

**CHARLES M. SCHULZ
SONOMA COUNTY AIRPORT**

**BIOLOGICAL ASSESSMENT
SONOMA COUNTY, CALIFORNIA**

Submitted to:

Federal Aviation Administration
Western-Pacific Region
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Hawthorne, California 90250

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LSA

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1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

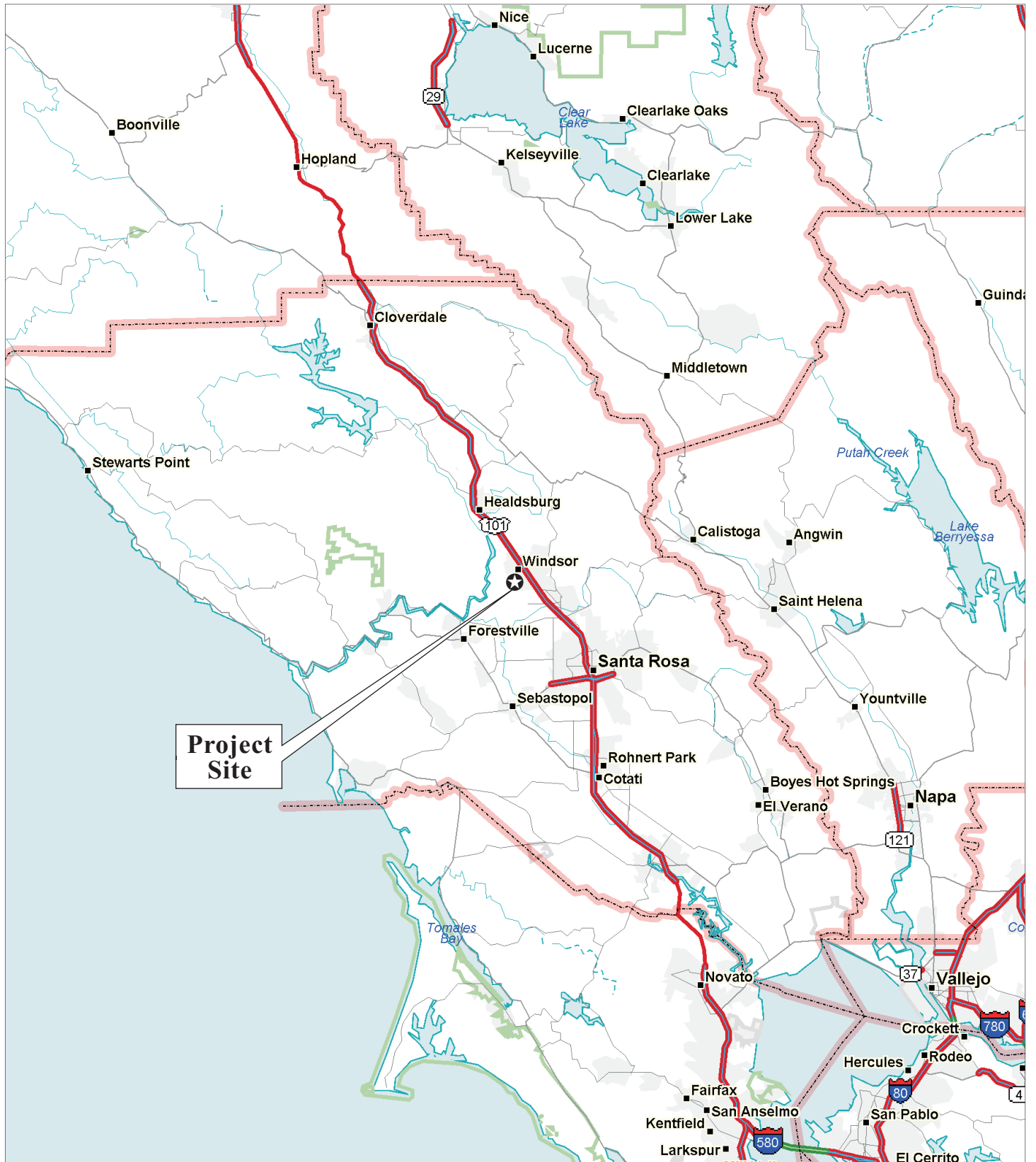
The purpose of this Biological Assessment (BA) is to describe the existing biological resources, including special-status species and habitats, at the Charles M. Schulz Sonoma County Airport (hereafter referred to as the Airport). This BA provides technical information on biological resources in support of possible future Airport projects and for the on-going preparation of a draft *Wildlife Hazard Assessment Report* (WHMP) for the Sonoma County Airport (LSA 2006). The main text of this BA addresses only federally-listed species. Appendix A of this BA addresses other special-status species that are not federally-listed, but are typically addressed under the California Environmental Quality Act (CEQA). This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536) and follows the standards established by the U.S. Fish and Wildlife Service (USFWS).

1.2 SITE LOCATION AND STUDY AREA

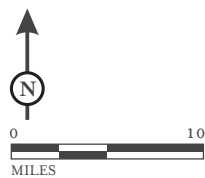
The Airport is located northwest of Santa Rosa, California, approximately two miles west of Highway 101 and just south of the City of Windsor (Figure 1). The Airport property, referred to in this BA as the study area, is approximately 845.2 acres in size with two approximately 5,000-foot long runways (Runway 14-32 and Runway 1-19) that converge at the northern end of the property (Figures 2 and 3). It is bordered on the north by Redwood and Airport Creeks, to the east by North Laughlin Road, to the south by Laughlin Road, and to the west by Slusser and Windsor Roads (Figure 3). Mark West Creek is located just southeast of the southeast corner of the study area. The Airport is located in the Healdsburg California 7.5-minute USGS quadrangle. Access to the Airport is via Airport Boulevard off of U.S. Highway 101.

The study area consists of the infield between the runways and taxiways, parcels directly adjacent to the existing runways and taxiways, small parcels to the east of the eastern taxiway, and several biological preserves (Figure 3). The topography is generally flat with variously sized depressions, swales, and ditches, some of which pond water during the rainy season. A large portion of the property is irrigated with treated wastewater and mowed throughout the year (Figure 3).

The Airport is located within the northern portion of the USFWS Santa Rosa Plain Conservation Strategy Area (SRPCSA) (Figure 4). The northern portion of the SRPCSA is referred to in this BA as the "Airport region." The boundary of the SRPCSA generally coincides with edge of the Santa Rosa Plain (Plain), a distinctive geographic feature in central Sonoma County. The Plain is a generally flat landscape that historically supported open valley oak (*Quercus lobata*) woodland and grassland (savannah). This landscape is crossed by several prominent creeks that flow to the west into the Laguna de Santa Rosa (Laguna) along the western edge of the Plain. Historically, much of the Plain also supported extensive vernal pool-swale complexes that also drained to the Laguna. Extensive stands of riparian woodland historically occurred along the Laguna which flows to the north, along the western edge of the Plain, and eventually drains to the Russian River via Mark West Creek.



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SOURCE: ©2002 DeLORME. STREET ATLAS USA®2003.

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FIGURE 1

Charles M. Schulz
Sonoma County Airport
Regional Location

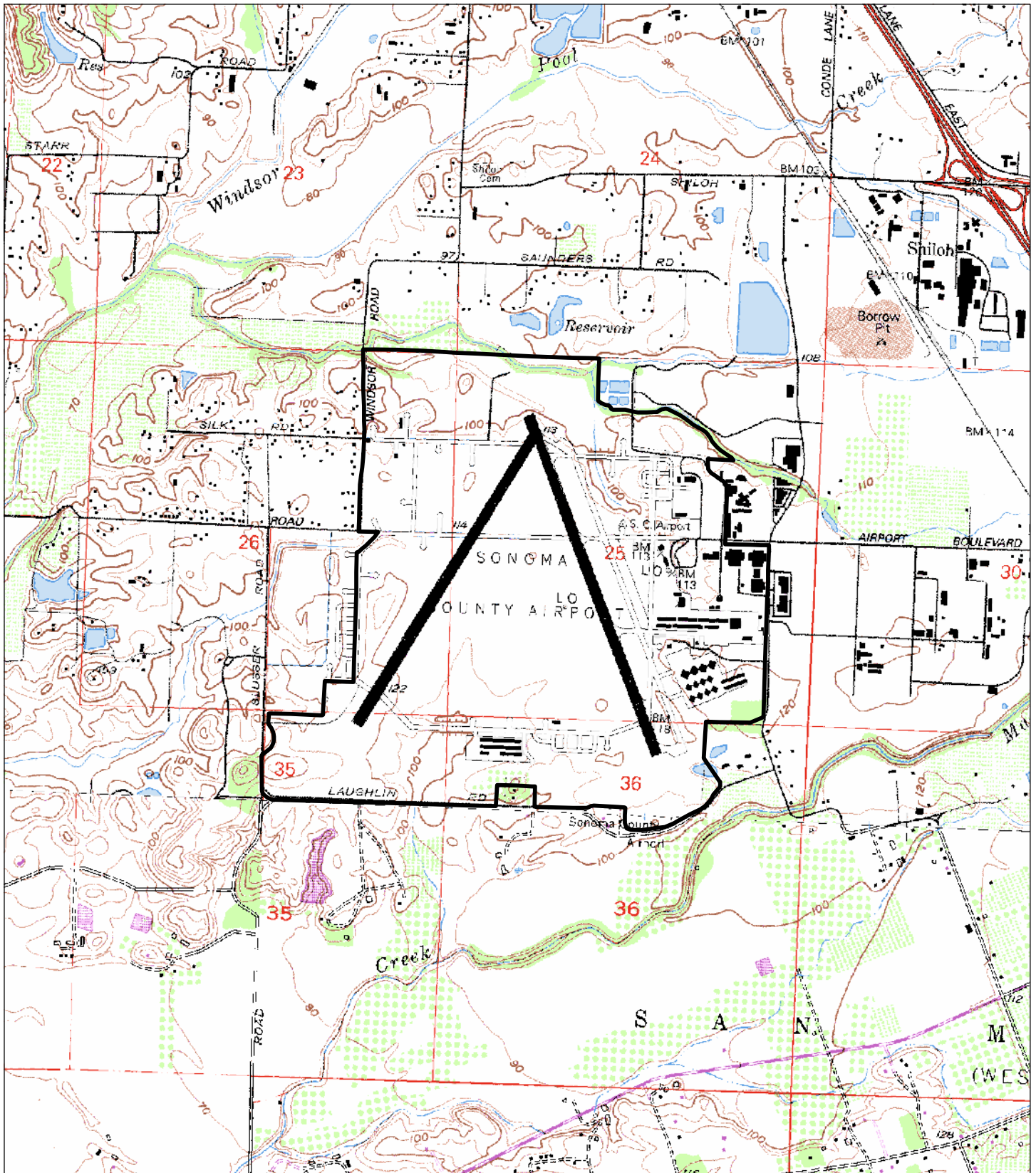


FIGURE 2

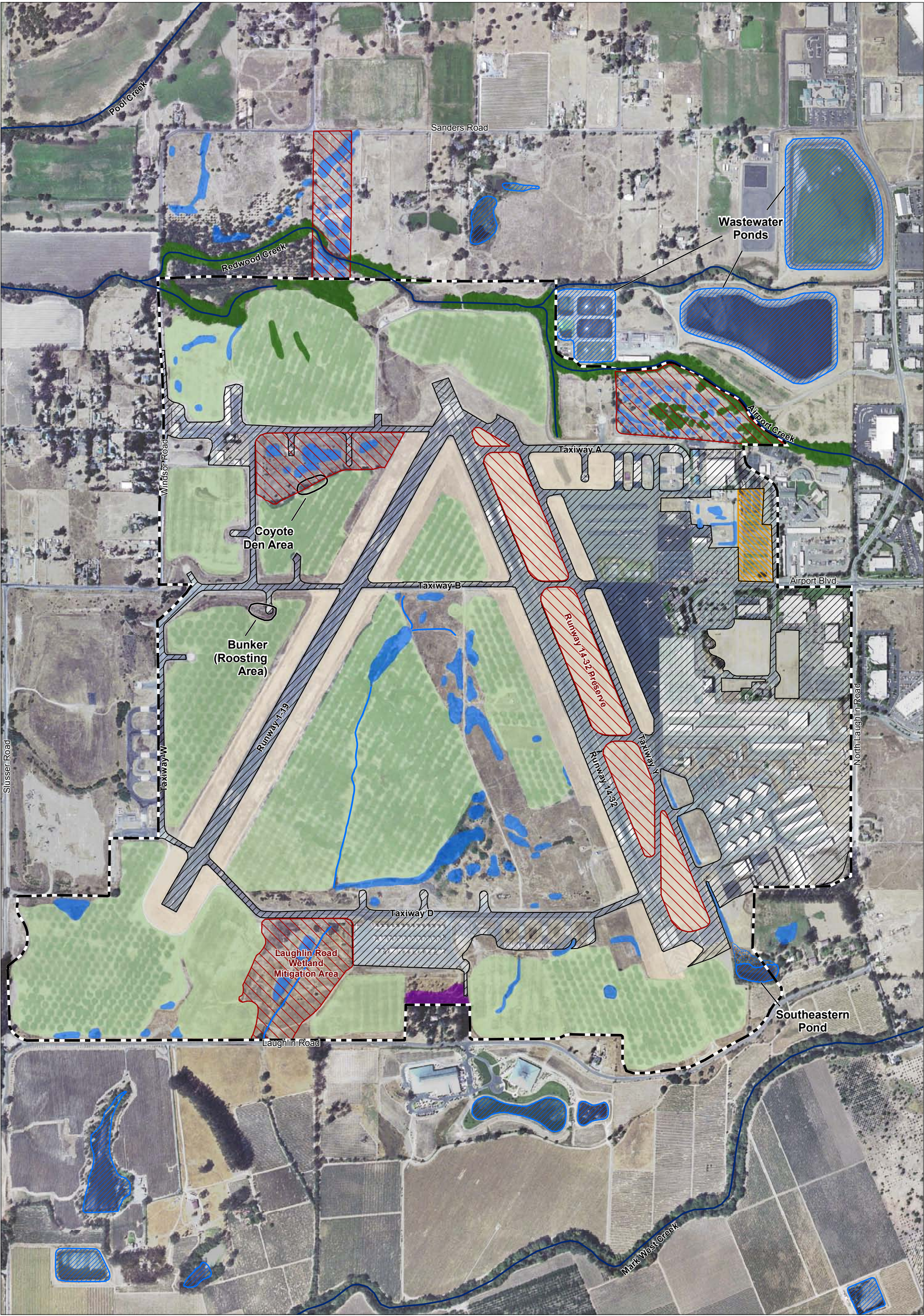
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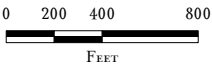
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□ PROJECT LOCATION

Charles M. Schulz
Sonoma County Airport
Biological Assessment
Project Location



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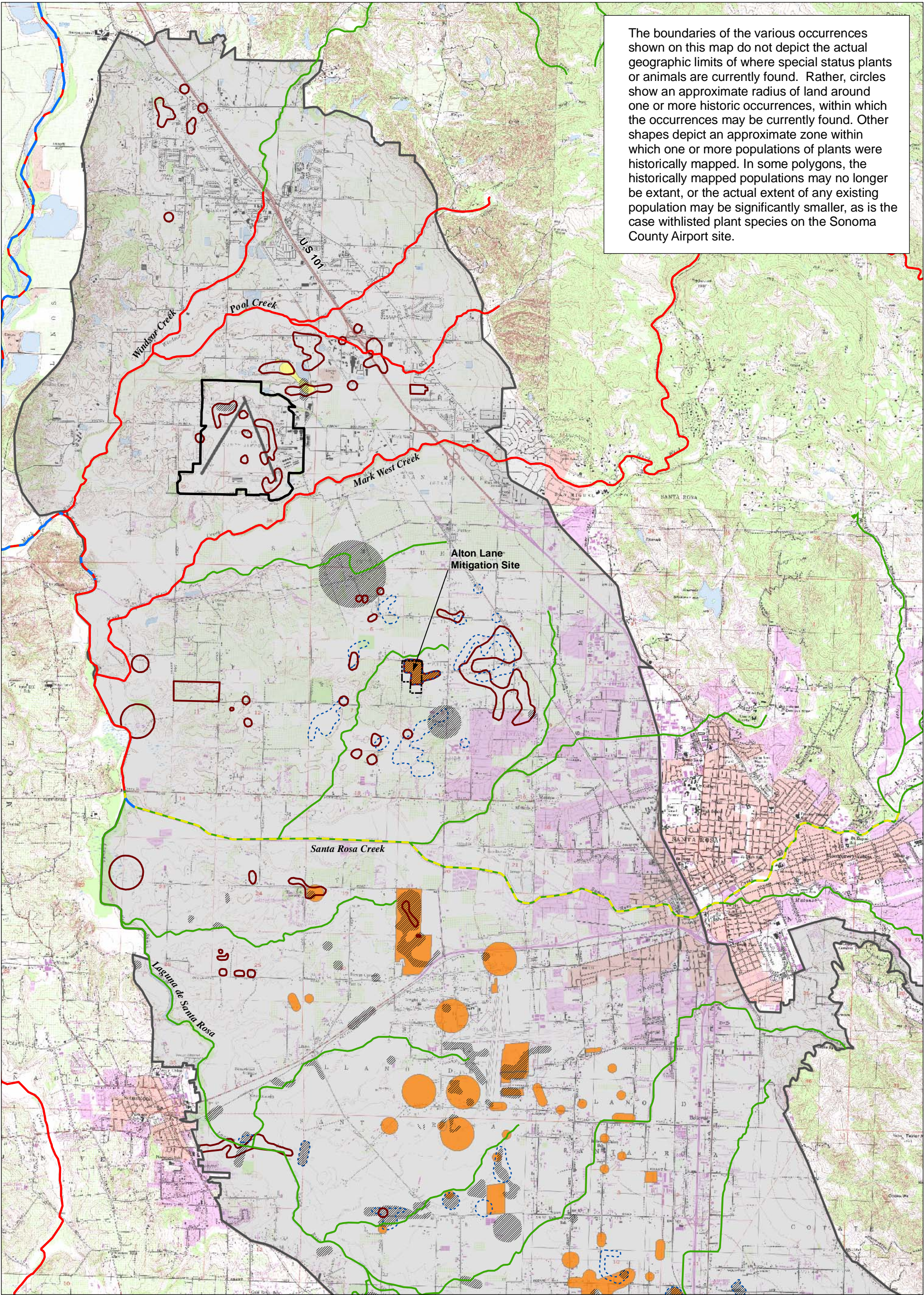


- | | | |
|------------------|--|---|
| PROJECT AREA | SEASONAL WETLANDS
(INCLUDING VERNAL POOLS AND SWALES) | AGRICULTURE |
| PERENNIAL CREEKS | IRRIGATED RUDERAL - CULTIVATED | DEVELOPED |
| PRESERVES | MOWED AREAS | PERENNIAL PONDS |
| | RIPARIAN WOODLAND / VALLEY OAKS | FRESHWATER MARSH |
| | BLUE GUM | NON-NATIVE GRASSLAND /
RUDERAL GRASSLAND |

FIGURE 3

Charles M. Schulz
Sonoma County Airport
Biological Assessment

Site Features, Habitats and
Vegetation Communities



The boundaries of the various occurrences shown on this map do not depict the actual geographic limits of where special status plants or animals are currently found. Rather, circles show an approximate radius of land around one or more historic occurrences, within which the occurrences may be currently found. Other shapes depict an approximate zone within which one or more populations of plants were historically mapped. In some polygons, the historically mapped populations may no longer be extant, or the actual extent of any existing population may be significantly smaller, as is the case with listed plant species on the Sonoma County Airport site.

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PROJECT AREA

SANTA ROSA PLAIN CONSERVATION STRATEGY AREA (SRPCSA)

STEELHEAD CRITICAL HABITAT

STEELHEAD DISTRIBUTION

CHINOOK CRITICAL HABITAT

CHINOOK DISTRIBUTION

CNDDDB OCCURRENCES *

SONOMA SUNSHINE (*BLENNOSPERMA BAKERI*)

BURKE'S GOLDFIELDS (*LASTHENIA BURKEI*)

SEBASTOPOL MEADOWFOAM (*LIMNANTHES VINCULANS*)

CALIFORNIA TIGER SALAMANDER (*AMBYSTOMA CALIFORNIENSE*)

MANY-FLOWERED NAVARRETIA (*NAVARRETIA LEUCOCEPHALA* S.S.P. *PLIEANTHA*)

FIGURE 4

Charles M. Schulz
Sonoma County Airport
Biological Assessment

CNDDDB Occurrences of
Federally-listed Species and
Critical Habitat in the Project Region

* The occurrences depicted from the CNDDDB are 1980 or later.

Much of the Plain's vernal pool and riparian habitat has been lost to development over the past century.

1.3 NOMENCLATURE

The scientific and English names for the plant and animal species used in this report are from the following sources: plants, Hickman (1993) and CNPS (2006); fishes, Nelson et al (2004); amphibians and reptiles, Crother (2000) and Crother et al. (2003); birds, American Ornithologist's Union (1998) and supplements; and mammals, Baker et al. (2003). For animals, subspecies names are used only when a specific subspecies is considered a special-status species by the California Department of Fish and Game (CDFG) or USFWS.

2.0 SPECIES ADDRESSED

2.1 LISTED SPECIES

Covered species or *listed species* are those species formally listed under the federal ESA. Presence of these covered species have been documented in the study area region or have a potential to occur within the study area based on the known distribution of the species and the presence of suitable habitat in the study area. Candidate species are those species that are being considered for formal listing under the federal ESA and are usually addressed in a BA, however no candidate species are known to occur or potentially occur in the study area.

Six federally-listed plant species and three federally-listed animal species were identified as either present or potentially present within the study area. Lists of federally-listed species that potentially occur in the study area were compiled based on the experience and knowledge of LSA biologists with these species on the Plain and a review of the California Natural Diversity Data Base (CNDDB) (CNDDB 2006), California Native Plant Society's on-line database (CNPS 2006), and Sacramento U.S. Fish and Wildlife Service's (USFWS) on-line database of potentially occurring federally-listed species (USFWS 2006) (Tables A and B). These three databases were queried for all known records in the following U.S. Geological Survey 7.5 minute quadrangles: Healdsburg, Guerneville, Mark West Springs, Camp Meeker, Sebastopol, and Santa Rosa. However, only those records occurring within the Airport region (*i.e.*, northern portion of SRPCSA) were analyzed for this BA, because most of the federally-listed species (and other special-status species) that occur in the surrounding foothill and mountain areas do not typically occur within SRPCSA; the exception being the steelhead (*Oncorhynchus mykiss*) which is addressed in this BA.

Figure 4 shows the CNDDB records of federally-listed plants and animals and critical habitat in the Airport region. The Airport region includes portions of those six quadrangles that are on the Santa Rosa Plain but not in the adjacent foothills. In the sections below and in Tables A and B, the "Airport region" specifically refers to the portion of the northern Santa Rosa Plain that was included in the review of the CNDDB records as shown in Figure 4.

Plant species covered in this BA are all associated with vernal pools and other wetlands and include Sebastopol meadowfoam (*Limnanthes vinculans*), Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*), many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*), white sedge (*Carex albida*), and showy Indian clover (*Trifolium amoenum*). Potential habitat for these six species is found on the Santa Rosa Plain and in the study area.

Animal species covered by this document include California freshwater shrimp (*Syncaris pacifica*), Central California Coast Evolutionary Significant Unit (ESU) of steelhead and California tiger salamander (*Ambystoma californiense*). California freshwater shrimp are associated with low gradient permanent streams on the Santa Rosa Plain, and steelhead spawn in flowing or intermittent streams with suitable cool temperatures and gravel or cobble substrate. The California tiger salamander is associated with vernal pools and adjacent uplands on the Santa Rosa Plain.

Table A: Federally-listed Plant Species Known to Occur or Potentially Occuring in the Project Area

Species	Status (Federal/State/ CNPS)	Habitat/Blooming Period	Potential for Occurrence
<i>Blennosperma bakeri</i> Sonoma sunshine	E/E/1B	Vernal pools and swales in valley and foothill grassland. 10-100 meters elevation. March-May	Potential to occur in the project area, but not observed during focused surveys in 2002-2004. Closest known CNDDDB occurrence is approximately 1.8 miles southeast of the project area along Wood Road.
<i>Carex albida</i> white sedge	E/E/1B	Freshwater marsh, bogs and fens, and meadows and seeps. Endemic to Sonoma county. 35-55 meters elevation. May-June	Potential to occur in the project area, but not observed during focused surveys in 2002-2004. Closest known CNDDDB occurrence is approximately 3 miles south of the project area. CNDDDB mapping is along Santa Rosa Creek. Last seen in 1977; possibly extirpated.
<i>Lasthenia burkei</i> Burke's goldfields	E/E/1B	Most often in vernal pools and swales and sometimes in meadows and seeps. 15-580 meters elevation. April-June	Known to occur in project area in three locations found during 2002-2004 surveys. Also occurs adjacent to the project area.
<i>Limnanthes vincluans</i> Sebastopol meadowfoam	E/E/1B	Mesic meadows, vernal pools, swales, wet meadows and marshy areas within valley oak savanna and valley and foothill grassland. On poorly drained soils of clays and sandy loam. Only known from Napa and Sonoma counties. 15-115 meters elevation. April-May	Potential to occur in the project area, but not observed during focused surveys in 2002-2004. Historically occurred in the project area at Goldfield's Preserve but was extirpated. Closest known CNDDDB occurrence is approximately 0.8 mile southeast of the project area. near River Road.
<i>Navarretia leucocephala</i> ssp. <i>pliantha</i> many-flowered navarretia	E/E/1B	Volcanic ash flow vernal pools. 30-950 meters elevation. May-June	Potential to occur in the project area but not observed during focused surveys in 2002-2004. Closest known CNDDDB occurrence is approximately 0.3 mile northeast of the project area near Saunders Road.
<i>Trifolium amoenum</i> showy Indian clover	E/E/1B	Open sunny sites, swales. Most recently sited on roadside and eroding cliff face. In valley and foothill grassland and coastal bluff scrub. Sometimes on serpentine soil, 5-560 meters elevation. April-June	Potential to occur in the project area but not observed during focused surveys in 2002-2004. Closest known CNDDDB occurrence is approximately 4.8 miles south of the project area but it was last seen in 1945 and is possibly extirpated.

Status Legend

Federal:

FE = Federally endangered
FT = Federally threatened
FPE = Federally proposed endangered
FPT = Federally proposed threatened
FC = Federal candidate for listing as threatened or endangered
CH = Designated critical habitat
CHP = Proposed Critical Habitat
D = Delisted

State:

SR = State rare
SE = State endangered
ST = State threatened

CNPS (California Native Plant Society) List:

1A = Presumed extinct in California
1B = Rare, threatened or endangered in California and elsewhere.
2 = Rare, threatened or endangered in California but common elsewhere.
3 = More information is needed for assignment to a list (review list).
4 = Limited distribution (watch list).

Table B: Federally-listed Animal Species Known to Occur or Potentially Occurring in the Project Area

Species	Status (Federal/State)	Habitat	Potential for Occurrence
<i>Syncaris pacifica</i> California freshwater shrimp	E/SE	Creeks with pools (12-36 inches deep) and undercut banks with exposed live root tangles.	Not likely to occur; no recent or historical records from Redwood and Airport Creek, these creeks were historically ephemeral.
<i>Oncorhynchus mykiss</i> Steelhead	E/--	Clear cool riffles with gravel or cobble substrate for spawning; clear, cool riffles and pools as rearing habitat.	Not likely to occur; Redwood and Airport Creek are warm water creeks, nor suitable spawning or rearing habitat.
<i>Ambystoma californiense</i> California tiger salamander	E/CSC	Vernal pools or other fish free ephemeral water bodies with a sufficient hydroperiod for larval development and adjacent uplands with an abundance of small mammal burrows as non-breeding season	Not likely to occur; no recent or historical natural occurrences in the northern portion of the Santa Rosa Plain. Numerous recent surveys for larva in areas around the Airport have not found any.

Status Legend

Federal:

FE = Federally endangered

FT = Federally threatened

CH = Designated critical habitat

CHP = Proposed Critical Habitat

State:

SE = State endangered

ST = State threatened

CSC = California species of concern

2.2 OTHER SPECIAL-STATUS SPECIES

Other special-status species that are not afforded protection under the federal ESA, and are therefore not included in the main text of this BA, are known from the study area or potentially occur in the study area. These species are typically addressed under CEQA and are discussed in Appendix A.

2.3 CRITICAL HABITAT STATUS

Critical habitat has been designated for the Central California Coast steelhead (USDC 2005) and occurs along Mark West Creek just southeast of the Airport property and along Windsor Creek to the north of the study area (Figure 4). In addition, critical habitat for the California coastal ESU Chinook salmon (*Oncorhynchus tshawytscha*) has been designated along lower Mark West Creek west of the study area, but does not include that portion of the Creek adjacent to the Airport (Figure 4). Therefore, this species is not addressed in this BA. Redwood and Airport Creeks drain to Windsor Creek, but these small drainages are not suitable for steelhead and, are not within designated critical habitat.

2.4 CONSULTATION TO DATE

To date there has been no formal or informal consultation with the USFWS regarding any future Airport projects or the draft WHMP.

3.0 EXISTING CONDITIONS

3.1 PHYSICAL FACTORS

Topography. The study area is generally flat with variously sized depressions, swales and ditches, some of which pond water during the rainy season. Elevations in the study area range from approximately 90 to 120 feet above mean sea level.

Soils. The soils mapped on the Airport study area by the Natural Resources Conservation Service are Huichica loam, 2 to 9 percent slopes (HtC), Huichica loam, 9 to 15 percent slopes (HtD), Huichica loam, ponded, 0 to 5 percent slopes (HuB), Huichica loam, shallow, 0 to 9 percent slopes (HvC), Huichica loam, shallow, ponded, 0 to 5 percent slopes (HwB), Yolo loam, 0 to 2 percent slopes (YnA), and Zamora silty clay loam, 0 to 2 percent slopes (ZaA) (SCS 1972). The majority of the Airport study area is mapped as Huichica loam, shallow, ponded, 0 to 5 percent slopes and Huichica loam, ponded, 0 to 5 percent slopes. The Huichica Series soil map units contain small inclusions of Clear Lake clay, Haire gravelly loam, Wright loam, and Zamora silty clay loam. All of the Airport study area soil map units are within the Huichica Series except for two areas of the Zamora soil along the northern study area boundary and a small area of the Yolo soil in the southeast study area boundary.

The Huichica Series soils is described as having upper horizons of loam, clay loam from approximately 14 to 23 inches in depth, clay from 23 to 30 inches in depth, and strongly cemented hardpan below 30 inches in depth. The Huichica Series soils are described as moderately well drained (HtC, HtD, and HvC map units) or as somewhat poorly drained (HuB and HwB). All the Huichica Series soils are described as having very slow permeability in the subsoil.

None of the HtC, HtD, and YnA soil map units or any of their inclusions are listed as being hydric in Sonoma County. The HuB and HwB soil map units can be hydric in depressions. The HvC soil map unit can be hydric in depressions occurring within Clear Lake clay inclusions. The ZaA soil map unit can be hydric in upland seeps.

From the standpoint of this BA, nearly all the soil types found in the study area are capable of supporting vernal pool wetlands and their associated listed plant species.

3.2 HABITATS AND VEGETATION COMMUNITIES

Habitats and vegetation communities in the study area are mapped in Figure 3. The acreages of the habitats and vegetation communities were calculated with a geographic information system (GIS) and are approximate. The total acreage of the site in the study area is approximately 845.2 acres. Most of the study area that has not been developed for Airport uses consists of ruderal grassland habitat that is irrigated with treated wastewater and is mapped on Figure 3 as “irrigated ruderal – cultivated” (302.1 acres). Hydrophytic vegetation is present in some of these irrigated portions of the study area, including Italian ryegrass (*Lolium multiflorum*), umbrella sedge (*Cyperus eragrostis*), velvet grass (*Holcus lanatus*) and Harding grass.

Wetland and riparian habitats present on the site include seasonal wetlands (including vernal pools and swales) (23.1 acres of vernal pools/swales/seasonal wetlands and 3,667 linear feet of swales); perennial ponds (0.86 acre) and perennial creeks (4,628 linear feet), and riparian woodland/valley oaks (17.3 acres).¹ The study area also supports 185.1 acres of non-native grassland/ruderal grasslands dominated by non-native annual grasses and interspersed with native and non-native forbs (broadleaved plants). Non-native grasslands adjacent to the runways that are regularly mowed are mapped as “mowed areas” in Figure 3 (97.6 acres). One agricultural area (4.9 acres) in the study area consists of a vegetable garden for the adjacent Sonoma County correctional facility. Developed areas in the study area are unvegetated areas that include the runways, taxiways, and Airport buildings and facilities (212.1 acres).

Except for the riparian woodland along Redwood Creek and Airport Creek and a stand of blue gum (*Eucalyptus globulus*) (1.6 acres), woody vegetation is primarily absent from the rest of the study area. There are a few individuals of coast live oak (*Quercus agrifolia*), Fremont’s cottonwood (*Populus fremontii*), red willow (*Salix laevigata*), and coyote brush (*Baccharis pilularis*) that occur mostly in the southern portion of the infield.

The following sections describe some of these habitats and vegetation communities in the study area in more detail.

Non-native Grassland/Ruderal Grassland (42200)². Non-native annual grasslands and ruderal grasslands occur throughout the study area. Ruderal grasslands occur in disturbed areas and are dominated by non-native exotic vegetation. The dominant species in non-native grassland/ruderal grassland habitat within the study area include: wild oat (*Avena fatua*), foxtail fescue (*Vulpia myuros*), Harding grass (*Phalaris aquatica*), chicory (*Cichorium intybus*), medusahead (*Taeniatherum caput-medusae*) and English plantain (*Plantago lanceolata*). Other common species include ripgut (*Bromus diandrus*), orchard grass (*Dactylus glomeratus*), Bermuda grass (*Cynodon dactylon*), soft chess (*Bromus hordeaceus*), common knotweed (*Polygonum arenastrum*), wild radish (*Raphanus sativus*), and mustards (*Brassica* spp.). Some areas support patches of native grasses such as purple needlegrass (*Nassella pulchra*), California brome (*Bromus carinatus*), and California oatgrass (*Danthonia californica*). Moist grasslands include species that are similar to some irrigated areas, such as Italian ryegrass, umbrella sedge, velvet grass and Harding grass.

Non-native grasslands and areas supporting ruderal vegetation often support good populations of small mammals. Mammal species present within the study area include the California vole (*Microtus californicus*), Botta’s pocket gopher (*Thomomys bottae*), and black-tailed jackrabbits (*Lepus californicus*). Predators that forage for small mammals in grasslands and have been observed on the Airport property include the gopher snake (*Pituophis catenifer*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), barn owl (*Tyto alba*), and coyote (*Canis latrans*).

During the winter and spring, when the grasslands are still green, great egrets (*Ardea alba*) and great blue herons (*Ardea herodias*), more typically associated with wetland habitats, can be seen hunting

1 The wetland acreages provided herein are preliminary, and may change following completion of a formal wetland delineation study that is expected to be completed in the late spring 2006.

2 Number in parenthesis refers to the NDDb/Holland plant community classification code number (Holland 1986 and Keeler-Wolf 1995).

voles and gophers in grasslands on the Airport property. Smaller birds typically associated with grasslands and common at the Airport include savannah sparrows (*Passerculus sandwichensis*) and western meadowlark (*Sturnella neglecta*). Areas of mowed grass such as the strips along and at the ends the Airport runways are attractive to birds such as the Canada goose (*Branta canadensis*), killdeer (*Charadrius vociferous*), and American pipit (*Anthus rubescens*).

Seasonal Wetlands including Vernal Pools and Swales (44100). The study area supports northern hardpan vernal pools. In the relatively undisturbed pools in the study area, the spring vegetation is typically dominated by native annuals such as vernal pool buttercup (*Ranunculus bonariensis*), yellow-ray goldfields (*Lasthenia glaberrima*), Fremont's goldfields (*Lasthenia fremontii*), Douglas meadowfoam (*Limnanthes douglasii*), maroon-spot downingia (*Downingia concolor*), and slender popcorn-flower (*Plagiobothrys stipitatus*). Later in the season, semaphore grass (*Pleuropogon californicus*), annual hairgrass (*Deschampsia danthonioides*), and coyote thistle (*Eryngium armatum*) are the dominant plant species in the pools.

Disturbed pools and swales and other seasonal wetland areas, including those that are irrigated, are dominated by Italian ryegrass, Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), pennyroyal (*Mentha pulegium*) and Bermuda grass (*Cynodon dactylon*).

The majority of the seasonal wetlands are located in the Infield between the runways and in a 3,000-foot by 300-foot strip east of and parallel to Runway 14-32 and in the preserves (Figure 3). Based on the vegetation and distribution pattern of the vernal pools, they appear to be remnants of the historic pool systems that once encompassed much of the Santa Rosa Plain. A few vernal swales and pools are also scattered near the south end of Runway 14-32, along embankments and berms. These pools and swales appear to have been created inadvertently when some of the Airport features were constructed and currently contain plant species more typical of disturbed vernal pools. Extensive systems of vernal pools and swales, encompassing more than 7 acres, were created between 1988 and 2002 in the SACMA, SACMA-II and Goldfields Preserve mitigation sites at the north end of the study area (Figure 3).

Vernal pools on the Santa Rosa Plain provide important breeding habitat for amphibians such as the California tiger salamander, Pacific treefrog (*Pseudacris regilla*), and western toad (*Bufo boreas*); only the treefrog has been documented within the study area. Various species of water birds are attracted to seasonal wetlands and vernal pools including mallards (*Anas platyrhynchos*), greater yellowlegs (*Tringa melanoleuca*), Wilson's snipe (*Gallinago delicata*), great egret, and great blue heron. Birds typical of freshwater marsh on the northern Santa Rosa Plain include Virginia rail (*Rallus limicola*), song sparrow (*Melospiza melodia*), and red-winged blackbird (*Agelaius phoeniceus*).

Freshwater Marsh (52410). Patches of freshwater marsh vegetation occurs adjacent to some seasonal wetlands and swales (including drainage ditches). Freshwater marsh vegetation is characterized by tall perennial marsh plants (up to 10 feet), such as cattail (*Typha* sp.) and bulrush (*Scirpus* sp.) in areas where water seldom exceeds three feet in depth. Along its upland edges, dense stands of shorter-statured marsh plants are found, such as sedges e.g., (*Carex obnuta*), spikerush (*Eleocharis macrostachya*), and rushes (*Juncus* spp.). Woody species such as willows (*Salix* spp.) and blackberry (*Rubus discolor*) are also present along upland edges of seasonal wetlands and ponds. The interiors may be broken by open patches of water that often are choked with smartweed (*Polygonum* sp.).

Freshwater marsh occurs on Airport property in the infield at the south end of the runways (Field 17) associated with six mitigation ponds created in 1988 (Figure 3). Freshwater marsh also occurs to the west of the south end of Runway 1-19. Marsh vegetation also occurs in two wetland mitigation features that were constructed in 1998 in the southwest corner of the Airport, east of Runway 1-19. South of Runway 1-19, there is a pond approximately 1,000' long and 400' wide at its widest point, created for agricultural irrigation. Although the margins of the pond have been cleared and mowed to the waterline, occasional stands of freshwater marsh vegetation remain along the edges.

Perennial Aquatic Habitat. The study area supports streams channels at Redwood Creek, Airport Creek, Mark West Creek, and a perennial pond in the southeastern portion of the site (Southeastern Pond) (Figure 3). These features are unvegetated open water habitats, but adjacent to these features are stands of woody riparian and freshwater marsh vegetation.

Redwood Creek and Airport Creek are seasonal to perennial creeks that run along the northern boundary of the study area (Figure 3). Redwood Creek originates approximately a quarter of a mile to the west of Highway 101, and flows west for slightly more than a mile until it converges with Airport Creek just inside the northeast corner of the Airport property (Figure 3). This convergence occurs just before the creek flows onto Airport property. Redwood Creek continues across the northern edge of the Airport, eventually joining Windsor Creek approximately 1.2 miles west of the Redwood Creek/Airport Creek confluence. Windsor Creek in turn flows into Mark West Creek some 1.5 miles southwest of the Airport. Mark West Creek is a perennial stream that occurs south of the Airport (Figure 2). It originates in the Sonoma Hills east of Highway 101 and flows westward, until joining the Russian River approximately 7 miles west of Highway 101.

Various species of native and introduced freshwater fish occur in the creeks of the Santa Rosa Plain. Steelhead migrate up the larger creeks (e.g., Mark West Creek) to their spawning sites which tend to be in foothill areas just east of the Plain. The low gradient portions of the creeks on the Santa Rosa Plain tend to be dominated by warm water fishes such as the California roach (*Lavinia symmertricus*) and threespine stickleback (*Gasterosteus aculeatus*). Non-native fish common in the creeks of the Plain include the common carp (*Cyprinus carpio*), western mosquitofish (*Gambusia affinis*), and largemouth bass (*Micropterus salmoides*).

The only fish species observed within the study area (Redwood Creek) was the threespine stickleback. It is likely that non-native fishes, such as western mosquitofish, are present in the Southeastern Pond, but this has not been confirmed by LSA biologists. The perennial ponds and creeks of the Santa Rosa Plain are generally not suitable as breeding site for native amphibians due to the presences of predatory fishes including both native and non-native species. The American bullfrog (*Rana catesbeiana*), a non-native, is present in many of the perennial ponds and creeks of Plain and is likely to occur in the Southeastern Pond. The Pacific pond turtle (*Actinemys marmorata*) occurs in perennial aquatic habitats on the -Plain, but has not been documented within the study area.

A wide variety of water birds use perennial ponds and creeks of the Santa Rosa Plain, examples include Canada goose (*Branta canadensis*), mallard, American wigeon (*Anas americana*), green-winged teal (*Anas crecca*), bufflehead (*Bucephala albeola*), pied-billed grebe (*Podilymbus podiceps*), and black-crowned night heron (*Nycticorax nycticorax*); all these species have been observed within the study area or in adjacent areas.

Riparian Woodland (61000). The Redwood Creek/Airport Creek corridor supports a 40-80 foot wide riparian woodland community that continues with few interruptions until its eventual confluence with Windsor Creek. On Airport property, the riparian corridor supports mature valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), Siberian elm (*Ulmus pumila*) and possibly Northern California black walnut (*Juglans californica* var. *hindsii*).³ Understory vegetation includes poison oak (*Toxicodendron diversilobum*), Himalayan blackberry (*Rubus discolor*) and sedge (*Carex* sp.).

There is one 400-foot section of the creek at the end of Runway 14-32 that is maintained clear of all woody vegetation to meet safety compliance standards for the Airport as required by the Federal Aviation Administration (FAA). The vegetation in this area is dominated by poison hemlock (*Conium maculatum*) and Harding grass. To the east of the Airport, the upstream stretch of Redwood Creek has been cleared of woody vegetation and flows through a trapezoidal channel with little riparian habitat. The only other significant opening in the riparian canopy west of the Redwood Creek/Airport Creek confluence and east of Windsor Road is a narrow (20 foot wide) opening in the canopy with a bridge to allow aircraft rescue and firefighting vehicle crossing approximately 180 feet east of the 400 foot clearing.

Riparian woodlands in Sonoma County support a wide diversity of native wildlife, but species composition varies depending on the dominant tree cover. The woodlands along Redwood and Airport Creeks tend to be dominated by oaks and species associated primarily with oaks are the most common. Examples of birds that breed in oak dominated riparian woodlands, and have been observed in the study area, include Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), and white-breasted nuthatch (*Sitta carolinensis*). Mule deer (*Odocoileus hemionus*) use the riparian woodland within the study area for shelter and foraging habitat.

³ The walnut species that occurs in the Redwood Creek riparian corridor along the Airport's northern boundary have the morphological characteristics of Northern California black walnut (var. *hindsii*), however the trees may in fact be a hybrid with the cultivated variety, *J. regia*, with which the native species readily hybridizes (see Appendix B). Alternatively, the tree may indeed be the native variety but may have been introduced by humans since the only known occurrences of this species in Sonoma County may have been a result of the spread of nuts traded by Native Americans tribes from the Central Valley.

4.0 SPECIES ACCOUNTS

This section discusses the biology of federally listed plants and animals that are either known to occur in the study area or potentially occur in the study area. The species accounts include the species' status, description, general distribution, and occurrence in the study area.

Information on the six plant species was extracted from *The Jepson Manual* (Hickman 1993), CNDDDB (2006), CNPS (2006), *Santa Rosa Plain Vernal Pool Ecosystem Preservation Plan* (CH2M Hill 1995), *Final Santa Rosa Plain Conservation Strategy* (USFWS 2005), and the following Programmatic Biological Opinion for the Santa Rosa Plain: *Permitted Projects that May Affect Four Endangered Plant Species on the Santa Rosa Plain, California (File Number 22342N)* (USFWS 1998a). In addition, the federally-listed plant accounts include the results of focused surveys for special-status plants that were conducted in the study area in 2002-2004 (LSA 2005). Information sources for the animal species covered in this document are included at the beginning of each species account.

4.1 BURKE'S GOLDFIELDS (*LASTHENIA BURKEI*)

USFWS - Endangered species.

CDFG - Endangered species.

CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. Burke's goldfields is an annual species in the sunflower family (Asteraceae) that occupies vernal pools, swales, wet meadows, and seeps. Burke's goldfields blooms from April through June. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. Burke's goldfields is endemic to the Central Coastal Ranges and has historically been reported from Mendocino, Lake, and Sonoma counties. The CNDDDB (2006) records 32 occurrences. The type locality is in Mendocino County; however, this population, which is also the only known occurrence in that county, is possibly extirpated (CNDDDB 2006). Two occurrences, both presumed extant, are recorded from Lake County. The remaining 29 occurrences are from Sonoma County with the center of distribution in the northwestern and central areas of the Santa Rosa Plain. Three of these occurrences are from south of Highway 12 and one occurrence from north of Healdsburg. Four of the 29 occurrences in Sonoma County are known to be extirpated, and two are possibly extirpated (CNDDDB 2006).

Occurrence in the Airport Region. Occurrences in the Airport region are located north, northeast and south of the study area (Figure 4). There are twenty-two CNDDDB occurrences within 5 miles of the study area (Figure 4). Occurrences in the region of the study area include colonies mapped between the Airport and Shiloh, at the junction of Highway 101 and Shiloh Road, northwest of

Windsor along Starr Road, on the east side of Redwood Highway north of Arata Lane, southwest of the Windsor Road/Arata Lane intersection, and in the Wikiup wetlands mitigation bank east of the Airport, between Highway 101 and Redwood Highway. A population has also been introduced at the SACMA Preserve, directly north of Airport Boulevard. In the spring of 2005, LSA also found one individual Burke's goldfields at the SACMA II Preserve (Figure 3). Further documentation of this occurrence will be conducted by LSA botanists in the Spring 2006.

Occurrence within the Study Area. The extant occurrences of Burke's goldfields in the study area are based on the surveys conducted by LSA from 2002 through 2005 are shown in Figure 5. The CNDDDB (2006) occurrence record no. 7 refers to these sub-populations of Burke's goldfields in the Airport study area (Figure 4). Seven small sub-populations are mapped by the CNDDDB from observations made in 2002 (Figure 4). The locations of these CNDDDB sub-populations (Figure 4) is somewhat different than the locations found in LSA's 2002 through 2004 surveys (Figure 5).

Sub-populations of Burke's goldfields occur in three locations on the Airport property, all of which are designated as protected preserves: SACMA Preserve, Goldfields Preserve, and the Runway 14-32 Wetland Preserve (Figure 5). The SACMA Preserve sub-population consists of CDFG-salvaged soil that contained seeds of Burke's goldfields that was introduced into constructed vernal pools at the SACMA site in 1999. The source of the salvaged soil was a vernal pool lost during construction of a project in the industrial park immediately to the east of the Airport. As of 2005, constructed pools at the SACMA site supported approximately 2,700 individual plants of Burke's goldfields (LSA 2006). The Goldfields Preserve site consists of an estimated >100,000 individuals in a dense cover (LSA 2005). This sub-population consists of naturally occurring plants and seeded plants introduced into two constructed pools in 1988. Colonies of Burke's goldfields were observed in several pools in the Runway 14-32 Preserve in the late 1980s and was confirmed by LSA botanists in the spring of 2005 (Patterson 1987; CNDDDB 2006).

4.2 SONOMA SUNSHINE (*BLENNOSPERMA BAKERI*)

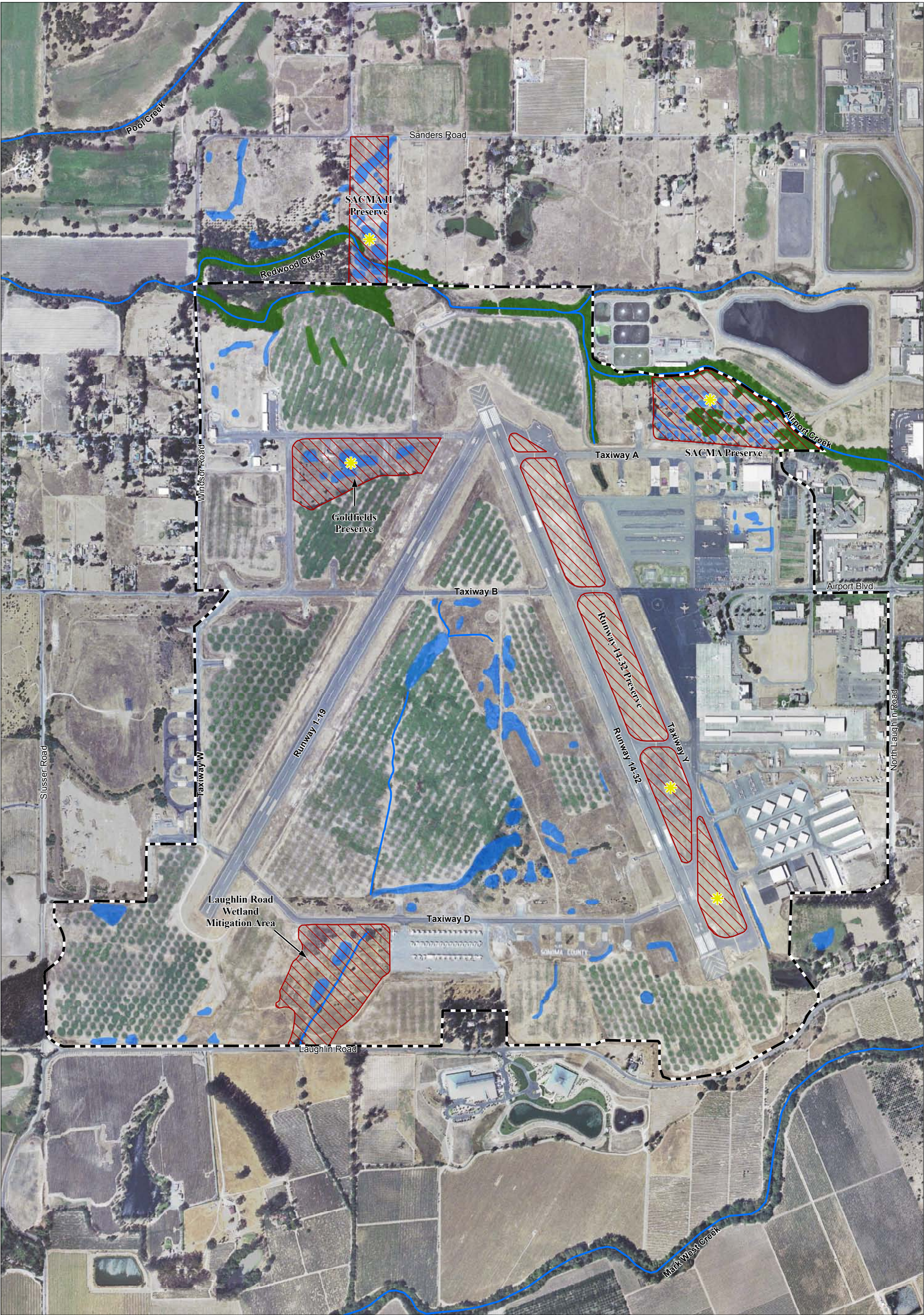
USFWS - Endangered species.

CDFG - Endangered species.

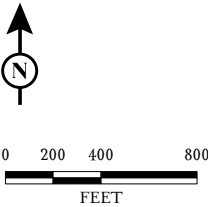
CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. Sonoma sunshine is an annual species in the sunflower family (Asteraceae) that occupies vernal pools, swales and mesic grasslands. Sonoma sunshine blooms from March through May. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. Sonoma sunshine is endemic to Sonoma County. The CNDDDB (2006) records 26 populations, 22 of which are presumed extant. Five occurrences, two of which are extirpated, are outside the Santa Rosa Plain in Sonoma Valley. The remaining populations (one population is considered extirpated) are found on the Santa Rosa Plain predominantly to the west and northwest of Santa Rosa.



LSA



- BURKE'S GOLDFIELDS (*LASTHENIA BURKEI*)
- PROJECT AREA
- PRESERVES
- SEASONAL WETLANDS (INCLUDING VERNAL POOLS AND SWALES)
- RIPARIAN WOODLAND/VALLEY OAKS

FIGURE 5

Charles M. Schulz
Sonoma County Airport
Biological Assessment

Burke's Goldfields Observed
Occurrences in the Project Area

Occurrence in Airport Region. The closest known CNDDDB population to the Sonoma County Airport occurs 1.8 miles southeast of the study area (Figure 4; occurrence record no. 6). This record is northwest of Santa Rosa, along Wood Road and between Hartman Road and the end of Alton Road. This occurrence was last observed in 1993. In addition, there are nine other CNDDDB occurrences, most of which are presumed extant, within 5 miles of the study area (Figure 4).

Occurrence within the Study Area. Sonoma sunshine is not known to occur in the study area and was not observed in the Airport study area by LSA botanists during two years of appropriately timed surveys in 2003 and 2004 (LSA 2005).

4.3 SEBASTOPOL MEADOWFOAM (*LIMNANTHES VINCULANS*)

USFWS - Endangered species.

CDFG - Endangered species.

CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. Sebastopol meadowfoam is an annual species in the meadowfoam family (Limnanthaceae) that occupies vernal pools/swales and wet grasslands and meadows, commonly in valley oak savanna, on poorly drained soils of clay and sandy loam. Sebastopol meadowfoam blooms in April and May. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. Sebastopol meadowfoam is endemic to central Sonoma County in the region of Santa Rosa and Windsor, with the exception of one population (likely introduced) at the Yountville Ecological Preserve in Napa County.

The CNDDDB (2006) records 39 occurrences of Sebastopol meadowfoam, 32 of which are presumed extant. The distribution of the meadowfoam on the Santa Rosa Plain is centered in the central and southern portions of the Plain. Two occurrences are outside of the Santa Rosa Plain, one at Atascadero Creek Marsh, west of Sebastopol, the other in the region of Knights Valley, northeast of Windsor.

Occurrence in Airport Region. The closest CNDDDB record of Sebastopol meadowfoam to the Airport is located approximately 0.8 mile southeast of the study area (Figure 4). This record is located in the region of Wood Road and Woolsey Road near River Road, northwest of Santa Rosa (CNDDDB 2006). This occurrence was originally observed in 1976, but was not observed during a subsequent survey in 1983 (CNDDDB 2006). The next closest CNDDDB record (occurrence no. 21) of this species to the study area is located at the Alton Lane Preserve approximately 2.2 miles southeast of the study area (Figure 4). This record was observed in 1998 and is presumed extant. There are five additional CNDDDB occurrences of this species within 5 miles south of the study area and most of these occurrences are presumed extant.

Occurrence within the Study Area. A population (occurrence record 46) that occurred in a swale near the area that is presently the Airport's Goldfields Preserve is reported as extinct (Figure 4). The swale is currently dominated by freshwater marsh perennials and no longer provides habitat for the meadowfoam (Pavlik, et al. 1998, as cited in CNDDDB 2006). This population was not observed by LSA botanists during surveys of the Goldfields Preserve as a reference site in 2003 and 2004 (LSA 2005). During 2003 and 2004, LSA botanists paid particular attention to vernal pools and seasonal

wetlands in the southern portion of the Airport property, due to the presence of dense cover by Douglas' meadowfoam (*Limnanthes douglasii*), a meadowfoam also associated with vernal pools and other mesic areas. Sebastopol meadowfoam was not observed in the study area during this period.

4.4 MANY-FLOWERED NAVARRETIA (*NAVARRETIA LEUCOCEPHALA* SSP. *PLIEANTHA*)

USFWS - Endangered species.

CDFG - Endangered species.

CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. Many-flowered navarretia is an annual species of the phlox family (Polemoniaceae) that occupies vernal pools situated on volcanic ash flows. Many-flowered navarretia blooms from May through June. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. Many-flowered navarretia is endemic to Lake and Sonoma counties. It is known from nine location and all are presumed extant (CNDDDB 2006). Five populations are presumed extant in Lake County and two in Sonoma County (CNDDDB 2006).

Occurrence in Airport Region. The closest known CNDDDB population (occurrence no. 9) to Airport property is located near Sanders Road approximately 0.3 mile northeast of the study area (Figure 4). This occurrence was last observed in 1998 and is presumed extant. There are no other CNDDDB occurrences located in the northern Santa Rosa Plain in the region of the study area (Figure 4).

Occurrence within the Study Area. This species is not known to occur in the study area and was not observed in the Airport survey area by LSA botanists during two years of appropriately timed surveys in 2003 and 2004 (LSA 2005).

4.5 WHITE SEDGE (*CAREX ALBIDA*)

USFWS - Endangered species.

CDFG - Endangered species.

CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. White sedge is a perennial herb in the sedge family (Cyperaceae) that occurs in freshwater marshes, swamps and bogs. The blooming period of white sedge is May through July. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. The species was historically known to occur in four populations, all in Sonoma County (CNDDDB 2006). It is presumed extant at two locations (upper and lower Pitkin Marsh), possibly extirpated from Santa Rosa Creek, and extirpated at the Perry Marsh due to loss of its habitat.

Occurrence in Airport Region. The closest CNDDDB occurrence (occurrence no. 2) of this species is along Santa Rosa Creek approximately 3.0 miles south of the Airport study area (Figure 4). This record was observed in 1977 and is possibly extirpated due to the loss of freshwater marsh habitat on this creek. There are no other CNDDDB occurrences in the region of the study area in the northern Santa Rosa Plain (Figure 4).

Occurrence within the Study Area. This species is not known to occur in the study area and was not observed in the Airport survey area by LSA botanists during two years of appropriately timed surveys in 2003 and 2004.

4.6 SHOWY INDIAN CLOVER (*TRIFOLIUM AMOENUM*)

USFWS - Endangered species.

CDFG - Endangered species.

CNPS - List 1B, *i.e.*, plant rare, threatened, or endangered in California (and elsewhere).

Description and Life History. Showy Indian clover is an annual plant in the pea family (Fabaceae) that occurs along coastal bluffs and in grassland habitats. The flowering period for Showy Indian clover is April through June. A detailed description of this species and its life history is found in the Botanical Surveys Report (Appendix B).

Distribution. There are 33 CNDDDB occurrences of showy Indian clover occur in 7 Bay Area counties (CNDDDB 2006). However, all the known populations are believed to have been extirpated by the late-1980s due to urbanization, land conversion to agriculture and competition from weedy, non-native plant species. In 1993, a single plant was found near Occidental but was not observed again in later years. In 1996, a small population was observed in grasslands in Marin County in the Valley Ford 7.5 minute quadrangle.

Occurrence in Airport Region. The closest CNDDDB occurrence of showy Indian clover to the study area is approximately 4.8 miles south of the study area (Figure 4). This record was observed in 1945 near Wrights School, 4 miles west of Santa Rosa and is possibly extirpated. There are no other CNDDDB records in the region of the study area (Figure 4). The single confirmed population of this species in the Valley Ford region is located at least approximately 13 miles from the Airport study area.

Occurrence within the Study Area. This species is not known to occur in the study area and was not observed in the Airport survey area by LSA botanists during two years of appropriately timed surveys in 2003 and 2004. The potential for occurrence on Airport lands is very low due to the highly disturbed nature of the Airport's grasslands, on-going wastewater irrigation and mowing.

4.7 CALIFORNIA FRESHWATER SHRIMP (*SYNCARIS PACIFICA*)

USFWS - Endangered species.

CDFG - Endangered species.

Description and Life History. The following discussion is of California fresh water shrimp biology based on the *California Freshwater Shrimp Recovery Plan* (USFWS 1998b). California freshwater shrimp are year-round residents of low elevation (less than 380 feet) perennial creeks with a low gradient (generally less than one percent). They occur only in Marin, Sonoma, and Napa counties.

Superior habitat for California freshwater shrimp includes creeks that are 12-36 inches deep, with exposed live roots of trees, such as alder (*Alnus* sp.), and willow (*Salix* sp.), along completely submerged undercut banks (horizontal depth greater than 6 inches), with overhanging vegetation and vines. During the winter, shrimp are found beneath the undercut banks among the fine roots or overhanging vegetation. These areas provide shelter from high water velocities. During the summer, shrimp may become restricted to deeper pools as the creeks begin to dry. These pools also generally have overhanging vegetation on which the shrimp forage for fine particulate matter. Shrimp are not typically found in creek reaches with boulder and bedrock bottoms.

California freshwater shrimp are likely prey for a wide variety of predaceous and opportunist vertebrates and invertebrates including California roach (*Lavinia symmetricus*), three-spine stickleback (*Gasterosteus aculeatus*), steelhead, western pond turtle (*Actinemys marmorata*), California newt (*Taricha torosa*), California giant salamander (*Dicamptodon ensatus*), water scorpions (*Ranatra* spp.), predaceous diving beetles and dragonfly and damselfly nymphs. Introduced fish species such as green sunfish (*Lepomis cyanellus*), carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*) all prey on this species.

Distribution. California freshwater shrimp occur in 17 creek segments in Marin, Napa, and Sonoma counties. The distribution of shrimp can be separated into four drainage units: 1) tributary streams in the lower Russian River drainage which flow westward to the Pacific Ocean, 2) coastal streams flowing westward directly into the Pacific Ocean, 3) streams draining into Tomales Bay, and 4) streams flowing southward into northern San Pablo Bay. Many of the shrimp populations are now isolated from one another in disjunct drainage units. In Sonoma County, California freshwater shrimp are known to have occurred and/or still occur in 11 creeks.

Occurrence in Airport Region. The three creeks closest to the study area known to support California freshwater shrimp are Blucher Creek, a tributary to the Laguna de Santa Rosa, and Jonive and Green Valley creeks which flow directly into the Russian River near Rio Dell. All these drainages are over five miles from the study area. Mark West Creek, located just outside the study area may also provide suitable habitat for California freshwater shrimp, based on the prevalence of exposed roots and vegetation extending into the water, and the creek's historic perennial flows. However, this species has not been observed in the creek.

Occurrence Within the Study Area. There are no records of the California freshwater shrimp within the study area. Redwood Creek and Airport Creek do not provide suitable habitat for California freshwater shrimp due to a lack of undercut banks to provide refuge during high flows, and a paucity of exposed roots and vegetation extending into the water on which the shrimp can move and forage. Neither creek historically provided suitable shrimp habitat because of their original ephemeral conditions. Both creeks originate in small drainage basins that would not have provided adequate runoff for perennial flows. Their current more perennial hydrology appears to be associated primarily with urban runoff from the extensive developed and landscaped areas upstream of the study area and winter storm flows. Given these past and present conditions, it is unlikely that California freshwater shrimp ever occurred in Redwood or Airport Creeks.

LSA Biologists Steve Foeman (Federal Permit #TE842267-1) and Eric Lichtwardt conducted a habitat assessment of Redwood and Airport Creeks within the study area on February 2, 2006. The assessment verified the lack of suitable habitat conditions for freshwater shrimp in the vicinity of the study area. Dip-net sampling was not practical in most areas along the creeks due to relatively high runoff from recent rains. Nevertheless, limited sampling was conducted where feasible, with negative results.

4.8 STEELHEAD (*ONCORHYNCHUS MYKISS*)

USFWS – Threatened species.

CDFG – California species of special concern.

Status and Life History. The following discussion of steelhead biology is based on Moyle (2002) and USFWS (1997). The steelhead is a native salmonid of the North Pacific Ocean and the associated fresh water drainages of western North America and northeast Asia. Steelhead have a complex life cycle, with some fish exhibiting anadromy (spawning in freshwater, juveniles migrating to the ocean, then adults returning to spawn in their natal freshwater rivers and creeks) and others being freshwater residents (spending their entire lives in freshwater). In North America steelhead historically inhabited most coastal creeks and rivers from Alaska to California, as well as inland rivers and creeks in the Pacific drainage including Idaho and western Montana.

Steelhead are an anadromous (sea-run) strain of rainbow trout and are closely related to Pacific salmon (*Oncorhynchus* spp.). Like Pacific salmon, steelhead migrate from the ocean to freshwater streams to spawn. Unlike most Pacific salmon, many steelhead survive and return to the sea after spawning, and may spawn again in subsequent years. Juveniles spend from one to three or more years in their natal creeks before going to sea. Young steelhead and salmon migrating to the sea are known as smolts. Smoltification is a process of physiological change that occurs as the juvenile fish migrate downstream on their way to the sea. After entering the sea, steelhead grow rapidly to adult size. Most steelhead return to their natal drainages to spawn after spending two or three years at sea, although some, usually males (called *half-pounders*), may overwinter in fresh water after spending the summer at sea.

In the Laguna de Santa Rosa system (including Windsor and Mark West Creeks), the steelhead spawning run generally occurs between December and the end of April. Steelhead movements are determined by an interaction of the breeding condition of the fish and winter rainfall patterns. Most steelhead enter the Russian River from December to February, but often remain in the main river for some time and do not enter smaller tributary streams, such as the Windsor and Mark West Creeks, until runoff events occur. Rainstorms cause the water to rise and turbidity to increase. Shortly thereafter, as flow and turbidity in the swollen creeks begin to decrease, the fish typically move upstream. This pattern may be considerably modified, for example, by lack of rainfall at the appropriate time, in which case fish may take advantage of any rise in stream flow, however minor, that might occur.

Steelhead require specific types of habitat for nest-building (nests are referred to as redds) and spawning, for successful incubation of the eggs, and for feeding and rearing of the young fish prior to their becoming smolts and making their downstream migration to the sea. Steelhead spawn in areas

where water depth ranges from 4 to 28 inches. The general requirements for this species include coarse, clean, well-oxygenated gravel for making redds and spawning, where the embryos will be allowed to develop undisturbed, at appropriate temperatures and with ample water movement to supply oxygen and remove metabolic wastes. The optimal temperature range for spawning in northern California is approximately 39-57°F. Incubation time decreases with increasing temperature, but higher temperatures also increase the virulence of pathogens and the toxicity of any harmful contaminants in the water. Water temperatures above about 64°F are generally unfavorable, and sustained temperatures above 72-77°F are lethal to embryos and juveniles.

Developing embryos require high dissolved oxygen levels (near saturation) within the redd. Maintenance of high oxygen levels depends on a continuous flow of well-oxygenated water through the gravel; thus, the gravel must be fairly coarse (usually 0.8- 4 inches diameter), stream velocity above the gravel in the range of 0.7-2.9 feet/second and the gravel must be free from excessive quantities of suspended or deposited sediment. Accumulations of fine sediment (< 0.08 inches particle size) resulting from erosion, logging, poor agricultural practices, reduced stream velocity, etc., directly affect viability of embryos, emerging fry, and juveniles. In addition, sedimentation reduces the carrying capacity of the stream by reducing invertebrate food production and available shelter in crevices beneath cobble and boulders.

After emerging from the gravel, juvenile (often referred to as parr) steelhead continue to require well-aerated, cool, clean water free from excessive loads of sediment, as well as a supply of invertebrate food and shelter for resting and protection from predators. Steelhead fry are inclined to occupy riffles; however, in small California streams, such as Windsor Creek, riffle surface areas greatly diminish during the dry season relative to pools, and steelhead occur mainly in pools in these instances.

Distribution. Steelhead historically were distributed throughout the North Pacific Ocean from the Kamchatka Peninsula in Asia to the northern Baja Peninsula. Currently, this species occurs from the Kamchatka Peninsula, east and south, along the western coast of North America to at least San Mateo Creek in San Diego County. This species occurs in both coastal streams and inland waters (usually referred to as redband trout in inland streams).

Occurrence in the Airport Region. Within the Airport region, steelhead occur in suitable habitat throughout the Russian River drainage; however, spawning areas are concentrated in the middle and upper reaches of its tributary streams. Although suitable spawning habitat is present mainly in the tributary streams (e.g., Mark West Creek), the river and its major tributaries are essential movement corridors for fish migrating up and downstream to and from the spawning areas. In the Airport vicinity steelhead occur (depending on the season) in the Laguna de Santa Rosa, Mark West Creek, and Windsor Creek.

Occurrence within the Study area. There are no records of steelhead from Redwood or Airport Creeks. As noted above, are warm water creeks that were probably ephemeral before upstream development and associated landscaping provided a perennial water source through urban runoff. They do not extend east of U.S. Highway 101 and do not receive runoff from the foothills to the east. LSA Biologists conducted a steelhead habitat assessment of Redwood and Airport Creeks within the study area on February 2, 2006. Field observations verified that both creeks are slow flowing with mud banks and bottoms. The creeks did not contain suitable spawning, rearing, or migration habitat for steelhead.

4.9 CALIFORNIA TIGER SALAMANDER (*AMBYSTOMA CALIFORNIENSE*)

USFWS - Endangered species.

CDFG – Species of special concern.

Status and Life History. The following discussion of California tiger salamander biology is based on Shaffer and Trenham (2005) and Stebbins (2003). The Sonoma County population of the California tiger salamander is a federally listed endangered species and a California species of special concern. Seasonal wetlands, vernal pools, or slow-moving, calm streams that typically do not support fish, bullfrogs (*Rana catesbeiana*), red swamp crayfish (*Procambarus clarkii*), or signal crayfish (*Pacifastacus leniusculus*) provide suitable breeding habitat. Upland habitat with small mammal burrows must be adjacent or near to the breeding habitat.

California tiger salamander spend the majority of their lives underground in California ground squirrel (*Spermophilus beecheyi*) or Botta's pocket gopher (*Thomomys bottae*) burrows, or in other suitable under ground retreats. On the Santa Rosa Plain, where California ground squirrels appear to be absent or very rare, California tiger salamanders use primarily pocket gopher burrows. California tiger salamanders emerge from their burrows on only a few nights each year during the rainy season to migrate to their breeding ponds. Breeding ponds and streams usually hold water through the month of May to allow time for larvae to fully metamorphose.

Distribution. The California tiger salamander occurs in central California from the central Sacramento Valley to the central San Joaquin Valley and surrounding foothills of both the Coast Range and the Sierra Nevada. The species is also recorded from the San Francisco Bay region, the Monterey Bay region, and valleys and foothills in San Luis Obispo and Santa Barbara counties. A geographically isolated and genetically distinctive population also occurs on the Santa Rosa Plain and in areas north of Petaluma in Sonoma County. The actual occurrence of the species within this range is restricted to locations where aquatic breeding sites are surrounded by suitable upland habitat.

Occurrence in Airport Region. Although the Airport is within the presumed historic geographic range of the California tiger salamander, there are no records of this species within 3.1 miles (5 km) of the study area. The closest occurrence of this species is approximately 3.2 miles (5.15 km) southeast of the site at the Alton Lane Mitigation Site (Figure 4). The landscape surrounding the Airport is dominated by agricultural land uses (e.g., vineyards) and developed areas generally not favorable to California tiger salamanders; however, there are also sizable patches of non-native grassland and pasture land (Figure 6).

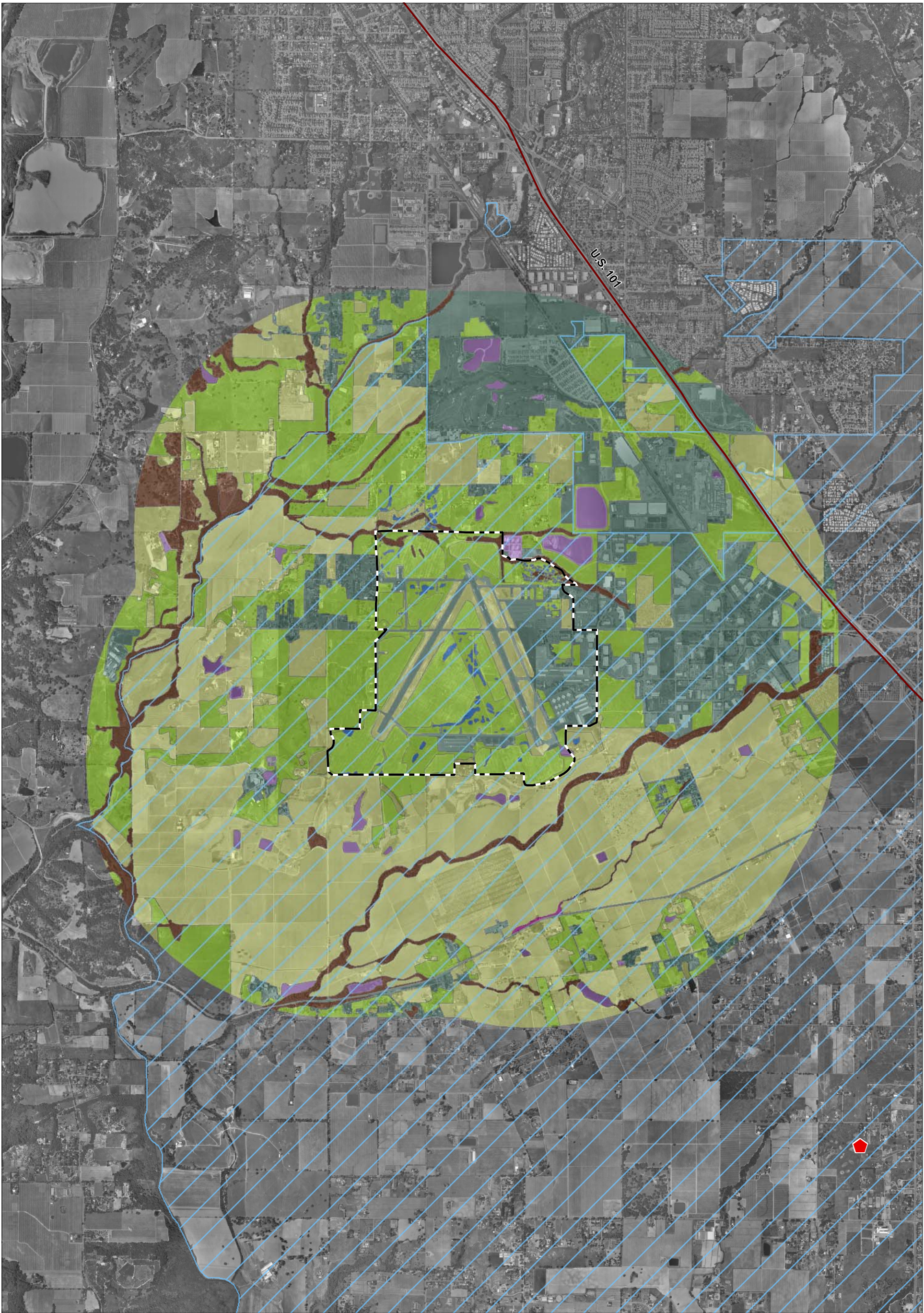
The Alton Lane Mitigation Site, south and west of Alton and Fulton roads, respectively, is a mitigation site composed of naturally-occurring and artificially-created vernal pools and swales. California tiger salamander larvae were first reported at the site in 1996 and then again in 2002 (CNDDDB 2004). However, according to Charlie Patterson (pers. comm.), the occurrence of California tiger salamanders at this site is the result of introduced individuals and not a naturally-occurring population. The next closest known, extant breeding area is at the California Department of Fish and Game Wright Mitigation Bank at Wright Avenue and Hall Road about 6 miles (9.6 km) south of the Airport. Another large breeding site occurs about 6.5 miles (10.5 km) south of the Airport at Kelly Farm and Duer Road. The majority of the California tiger salamander occurrence records for the Santa Rosa Plain region are located southwest of Santa Rosa (*i.e.*, over 7.5 miles [12 km]) south of the Airport.

There are no known records of California tiger salamanders in the northern portion of Santa Rosa Plain (*i.e.*, north of Mark West Creek) and the only known occurrence north of Santa Rosa Creek is the introduced population at the Alton Lane Mitigation Site, discussed above.

LSA biologists have conducted aquatic surveys for California tiger salamander larvae at a number of locations within a mile of the Airport over the past few years; larva have not been found on any of these sites. One site in particular, the Sonoma County Consolidated Mitigation preserve (SACMA) has been surveyed annually for the past five years (Figure 3). Approximately 48 pools and seasonal wetlands were created on this site for wetland mitigation purposes. The pools have been sampled once each spring on an annual basis and no tiger salamander larvae have been observed. The Pacific treefrog (*Pseudacris regilla*) is the only amphibian that has been observed in the pools.

LSA has also surveyed pools at the SACMA II Preserve (Duran mitigation site) located just north of the Airport at the southwest corner of Windsor and Sanders roads (Figure 3). The pools on this site were constructed within the last 3 years and sampled in the spring of 2003 for tiger salamander larvae; no larvae were observed. Other pools along Windsor Road on the west side of the Airport were sampled as part of the City of Santa Rosa's Geysers Recharge project and no tiger salamanders were observed. Field sampling and distributional information all suggest that California tiger salamanders absent form the area around of the Airport. The California tiger salamander is considered potentially present in the region around the Airport based on a presumed historic range.

Occurrence within the Study area. There are no records of California tiger salamanders within the study area. LSA biologists surveyed the vernal pools in the Goldfields Preserve for California tiger salamander larva in 2005 and none were found. Based on the lack of historical records of California tiger salamanders from the northern portion of the Plain (*i.e.*, north of Santa Rosa Creek) and the negative finding of numerous surveys for California tiger salamander in the area around the Airport it is unlikely that this species occurs within the study area (Figure 3).



LSA



0 625 1,250 2,500
FEET

- PROJECT AREA
- ★ CALIFORNIA TIGER SALAMANDER BREEDING SITE
- ▨ USFWS POTENTIAL CTS RANGE
- AGRICULTURE
- NON-NATIVE GRASSLAND (INCLUDES RUDERAL GRASSLAND AND PASTURE)

- RIPARIAN WOODLAND/VALLEY OAKS
- PERENNIAL PONDS
- SEASONAL WETLANDS (INCLUDES VERNAL POOLS)
- CREEK
- DEVELOPED

FIGURE 6

Charles M. Schulz
Sonoma County Airport
Biological Assessment

Generalized Habitats and
Water Bodies within 2
Kilometers of the Project Area

5.0 SANTA ROSA PLAIN CONSERVATION STRATEGY

The *Final Santa Rosa Plain Conservation Strategy* (Strategy) was developed to create a long-term conservation plan to mitigate for the potential adverse impact of future development on federally-listed plants and animals in the Santa Rosa Plain (Conservation Strategy Team 2005). The Strategy protects and contributes to the recovery of Burke's goldfields, Sonoma sunshine, Sebastopol meadowfoam, many-flowered navarretia, and California tiger salamander. The Strategy also incorporates earlier USFWS Section 7 guidance for projects that would affect listed vernal pool plants or their habitat, i.e. the *Programmatic Formal Consultation for the U.S. Army Corps of Engineers 404 Permitted Projects that May Affect Four Endangered Plant Species on the Santa Rosa Plain* (USFWS 1998a).

The Strategy identifies eight conservation areas for listed plants and California tiger salamanders, one listed plant and California tiger salamander preserve system, and one listed plant conservation area. Conservation areas delineate lands where project-related impacts to listed species should be mitigated. The Strategy also encourages the establishment of preserves within these areas; translocation of listed species; habitat improvement through wetland creation, restoration and enhancement; and mitigation measures to reduce and compensate for impacts. Projects in the Santa Rosa Plain that potentially affect these federally-listed species should evaluate those effects and implement mitigation measures based on recommendations in the Strategy.

Under the Conservation Strategy, a large portion of the undeveloped parts of the study area falls within the "Windsor Listed Plant Conservation Area" (Figure 7). The remainder of the undeveloped areas are located either within an area described as "Potential for Presence of California Tiger Salamander and Listed Plants" or within designated Mitigation Preserves (i.e., SACMA, SACMA-2, Goldfields Preserve and the Laughlin Road Mitigation Area).

The Conservation Strategy and the earlier Programmatic Biological Opinion for listed plants contain various mitigation guidelines and requirements that would apply to any projects in the study area. These are summarized below:

Lands designated on Figure 7 as "Existing Mitigation Preserves" are permanently protected. Impacts to these lands would generally not be allowed.

Lands designated in Figure 7 as "Windsor Listed Plant Conservation Area" and within the Potential for Presence of California Tiger Salamander and Listed Plants" are subject to the following minimum mitigation guidelines:

- Minimum replacement of vernal pools and seasonal wetlands at 1:1 ratio. Higher ratios may be needed depending on the quality of the wetland being impacted, as determined by application of a Habitat Quality Evaluation rating system, defined in the Programmatic Opinion.
- Minimum preservation ratio of 1:1 for all potential endangered plant habitat, which would essentially be all vernal pools and other seasonal wetlands within the study area for which the botanical surveys (Appendix B) did not find listed plants to be present. For vernal pools and

seasonal wetlands that are documented in Appendix B to contain listed plants, the preservation ratio is 2:1 (if preserved in a designated Mitigation Bank of Preserve), or 3:1 if preserved elsewhere. It should be noted that the USFWS encourages the establishment of endangered plant mitigation banks within the lands designated in Figure 7 as "Windsor Listed Plant Conservation Area."

- Monetary contribution into an established a California tiger salamander mitigation fund for impacts to all land (upland or wetland) not currently developed. The contribution would need to be at a 0.2:1 mitigation ratio which, under the current fund, is equal to approximately \$27,600/acre. This mitigation fee could be avoided if protocol-level surveys were conducted and found that tiger salamander are absent from the site.

6.0 REPORT CONTRIBUTORS

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