SHARP PARK WILDLIFE SURVEYS 
AND SPECIAL STATUS REPTILE AND AMPHIBIAN RESTORATION 
RECOMMENDATIONS

Prepared for:
Tetra Tech
1020 SW Taylor Street, Suite 530
Portland, OR 97205
(503) 223-5388

Prepared by:
Swaim Biological Incorporated
4435 First Street, PMB 312
Livermore, CA 94551
(925) 455-8770

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Executive Summary

SBI conducted a literature and existing survey data review for Sharp Park and the vicinity to update the information in the previous enhancement plan (PWA 1992). We also conducted visual surveys western pond turtle (WPT) at Sharp Park from January through June 2008. Visual Surveys for the California red-legged frog (CRLF) and San Francisco garter snake (SFGS) were conducted at and near the following aquatic habitats: Horse Stable Pond (HSP), Laguna Salada (LS), the canal connecting HSP and LS, Sanchez Creek west of Highway 1, and Arrowhead Lake east of Highway 1 and the Archery Range. We conducted limited trapping surveys (under a separate contract) for SFGS and CRLF at Horse Stable Pond, the canal and the western side of LS. Surveys for the San Francisco forktail damselfly (FTDF), and salt marsh common yellowthroat (SMYT) were also conducted west of Highway 1 to determine the status of these species. During the course of the study we identified to the extent possible limiting factors for the special status reptiles and amphibians on the site and their prey species.

The survey results indicate that California red-legged frogs successfully breed primarily in HSP, but also breed in the Canal and Arrowhead Lake. California red-legged frogs breed at Laguna Salada (LS) in relatively high numbers, but breeding success and recruitment appears to be very limited because of combination of unsuitable vegetation structure and hydrology issues.

Although use of HSP, LS and the connecting canal has been documented in the past as recently as 2006 (HSP and LS only), the San Francisco garter snake was not observed at Sharp Park during the 2008 surveys. Concurrent surveys at Mori Point to the south documented five individual SFGS that were captured a total of ten. One male western pond turtle was captured in Laguna Salada and others many have been sighted, but data are insufficient to determine if a breeding population exists. Numerous sightings of salt marsh common yellowthroats throughout Horse Stable Pond, Laguna Salada and the Canal suggest that several breeding pairs nested in Sharp Park during the survey period. A single San Francisco forktail damselfly was observed on the northern side of Horse Stable pond, indicating that the species continues to persist in the study area. PWA (1992) sufficiently covered the enhancement and constraints issues for SMYT and FTDF and no new recommendations or discussion is presented.

The primary limiting factor for the California red-legged frog is the deterioration of breeding habitat as Laguna Salada due to a combination of inappropriate vegetation structure for successful breeding. The California red-legged frog would benefit significantly from restoration actions that facilitate creation and enhancement of productive breeding habitat at any and all the aquatic features within Sharp Park. The constraint on creation would be to avoid completely isolating an aquatic feature within golf course features that do not maintain aquatic connectivity to other breeding habitat. For CRLF breeding, we recommend creating open water habitats adjacent to existing emergent vegetation in Laguna Salada, the Canal, Sanchez Creek and Horse Stable pond to promote breeding of California red-legged frogs. Our recommendations are mostly in line with those made by PWA (1992).
Laguna Salada and the canal contain functionally little or no secure upland habitat for the San Francisco garter snake adjacent to the aquatic feature. This is one of the primary limiting factors for the snake. This lack of suitable upland with nearly constant disturbance by golf activity during the day minimizes the connectivity between Horse Stable Pond and LS. For SFGS that do make it to LS, the structure of the aquatic vegetation at LS currently provides extremely poor foraging habitat for SFGS. Use of LS by the snake exposes the snake to the potential for mortality as well from mowing, crushing by carts and people because in its current condition, the edges of LS are the most likely pathways for the SFGS to follow.

SFGS recovery in the form of increased distribution and carrying capacity in Sharp Park will not be accomplished by simply increasing CRLF breeding habitat or numbers in general. To increase SFGS use of the west and north perimeter of HSP, LS, and the connecting Canal, will require development of additional undisturbed suitable upland habitat in these areas. Increased use of the northern bank of HSP, the connecting canal, and LS is desireable from an enhancement and recovery standpoint, but could present significant golf course management issues because of its fully-protected status. Although limited take can be authorized during the recovery actions, it cannot be authorized for golf course management activities.

For SFGS, we recommend providing upland areas for basking, retreat and migration on the eastern and southern sides of Laguna Salada for garter snakes. Creating a wide zone of unmowed, undisturbed vegetation adjacent to, and along the length of the Canal would benefit the San Francisco garter snake by providing both upland habitat and an adequate seasonal movement corridor to Laguna Salada and potentially attract a resident segment of the local population to use the area consistently throughout the year. Depending on the configuration, restored upland habitats may need to be enclosed with fencing to prevent both golf and other park visitors (pedestrian and bicycle) from impacting these habitats and listed species using these areas. At Arrowhead Lake, we support significant reduction in non-native tree cover to increase suitable habitat connectivity with SFGS populations in the Crystal Springs watershed, and upland habitat enhancement for the SFGS. We also recommend determining whether large predatory fish occur in Laguna Salada and Arrowhead Lake and if so, removing them.

Measures for avoiding take of listed species while performing habitat enhancement activities. It also makes recommendations for further studies to monitor and assess the effectiveness of habitat enhancements.
1.0 INTRODUCTION

1.1 Project Background

As part of our agreement to provide biological support services for Tetra Tech, SBI compiled literature and database records and conducted field surveys for special-status wildlife species at Sharp Park. Results of this study will be included in the Laguna Salada Resource Enhancement Plan developed by the City of San Francisco Department of Recreation and Parks and the San Francisco Planning Department.

The information contained in this report follows several studies conducted at Sharp Park over the past decades. Surveys for the San Francisco garter snake first were conducted at Sharp Park in the mid 1940s and were repeated on subsequent occasions until the most recent published surveys in 2006 (SBI 2006). Habitat conditions and species abundance varied during this time and present conditions reflect the history of local environmental events as well as historic and current land use practices. This report summarizes the results of the historical surveys conducted at the site and provides a description of current habitat conditions and use by listed species.

1.2 Report Purpose

This report provides a summary of the existing information, including findings of surveys conducted specifically in support of the Biological Assessment for the Laguna Salada Restoration Project in 2008. We report on the presence and where possible the distribution of the California red-legged frog (*Rana draytonii*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), San Francisco forktail damselfly (*Ischnura gemina*), salt marsh common yellowthroat (*Geothlypis trichas sinuosa*), and western pond turtle (*Clemmys marmorata*) within Sharp Park. The results of our field surveys and opportunities to enhance habitat within the study area with regard to the target species are discussed. We also propose measures to reduce the risk of accidental “take” of listed species during enhancement implementation and ongoing golf course operations and maintenance. This report focuses primarily on the federally threatened California red-legged frog and federally endangered and state endangered and fully protected San Francisco garter snake.

1.3 Project Location and Study Area

Sharp Park is located in the town of Pacifica in San Mateo County, approximately 15 miles south of San Francisco. It covers an area of approximately 400 acres, extending westward from the lower slopes of the Coast Range (Sweeney Ridge) to the Pacific Ocean just north of Mori Point (Figure 1).
Sharp Park’s location near several open space areas makes it an important part of the overall distribution of San Francisco Garter Snake and California red-legged frog on the San Francisco Peninsula. The Golden Gate National Recreation Area (Mori Point) borders Sharp Park to the southwest and supports San Francisco garter snake and California red-legged frog. Habitat enhancement projects in 2004, 2005 and 2007 increased the amount breeding habitat for California red-legged frog and foraging habitat for the San Francisco garter snake at Mori Point. Sweeney Ridge GGNRA lies to the east and southeast and provides habitat for the California red-legged frog. San Francisco garter snakes were recently detected at the north end of San Andreas Reservoir, just east of Sweeney Ridge (SBI 2008 unpubl. data). To the north of Sharp Park, Milagra Ridge GGNRA supports California red-legged frogs and contains habitat suitable to support San Francisco garter snakes. To the south beyond Mori Point, the Caleras Creek watershed supports a large population of California red-legged frogs and also includes potential habitat for the San Francisco garter snake. Movement of individual San Francisco garter snake and California red-legged frog probably occurs between some or all of these sites, and Sharp Park provides suitable habitat for dispersal and foraging for both species as well as being a source population for California red-legged frog.

USFWS (1995) included Sharp Park among six locations supporting a significant population of San Francisco garter snakes and considered essential to their long-term survival. Since that time additional populations have been located, but geographically, Sharp Park still represents the northernmost known population of the San Francisco garter snake. Fox (1951) believed that the population of San Francisco Garter Snake occurring on the coast around Laguna Salada and along Skyline Boulevard represented the purest examples of the subspecies.

1.4 Regulatory Context and Species Accounts

1.4.1 San Francisco Garter Snake

The SFGS was one of the first species to be designated federally endangered in 1967: state listing followed in 1971. The SFGS is also a fully protected species, meaning that the CDFG cannot permit take (add definition), except for recovery actions. SFGS populations have severely declined over the past century. This species has suffered from habitat loss due to urbanization, collection by the black-market pet trade, and decline of its main prey species, the California red-legged frog.

SFGS have a yellowish-green dorsal stripe, edged with black, bordered by a red stripe, then black again on both sides. The belly is blue-green and the top of the head is red (Stebbins, 2003). Juveniles have the same coloration as adults.

Historically, SFGS occurred in scattered wetlands and the associated matrix of uplands along the San Francisco Peninsula, from just south of the San Francisco County line south to Waddell Creek, Santa Cruz County, and along the base of the Santa Cruz Mountains to at least Upper Crystal Springs Reservoir (U.S. Fish and Wildlife Service, 1985). SFGS enter into a zone of intergradation with conspecific California red-sided garter snake (T. sirtalis
infernalis) just south of the Pulgas water temple (Crystal Springs Reservoir, San Mateo Co.) into extreme northern Santa Clara County around Stanford University campus (Barry, 1994).

They are found at permanent and seasonal freshwater wetlands that provide dense vegetation for cover, open habitats for basking, and are nearby to upland areas where snakes may retreat into rodent burrows through winter (Barry 1994). Typical upland habitats are annual grassland and coastal prairie. The presence of preferred prey items, Pacific chorus frogs (*Pseudacris regilla*) and California red-legged frogs (*Rana draytonii*), is a key component of suitable San Francisco garter snake habitat.

In general, garter snakes are highly mobile and tend to move seasonally between breeding, foraging and upland sites. The San Francisco garter snake appears to be particularly active in the spring, possibly a result of mate seeking (Larsen 1994). In one study a snake moved a straight line distance of 2.1 km over a period of several months (Wharton 1989). We reviewed all available historical accounts of surveys conducted at Sharp Park and in the vicinity. Recent surveys include a trapping study for the San Francisco garter snake conducted by SBI in Sharp Park that sampled portions of the habitat adjacent to Laguna Salada, the canal leading to Horse Stable Pond, Horse Stable Pond, Arrowhead Lake and Mori Point (SBI 2005). Additional surveys were conducted at Mori Point in 2004, 2006 and 2008 in association with two pond creation projects (SBI 2006). These surveys included data on both California Red-Legged frog and San Francisco Garter snake distribution and abundance at the site. We also compiled locality data for the California red-legged frog and Western pond turtle from California Natural Diversity Database (CNDDB) records and museum database collections. Salt marsh common yellowthroat and San Francisco forktail damselfly occurrence at the site was described in the Laguna Salada Resource Enhancement Plan (PWA 1992) and is considered in our analysis.

The first records of the San Francisco garter snake at Sharp Park were made in the mid-1940s and published in the early 1950s (Fox 1951). The specimens were collected from Laguna Salada, specifically the eastern most pool. The snake apparently existed in abundance but came under collecting pressure first by zoologists and later by reptile enthusiasts. Collection by scientists waned during the 1960s as awareness of its decline increased, and in 1967 the snake was listed as a Federal endangered species, followed by a California state endangered listing in 1971. With increased awareness of the rarity of the snake however, collecting pressure for the pet trade increased at Sharp Park, a highly accessible collecting site (McGinnis 1988) and the population probably continued to remain relatively low during the first part of the 1970s. Surveys in the late 1970s detected the presence of numerous San Francisco garter snakes at Horse Stable Pond (Barry 1979) and at Mori Point (Barry 1978) and the species appeared to be recovering. In the early 1980s however, saltwater intrusion through the eroding seawall caused the numbers of California red-legged frogs and San Francisco garter snakes at Sharp Park to decline (McGinnis 1988). Numerous surveys during the 1980s resulted in the detection of one adult and one newborn garter snake in the upland area east of Horse Stable Pond (McGinnis 1986b). By the latter half of the 1980s the San Francisco garter snake population at Sharp Park and Mori Point appeared to be on the verge of extinction (McGinnis 1988). Surveys in the early 1990s suggested that numbers were still
low; three juvenile snakes were found at Mori Point and none were observed at Sharp Park (PWA 1992).

The results of a series of trapping studies at Mori Point and Sharp Park since 2004 suggest that the San Francisco garter snake population again may be increasing, at least at Mori Point. Trapping surveys conducted in association with a habitat enhancement project at Mori Point in 2004 and 2006 resulted in the capture of six and thirteen San Francisco garter snakes, respectively (SBI 2006). In 2004 an additional four garter snakes were captured at Horse Stable Pond, and a juvenile was captured along the west side of the connecting canal between HSP and LS (SBI 2005). In 2008, five San Francisco garter snakes were captured at Mori Point in a study conducted for the U.S. Fish and Wildlife Service (SBI, unpubl. data).

1.4.2 California Red-legged Frog

The California red-legged frog (*Rana draytonii*) is a federally endangered species and considered a species of special concern by the state of California. It is California's largest native frog (Wright and Wright 1961) at 85.0-138.0 mm snout-vent length. It is brown to reddish-brown with diffuse moderate-sized dark brown to black spots that occasionally have light centers (Storer 1925). The California red-legged frog can be easily identified by its distinct dorsolateral folds, also usually visible on larvae. Dark bands stripe the dorsal side of the hind legs and red coloration is typical of the ventral side of the hind legs (Stebbins 2003).

In California, red-legged frog populations are distributed from Shasta County south to the Mexican border. Introduced populations also currently exist in south-central Nevada (Linsdale 1940, Green 1985). California red-legged frogs inhabit humid forests, woodlands, grasslands, and stream sides (Stebbins 2003) characterized by dense, shrubby riparian vegetation associated with deep (0.7 m), still, or slow-moving water (Hayes and Jennings 1988). Emergent vegetation is ideal for cover and egg attachment (Storer 1925).

California red-legged frogs are generally found in close proximity to water, but often disperse to upland habitat after rains (Stebbins 2003). Although the majority of frogs at some locations remain at the breeding site year round, long-distance movements of up to 3,600 meters to and from non-breeding sites have been observed (Bulger et al. 2003).

One-hundred percent mortality occurs in California red-legged frog egg masses at salinity levels of 4.5 parts per thousand (Jennings and Hayes 1990), and larvae cannot survive in concentrations higher than 7.0 parts per thousand (M. Jennings in litt. 1993 cited in USFWS 2002). The presence of egg masses in Laguna Salada, the Canal and Horse Stable Pond suggest salinity levels of less than 4.5 ppt during the breeding season. Historic pesticide use has been linked with declines in California red-legged frog and other amphibian populations located downwind (Davidson 2004).
1.4.3 Western Pond Turtle

The western pond turtle (*Clemmys marmorata*) is not listed by the federal government but is a California species of special concern. It is a medium-sized turtle reaching about 22 cm in length with a low carapace, olive, brown or blackish in color usually with a dark radiating pattern on its shields (Stebbins 2003). Historically, this turtle had a relatively continuous distribution in most Pacific slope drainages from Klickitat County, Washington, along the Columbia River to northern Baja California, Mexico. In California, it was historically present in most Pacific slope drainages between the Oregon and Mexican borders (Jennings and Hayes 1994). The Western pond turtle is a California species of special concern and is declining over the majority of its range.

Western pond turtles require some still- or slow-water aquatic habitat. Habitat quality seems to vary with the availability of aerial and aquatic basking sites; however, western pond turtles often reach higher densities where many aerial and aquatic basking sites are available. Hatchlings require shallow water habitat with relatively dense submergent or short emergent vegetation in which to forage. Pacific pond turtles also require an upland oviposition site in the vicinity of the aquatic site. Suitable oviposition sites must have the proper thermal and hydraulic environment for incubation of the eggs. The thin shelled eggs of these turtles are suited to development in a dry nest; in an excessively moist nest (irrigated areas), eggs have a high probability of failing. Nests also are typically located on a slope that is unshaded to ensure that substrate temperatures would be high enough to incubate the eggs.

This aquatic turtle usually leaves the aquatic site to reproduce, aestivate, and overwinter. Western pond turtles may overwinter on land or in water, or may remain active in water during the winter season (Jennings and Hayes 1994). Mating, which has been rarely observed, typically occurs in late April or early May, but may occur year-round. Females migrate from the aquatic site to an upland location and deposit from one to thirteen eggs in a shallow excavation. The nesting site can be more than 400 meters from the aquatic site (Storer 1930; Reese 1996), but average distance is probably less than 200 meters (Jennings and Hayes 1994). Females may lay more than one clutch per year, usually during May and June, although some individuals may deposit eggs as early as late April and as late as early August (Jennings and Hayes 1994).

1.4.4 San Francisco Forktail Damselfly

The San Francisco forktail damselfly is known to occur only in the San Francisco Bay Area and is listed as an IUCN Red List Endangered species. Its range extends from Point Reyes, in Marin County to approximately San Jose, Santa Clara County, with most known populations occurring around the San Francisco Bay including the wetland habitats at Sharp Park (Garrison and Hafernik 1981; Hafernik 1989). Males are dark in color with blue patterns on the thorax and tip of the abdomen. Females are more cryptically colored tending to greenish or brown. A relatively long flight season and its ability to remain active during
cool, windy and foggy days are probably adaptations to life in the San Francisco Bay Area (Garrison and Hafernik 1981).

The San Francisco forktail damselfly is associated with wetlands and slow-moving waters in the San Francisco Bay Area. Naiads and adults are predaceous and feed on invertebrates including small crustaceans and insects. Adults tend to perch on horizontal substrates and use both aquatic vegetation and nearby grasses and shrubs.

1.4.5 Salt Marsh Common Yellowthroat

The salt marsh common yellowthroat is one of 12 subspecies of the common yellowthroat recognized north of Mexico (Menges 1998). As its name suggests, it is relatively abundant in appropriate habitats, yet this subspecies is in decline due to loss of wetland habitats (Menges 1998). Currently it is listed as both state and federal Species of Concern. The subspecies is generally identified by range and breeding habitat. Some suggest that salt marsh common yellowthroats are distinguishable by sight and song (Grinnell 1901, Marshall and Dedrick 1994, Raby 1992).

The male common yellowthroat is distinctive, with a black mask and bright yellow chin and breast. The females are much more cryptic, olive green above with yellow on the chin and crissum (Sibley 2003). They feed on invertebrates and seeds. Pairs are monogamous during the breeding season and often raise two broods of 3-5 young. They are known as one of the three most frequent cowbird hosts (Ehrlich et al. 1988).

2.0 SPECIES SURVEY AND HABITAT ASSESSMENT
METHODS

2.1 Habitat Assessment

The habitat assessment was conducted to document the current vegetation conditions as they relate to habitat for each of the species, to determine if the limiting factors enumerated by PWA (1992) still occur, and to identify any new limiting factors. Our study area also included more detailed habitat assessment and species surveys of the portion of Sharp Park on the west side of Highway 1. The primary purpose of the field surveys was to assess the status of the target species in the project area and identify the habitat within the project area currently being used by the California red-legged frog. Extensive surveys for the San Francisco garter snake were not conducted.

2.2 Field Surveys
We conducted field surveys for the target species from January through July, 2008. These included visual surveys both on foot and by kayak, live funnel-trapping for a brief period using a separate contract (Mori Point and Horse Stable Pond only), nocturnal eye-shine surveys, point counts, dip-netting and seining. We timed the surveys to coincide with peak activity of the target species and refined our plans based on local weather conditions. Surveys for California red-legged frog and San Francisco garter snake were intended to help determine relative abundance and habitat use while surveys for other species were primarily intended to establish whether species were present in the study area.

2.2.1 California Red-Legged Frog

The presence of breeding populations of California red-legged frogs is most easily determined by searching for egg masses. In coastal populations, females may begin to lay eggs in late December to early January, typically attaching them to emergent vegetation or uneven substrate. At Arrowhead Lake, Sanchez Creek, Horse Stable Pond, the Canal, and Laguna Salada we conducted egg mass surveys by walking transects around the perimeter of the water bodies and inspecting the areas near the shoreline for egg masses. At Laguna Salada and Horse Stable Pond we supplemented walking surveys with kayaks to help view the open water-emergent vegetation interface that was inaccessible on foot. To survey the dense emergent vegetation on the east side of Laguna Salada we walked using hip waders or wet suits.

We conducted frog egg mass surveys on foot and by kayak on 1/8, 1/9, 1/14, 1/22, 1/31, 2/6, 2/13, 2/20, 2/26, 3/4, 3/13. We surveyed for postmetamorphs using visual encounter surveys on 2/20 (evening), and incidental observations were recorded daily from 3/27, to 5/5 at Horse Stable Pond, Laguna Salada and the Canal while performing trap checks for San Francisco garter snakes. We performed seining and dip-netting for frogs and tadpoles at Horse Stable Pond, Laguna Salada, the Canal, Arrowhead Lake and portions of Sanchez Creek on 5/20 and 5/21. Other incidental sightings of California red-legged frog were recorded during visual surveys for garter snakes and site visits to document habitat conditions from March through July.

2.2.2 San Francisco Garter Snake

We conducted visual surveys specifically for San Francisco garter snakes on 3/4, 3/13, 3/21, 3/27, 4/1, 4/4, 4/16, 4/21, 5/7, 5/12, 5/21, and 5/30. We also conducted visual surveys daily from 3/27 to 5/5 at Horse Stable Pond, Laguna Salada and the Canal while performing trap checks at Mori Point and Sharp Park.

2.2.3 Western Pond Turtle

Western Pond turtle visual surveys were conducted concurrently with frog egg mass surveys, and a trapping survey was conducted from 5/7 to 5/23. One basking-style trap was placed in
Laguna Salada and one in Arrowhead Lake. Each was checked daily for approximately two weeks.

2.2.4 San Francisco Forktail Damselfly

Visual surveys conducted at Sharp Park in 1990 and 1991 by Arndt and Hafernik suggested a low to moderate population density of San Francisco forktail damselflies (PWA 1992). Their findings were concentrated along the Canal and around the edges of Horse Stable Pond, especially in areas where *Typha* and *Scirpus* grew in lower densities (PWA 1992). Dip net sampling yielded similar results with the highest relative densities of *Ischnura* naiads found in the southern portion of the Canal, although some of their samples also probably contained *I. cervula* (PWA 1992). The results of these surveys suggested that the southern portion of the Canal and margins of Horse Stable Pond were most important for the survival of overwintering naiads (PWA 1992). We conducted visual surveys for San Francisco forktail damselflies concurrently with surveys for frog egg masses and snakes.

2.2.5 Salt Marsh Common Yellowthroat

We conducted timed point count surveys for salt marsh common yellowthroats on 4/4, 4/21, 5/6, and 5/20 and non-point surveys on 3/21 and 3/29. For timed point count surveys, we chose points distributed throughout the study area based on their proximity to suitable habitat around the aquatic features at Sharp Park. All birds that were observed visually or acoustically were recorded during ten-minute intervals at each point.
3.0 RESULTS

Four of the five target species were found to be present in the area of Sharp Park west of Highway 1 and one was observed east of Highway 1 (Table 1). Detailed results for each species are present in the sections below.

<table>
<thead>
<tr>
<th>Species</th>
<th>Arrowhead Lake</th>
<th>Sanchez Creek</th>
<th>Horse Stable Pond</th>
<th>Canal</th>
<th>Laguna Salada</th>
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B = Breeding, NB = non-breeding

Table 1. Summary of Results of 2008 Field Surveys

3.1 California Red-Legged Frog

During our surveys we found a total of 85 California red-legged frog egg masses. The highest concentration was in Horse Stable Pond where we located 57 masses (Figure 2). We also found four egg masses in the Canal and twenty in portions of Laguna Salada. East of CA Hwy 1, we found four egg masses in Arrowhead Lake (Figure 2). No egg masses were found in Sanchez Creek. Tadpoles were captured in Arrowhead Lake, and Horse Stable Pond.

The results indicate that California red-legged frog breeding took place primarily in Horse Stable Pond and to a much lesser extent the Canal, Laguna Salada and Arrowhead Lake (Table 2). Areas that are suitable for foraging and basking but where no sign of breeding was observed include Sanchez Creek and portions of Laguna Salada, notably the north end. Juvenile and adult California red-legged frogs were concentrated in and around Horse Stable.
Pond, the Canal, and Lower Sanchez Creek. In these areas we observed frogs basking in sunlight or sitting under vegetation directly adjacent to the water.

3.2 San Francisco Garter Snake

No San Francisco garter snakes were observed during visual surveys at Sharp Park, including the areas around Lower Sanchez Creek, Laguna Salada, the Canal, and Horse Stable Pond. However, the abundance of prey items in these areas, their proximity to recent observations of the snake at Mori Point and HSP (SBI 2006), and historical occurrence suggest that they are likely to be used by San Francisco garter snakes for foraging and movement. Five San Francisco garter snakes were trapped at a nearby wetlands at Mori Point in 2008 (SBI unpubl. data) and in wetland habitats south of the golf course and east of Horse Stable Pond. On July 9th, Golden Gate National Recreation Area biologists reported seeing a San Francisco garter snake in the ‘north pond’, a few hundred feet east of Horse Stable Pond (S. Bennett in litt 2008).

Arrowhead Lake supports a breeding population of California red-legged frogs and Pacific chorus frogs, and is bounded by dense riparian vegetation, providing suitable foraging habitat for the San Francisco garter snake. Although no San Francisco garter snakes were observed there during these surveys, Arrowhead Lake and the surrounding uplands may be used as habitat. There is a historical record of and SFGS on the parcel north of and adjacent to Sharp Park with no barriers between. San Francisco garter snakes are also known to occupy the SFPUC watershed land to the east around San Andreas Reservoir below Sweeney Ridge.

3.3 Western Pond Turtle

We were unable to determine whether a breeding population of western pond turtles exists at Sharp Park. One male western pond turtle was captured by hand in Laguna Salada on 2/26. Other turtles were observed swimming in Laguna Salada and Arrowhead Lake but could not be identified. The individuals observed were in deep (approximately 2 meters) water near the northern end of Laguna Salada and swimming near the center of Arrowhead Lake. Suitable aquatic habitat for pond turtles exists in both Laguna Salada and Arrowhead Lake, including deep, still water, emergent vegetation, and coarse woody debris for basking. Little upland habitat for nesting exists around Laguna Salada, eggs could be deposited east of Horse Stable Pond or in the upland areas at Mori Point if one or more adult females are present.

3.4 San Francisco Forktail Damselfly

On 5/21, one male San Francisco forktail damselfly was observed at the north end of Horse Stable Pond (Figure 2).
3.5 Salt Marsh Common Yellowthroat

Salt marsh common yellowthroats were observed in cattails east of Horst Stable Pond, near the Canal, and around Laguna Salada, particularly the western edge (Figure 3). We observed no salt marsh common yellowthroats east of CA Hwy 1. Nests were not located during our surveys but breeding and nesting were assumed based on the presence of individuals of both sexes including singing males during the breeding season. We recorded a total of 23 observations of yellowthroats around Horse Stable Pond the Canal and Laguna Salada, although multiple observations of the same individuals were likely. Previously territory sizes in the Bay Area have been estimated at between 0.2 and 2.0 territories per hectare (Foster 1977). We used a simplified estimate of one territory per hectare of suitable habitat, resulting in an estimate of six nesting pairs of salt marsh common yellowthroats at Sharp Park during the 2008 breeding season.

Complete bird lists are provided for the areas east and west of CA Hwy-1 (Appendix 1).

4.0 DISCUSSION

Below we describe the known and potential limiting factors for SFGS, CRLF and WPT at Sharp Park. The limiting factors for each aquatic feature Laguna Salada, Horse Stable Pond, Connecting Channel, Sanchez Creek, and Arrowhead Lake Following the summary statement of the limiting factor, we provide supporting details, as needed, on how these factors impact the species or their habitat directly and/or indirectly. We did not detail the limiting factors on the SMYT or FTDF beyond that of PWA (1992) here and make no further comment on these species.

4.1 Limiting Factors for California Red-Legged Frog and San Francisco Garter Snake

4.1.1 Laguna Salada

Despite its large size and extensive wetland area, less than one-quarter of the total frog egg masses (20 of 87) were found in Laguna Salada. Seventeen of those 20 were found along the eastern margin of LS where it interfaces the golf course adjacent to the rough and fairways of holes X and X.

Although it is the largest aquatic feature in Sharp Park, use of LS by San Francisco garter snakes appears to be very minimal. No SFGS were observed there in 2008 visual surveys or
trapping surveys along the western edge of LS in 2006 or 2008. No traplines were placed on the eastern side during the trapping because all the wetland vegetation and portions of the golf course on the east side were still submerged when the surveys for SFGS began in April 2008.

Below.

1. **Dense vegetation on the eastern margin of Laguna Salada where it interfaces with the golf course provides poor California red-legged frog breeding habitat.**

   A large portion of the area east side of the main open water area of Laguna Salada is covered by very dense stands of cattails and other wetland plants (Photo or figure). When water levels were high in winter 2008 storms, water was trapped on the eastern margin by the dense vegetation of LS (Photo). This created an area on the eastern edge of LS that was structurally the most appropriate and possible only accessible area for CRLF breeding. CRLF deposited all but 3 of the 20 egg masses in this area. This water drains slowly enough toward the open water area of LS to potentially remain long enough to allow some successful hatching of tadpoles from the egg masses, but it is unlikely that tadpoles can reach areas where water remains for full development. As a result this area provides for very limited, if any successful breeding habitat for California red-legged frog and to some degree acts as a sink.

2. **The remainder of Laguna Salada wetland lacks areas that are both accessible to frogs with the appropriate water depths and emergent vegetation for breeding and egg mass attachment.**

   The only interface of persistent open water is on the main body of LS (Figure 1) where it appears frogs can’t readily reach because of the densities of the vegetation and possibly because of predatory fish in the main body of water. If predatory fish are present, the deep water allows large predatory fish to access egg masses and tadpoles, and colder temperatures slow tadpole development. Areas of shallow water that developed on the eastern shore adjacent to the golf course during the winter months provided protection from fish but these areas disappeared by mid-April as the water level receded, leaving insufficient time for tadpole development and metamorphosis.

3. **Virtual lack of suitable secure upland habitat (unmowed, undisturbed) for basking and daily retreats adjacent to LS for SFGS**

4. **Lack of adequate connectivity between HSP and LS along the Canal due to lack of upland and very frequent disturbance by golf activity along the connecting canal during the day**
5. Wetland vegetative structure adjacent to the open water of LS is too dense and not functioning adequately for foraging habitat for SFGS.


Aquatic predators including several species of small fish and Signal crayfish (*Pacifastacus leniusculus*) were observed in Laguna Salada. While the presence of small fish probably does not have a significant negative effect on California red-legged frogs, crayfish and larger fish species prey on one or more life stages of the California red-legged frog and have been a factor in their decline (USFWS 2002). We did not observe any large fish during our surveys but they may exist, particularly in Laguna Salada and Arrowhead Lake.

7. Subsidized Native and Non-native Terrestrial/avian predator Populations Potentially Inflated.

Avian predators including hawks, ravens, crows, herons and gulls benefit from food acquired from human visitors, particularly on the western side of Laguna Salada. Terrestrial predators such as raccoons, opossums, skunks and non-native rats may also be subsidized by food-related trash from Sharp Park and the surrounding developments. Numerous domestic cats were observed in the area, a potentially serious threat to resident snakes and frogs. In January 2006 several cat food containers were found near Horse Stable Pond, presumably left by visitors to the park. This may lead to unnaturally high predation on SFGS and CRLF, especially where adequate cover is lacking on the west side.

8. Park visitors and their pets negatively impact frogs and deter snake movement on the west Laguna Salada.

Non-golf pedestrian/pet use of upland areas surrounding Laguna Salada is concentrated on the west edge where social trails have become established. While pedestrian traffic in this area has the potential to impact snakes and frogs, much of the area consists of sand dunes with ice plant (*Mesembryanthemum crystallinum*), and Monterey cypress (*Cupressus macrocarpa*), vegetation not typically associated with high-quality frog and snake habitat. Emergent bulrushes along the west edge of Laguna Salada remain relatively unaffected by human activity in this area, but heavy foot traffic immediate uphill may prevent the growth of dense vegetation that could provide cover for snakes and frogs.

On several occasions dogs were observed running or swimming through water along the west edge of Laguna Salada. Dog activity in breeding areas could reduce the chances of successful development by crushing frog eggs or dislodging egg masses from emergent vegetation making them more susceptible to predators.
9. Isolated patches of dense vegetation surrounded by bare areas and invasive ice plant
deter movement of snakes on the western side of Laguna Salada

On the west side of Laguna Salada emergent vegetation is interspersed with open beach areas
creating isolated patches of bulrush. Because the San Francisco garter snake tends to avoid
bare areas, these isolated patches of cover provide snakes with habitat of marginal quality.
The former golf course fairway and green southwest of Laguna Salada have become
dominated by invasive ice plant (*Mesembryanthemum crystallinum*), and Monterey cypress
(*Cupressus macrocarpa*), vegetation not typically associated with high-quality snake habitat
and probably act to deter movement of snakes and frogs through the area. Ice plant forms
dense nearly impenetrable mats that impede the movement of snakes through them.

10. Park visitors and their pets may further deter movement of snakes on the west side
of Laguna Salada

Non-golf pedestrian/pet use of upland areas surrounding Laguna Salada is concentrated on
the west edge where social trails have become established and the activity there is relatively
constant.

11. Exposure to potential injury, mortality from golf course operations and
maintenance- mowing, crushing by carts and people.

4.1.2. Horse Stable Pond

Horse Stable Pond was the primary center for California red-legged frog breeding activity in
Sharp Park during our surveys. Over two-thirds of the egg masses we found were here and it
has the highest quality SFGS habitat as detected by past trapping studies.

1. Stranding and mortality of CRLF due to Pumping water/Reduction of SFGS prey

At Horse Stable Pond, receding water levels caused by pumping has stranded egg masses and
caused them to desiccate. Egg masses stranded by receding water levels in Horse Stable
Pond were recorded in 2003, 2004, and 2005 (SFRPD unpubl. data). In 2008 we observed
several egg masses that had been deposited on broken cattail stalks stranded above the water
line following pumping. We were able to bend the cattail further to return the bulk of the
mass into the water to prevent desiccation. While frog egg masses appeared to be resistant
to minor reductions in water level, drawdown of more than a few centimeters poses a
significant desiccation risk to developing eggs attached to emergent vegetation and to those
deposited in shallow water. Once all of the eggs have hatched into tadpoles, the threat posed
by changing water levels is reduced or eliminated so long as sufficient water remains for
development and metamorphosis. Pumping however, may still pose a threat if tadpoles are caught in the pump mechanism or forced from Horse Stable Pond into the ocean.

2. Park visitors and their pets negatively impact frogs at Horse Stable Pond

Similar to LS, visitors to Sharp Park currently allow dogs to run off-leash along the west edge of Laguna Salada and at Horse Stable Pond. Free-roaming dogs potentially may harass or harm snakes and frogs, disturb aquatic habitats including frog oviposition sites, and may disturb turtle nesting sites. During one survey an off-leash dog was observed running through the water at Horse Stable Pond at a time when numerous California red-legged frog egg masses were attached to nearby vegetation.

3. Extremely Minimal upland habitat on north side for SFGS

4.1.3. Sanchez Creek

Portions of Sanchez Creek and its adjacent banks remain moist and cool throughout the year and provide non-breeding habitat for CRLF. The portion of the creek west of the terminus of Fairway drive does not appear to provide-breeding habitat for CRLF.

Limiting factors:

1. Open water areas in Sanchez Creek tend to flow too swiftly to provide oviposition sites for frogs and contains sparse cover in some areas that may deter movement of snakes.

Particularly from the terminus of Fairway Drive east, Sanchez Creek lacks emergent and overhanging vegetation. This area currently provides only marginal habitat for frogs and snakes. Creating a riparian corridor along this portion of the creek would provide suitable non-breeding habitat for frogs and would create a dispersal corridor increasing connectivity between areas bisected by CA-Hwy 1. Water flow through Sanchez Creek is too swift during the red-legged frog breeding season to facilitate breeding east of the terminus of Fairway Drive.

2. Sedimentation of Creek west of terminus of Fairway Drive. Further downstream the creek is sedimented. This area lacks open water and contains extremely dense vegetation, reducing its suitability for frog breeding and egg deposition.
4.1.4. Canal

The canal connecting Laguna Salada with Horse Stable Pond provides breeding and non-breeding habitat for California red-legged frogs, and may serve as a foraging and migration area for San Francisco garter snakes.

Limiting factors:

1. Dense vegetation reduce the suitability of most of the canal for frog breeding and egg mass deposition

Like portions of Sanchez Creek west of Fairway Drive, the canal is sedimented and in some areas has become invaded by cattails. These areas would be more suitable for breeding if they contained a combination of open water and emergent vegetation.

2. Pumping water can strand frog egg masses in the Canal and cause them to fail

As in Horse Stable Pond, drawdown of water in the Canal more than a few centimeters poses a significant desiccation risk to developing eggs attached to emergent vegetation and to those deposited in shallow water. Once all of the eggs have hatched into tadpoles, the threat posed by changing water levels is reduced or eliminated provided that sufficient water remains for development and metamorphosis.

The canal connecting Laguna Salada with Horse Stable Pond provides does not appear to provide suitable connectivity to LS for SFGS in its current condition.

3. The band of unmowed vegetation along the edges of the canal is narrow and provides little upland habitat with burrows and cover for movement. Increasing the buffer of natural habitat along the edges of the canal would provide cover for garter snakes and moving between Laguna Salada and the Horse Stable / Mori Point uplands and would provide much-needed upland habitat for garter snakes foraging in the canal and Laguna Salada

4. The area near the canal is frequently disturbed by golf activity and SFGS would likely need to cross golf course paths and other features to get to LS.

4.1.5. Arrowhead Lake

CRLF currently breed here, but SFGS have not been observed.

1. Large predatory fish, if present, could severely limit red-legged frog breeding success and prey on both SFGS and CRLF.

2. Extensive stands of non-native vegetation limit potential SFGS colonization.
4.2 Other limiting factors

4.2.1 Take Due Golf Operations and Maintenance

1. Impacts to frog and garter snake habitat from golf are likely to occur in areas where the golf course is directly adjacent to wetland and riparian vegetation. Golf may have direct and indirect impacts on frogs and garter snakes.

Portions of Sharp Park Golf Course lie directly to the north of Horse Stable Pond, both sides of the Canal and Sanchez Creek, and much of the perimeter of Laguna Salada, creating a potential for impacts to wildlife and habitat in these areas. Nearby foot and cart traffic, players searching for golf balls and grounds keepers performing maintenance activities may impact wildlife or habitat directly through harassment, trampling of vegetation, and inadvertent harm to individuals by mowing. Indirectly, the golf course may limit the movement of garter snakes to and from foraging habitats by creating large expanses of grass that provides little cover or underground refuges. These areas also probably support few prey items for frogs such as insects and other invertebrates than do more densely vegetated upland areas. In general, the proximity of the golf course to aquatic habitats reduces the amount of surrounding upland vegetation associated with high quality habitat for both species.

3. TTWW- we did not determine if this would be a limitation
4. Pesticides/Fertilizer Runoff- We did not assess whether impacts from pesticide and fertilizer runoff from the golf course or other areas of the watershed are limiting

4.2.2 Collection by Reptile Enthusiasts

5. Reptile collectors present an unknown level of risk to San Francisco garter snakes at Sharp Park

4.2.3 Salinity

6. Salinity: We did not assess water quality, but salinity was sufficiently low to allow frog breeding in 2008
4.3 Enhancement Recommendations and Constraints

4.3.1. Laguna Salada

- Increase the amount of shallow water with emergent vegetation in areas where large fish could not prey on frog eggs. This could be done by:
  1) Dredging the area on the eastern side to create an area of open water with raised banks and separating it from the main portion of Laguna Salada
  2) creating shallow “fingers” radiating out from the edges with open water in the centers and emergent vegetation along the edges

- Increasing available upland habitat for the San Francisco garter snake with an attempt to keep the enhancements from resulting in mortality due to golf course maintenance (primarily mowing). Specific Areas include:
  1) Relocation or shortening and narrowing of hole #13
  2) Narrowing hole #14
  3) Determine feasibility of adding a single hole to the west side in its former location. This is the area that is currently in the poorest habitat condition for SFGS and CRLF. Other restoration species may not benefit from this action.
  4) Investigate potential of moving 1 or 2 holes to the east side of Highway 1.

- Reduce human and pet impacts to wildlife and habitats by posting educational signs

- Currently the area surrounding Laguna Salada and the canal consists of golf course greens or sandy areas with sparse vegetation and few underground retreats. Increasing cover and retreats in the areas adjacent to the canal would allow some snakes to remain year-round in the vicinity of Laguna Salada, and facilitate the movement of others to upland habitats elsewhere including the area east of Horse Stable Pond and Mori Point.

4.3.2. Horse Stable Pond

- Deepen the eastern edge of the pond to increase breeding areas. Create an edge of 2-foot deep water with cattails adjacent to a deeper open-water area.

- Restrict access by pedestrians and dogs potentially with fencing and signage.

- Replace non-native ice plant near the pump house with native vegetation that provides cover for snakes and frogs

- Eliminate water level reductions during the frog breeding season
- Plant native vegetation on the uphill area north of the pond currently covered by the golf course (Hole 12). This area would become upland habitat for snakes and would provide underground retreats and a migration corridor between the Pond and Laguna Salada.
- Remove the old tires and other debris in the vicinity
- Investigate the feasibility of breaching the seawall to allow Sanchez Creek to flow to the ocean via gravity.

4.3.3. Sanchez Creek

- Create a natural riparian buffer around the portion of the creek east of the terminus of Fairway Drive. This would provide non-breeding habitat for California red-legged frogs and a movement corridor for both frogs and San Francisco garter snakes.
- Provide frog breeding habitat by removing a portion of the cattails in the area west of Fairway Drive creating deeper open water pools away from the culvert outflow.
- West of Fairway Drive the creek is heavily sedimented and little open water is available for breeding habitat. Although west of Fairway Drive the creek channel supports emergent vegetation, the density of these plants, primarily cattails, has severely reduced available open water, reducing its suitability as breeding habitat for frogs. A reduction in the density of cattails west of Fairway Drive would increase the suitability of this area as a frog breeding site and increase foraging habitat for San Francisco garter snakes.

4.3.4. Canal

- Increase the functionality of the area as a movement corridor and upland habitat by creating a buffer of unmowed vegetation around the edges of the Canal. This area would provide underground retreats and basking sites for both snakes and frogs. This would require a reconfiguration of a portion of the golf course. Several specific recommendations were enumerated in the Laguna Salada Section to increase connectivity. Additional recommendations for holes not adjacent to LS include
  1) Shorten Hole #9
  2) Relocate Hole #12
- Re-contour the canal and deepen the center to >3 feet in order to prevent cattails from reestablishing. The edges should remain shallow enough to allow cattails to persist (approximately 2 feet) and provide habitat for egg deposition, tadpole development and snake foraging
- Install a fence and signage to restrict visitor access to the canal area
- Remove non-native Monterey cypress and allow sunlight to promote the growth of understory vegetation.

4.3.5. Arrowhead Lake

- At Arrowhead Lake, we support significant reduction in non-native tree cover to increase suitable habitat connectivity with SFGS populations in the Crystal Springs watershed, and upland habitat enhancement for the SFGS.
- Monitor for the presence of bullfrogs and implement control measures
- Determine whether large predatory fish are present and implement a removal plan to increase California red-legged frog breeding success and eliminate the potential for predation on SFGS.
- Determine whether western pond turtles are present and if so, create platforms for basking

Recommendations for other limiting factors:

- Create sufficient buffer zones with upland habitat around aquatic features so that garter snakes are less likely to use golf course rough or fairways. Use of the fairways and other golf features is primarily at night and may not conflict with operations as much.
- Create barren, sandy areas between high-quality breeding and foraging habitat and the golf course to deter the movement of frogs and garter snakes
- Modify the design the golf course so that garter snakes can move safely between the Horse Stable Pond / Mori Point area and Laguna Salada

4.4 Take Avoidance Measures During Enhancement Implementation

Specific measures to avoid potential adverse effects on the California red-legged frog and the San Francisco garter snake during enhancement activities should be developed in consultation with the US Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). We recommend the following general measures as guidelines for the Enhancement Plan:

- Prior to any ground-disturbing activity, a qualified biologist should provide environmental awareness training for all workers who will be on site. The training should include a brief overview of the Endangered Species Act, a description of the California red-legged frog and San Francisco garter snake, what steps should be taken
to avoid impacts to their habitats, and what to do if an individual frog or snake is found.

- A temporary exclusion fence (e.g. silt fence) should be installed to prevent listed species from entering the work area. The placement of the fence would be directed by a qualified biologist in consultation with the USFWS and CDFG.

- Following installation of the exclusion fence and at least 6 weeks prior to construction, a trapping program will be conducted to remove all listed species from the area to be impacted.

- A qualified biologist should monitor all work activities on site. The monitor would verify that exclusion fence, erosion control measures and any other environmental protection measures are properly installed.

- Work should be confined to the smallest area possible to safely complete the project. Workers should be instructed to stay within the work corridor and limits should be clearly marked.

- Vehicle refueling and maintenance should be conducted a minimum of 150 feet from aquatic habitats and other sensitive areas identified by a qualified biologist.

- Construction activities should be done during the dry season (June 1 through October 15).

- If a California red-legged frog or San Francisco garter snake is found inside a work area a USFWS and CDFG-authorized biologist should relocate it out of harm’s way.

4.5 Take Avoidance Measures to Minimize Impacts of Golf Course Operations and Maintenance after Enhancement Implementation
4.6 Measuring Restoration Project Success

Future surveys should be aimed at monitoring long-term trends in San Francisco garter snake population demographics (i.e., age class ratios, sex ratios, total number of individuals) at Sharp Park and measuring the success of enhancement activities. Mark-recapture surveys would allow calculation of garter snake population estimates and can be compared statistically with future surveys to measure the recovery of the population.

Visual surveys for California red-legged frog egg masses would allow the assessment of frog habitat enhancement activities at Sharp Park. Several years of egg mass observation data currently exist for Horse Stable Pond. Egg mass surveys conducted in 2008 at the other aquatic habitats in would provide baseline data for future surveys in those areas using similar methods.

5.0 Conclusions

5.1 California red-legged frog habitat enhancement

Increasing California red-legged frog breeding habitat should be a priority for habitat enhancement in Sharp Park. Our surveys suggest that oviposition sites are limited to Horse Stable Pond, the southern and western portion of Laguna Salada, and to a lesser extent the Canal, and Arrowhead Lake. Tadpoles were not observed in Laguna Salada during visual surveys or seining, and while this is not conclusive proof of their absence, we believe few tadpoles were able to survive to metamorphosis in Laguna Salada. If this is the case, California red-legged frog breeding success in Sharp Park relies primarily on the persistence of high-quality habitat in Horse Stable Pond. The creation of additional suitable habitat would increase the total population of frogs and provide a hedge against a sudden decline in its habitat quality resulting from seawater intrusion or other disturbance at Horse Stable Pond.

5.2 San Francisco garter snake habitat enhancement

Increasing California red-legged frog breeding areas will also provide foraging areas for garter snakes. While the predator/prey relationship between the California red-legged frog and San Francisco garter snake results in some degree of overlap in their aquatic habitat requirements, upland habitat requirements differ. San Francisco garter snakes do not remain at water bodies year-round; instead they retreat daily to refuges such as rodent burrows in the upland through out the year. The distance they move into the uplands can vary both seasonally and daily. During the non winter months when it is cold, San Francisco garter snakes are likely to seek winter retreats further into the uplands where the burrows would not be flooded by rain. Radio-tracking suggests they may remain in their upland retreats for weeks at a time (Larsen 1994). Other important upland features include open grassy hillsides for basking and mating (USFWS 1985).
High-quality upland habitat at Sharp Park with rodent burrows and grass in sufficient quantity to provide cover is limited to the area east of Horse Stable Pond, and increasing habitat of this type should be a priority for enhancement. The northern and eastern sides of Laguna Salada transition abruptly from wetland vegetation to the golf course, providing few, if any, areas where snakes can bask without threat of disturbance or predation. Large San Francisco garter snakes are also less likely to move across open areas such as the golf course greens where little cover is available to protect them from avian and terrestrial predators. Therefore we recommend combining actions to increase available aquatic foraging habitat with the creation of protected, open, grassy upland areas with underground retreats to maximize the benefits of habitat enhancements for the San Francisco garter snake.
6.0 FIGURES
Figure 1. Regional Location.
Figure 2. Distribution of California red-legged frog egg masses west of CA Hwy 1.
Figure 3. Distribution of California red-legged frog egg masses at Arrowhead Lake.
Figure 4. Salt marsh common yellowthroat observations and estimated territories
7.0 LITERATURE CITED


Swaim Biological Incorporated 2005. Results of surveys for the San Francisco garter snake and California red-legged frog for the NCCWD recycled water project in Pacifica, San Mateo County, California. Prepared for North Coast County Water District. 10 Jan 2005. 19 pp + Appendix


In Litt References

Bennett, S. 2008. Electronic mail message to Karen Swaim regarding the sighting of a San Francisco garter snake at Mori Point.

## Appendix I. Birds Encountered During Point Count Surveys

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<td><em>Psaltriparus minimus</em></td>
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<td><em>Turdus migratorius</em></td>
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<tr>
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<td><em>Pipilo crissalis</em></td>
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<td><em>Melospiza melodia</em></td>
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<td>Scientific Name</td>
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<td>California Quail</td>
<td>Callipepla californica</td>
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<td>Mourning Dove</td>
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