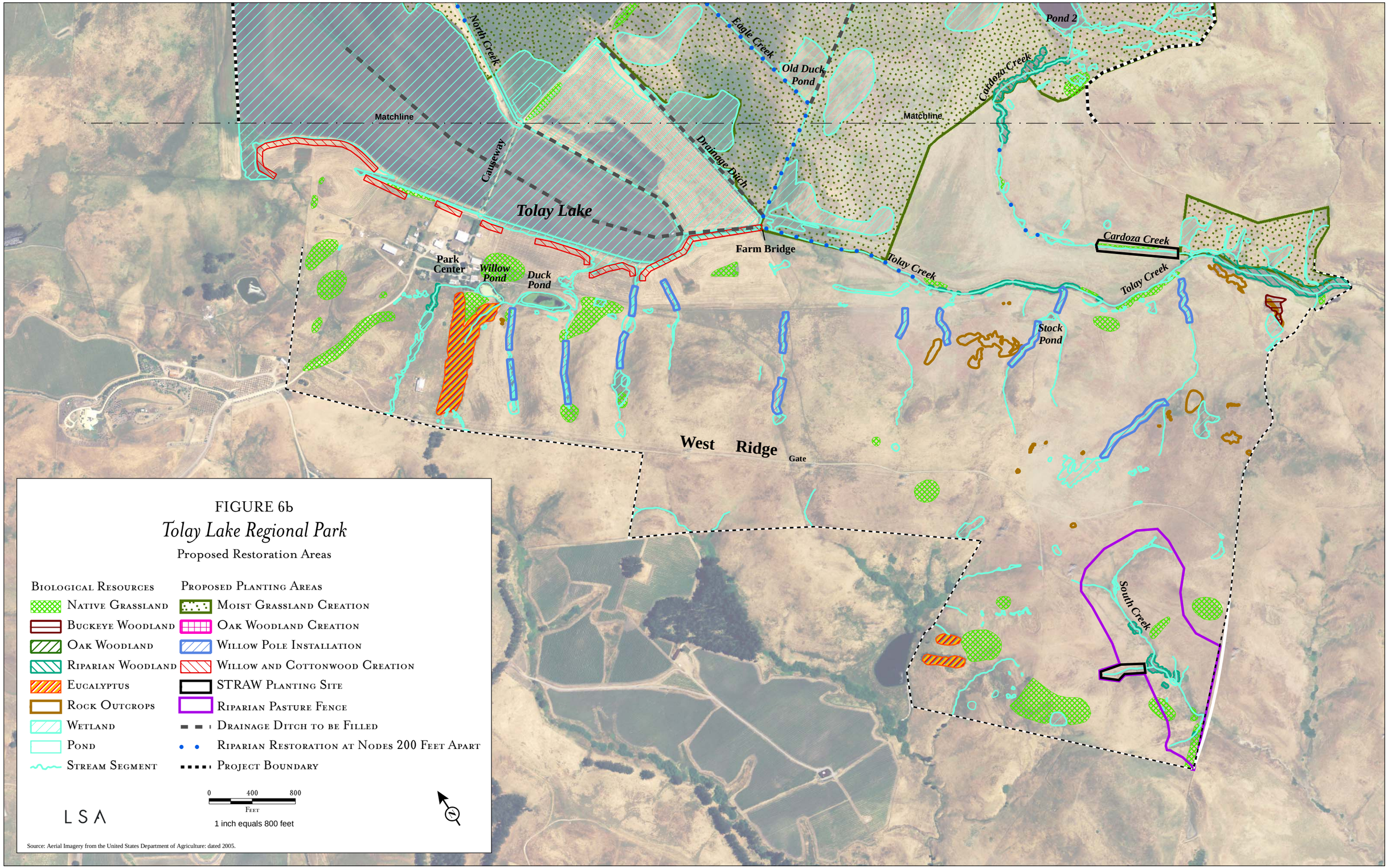

FIGURE 6b

Tolay Lake Regional Park

Proposed Restoration Areas

Biological Resources	Proposed Planting Areas
Native Grassland	Moist Grassland Creation
Buckeye Woodland	Oak Woodland Creation
Oak Woodland	Willow Pole Installation
Riparian Woodland	Willow and Cottonwood Creation
Eucalyptus	STRAW Planting Site
Rock Outcrops	Riparian Pasture Fence
Wetland	Drainage Ditch to be Filled
Pond	Riparian Restoration at Nodes 200 Feet Apart
Stream Segment	Project Boundary

0 400 800

Feet

1 inch equals 800 feet

LSA

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

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TABLES

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

Family	Scientific Name	Common Name	Origin*
Alismataceae	*Alisma lanceolatum*	Water plantain	N
Amaranthaceae	*Amaranthus blitoides*	Prostrate pigweed	N
Amaranthaceae	*Amaranthus retroflexus*	Pigweed	I
Anacardiaceae	*Toxicodendron diversilobum*	Poison oak	N
Apiaceae	*Conium maculatum*	Poison hemlock	I
Apiaceae	*Eryngium armatum*	Armed coyote thistle	N
Apiaceae	*Lomatium sp.*	Biscuitroot	N
Apiaceae	*Osmorrhiza chilensis*	Sweetroot	N
Apiaceae	*Sanicula bipinnatifida*	Purple sanicle	N
Apiaceae	*Sanicula crassicaulis*	Pacific sanicle	N
Apiaceae	*Scandix pecten-veneris*	Venus' needle	I
Apiaceae	*Torilis arvensis*	Japanese hedge-parsley	I
Apiaceae	*Torilis nodosus*	Hedge-parsley	I
Asclepiadaceae	*Asclepias fascicularis*	Narrow-leaf milkweed	N
Asteraceae	*Achillea millefolium*	Yarrow	N
Asteraceae	*Achyrachaena mollis*	Blow wives	N
Asteraceae	*Agoseris grandiflora*	Agoseris	N
Asteraceae	*Anthemis cotula*	Mayweed	I
Asteraceae	*Artemisia douglasiana*	Mugwort	N
Asteraceae	*Baccharis pilularis*	Coyote brush	N
Asteraceae	*Carduus pycnocephalus*	Italian thistle	I
Asteraceae	*Centaurea calcitrapa*	Purple star-thistle	I
Asteraceae	*Centaurea solstitialis*	Yellow star-thistle	I
Asteraceae	*Chamomilla suaveolens*	Pineapple weed	I
Asteraceae	*Cirsium vulgare*	Bull thistle	I
Asteraceae	*Cotula coronopifolia*	Brass-buttons	N
Asteraceae	*Gnaphalium luteo-album*	Cudweed	I
Asteraceae	*Grindelia camporum*	Gumplant	N
Asteraceae	*Hemizonia congesta* var. *congesta*	Hayfield tarweed	N
Asteraceae	*Hesperevax sparsiflora* var. *sparsiflora*	Erect dwarf-cudweed	N
Asteraceae	*Hypochaeris radicata*	Hairy cat's ear	I
Asteraceae	*Lactuca serriola*	Prickly lettuce	I
Asteraceae	*Lasthenia californica*	California goldfields	N
Asteraceae	*Lasthenia glaberrima*	Smoth goldfields	N
Asteraceae	*Layia gaillardioides*	Tidy tips	N
Asteraceae	*Madia sativa*	Coast tarweed	N
Asteraceae	*Microseris douglasii*	Douglas microseris	N
Asteraceae	*Picris echioides*	Bristly ox-tongue	I
Asteraceae	*Senecio vulgaris*	Common groundsel	I
Asteraceae	*Silybum marianum*	Milk thistle	I
Asteraceae	*Soliva sessilis*	South American soliva	I
Asteraceae	*Sonchus oleraceus*	Common sow thistle	I
Asteraceae	*Taraxacum officinale*	Dandelion	I
Asteraceae	*Tragopogon porrifolius*	Oyster plant	I
Asteraceae	*Wyethia angustifolia*	Mule's ears	N
Asteraceae	*Xanthium spinosum*	Spiny clotbur	N
Asteraceae	*Xanthium strumarium*	Cocklebur	N
Boraginaceae	*Amsinckia menziesii* var. *menziesii*	Fiddleneck	N
Boraginaceae	*Heliotropium curassavicum*	Heliotrope	N
Boraginaceae	*Plagiobothrys nothofulvus*	Rusty popcornflower	N
Boraginaceae	*Plagiobothrys stipitatus*	Slender popcornflower	N
Brassicaceae	*Brassica nigra*	Black mustard	I
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's purse	I
Brassicaceae	*Cardamine californica* var. *californica*	Toothwort	N
Brassicaceae	*Cardamine oligosperma*	Bitter-cress	N

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

Family	Scientific Name	Common Name	Origin*
Brassicaceae	*Lepidium nitidum*	Peppergrass	N
Brassicaceae	*Raphanus raphanistrum*	Jointed charlock	I
Brassicaceae	*Raphanus sativus*	Radish	I
Brassicaceae	*Rorippa curvisiliqua*	Winter cress	N
Brassicaceae	*Rorippa nasturtium-aquaticum*	Water cress	N
Brassicaceae	*Sinapis arvensis*	Charlock	I
Brassicaceae	*Sisymbrium officinale*	Hedge mustard	I
Callitrichaceae	*Callitriche sp.*	Water starwort	N
Caprifoliaceae	*Symphoricarpos mollis*	Creeping snowberry	N
Caryophyllaceae	*Cerastium fontanum* ssp.*vulgare*	Mouse-ear chickweed	I
Caryophyllaceae	*Cerastium glomeratum*	Mouse-ear chickweed	I
Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved allseed	I
Caryophyllaceae	*Silene gallica*	Windmill pinks	I
Caryophyllaceae	*Spergularia rubra*	Sand-spurrey	I
Caryophyllaceae	*Stellaria media*	Common chickweed	I
Chenopodiaceae	*Atriplex triangularis*	Spearscale	N
Chenopodiaceae	*Chenopodium album*	Lamb's quarters	I
Convolvulaceae	*Calystegia subacaulis*	Morning-glory	N
Convolvulaceae	*Convolvulus arvensis*	Bindweed	I
Crassulaceae	*Crassula aquatica*	Pygmyweed	N
Crassulaceae	*Crassula connata*	Sand pygmyweed	N
Cucurbitaceae	*Marah fabaceus*	California man-root	N
Cuscutaceae	*Cuscuta* sp.	Dodder	N
Cyperaceae	*Carex* sp.	Sedge sp 1	N
Cyperaceae	*Carex* sp.	Sedge sp 2	N
Cyperaceae	*Cyperus eragrostis*	Nutsedge	N
Cyperaceae	*Eleocharis macrostachya*	Spikerush	N
Cyperaceae	*Scirpus acutus* var. *occidentalis*	Tule	N
Dipsacaceae	*Dipsacus fullonum*	Wild teasel	I
Driopteridiaceae	*Athyrium filix-femina*	Western lady-fern	N
Equisetaceae	*Equisetum arvense*	Common horsetail	N
Equisetaceae	*Equisetum laevigatum*	Narrow horsetail	N
Ericaceae	*Arbutus menziesii*	Madrone	N
Euphorbiaceae	*Chamaesyce* sp.	Rattlesnake weed	N
Euphorbiaceae	*Euphorbia peplus*	Petty spurge	I
Fabaceae	*Lathyrus* sp.	Wild pea	N
Fabaceae	*Lotus corniculatus*	Birdfoot trefoil	I
Fabaceae	*Lupinus nanus*	Sky lupine	N
Fabaceae	*Medicago polymorpha*	Californa burclover	I
Fabaceae	*Melilotus officinalis*	Yellow sweetclover	I
Fabaceae	*Melilotus indica*	Sourclover	I
Fabaceae	*Thermopsis macrophylla*	Yellow false lupine	N
Fabaceae	*Trifolium campestre*	Hop clover	I
Fabaceae	*Trifolium ciliolatum*	Tree clover	I
Fabaceae	*Trifolium depauperatum*	Dwarf sack clover	N
Fabaceae	*Trifolium dubium*	Little hop clover	I
Fabaceae	*Trifolium fragiferum*	Strawberry clover	I
Fabaceae	*Trifolium fucatum*	Sour clover	N
Fabaceae	*Trifolium hirtum*	Rose clover	I
Fabaceae	*Trifolium subterraneum*	Subterraneum clover	I
Fabaceae	*Trifolium variegatum*	Whitetip clover	N
Fabaceae	*Vicia sativa* ssp. *sativa*	Common vetch	I
Fagaceae	*Quercus agrifolia* var. *agrifolia*	Coast live oak	N
Fagaceae	*Quercus kelloggii*	Black oak	N
Gentianaceae	*Centaurium muehlenbergii*	Monterey centaury	N

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

Family	Scientific Name	Common Name	Origin*
Geraniaceae	*Erodium botrys*	Broad-leaf filaree	I
Geraniaceae	*Erodium cicutarium*	Red-stem filaree	I
Geraniaceae	*Erodium moschatum*	White-stem filaree	I
Geraniaceae	*Geranium dissectum*	Cut-leaf geranium	I
Geraniaceae	*Geranium molle*	Dove's foot geranium	I
Hippocastanaceae	*Aesculus californica*	California buckeye	N
Hydrophyllaceae	*Nemophila heterophylla*	Variable-leaf nemophila	N
Hydrophyllaceae	*Phacelia* sp.	Phacelia	N
Iridaceae	*Sisyrinchium bellum*	Blue-eyed-grass	N
Juncaceae	*Juncus balticus*	Baltic rush	N
Juncaceae	*Juncus bufonius* var. *bufonius*	Toad rush	N
Juncaceae	*Juncus effusus*	Soft rush	N
Juncaceae	*Juncus mexicanus*	Mexican rush	N
Juncaceae	*Juncus phaeocephalus*	Brown-headed rush	N
Juncaginaceae	*Lilaea scillioides*	Flowering quillwort	N
Lamiaceae	*Lamium purpureum*	Red dead-nettle	I
Lamiaceae	*Mentha pulegium*	Pennyroyal	I
Lamiaceae	*Stachys ajugoides*	Hedge nettle	N
Lauraceae	*Umbellularia californica*	California bay	N
Lemnaceae	*Lemna* sp.	Duckweed	N
Liliaceae	*Brodiaea elegans*	Harvest brodiaea	N
Liliaceae	*Chlorogalum pomeridianum* var. *pomeridianum*	Soap plant	N
Liliaceae	*Dichelostemma capitatum*	Blue dicks	N
Liliaceae	*Fritillaria liliacea*	Fragrant fritillary	N
Liliaceae	*Muilla maritima*	Common muilla	N
Liliaceae	*Triteleia hyacinthina*	Hyacinth brodiaea	N
Liliaceae	*Triteleia laxa*	Ithuriel's spear	N
Liliaceae	*Zigadenus fremontii*	Fremont's star lily	N
Limnanthaceae	*Limnanthes douglasii*	Meadowfoam	N
Lythraceae	*Ammannia coccinea*	Red ammannia	N
Lythraceae	*Lythrum hyssopifolium*	Hyssop loosestrife	I
Malvaceae	*Abutilon theophrastii*	Velvet-leaf	I
Malvaceae	*Malva nicaeensis*	Bull mallow	I
Malvaceae	*Sidalcea malvaeflora*	California checker mallow	I
Martyniaceae	*Proboscidea lutea*	Devil's claw	I
Moraceae	*Ficus carica*	Edible fig	I
Myrtaceae	*Eucalyptus globulus*	Blue gum eucalyptus	I
Onagraceae	*Camissonia ovata*	Sun cup	N
Onagraceae	*Clarkia* sp.	Fairyfan	N
Onagraceae	*Epilobium brachycarpum*	Willow herb	N
Onagraceae	*Ludwigia* sp.	Water-primrose	I
Papaveraceae	*Eschscholzia californica*	California poppy	N
Papaveraceae	*Platystemon californicus*	Creamcups	N
Plantaginaceae	*Plantago lanceolata*	English plantain	I
Plantaginaceae	*Plantago subnuda*	Naked plantain	I
Poaceae	*Avena barbata*	Slender wildoats	
Poaceae	*Avena fatua*	Wild oats	I
Poaceae	*Briza minor*	Little quaking grass	I
Poaceae	*Bromus diandrus*	Ripgut brome	I
Poaceae	*Bromus hordeaceus*	Soft chess brome	I
Poaceae	*Crypsis schoenoides*	Prickle grass	I
Poaceae	*Cynosurus echinatus*	Hedgehog dogtail	I
Poaceae	*Danthonia californica*	California oatgrass	N
Poaceae	*Elymus glaucus*	Blue wildrye	N
Poaceae	*Gastridium ventricosum*	Nit grass	I

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

Family	Scientific Name	Common Name	Origin*
Poaceae	*Holcus lanatus*	Common velvet grass	I
Poaceae	*Hordeum brachyantherum*	Meadow barley	N
Poaceae	*Hordeum marinum* var. *gussoneanum*	Mediterranian barley	I
Poaceae	*Hordeum murinum* ssp. *leporinum*	Hare barley	I
Poaceae	*Leymus triticoides*	Creeping wildrye	N
Poaceae	*Lolium multiflorum*	Italian ryegrass	I
Poaceae	*Nassella pulchra*	Purple needle-grass	N
Poaceae	*Paspalum dilatatum*	Dallis grass	I
Poaceae	*Phalaris aquatica*	Harding grass	I
Poaceae	*Phalaris paradoxa*	Canary grass	I
Poaceae	*Pleuropogon californicus*	Semaphore grass	N
Poaceae	*Poa annua*	Annual bluegrass	I
Poaceae	*Polypogon monspeliensis*	Annual beard grass	I
Poaceae	*Taeniatherum caput-medusae*	Medusa head	I
Poaceae	*Triticum aestivum*	Wheat	I
Poaceae	*Vulpia bromoides.*	Annual fescue	I
Poaceae	*Vulpia myuros*	Annual fescue	I
Polygonaceae	*Polygonum amphibium* ssp. *emersum*	Water smartweed	N
Polygonaceae	*Polygonum arenastrum*	Common knotweed	I
Polygonaceae	*Polygonum hydropiperoides*	Waterpepper	N
Polygonaceae	*Rumex acetosella*	Sheep sorrel	I
Polygonaceae	*Rumex conglomeratus*	Clustered dock	I
Polygonaceae	*Rumex crispus*	Curly dock	I
Polygonaceae	*Rumex pulcher*	Fiddle dock	I
Polypodiaceae	*Polypodium californicum*	California polypody	N
Portulacaceae	*Calandrinia ciliata*	Red maids	N
Portulacaceae	*Claytonia exigua*	Common montia	N
Portulacaceae	*Claytonia perfoliata*	Miner's lettuce	N
Portulacaceae	*Portulaca oleracea*	Common purslane	I
Primulaceae	*Anagalis arvensis*	Scarlet pimpernel	I
Primulaceae	*Centunculus minimus*	Chaffweed	N
Primulaceae	*Dodecatheon hendersonii*	Shooting star	N
Pteridiaceae	*Adiantum jordanii*	California maidenhair fern	N
Pteridiaceae	*Pentagramma triangularis*	Goldback fern	N
Ranunculaceae	*Ranunculus aquatilis*	Water buttercup	N
Ranunculaceae	*Ranunculus californicus*	California buttercup	N
Ranunculaceae	*Ranunculus lobbii*	Lobb's aquatic buttercup	N
Ranunculaceae	*Ranunculus muricatus*	Prickle-fruited buttercup	I
Ranunculaceae	*Ranunculus orthorhynchus* var.*bloomeri*	Strait-beaked buttercup	N
Rhamnaceae	*Rhamnus californica*	California coffeeberry	N
Rosaceae	*Aphanes occidentalis*	Western lady's mantle	N
Rosaceae	*Prunus* sp.	Ornamental plum	N
Rosaceae	*Rosa* sp.	Ornamental rose	N
Rosaceae	*Rubus discolor*	Himalayan blackberry	I
Rosaceae	*Rubus ursinus*	California blackberry	N
Rubiaceae	*Galium aparine*	Goose-grass	I
Rubiaceae	*Galium murale*	Tiny bedstraw	I
Rubiaceae	*Galium trifidum*	Sweet scented bedstraw	N
Rubiaceae	*Sherardia arvensis*	Field madder	I
Salicaceae	*Populus fremontii* ssp. *fremontii*	Fremont cottonwood	N
Salicaceae	*Salix exigua*	Narrow leaf willow	N
Salicaceae	*Salix laevigata*	Red willow	N
Salicaceae	*Salix lasiolepis*	Arroyo willow	N
Salicaceae	*Salix lucida* ssp. *lasiandra*	Yellow willow	N
Saxifragaceae	*Lithophragma* sp.	Woodland star	N

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

Family	Scientific Name	Common Name	Origin*
Scrophulariaceae	*Bellardia trixago*	Bellardia	I
Scrophulariaceae	*Castilleja attenuata*	Valley-tassels	N
Scrophulariaceae	*Castilleja exerta*	Purple owl's clover	N
Scrophulariaceae	*Kickxia elatine*	Fluellin	I
Scrophulariaceae	*Mimulus aurantiacus*	Bush monkeyflower	N
Scrophulariaceae	*Mimulus guttatus*	Common monkey-flower	N
Scrophulariaceae	*Parentucellia viscosa*	Parentucellia	I
Scrophulariaceae	*Scrophularia californica* ssp. *californica*	California figwort	N
Scrophulariaceae	*Triphysaria eriantha* ssp. *eriantha*	Butter-and-eggs	N
Scrophulariaceae	*Triphysaria pusilla*	Dwarf owl's clover	N
Scrophulariaceae	*Triphysaria versicolor* ssp. *faucibarbata*	Smooth owl's clover	N
Scrophulariaceae	*Veronica peregrina*	Purslane speedweed	N
Scrophulariaceae	*Veronica persica*	Persian speedwell	I
Typhaceae	*Typha* sp.	Cattail	N
Urticaceae	*Urtica dioica* ssp. *holosericea*	Hoary nettle	N
Urticaceae	*Urtica urens*	Dwarf nettle	I
Verbenaceae	*Phyla nodiflora* var. *nodiflora*	Garden lippia	N
Violaceae	*Viola pedunculata*	Wild pansy	N
Viscaceae	*Phoradendron villosum*	Mistletoe	N

* Origin

N - Native Species

I - Introduced Species

Table B: Animal Species Observed at Tolay Lake Regional Park in 2006*

Common Name	Scientific Name
AMPHIBIANS	
Bullfrog	*Lithobates catesbeiana*
sierran treefrog	*Pseudacris sierra*
REPTILES	
Western fence lizard	*Sceloporus occidentalis*
Common garter snake	*Thamnophis sirtalis*
Ring-necked snake	*Diadophis punctatus*
BIRDS	
Canada goose	*Branta canadensis*
Gadwall	*Anas strepera*
American wigeon	*Anas americana*
Mallard	*Anas platyrhynchos*
Cinnamon teal	*Anas cyanoptera*
Northern shoveler	*Anas clypeata*
Northern pintail	*Anas acuta*
Green-winged teal	*Anas crecca*
Canvasback	*Aythya valisineria*
Greater scaup	*Aythya marila*
Bufflehead	*Bucephala albeola*
Ruddy duck	*Oxyura jamaicensis*
Wild turkey	*Meleagris gallopavo*
California quail	*Callipepla californica*
Pied-billed grebe	*Podilymbus podiceps*
Double-crested cormorant	*Phalacrocorax auritus*
Great blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Snowy egret	*Egretta thula*
Turkey vulture	*Cathartes aura*
White-tailed kite	*Elanus leucurus*
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperi*
Red-shouldered hawk	*Accipiter striatus*
Red-tailed hawk	*Buteo jamaicensis*
Golden eagle	*Aquila chrysaetos*
American kestrel	*Falco sparverius*
American coot	*Fulica americana*
Killdeer	*Charadrius vociferus*

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

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

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

* Observers = LSA Associates & Petaluma Wetlands Alliance

Table C: Active Ingredients Subject to the Pesticide Injunction

2, 4-D
Acephate
Alachlor
Aldicarb
Atrazine
Azinphos-methyl
Bensulide
Bromacil
Captan
Carbaryl
Chloropicrin
Chlorothalonil
Chlorpyrifos
DCPA
DEF
Diazinon
Dicofol
Diflubenzuron
Dimethoate
Disulfoton
Diuron
Endosulfan
EPTC
Esfenvalerate
Fenamiphos
Glyphosate
Hexazinone
Imazapyr
Iprodione
Linuron
Malathion
Mancozeb
Maneb
Metam sodium
Methamidophos
Methidathion
Methomyl
Methoprene
Methyl parathion
Metolachlor
Molinate
Myclobutanil
Naled
Norflurazon
Oryzalin
Oxamyl
Oxydemeton-methyl
Oxyfluorfen
Paraquat dichloride
Pendimethalin
Permethrin
Phorate
Phosmet
Prometryn
Pronamide
Propanil
Propargite
Rotenone
Simazine
Strychnine
Telone (1,3-dichlorpropene)
Thiobencarb
Triclopyr
Trifluralin
Vinclozolin
Ziram

APPENDIX 1

BIRD SURVEY ANALYSIS, TOLAY LAKE REGIONAL PARK

BIRD SURVEY ANALYSIS, TOLAY LAKE REGIONAL PARK

A dedicated and technically proficient group of about a dozen volunteer birders associated with Petaluma Wetland Alliance have regularly surveyed the Tolay Lake Regional Park for birds starting on April 15, 2006. They have conducted 28 surveys as of February 21, 2009, having made visits in every month of the year except August over the nearly three-year period. On each visit, the survey covers most of the property, but not all. All birds are identified to species and the number of individuals is tallied. Data are also recorded regarding weather conditions. Although there is some variation in the coverage of each survey, methodologically the visits are roughly comparable and scientifically valid.

The quality of the data is excellent. With a year or two more of surveys, the accumulated data should be used to develop a checklist of bird species with seasonal frequency of abundance information. The data are also extremely useful for park planning and conservation purposes. For example, introductions of new species can be tracked, such as the observation of Eurasian collared dove on September 23, 2007, and again on April 19, 2008. Special-status species such as grasshopper sparrow can be monitored. The data can also be mined to see what ordinarily common species, such as hermit thrush, are under-represented at the park due to marginal habitat conditions that could be enhanced, particularly bird species requiring mature trees or developed underbrush.

Table A compiles the results of these bird surveys. Number of species observed on each survey varied from 34 to 75. Number of individual birds counted on each survey varied from 419 to 5,204. Cumulatively, 149 species and 23,050 individuals have been observed.

Table B aggregates the data by species to give the frequency of abundance of birds observed. The five most frequently observed species in order of abundance were red-winged blackbird, European starling, western meadowlark, house finch, and Savannah sparrow. All of these species are birds that primarily forage in grasslands and marshlands, which are the two most abundant habitat types on Tolay Lake Regional Park.

Table C aggregates the data by relative seasonal abundance and by guilds. For the relative seasonal abundance analysis, the months of the year were joined in pairs; e.g., December with January and so forth. Then the number of birds counted in each monthly pair was added together and divided by the number of counts in that monthly pair to create an index of relative abundance. The six pairs of months roughly correspond to the following phenologies in the annual cycles of birds: April-May is the nesting season; June-July is the fledgling season; August-September is the post breeding season/migration season; October-November is the peak of migration for many non-resident birds; December-January is the beginning of the winter resident season; and February-March is end of the winter resident season and the beginning of the migratory season. Of course, the phenologies of some individuals and even species will differ in particulars from this generalized pattern.

Table C also groups the birds observed at Tolay Lake Regional Park by guilds, which are groupings of species using the same or similar habitats. Table D presents a summary of the data contained in Table C. The groups are necessarily broad but are designed to illustrate the relative seasonal abundances. The following guilds are delineated:

- The **forest, riparian, and brush guild** is generally composed of birds that are dependent on woody habitat from shrubs to mature trees for important phases of their life cycle, particularly for foraging and nesting.

- The **grassland guild** is generally composed of birds that forage primarily in grasslands. Some of these species also nest in grasslands. All the swallows were placed in this guild, even though some forage over forest and marsh as well; none of them nest in grass.
- The **raptor guild** is the most taxonomically parsimonious grouping, composed of hawks and falcons along with the turkey vulture.
- The **waterbird guild** is broken into marsh birds such herons and egrets, shorebirds such as sandpipers and plovers, and waterfowl and allies. The latter category includes ducks and geese along with gulls, a tern species, grebes, American coot, and belted kingfisher.

With the exception of marsh birds and shorebirds, each of the guilds is broken into two or three of the following seasonal categories: breeding/summer resident, migratory/winter resident, and year-round resident. These seasonal categorizations are based on the findings of the *Birds of Sonoma County California* (Bolander and Parmeter 2000) for the part of Sonoma County where Tolay Lake Regional Park is located. Some species, such as the European starling and the western meadowlark, are year-round residents, nesting in the park. But in the winter their numbers are greatly enhanced by migratory conspecifics. In the case of the starling and meadowlark, winter abundance is so disproportionately greater than in the breeding season that these birds were treated as migratory/winter residents.

Figures 1-4 graph the relative abundances of the four guilds. Among the forest, riparian, and brush guild birds, the most abundant are the year-round residents, although their numbers drop considerably in the nesting season (Figure 1). This drop suggests that suitable nesting habitat may be limited for some of these birds, many of which require mature trees or developed brush habitat. The breeding/summer resident birds, using forest, riparian, and brush habitat, have very low relative abundance in the winter, early spring, and fall as would be expected. But their breeding season numbers are not especially strong either, suggesting a paucity of suitable habitat for this group, which is composed mainly of neotropical migrants (i.e., bird species that winter in the neotropics).

Figure 2 illustrates the relative abundances of birds that comprise the grassland guilds. The largest group are the migratory/winter resident species with large numbers of migratory European starlings, western meadowlarks, and white-crowned and golden-crowned sparrows. The sparrow species may nest in Sonoma County, but mainly along the coast (Bolander and Parmeter 2000). Resident grassland birds, such as Savannah sparrow and Brewer's blackbird, are present year-round in moderate numbers with a slight depression in numbers during the breeding season. The grassland breeding/summer resident species, mainly swallows, peak as expected in the breeding season and into the summer. However, their numbers may be limited by the lack of suitable nesting habitat on-site.

Figure 3 illustrates the relative abundances of raptors. Tolay Lake Regional Park has an exceptionally healthy population of year-round resident raptors. Many forage in the grasslands and nest in the riparian and oak woodlands. Their numbers peak in the late summer/early fall augmented by migratory conspecifics coming down from the north. The more strictly migratory species are found on-site in relatively low numbers in the winter, early spring, and fall. The relatively low abundance of migratory raptors likely reflects mainly that these top predators occur at naturally low numbers, rather than lack of suitable habitat.

Figure 4 illustrates the relative abundances of birds that comprise the waterbird guilds. Both migratory and year-round resident waterfowl peak in February/March, but are virtually absent the rest of the year, reflecting the hydration period of Tolay Lake. Augmentation of the seasonal hydration of Tolay Lake could significantly increase waterfowl presence on-site. Shorebirds, which are primarily

migrants and winter residents, are present at low numbers primarily due to the limited amount of suitable habitat. The marsh bird group is dominated by the large number of red-winged blackbirds, especially in the fall and winter.

Figure 5 illustrates the relative abundance by season of all species and individuals. Both relative number of species and relative number of individuals track the same seasonal pattern at Tolay Lake Regional Park with high numbers in the winter, early spring, and fall and correspondingly low numbers in the latter part of the spring and through the summer, when the seasonal wetlands desiccate and many bird species migrate to the coast or to the north to breed.

Overall the data indicate a substantially rich avifauna at Tolay Lake Regional Park. Raptor populations are particularly strong. Waterfowl occur in large numbers when Tolay Lake is hydrated, but are limited by the seasonal nature of that waterbody. Enhancement of riparian, brush, and woody understory vegetation would likely increase the numbers of neotropical migrant breeding birds as well as year-round resident birds that use such habitat.

REFERENCE:

Bolander, G.L., and B.D. Parmeter. 2000. Birds of Sonoma County, California: An Annotated Checklist and Birding Gazetteer. Redwood Ornithological Society, Napa, CA. 155 pp.

Table A: Bird Species Observed, Number of Individuals and Dates, Tolay Lake Regional Park, Sonoma County, California

Species	Date of survey and number of birds observed by species																											
	4/15/06	4/29/06	10/17/2006	10/24/2006	11/6/2006	12/2/2006	1/27/2007	4/7/2007	4/21/2007	5/7/2007	6/9/07	7/7/07	9/1/07	9/23/07	11/3/07	12/8/07	02/20/08	03/15/08	04/19/08	05/24/08	06/21/08	07/19/08	9/13/2008	10/5/2008	11/15/2008	12/14/2008	1/2/2009	02/21/09
Grebe, Horned								3																				
Grebe, Eared																	2	2										
Grebe, Pied-billed	2	4							1	1							2	2										1
Pelican, Am. White														14	5													
Cormorant, D.-cr.								3		2						2		1							13		3	1
Heron, Great Blue		1	3	1		2						1	1	1		4	1	1	1	1		1		2	2		2	1
Egret, Great			1		2	3	3	1		5	2			1	3	1	1		3	5	3	2	3	2	1		1	2
Heron, Green												1																
Heron, Bl.-cr. Night												1										4	1	1				
Goose, Canada	7	5	26	6		238	10	10		8					8	9	29	22		4						12	30	133
Goose, Gr. White-fr.						2																					4	8
Duck, Wood																4												
Mallard	9	12		1		5	18	11	4	14	1	7		14		6	12	22	14	18	1	5	5	5		11	21	40
Gadwall	10	7				5		3	2	6						4	18	3	3	4								38
Pintail, Northern	2							1									241	9	1								1	87
Wigeon, American	8																60	83	2								2	306
Shoveler, Northern	1	3						126		1							36	10										4
Teal, Cinnamon	2	1						4	3	4			1	1			3	13	6	8								9
Teal, Blue-winged														1														
Teal, Green-winged	2							12									19	27	2								1	38
Canvasback																	40										1	55
Scaup, Greater	2																5	1									6	
Scaup, Lesser														5		10												
Bufflehead	12	1						2								7	37	30									1	56
Merganser, Com.							1									4											2	2
Duck, Ring-necked																	100	2										21
Duck,Ruddy																	76	41										22
Vulture, Turkey	1	1	8	4	4	10		9	5	16	4	3	8	4	6	2	19	3	7	10	1	6	11	13	1	2	10	6
Harrier, Northern	0	0	3	4	4	6	3	1	1		1	3	10	8	8	8							3	3	5	4	7	2
Kite, White-tailed	0	0	2	7	4	5	7	5		1		12	25	7	17	5	4	3				2	1	6	3	4	4	3
Hawk, Sharp-shin.			2												2									1	2			

Species	Date of survey and number of birds observed by species																											
	4/15/06	4/29/06	10/17/2006	10/24/2006	11/6/2006	12/2/2006	1/27/2007	4/7/2007	4/21/2007	5/7/2007	6/9/07	7/7/07	9/1/07	9/23/07	11/3/07	12/8/07	02/20/08	03/15/08	04/19/08	05/24/08	06/21/08	07/19/08	9/13/2008	10/5/2008	11/15/2008	12/14/2008	1/2/2009	02/21/09
Hawk, Cooper's									1	1					3	1	1				1		2		1	1	1	2
Hawk, Red-sh.	1	0		4		1		1			1	2	9	1	3	3		2			2		2	3	1		3	5
Hawk, Swainson's																			2									
Hawk, Red-tailed	2	1	7	3	9	6	3	4	4	11		2	15	12	11	6	6	7	4	4	1	10	10	7	6	9	10	6
Hawk, Ferruginous					1										1			1							1	2	1	
Hawk, Rough-leg.						1									1	1		1							2	2	2	1
Eagle, Golden								1				1		3	2	2	2				2		1		2		1	
Osprey							1																					
Merlin							1											2									1	1
Kestrel, American	1	2	6	6	7	6	9	1				7	9	5	6	11	4	4	3		1	4	7	5	5	8	9	4
Falcon, Prairie																								1			1	
Falcon, Peregrine					1	1			1									1			1			2				
Quail, California	0	9		16	6		8	19	20	15	12	14	26		4		8	13	11	20	18	15	2	20	66		37	6
Pheasant, Ring-n.										1																		
Turkey, Wild		1			1														7			3	15		10			
Moorhen, Common				1						2		3	2	1								3				1		
Coot, American	14	34				2		28	5	3		1	1	3		4	150	225	18					1				16
Sora																											1	
Killdeer	5	7	14	86	58	20	10	2	1	5	2	12	6	1	26	14	9	1	6	2	3	2	4	21	17	8	119	6
Yellowlegs, Greater	3	1						2	1								1	1	7									
Curlew, Long-billed						1		1	3							5										16	10	10
Sandpiper, West.		3																										
Sandpiper, Least		30																										
Dowitcher, Long-b.	5	119															9		15									14
Snipe, Wilson's								9									1	4	5							1	2	3
Gull, Glaucous-w.							1																					
Gull, California																										2	1	
Tern, Caspian		1																	1									
Dove, Mourning	4	0	3	4	14	2			7	18	19	18	1	1	2	2			7	19	16	16	4	5	11		4	2
Dove, Eurasian Co.														1						1								
Pigeon, Rock	8	8	14	15	9	2		12	7	3				2		1	14	4	3	7	7	1		13	12	1	7	3
Pigeon, Band-t.												1															1	
Owl, Barn	2	2	3	4	2	2	2			2	1	7	9	4	3	1	2	3	1		2	2	2	1	2		2	1
Owl, Great Horned	1		2	1			2	1	1	1		4				1		1		2		6	1	4	1	1	2	

Species	Date of survey and number of birds observed by species																											
	4/15/06	4/29/06	10/17/2006	10/24/2006	11/6/2006	12/2/2006	1/27/2007	4/7/2007	4/21/2007	5/7/2007	6/9/07	7/7/07	9/1/07	9/23/07	11/3/07	12/8/07	02/20/08	03/15/08	04/19/08	05/24/08	06/21/08	07/19/08	9/13/2008	10/5/2008	11/15/2008	12/14/2008	1/2/2009	02/21/09
Swift, Vaux's			2											10														
Humming., Allen's	2	4						5	3		2	1						1	7	4		1						1
Humming., Rufous	1							1	4	1							1	1										
Humming., Anna's	7	12	2		1	1	7	16	5	2	1	2	1	2	2		5	3	7	1	2		2	5	2	3	7	2
Selasphorus sp.																		4										
Kingfisher, Belted												1					1						1					
Woodpecker, Acorn						1						1						3	1		4		2		4		5	4
Sapsucker, Red-br.																							1		1			1
Woodpeck., Downy			1	4							1		3	2		1			1		2	1	1	1				1
Woodpeck., Hairy																1						1						
Woodpeck., Nuttall's	2	1		1					1	3		2	4	3	3	1	1	2	5	2	4	2	9	2	1	1	4	2
Flicker, Northern					4	11	3	1				1		1	7	10	8	19	1	1	1		1	3	8	7	17	6
Flycatcher, Olive-s.										1																		
Wood-Pewee, W.																			1				1					
Flycatcher, Pac. S.										1				1							1		3					
Flycatcher, Willow			1	1									1										1					
Flycatcher, Least													1															
Phoebe, Black	3	2	11	10	6	6	2	6	4	2	12	6	16	5	14	9	1	1	5	4	4	29	10	22	7	2	10	3
Phoebe, Say's			10	10	11	4	2							9	8	10	5	1					3	12	5	4	7	2
Flycatcher, Ash-thr.												2							4		1	3						
Kingbird, Western	2	1						3		1	2	7	1						5	11	3	2						
Shrike, Loggerhead				5	1	2			1	2		2	2		1	3	2	1	2		2	4	1	3	4	4	2	2
Vireo, Warbling			1											1								2	1					
Vireo, Hutton's			1		1								2		1	1									1	1		
Jay, Steller's						5				5		8		2		3	3	3	2		2		5		5		12	4
Scrub-Jay, Western			2		5	8	5				4	5	9	1	3	9	3	3		4	5	5	3	4	3	2	6	2
Raven, Common	4	4	4	10	21	10	11	3	5	10	4	7	8	2	25	12	5	11	5	9	7	9	4	19	6	13	18	4
Crow, American	2	1	1	1	5	5	1	1		2		3		6	12	2		6	3	18	3			3	1	9	11	5
Lark, Horned												1																
Swallow, N. R.-w.	1	4												2														
Swallow, Violet-gr.	23	5	54	2				10	3	31	3	24		24			1		35		17	1	23	14				
Swallow, Tree	9	40	20			12		8	30	2	3	11					2	24	29	55	19	43	8			2		1
Swallow, Cliff	70	80							52	70	25	66							72	75	60	4						
Swallow, Barn		241	5	3	1			72	20	19	19	41	18	5					18	90	35	31	13					

Species	Date of survey and number of birds observed by species																											
	4/15/06	4/29/06	10/17/2006	10/24/2006	11/6/2006	12/2/2006	1/27/2007	4/7/2007	4/21/2007	5/7/2007	6/9/07	7/7/07	9/1/07	9/23/07	11/3/07	12/8/07	02/20/08	03/15/08	04/19/08	05/24/08	06/21/08	07/19/08	9/13/2008	10/5/2008	11/15/2008	12/14/2008	1/2/2009	02/21/09
Titmouse, Oak												4		3		2	2	1	3		7				2		8	1
Chickadee, Ch.-b.										2			3				2		2		4	1	1		3			
Bushtit	1			15	45	3			5	4	7	5				20	21	2	3	16	1	3	20	25	24	7	59	5
Nuthatch, Wh.-br.						1										1	2	3	3		2		4		2		2	1
Creeper, Brown														1											2	2	4	1
Wren, Bewick's				1	3					1			2	1		1	2	2	4		2						4	2
Wren, House			1	2				1		2		12			1			1	3	3	3					2		
Wren, Marsh				2								1			1												1	
Kinglet, Golden-cr.																									1			
Kinglet, Ruby-cr.					6	6								1	2			3							6	2	1	2
Bluebird, Western	9	5	2	2	14	19	15		1	1		10	19	17	5		6	13	12	20	12	5	14	28	24	7	9	18
Robin, American	3	3				5	26		3			2	1		1	2	4	6	11	8	6	8			16	3	3	12
Varied Thrush																											30	22
Thrush, Hermit							2									1	1	2							1	1		
Mockingbird, N.	1	1	3	2	4			2		1		6	4		2			1		1			2	6			1	
Starling, European	15	12	9	63	64	978	169	27	12	15	24	6	21	47	4249	3	20	25	24	15	21	15	605	51	101	16	73	102
Pipit, American					1	1									94	7									25		5	
Waxwing, Cedar		16																										
Warbler, Or.-cr.				1					1	1									5									
Warbler, Yellow			3	2										1									3	1				
Warbler, Yellow-r.	6				11	6	4								12	3	3	11	3				3	1	12	2	5	11
Warbler, Towns.						1								3											1			
Warbler, MacGilliv.					1																							
Yellowthroat, C.														1														
Warbler, Wilson's			1	2						3			1															
Grosbeak, Black-h.													1															
Tanager, Western			1																				11					
Bunting, Lazuli												1																
Towhee, Spotted			1		3		1		1	6		2		2		2	3	2	6		6	2	4		8	1	11	8
Towhee, California	7	4	10	4	3	1	6	10	5	3	7	15	8	3	10	5	3	7	9	7	8	12	5	8	3	7	13	3
Sparrow, Grasshop.											1																	
Sparrow, Savannah			13	99	82	69	87	7	16	6	5	4	10	65	69	58	13	11	10	1			4	158	37	13	35	6
Sparrow, Lark			1	2						8		10		1					4		2							
Sparrow, Golden-cr.	2	1			21	22	77	21	5					1	5	21	4	22	14						8	21	47	37

Species	Date of survey and number of birds observed by species																												
	4/15/06	4/29/06	10/17/2006	10/24/2006	11/6/2006	12/2/2006	1/27/2007	4/7/2007	4/21/2007	5/7/2007	6/9/07	7/7/07	9/1/07	9/23/07	11/3/07	12/8/07	02/20/08	03/15/08	04/19/08	05/24/08	06/21/08	07/19/08	9/13/2008	10/5/2008	11/15/2008	12/14/2008	1/2/2009	02/21/09
Sparrow, White-thr.	1						35	1																				
Sparrow, White-cr.	14		6	30	11	19		59	7					46	88	84	102	82	3					18	8	88	157	19
Sparrow, Fox															1											2	1	
Sparrow, Song	7	4	6	23	2		2	9	6	1	16	16	8	21	3	2	2	4	2	10	3	7	6	7	8	3	5	5
Sparrow, Lincoln's			3	4	5		1	7						2			2	4	3					7		5		1
Junco, Dark-eyed	5	8			5	69	54	5		12		6		10	31	22	75	24	6	1	42		21		59	25	199	79
Meadowlark, West.		1	29	62	81	110	211	6	15	29	8	47	26	20	176	150	65	193	17	40	2	17	26	53	37	96	150	43
Cowbird, Brown-h.	1	1						1	1		1								4	4	1			1				
Blackbird, Red-w.	152	243	285	296	3000	2034	153	137	113	269	263	164	45	214	157	167	67	258	182	490	59	25	950	522	110	235	120	125
Blackbird, Brewer's	25	23	1	6	14	2	20	13	15	11	5	17	12	25	59	7		41	16	23	17	13	14	13	10	116	31	15
Oriole, Bullock's	1	1						1		5	3	4							9	6	1							
Finch, Purple																			1									
Finch, House	11	64	24	21	1	22		10	12	19	22	32	49	62	19	9	18	17	22	40	41	108	94	106	31	6	16	6
Goldfinch, Lesser					4					5		5	19	4	3	25		44	16	4	2	2	3	64			19	
Goldfinch, American		2	7	25	3	64		4	6	15	8	26	86	16	28	7	50	30	16	21	26	54	9	57	30	6	16	16
Sparrow, House	7	2	2	2	2	4		9		1	6	2	3		1					1	5	2						
Total No. Counted	498	1,039	617	876	3,564	3,821	973	728	419	692	495	688	507	733	5,204	779	1,417	1,437	745	1,090	504	494	1,966	1,330	781	799	1,435	1,495
Number of Species	56	55	48	48	48	51	38	56	45	59	34	61	44	61	51	60	66	73	70	45	55	46	57	49	60	51	75	75

Table B: Birds Observed in Order of Frequency of Observation, 4/15/06 to 02/21/09
Tolay Lake Regional Park, Sonoma County, California

Species	Number
Blackbird, Red-winged	10,835
Starling, European	6,782
Meadowlark, Western	1,710
Finch, House	882
Sparrow, Savannah	878
Sparrow, White-crowned	841
Junco, Dark-eyed	758
Swallow, Barn	631
Goldfinch, American	628
Swallow, Cliff	574
Blackbird, Brewer's	564
Goose, Canada	557
Coot, American	505
Killdeer	467
Wigeon, American	461
Quail, California	365
Pintail, Northern	342
Sparrow, Golden-crowned	329
Swallow, Tree	318
Bushtit	291
Bluebird, Western	287
Swallow, Violet-green	270
Mallard	256
Raven, Common	250
Goldfinch, Lesser	219
Phoebe, Black	212
Sparrow, Song	188
Towhee, California	186
Shoveler, Northern	181
Dove, Mourning	179
Hawk, Red-tailed	176
Vulture, Turkey	174
Dowitcher, Long-billed	162
Pigeon, Rock	153
Bufflehead	146
Duck, Ruddy	139
Pipit, American	133
Kestrel, American	130
Kite, White-tailed	127
Duck, Ring-necked	123
Robin, American	123
Flicker, Northern	110
Gadwall	103
Phoebe, Say's	103
Teal, Green-winged	101
Crow, American	101
Hummingbird, Anna's	100
Canvasback	96

Species	Number
Warbler, Yellow-rumped	93
Scrub-Jay, Western	91
Harrier, Northern	84
Towhee, Spotted	69
Owl, Barn	62
Jay, Steller's	59
Woodpecker, Nuttall's	56
Teal, Cinnamon	55
Thrush, Varied	52
Sparrow, House	49
Curlew, Long-billed	46
Shrike, Loggerhead	46
Egret, Great	45
Hawk, Red-shouldered	44
Sparrow, Lincoln's	44
Kingbird, Western	38
Turkey, Wild	37
Mockingbird, Northern	37
Sparrow, White-throated	37
Titmouse, Oak	33
Owl, Great Horned	32
Hummingbird, Allen's	31
Wren, House	31
Oriole, Bullock's	31
Sandpiper, Least	30
Kinglet, Ruby-crowned	29
Sparrow, Lark	28
Heron, Great Blue	26
Cormorant, Double-crested	25
Snipe, Wilson's (Common)	25
Woodpecker, Acorn	25
Wren, Bewick's	25
Nuthatch, White-breasted	21
Pelican, American White	19
Woodpecker, Downy	19
Chickadee, Chestnut-backed	18
Eagle, Golden	17
Yellowlegs, Greater	16
Waxwing, Cedar	16
Scaup, Lesser	15
Hawk, Cooper's	15
Cowbird, Brown-headed	15
Goose, Greater White-fronted	14
Scaup, Greater	14
Grebe, Pied-billed	13
Moorhen, Common	13
Swift, Vaux's	12
Tanager, Western	12

Species	Number
Hawk, Rough-legged	11
Flycatcher, Ash-throated	10
Creeper, Brown	10
Warbler, Yellow	10
Merganser, Common	9
Hummingbird, Rufous	9
Vireo, Hutton's	8
Thrush, Hermit	8
Warbler, Orange-crowned	8
Heron, Black-crowned Night	7
Hawk, Sharp-shinned	7
Hawk, Ferruginous	7
Falcon, Peregrine	7
Swallow, N. Rough-winged	7
Warbler, Wilson's	7
Flycatcher, Pacific Slope	6
Merlin	5
Vireo, Warbling	5
Wren, Marsh	5
Warbler, Townsend's	5
Grebe, Eared	4
Duck, Wood	4
Selasphorus sp.	4
Flycatcher, Willow	4
Sparrow, Fox	4
Grebe, Horned	3
Sandpiper, Western	3
Gull, California	3
Kingfisher, Belted	3
Sapsucker, Red-breasted	3
Hawk, Swainson's	2
Falcon, Prairie	2
Tern, Caspian	2
Dove, Eurasian Collared	2
Pigeon, Band-tailed	2
Woodpecker, Hairy	2
Wood-Pewee, Western	2
Heron, Green	1
Teal, Blue-winged	1
Osprey	1
Pheasant, Ring-necked	1
Sora	1
Gull, Glaucous-winged	1
Flycatcher, Olive-sided	1
Flycatcher, Least	1
Lark, Horned	1
Kinglet, Golden-crowned	1
Warbler, McGillivray's	1
Yellowthroat, Common	1
Grosbeak, Black-headed	1
Bunting, Lazuli	1
Sparrow, Grasshopper	1
Finch, Purple	1
Total no. individuals	23,050

Table C: Seasonal Occurrence, Relative Abundance of Bird Species Observed
Tolay Lake Regional Park, Sonoma County, California

Guilds/Species	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Forest, Riparian, and Brush - breeding/summer resident						
Hummingbird, Allen's	0.0	0.7	3.6	1.0	0.0	0.0
Flycatcher, Olive-sided	0.0	0.0	0.1	0.0	0.0	0.0
Wood-Pewee, Western	0.0	0.0	0.1	0.0	0.3	0.0
Flycatcher, Pacific Slope	0.0	0.0	0.1	0.3	1.3	0.0
Flycatcher, Ash-throated	0.0	0.0	0.6	1.5	0.0	0.0
Wren, House	0.4	0.3	1.3	3.8	0.0	0.7
Kingbird, Western	0.0	0.0	3.3	3.5	0.3	0.0
Vireo, Warbling	0.0	0.0	0.0	0.5	0.7	0.2
Warbler, Orange-crowned	0.0	0.0	1.0	0.0	0.0	0.2
Warbler, Wilson's	0.0	0.0	0.4	0.0	0.3	0.5
Warbler, Yellow	0.0	0.0	0.0	0.0	1.3	1.0
Grosbeak, Black-headed	0.0	0.0	0.0	0.0	0.3	0.0
Tanager, Western	0.0	0.0	0.0	0.0	3.7	0.2
Bunting, Lazuli	0.0	0.0	0.0	0.3	0.0	0.0
Oriole, Bullock's	0.0	0.0	3.3	2.0	0.0	0.0
Total	0.4	1.0	13.9	12.8	8.3	2.7
Forest, Riparian, and Brush - migratory/winter resident						
Flycatcher, Willow	0.0	0.0	0.0	0.0	0.7	0.3
Flycatcher, Least	0.0	0.0	0.0	0.0	0.3	0.0
Warbler, Yellow-rumped	4.0	8.3	1.3	0.0	1.0	6.0
Warbler, MacGillivray's	0.0	0.0	0.0	0.0	0.0	0.2
Swift, Vaux's	0.0	0.0	0.0	0.0	3.3	0.3
Hummingbird, Rufous	0.0	0.7	1.0	0.0	0.0	0.0
Selasphorus sp.	0.0	1.3	0.0	0.0	0.0	0.0
Phoebe, Say's	5.4	2.7	0.0	0.0	4.0	9.3
Kinglet, Ruby-crowned	1.8	1.7	0.0	0.0	0.3	2.3
Thrush, Varied	6.0	7.3	0.0	0.0	0.0	0.0
Waxwing, Cedar	0.0	0.0	2.3	0.0	0.0	0.0
Warbler, Townsend's	0.2	0.0	0.0	0.0	1.0	0.2
Sparrow, Fox	0.6	0.0	0.0	0.0	0.0	0.2
Total	18.0	22.0	4.6	0.0	10.7	18.8
Forest, Riparian, and Brush - year-round resident						
Turkey, Wild	0.0	0.0	1.1	0.8	5.0	1.8
Dove, Mourning	1.6	0.7	7.9	17.3	2.0	6.5
Dove, Eurasian Collared	0.0	0.0	0.1	0.0	0.3	0.0
Pigeon, Rock	2.2	7.0	6.9	2.0	0.7	10.5

Guilds/Species	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Pigeon, Band-tailed	0.2	0.0	0.0	0.3	0.0	0.0
Hummingbird, Anna's	3.6	3.3	7.1	1.3	1.7	2.0
Phoebe, Black	5.8	1.7	3.7	12.8	10.3	11.7
Jay, Steller's	4.0	3.3	1.0	2.5	2.3	0.8
Scrub-Jay, Western	6.0	2.7	0.6	4.8	4.3	2.8
Titmouse, Oak	2.0	1.3	0.4	2.8	1.0	0.3
Chickadee, Chestnut-backed	0.0	0.7	0.6	1.3	1.3	0.5
Bushtit	17.8	9.3	4.1	4.0	6.7	18.2
Nuthatch, White-breasted	0.8	2.0	0.4	0.5	1.3	0.3
Creeper, Brown	1.2	0.3	0.0	0.0	0.3	0.3
Wren, Bewick's	1.0	2.0	0.7	0.5	1.0	0.7
Robin, American	7.8	7.3	4.0	4.0	0.3	2.8
Thrush, Hermit	0.8	1.0	0.0	0.0	0.0	0.2
Mockingbird, Northern	0.2	0.3	0.9	1.5	2.0	2.8
Kinglet, Golden-crowned	0.0	0.0	0.0	0.0	0.0	0.2
Towhee, Spotted	3.0	4.3	1.9	2.5	2.0	2.0
Towhee, California	6.4	4.3	6.4	10.5	5.3	6.3
Junco, Dark-eyed	73.8	59.3	5.3	12.0	10.3	15.8
Finch, Purple	0.0	0.0	0.1	0.0	0.0	0.0
Finch, House	10.6	13.7	25.4	50.8	68.3	33.7
Sparrow, House	0.8	0.0	2.9	3.8	1.0	1.2
Owl, Barn	1.4	2.0	1.0	3.0	5.0	2.5
Owl, Great Horned	1.2	0.3	0.9	2.5	0.3	1.3
Woodpecker, Acorn	1.2	2.3	0.1	1.3	0.7	0.7
Sapsucker, Red-breasted	0.0	0.3	0.0	0.0	0.3	0.2
Woodpecker, Downy	0.2	0.3	0.1	1.0	2.0	1.0
Woodpecker, Hairy	0.2	0.0	0.0	0.3	0.0	0.0
Woodpecker, Nuttall's	1.2	1.7	2.0	2.0	5.3	1.2
Flicker, Northern	9.6	11.0	0.4	0.5	0.7	3.7
Total	165.0	142.7	86.1	146.0	142.7	132.7
Grassland - breeding/summer resident						
Swallow, Northern Rough-winged	0.0	0.0	0.7	0.0	0.7	0.0
Swallow, Violet-green	0.0	0.3	15.3	11.3	15.7	11.7
Swallow, Tree	2.8	9.0	24.7	19.0	2.7	3.3
Swallow, Cliff	0.0	0.0	59.9	38.8	0.0	0.0
Swallow, Barn	0.0	0.0	65.7	31.5	12.0	1.5
Cowbird, Brown-headed	0.0	0.0	1.7	0.5	0.0	0.2
Sparrow, Grasshopper	0.0	0.0	0.0	0.3	0.0	0.0
Total	2.8	9.3	168.0	101.3	31.0	16.7
Grassland - migratory/winter resident						

Guilds/Species	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Starling, European	247.8	49.0	17.1	16.5	224.3	756.2
Pipit, American	2.6	0.0	0.0	0.0	0.0	20.0
Meadowlark, Western	143.4	100.3	15.4	18.5	24.0	73.0
Sparrow, Golden-crowned	37.6	21.0	6.1	0.0	0.3	5.7
Sparrow, White-throated	7.0	0.0	0.3	0.0	0.0	0.0
Sparrow, White-crowned	69.6	67.7	11.9	0.0	15.3	26.8
Sparrow, Lincoln's	1.2	2.3	1.4	0.0	0.7	3.2
Total	509.2	240.3	52.3	35.0	264.7	884.8
Grassland - year-round resident						
Quail, California	9.0	9.0	13.4	14.8	9.3	18.7
Pheasant, Ring-necked	0.0	0.0	0.1	0.0	0.0	0.0
Lark, Horned	0.0	0.0	0.0	0.3	0.0	0.0
Bluebird, Western	10.0	12.3	6.9	6.8	16.7	12.5
Shrike, Loggerhead	2.2	1.7	0.7	2.0	1.0	2.3
Raven, Common	12.8	6.7	5.7	6.8	4.7	14.2
Crow, American	5.6	3.7	3.9	1.5	2.0	3.8
Sparrow, Savannah	52.4	10.0	5.7	2.3	26.3	76.3
Sparrow, Song	2.4	3.7	5.6	10.5	11.7	8.2
Sparrow, Lark	0.0	0.0	1.7	3.0	0.3	0.5
Blackbird, Brewer's	35.2	18.7	18.0	13.0	17.0	17.2
Goldfinch, Lesser	8.8	14.7	3.6	2.3	8.7	11.8
Goldfinch, American	18.6	32.0	9.1	28.5	37.0	25.0
Total	157.0	112.3	74.4	91.5	134.7	190.5
Marsh Birds						
Heron, Great Blue	1.6	1.0	0.4	0.5	0.7	1.3
Egret, Great	1.6	1.0	2.0	1.8	1.3	1.5
Heron, Green	0.0	0.0	0.0	0.3	0.0	0.0
Heron, Black-crowned Night	0.0	0.0	0.0	1.3	0.3	0.2
Wren, Marsh	0.2	0.0	0.0	0.3	0.0	0.5
Yellowthroat, Common	0.0	0.0	0.0	0.0	0.3	0.0
Blackbird, Red-winged	541.8	150.0	226.6	127.8	403.0	728.3
Sora	0.2	0.0	0.0	0.0	0.0	0.0
Total	545.4	152.0	229.0	131.8	405.7	731.8
Raptors - migratory/winter resident						
Hawk, Sharp-shinned	0.0	0.0	0.0	0.0	0.0	1.2
Hawk, Cooper's	0.6	1.0	0.3	0.3	0.7	0.7
Hawk, Swainson's	0.0	0.0	0.3	0.0	0.0	0.0
Hawk, Ferruginous	0.6	0.3	0.0	0.0	0.0	0.5
Hawk, Rough-legged	1.2	0.7	0.0	0.0	0.0	0.5
Merlin	0.4	1.0	0.0	0.0	0.0	0.0

Guilds/Species	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Falcon, Prairie	0.2	0.0	0.0	0.0	0.0	0.2
Falcon, Peregrine	0.2	0.3	0.1	0.3	0.0	0.5
Total	3.2	3.3	0.7	0.5	0.7	3.5
Raptors - year-round resident						
Vulture, Turkey	4.8	9.3	7.0	3.5	7.7	6.0
Harrier, Northern	5.6	0.7	0.3	1.0	7.0	4.5
Kite, White-tailed	5.0	3.3	0.9	3.5	11.0	6.5
Hawk, Red-shouldered	1.4	2.3	0.3	1.3	4.0	1.8
Hawk, Red-tailed	6.8	6.3	4.3	3.3	12.3	7.2
Eagle, Golden	0.6	0.7	0.1	0.8	1.3	0.7
Osprey	0.2	0.0	0.0	0.0	0.0	0.0
Kestrel, American	8.6	4.0	1.0	3.0	7.0	5.8
Total	33.0	26.7	13.9	16.3	50.3	32.5
Shorebirds - migratory/winter resident						
Yellowlegs, Greater	0.0	0.7	2.0	0.0	0.0	0.0
Curlew, Long-billed	6.4	3.3	0.6	0.0	0.0	0.0
Sandpiper, Western	0.0	0.0	0.4	0.0	0.0	0.0
Sandpiper, Least	0.0	0.0	4.3	0.0	0.0	0.0
Dowitcher, Long-billed	0.0	7.7	19.9	0.0	0.0	0.0
Snipe, Wilson's	0.6	2.7	2.0	0.0	0.0	0.0
Killdeer	34.2	5.3	4.0	4.8	3.7	37.0
Total	41.2	19.7	33.1	4.8	3.7	37.0
Waterfowl and Allies - migratory/winter resident						
Grebe, Horned	0.0	0.0	0.4	0.0	0.0	0.0
Grebe, Eared	0.0	1.3	0.0	0.0	0.0	0.0
Pelican, American White	0.0	0.0	0.0	0.0	4.7	0.8
Cormorant, Double-crested.	1.0	0.7	0.7	0.0	0.0	2.2
Goose, Gr. White-fronted	1.2	2.7	0.0	0.0	0.0	0.0
Teal, Blue-winged	0.0	0.0	0.0	0.0	0.3	0.0
Pintail, Northern	0.2	112.3	0.6	0.0	0.0	0.0
Wigeon, American	0.4	149.7	1.4	0.0	0.0	0.0
Shoveler, Northern	0.0	16.7	18.7	0.0	0.0	0.0
Teal, Green-winged	0.2	28.0	2.3	0.0	0.0	0.0
Duck, Ruddy	0.0	46.3	0.0	0.0	0.0	0.0
Canvasback	0.2	31.7	0.0	0.0	0.0	0.0
Scaup, Greater	1.2	2.0	0.3	0.0	0.0	0.0
Scaup, Lesser	2.0	0.0	0.0	0.0	1.7	0.0
Bufflehead	1.6	41.0	2.1	0.0	0.0	0.0
Merganser, Common	1.4	0.7	0.0	0.0	0.0	0.0
Duck, Ring-necked	0.0	41.0	0.0	0.0	0.0	0.0

Guilds/Species	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Gull, Glaucous-winged	0.2	0.0	0.0	0.0	0.0	0.0
Gull, California	0.6	0.0	0.0	0.0	0.0	0.0
Tern, Caspian	0.0	0.0	0.3	0.0	0.0	0.0
Total	10.2	474.0	26.9	0.0	6.7	3.0
Waterfowl and Allies - year-round resident						
Grebe, Pied-billed	0.0	1.7	1.1	0.0	0.0	0.0
Goose, Canada	59.8	61.3	4.9	0.0	0.0	6.7
Duck, Wood	0.8	0.0	0.0	0.0	0.0	0.0
Mallard	12.2	24.7	11.7	3.5	6.3	1.0
Gadwall	1.8	19.7	5.0	0.0	0.0	0.0
Teal, Cinnamon	0.0	8.3	4.0	0.0	0.7	0.0
Moorhen, Common	0.2	0.0	0.3	1.5	1.0	0.2
Coot, American	1.2	130.3	14.6	0.3	1.3	0.2
Kingfisher, Belted	0.0	0.3	0.0	0.3	0.3	0.0
Total	76.0	246.3	41.6	5.5	9.7	8.0
Total No. Counted	1,561	1,450	744	545	1,069	2,062
Number of Species	55	71	55	49	54	51

Table D: Seasonal Occurrence of Bird Guilds
Tolay Lake Regional Park, Sonoma County, California
(Numbers represent relative abundance)

Guilds	Season of Occurrence					
	Dec-Jan	Feb-Mar	Apr-May	Jun-Jul	Aug-Sep	Oct-Nov
Forest, Riparian, and Brush						
Forest, Riparian, and Brush - breeding/summer resident	0.4	1.0	13.9	12.8	8.3	2.7
Forest, Riparian, and Brush - migratory/winter resident	18.0	22.0	4.6	0.0	10.7	18.8
Forest, Riparian, and Brush - year-round resident	165.0	142.7	86.1	146.0	142.7	132.7
Grassland						
Grassland - breeding/summer resident	2.8	9.3	168.0	101.3	31.0	16.7
Grassland - migratory/winter resident	509.2	240.3	52.3	35.0	264.7	884.8
Grassland - year-round resident	157.0	112.3	74.4	91.5	134.7	190.5
Raptors						
Raptors - migratory/winter resident	3.2	3.3	0.7	0.5	0.7	3.5
Raptors - year-round resident	33.0	26.7	13.9	16.3	50.3	32.5
Waterbirds						
Marsh Birds	545.4	152.0	229.0	131.8	405.7	731.8
Shorebirds	41.2	19.7	33.1	4.8	3.7	37.0
Waterfowl and Allies - migratory/winter resident	10.2	474.0	26.9	0.0	6.7	3.0
Waterfowl and Allies - year-round resident	76.0	246.3	41.6	5.5	9.7	8.0
Relative numbers of individual birds	1,561	1,450	744	545	1,069	2,062
Relative number of Species	55	71	55	49	54	51

Figure 1: Forest, Riparian, and Brush Guild, Birds of Tolay Lake Regional Park

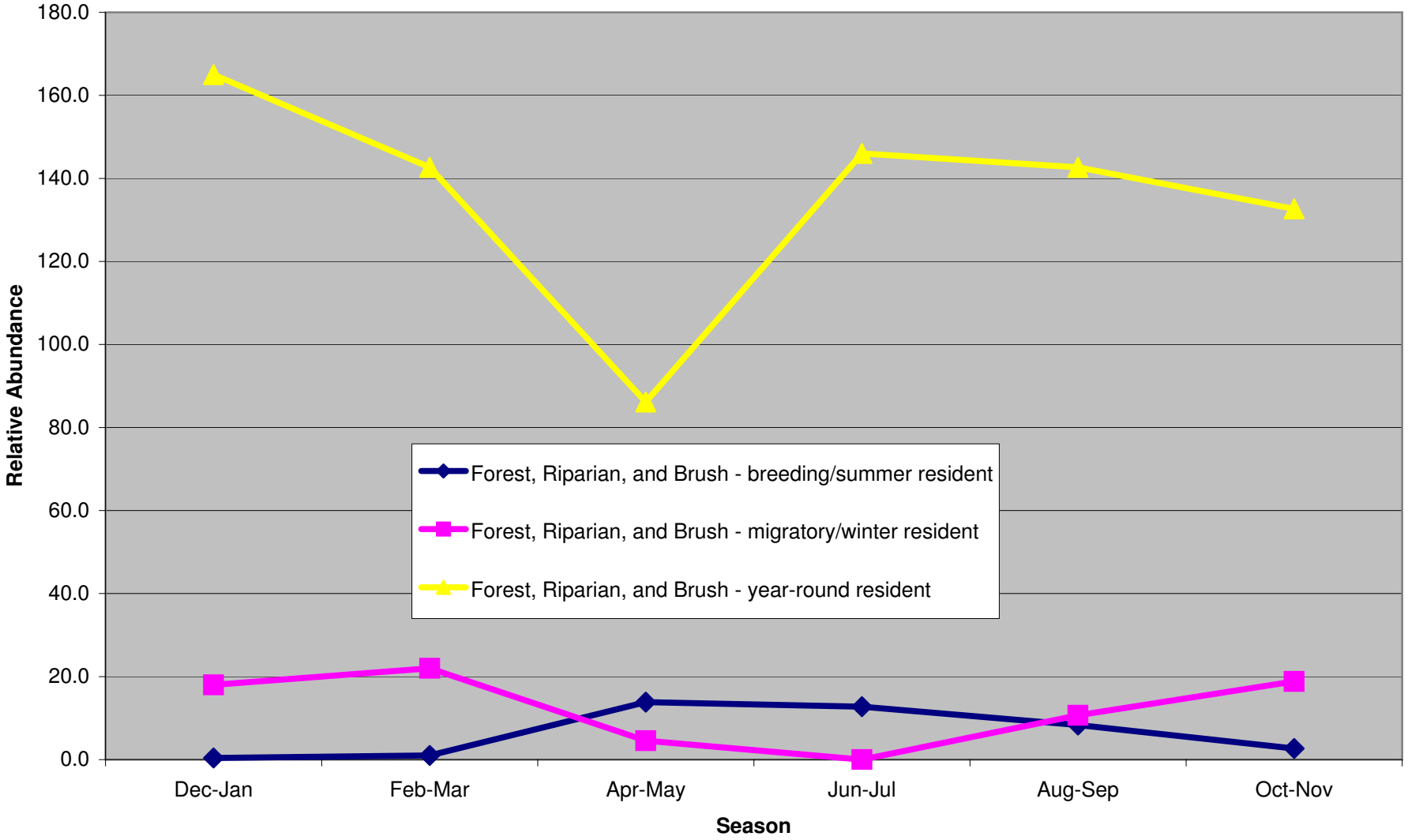

Figure 2: Grassland Guild, Birds of Tolay Lake Regional Park

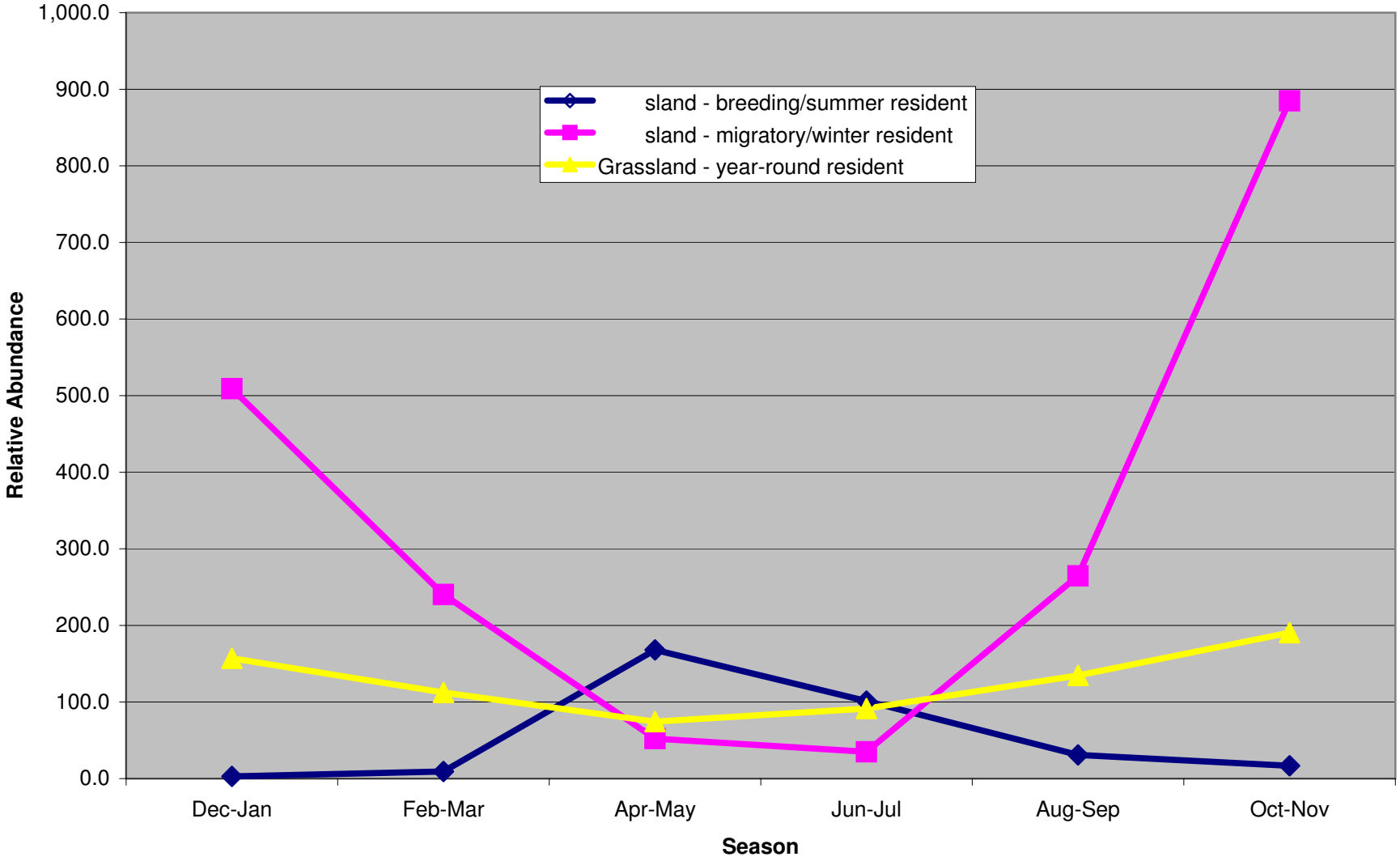

Figure 3: Raptors, Birds of Tolay Lake Regional Park

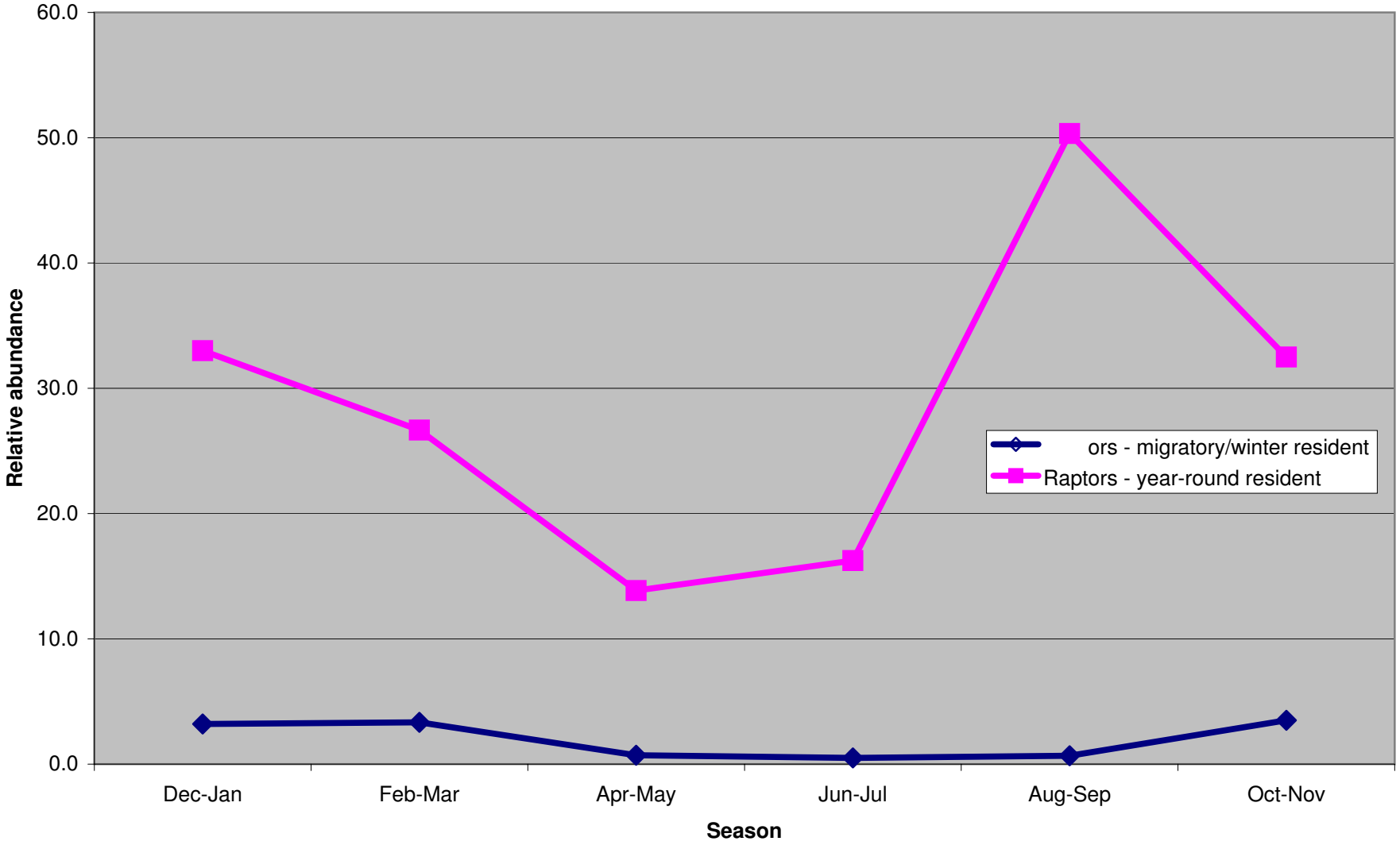

Figure 4: Waterbirds, Birds of Tolay Lake Regional Park

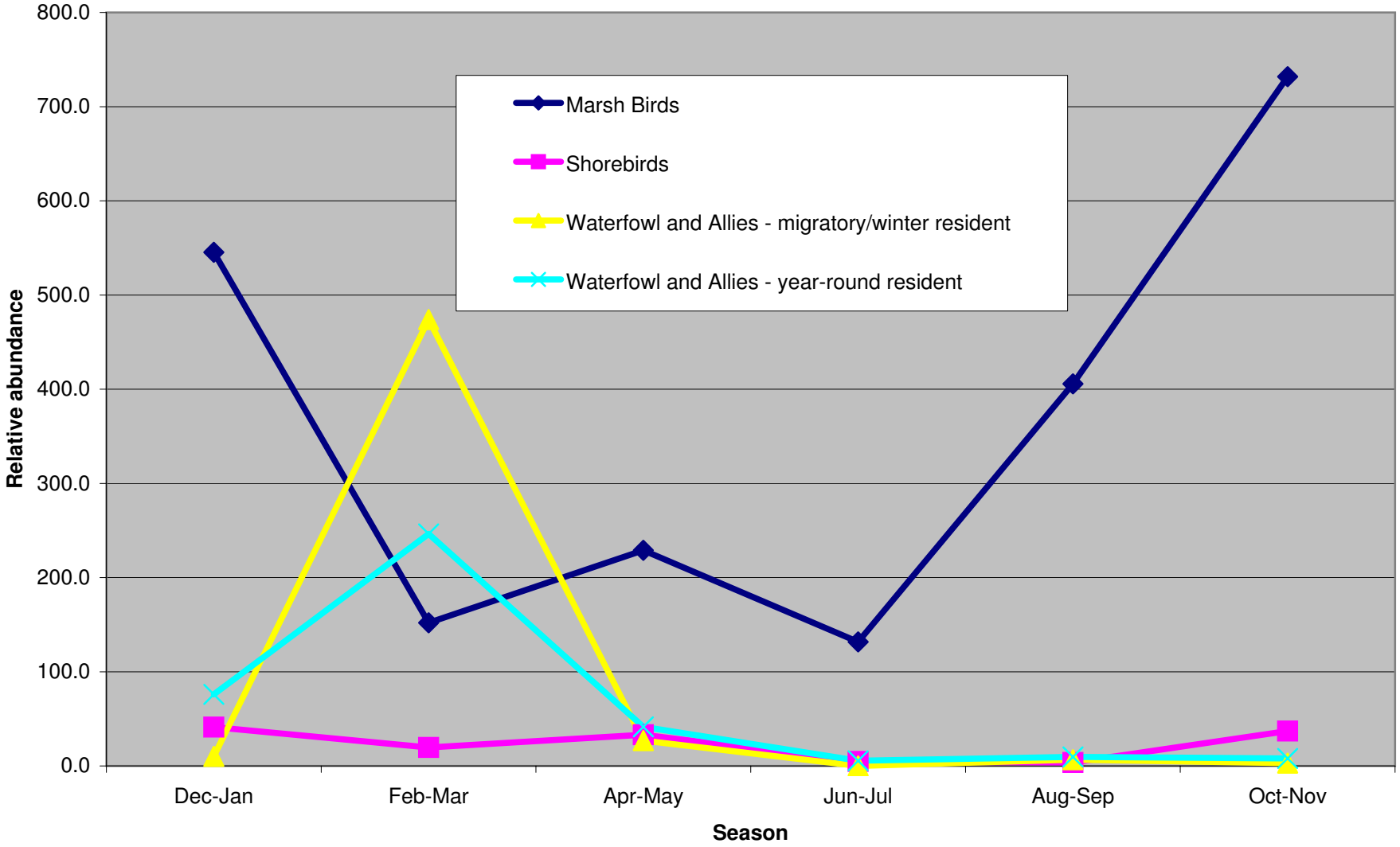

Figure 5: Relative Abundance by Season, Birds of Tolay Lake Regional Park