**Denise Duffy & Associates, Inc.**

PLANNING AND ENVIRONMENTAL CONSULTING

# PROTOCOL CALIFORNIA TIGER SALAMANDER SURVEY RESULTS FOR THE FERRINI RANCH DEVELOPMENT AREA

September 2008

Prepared for:

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## INTRODUCTION

DD&A was contracted by Bollenbacher and Kelton to conduct presence/absence surveys for the California tiger salamander (*Ambystoma californiense*, CTS) at Pond 18, located on the Ferrini Ranch property, south of Highway 68 near San Benancio Road in Monterey County, California (Figures 1, 2 and 3).

A request for authorization to conduct presence/absence surveys on the property was sent to USFWS on March 5, 2007 based on the potential for CTS to occur on the property as described in the WRA Inc. report titled "*Biological Assessment; Ferrini Property, Monterey County, California*". Authorization to conduct surveys was received from USFWS on September 27, 2007. DD&A biologists were authorized to initiate aquatic and drift fence/pitfall sampling at Pond 18 via project-specific written authorization from USFWS Ventura. Initial observations of CTS were reported to USFWS Ventura via phone and e-mail within 72 hours.

## CALIFORNIA TIGER SALAMANDER

CTS was listed as a federally Threatened species on August 4, 2004 (69 FR 47211-47248) and is also a designated California state species of special concern. Critical Habitat was designated for CTS on August 23, 2005 (70 FR 49379-49458), and went into effect on September 22, 2005.

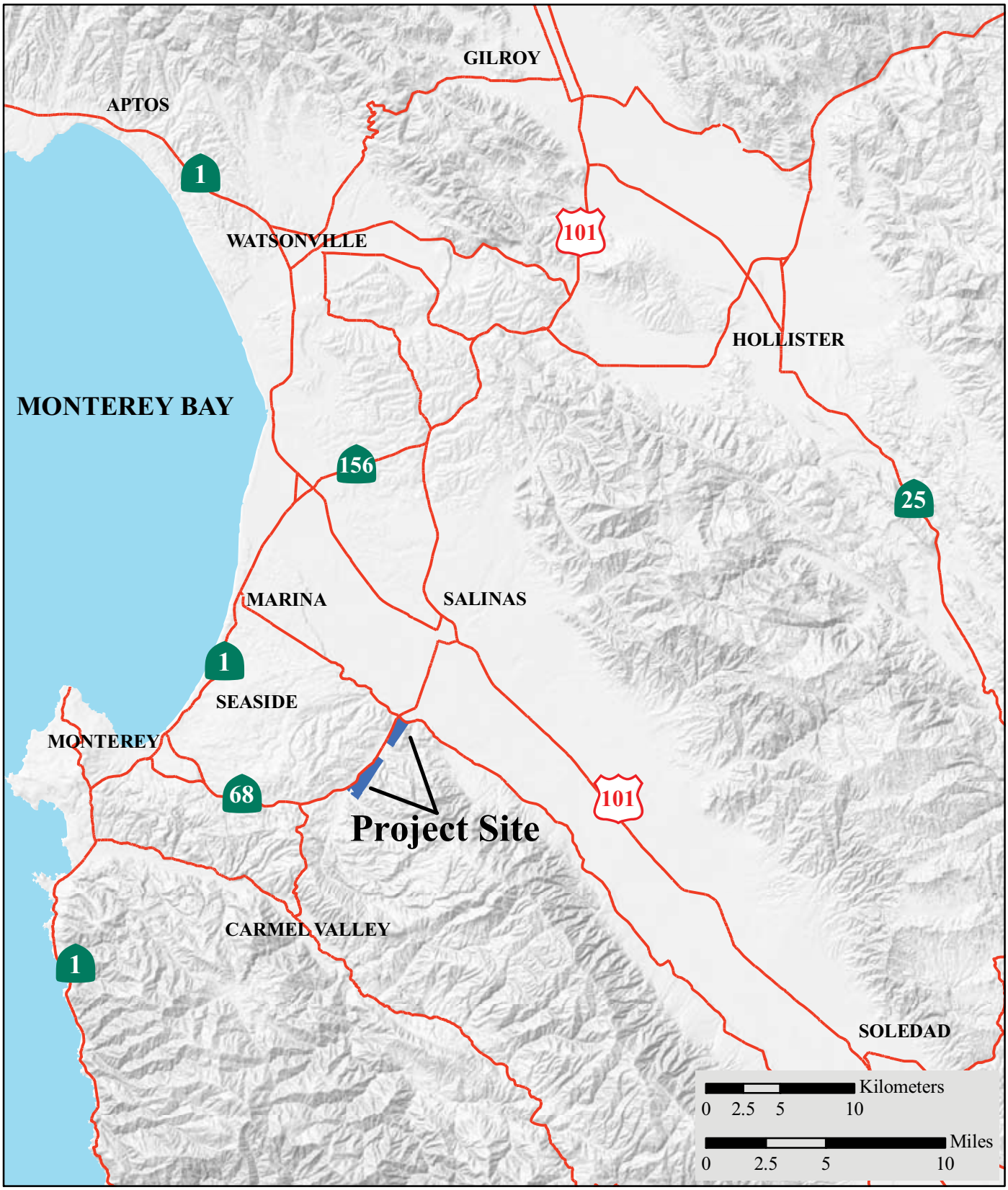
CTS persist in disjunct remnant vernal pool complexes in Sonoma County and Santa Barbara County, in vernal pool complexes and isolated stockponds scattered along a narrow strip of rangeland on the fringes of the Central Valley from southern Colusa County south to northern Kern County, and in sag ponds and human maintained stockponds in the coast ranges from the San Francisco Bay Area south to the Temblor Range. Tiger salamanders breed and lay eggs primarily in vernal pools and other temporary rainwater ponds following relatively warm rains in November to February. Adults have been found more than two km (1.24 miles) from breeding sites (USFWS, 2004). Permanent human-made ponds are sometimes utilized if predatory fishes are absent; streams are rarely used for reproduction. Males typically spend six to eight weeks at breeding ponds, while females typically spend only one to two weeks (Loredo et al., 1996). Eggs are laid singly or in clumps on both submerged and emergent vegetation and on submerged debris in shallow water (Stebbins, 2003; Jennings and Hayes, 1994). In years of below average rainfall, or when rains occur late in the season, females may forego breeding (Trehnam et al., 2000). CTS have been eliminated from an estimated 55-58 percent of its documented historic breeding sites. Currently, about 150 known local populations of CTS are extant.

## SITE DESCRIPTION

The Ferrini Ranch property consists of approximately 895 acres located between River Road and San Benancio Road, south of Highway 68, and is bisected into two sections by Toro Regional Park (Figures 1 and 2). Both areas are historically and currently grazed by livestock. The property supports a habitat mosaic of coast live oak woodland/savannah (437 acres), annual grasslands (402 acres), coastal scrub (30 acres), riparian areas (12 acres), wetlands and waters (5 acres) and developed (9 acres). For more specific background information on the property, please refer to the December 2007 WRA Inc. report titled "*Biological Assessment; Ferrini Property, Monterey County, California.*"

### *Pond 18*

Pond 18 is located in the northwest corner of the southern Ferrini property parcel at an elevation of approximately 150 feet (Figure 3). When fully inundated this seasonal aquatic feature covers approximately 15,000 square feet (estimated from best possible GIS data) and the maximum depth is approximately four feet. It is immediately bordered by oak savanna/annual grassland habitat on all sides. Pond 18 does not support emergent and/or surface vegetation. Since aquatic sampling was not conducted and inundation was never achieved during this study at this pond, turbidity and temperature readings could not be collected.

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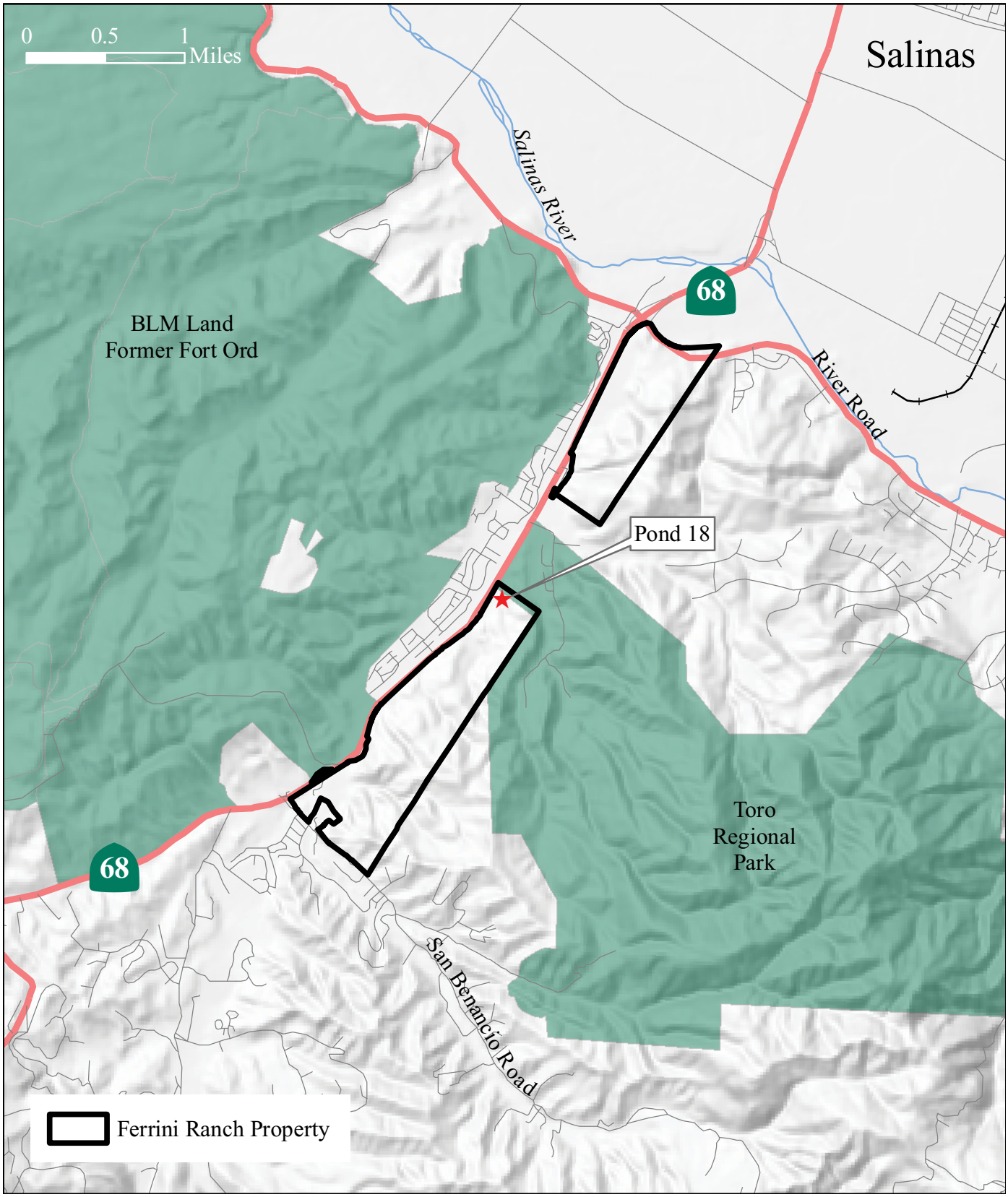
Ferrini Ranch Vicinity Map

Figure 1

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# Ferrini Ranch Regional Map

Figure
2

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# Pond 18 Location

Figure
3

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## METHODS

DD&A was authorized to conduct CTS surveys at Pond 18 via written approval from USFWS Ventura. Senior Project Manager Josh Harwayne was the lead on this project with the assistance of Mark Allaback of BioSearch (Federal Permit # TE-768251-10) and Dave Keegan, Brad Travers, Jami Davis and Matt Johnson of DD&A (Federal Permit # TE-091857-0). All surveyors possess all necessary state and federal permits to conduct these studies independently. Survey methods followed the "*Interim guidance on site assessment and field surveys for determining presence or a negative finding of the California tiger salamander"* developed by the USFWS and CDFG in 2003, with the exception that pitfall trap arrays were not removed upon the first California tiger salamander capture in order to collect sufficient tissue for genetic analysis of the population.

### *Aquatic Sampling*

In the spring of 2007 and 2008, Pond 18 did not support appropriate hydrology to conduct aquatic surveys.

### *Drift Fence/Pitfall Trapping Studies*

Drift fence/pitfall traps were installed at Pond 18 prior to October 10, 2007 (Figure 4). Silt-fencing (woven nylon fabric with pre-attached stakes) and vexar (extruded fence attached to stakes) were installed at regular intervals at each pond. The fencing was buried less than six inches deep, with at least two feet above ground. Pitfall traps (two-gallon plastic buckets) were arranged in pairs, one on either side of the fence, in order to capture animals migrating towards and away from the pond. The percentage of the perimeter sampled by the trap arrays was approximately 66.7%. Please refer to Table 1 for specifics regarding drift fence/pitfall trapping array.

Table 1: Drift Fence/Pitfall Trapping Array Measurements

| Pond Name | Length of Fencing (ft) | # of Fence Segments | Length of Breaks Between Segment (ft) | Total # of Traps | Trap Intervals (ft) | # of Traps per Segment | % of perimeter sampled |
|---|---|---|---|---|---|---|---|
| Pond 18 | 66 | 7 | ~ 33 | 42 | 33 | 6 | 66.7 |

Drift fences and pitfall traps were in place between October 10, 2007 and March 17, 2008. On days when it was raining or if at 2:00PM rain was the forecast for the remainder of the day or subsequent night (≥ 70% probability of precipitation based on the National Weather Service web-site), pitfall traps were opened before sunset and checked the following morning. Traps remained open until no rain had fallen and/or no CTS were captured in the preceding 24 hours. Open traps were shaded with an elevated piece of plywood and pieces of foam were used to keep the traps moist. When not in use, traps were closed with lids and the inverted shades were then weighted with bricks, to prevent entry.

All captured CTS were measured (snout-vent length and total length in mm, weight in grams), aged (post-metamorphic juvenile, sub-adult, adult), sexed, and inspected for malformations, injuries and general health. All CTS captured were digitally photographed in a standardized manner for substantial identification and to trace recaptures. The dorsal spot patterns were checked against a log of photographs to determine if they had been captured previously. All other amphibians were identified to species and the number captured was recorded for each day.

Tissue sampling was conducted utilizing the standard methodology for this species, as detailed in: *"Tissue Collection Protocol for Genetic Research"* (K.E. Leyse et. al., 2003). Project specific tissue collection authorization was received from USFWS Ventura under the Federal Recovery Permit of Mark Allaback. Josh Harwayne (DD&A Senior Project Manager), Mark Allaback (BioSearch Wildlife Biologist), Jami Davis (DD&A Assistant Scientist) and Brad Travers (DD&A Assistant Wildlife Biologist) collected 10 adult tissue samples on January 26-30, February 1 and 2, 2008. All tissue

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# Drift Fence/Pitfall Trap Array Locations

Figure 4

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samples were packed in a cooler with dry ice and sent via overnight service to the Shaffer Lab at the University of California, Davis (U.C. Davis) for genetic analysis.

*Climate Information*

Daily precipitation and high, low, and average daily temperature were obtained from the National Climatic Data center (http://www.ncdc.noaa.gov/oa/ncdc.html). Monthly rainfall totals and the 28-year average rainfall were obtained from the National Weather Service Climatological Station in Salinas, California (http://www.wrh.noaa.gov/mtr/versprod.php?pil=PNS&sid=MTR).

## RESULTS

During the study, 15 CTS captures were made. Eleven of these captures were unique individuals and four were recaptures. Other species captured during the drift fence/pitfall survey (Table 2) include Pacific tree frogs (*Hyla regilla*), western fence lizards (*Sceloporus occidentalis*), Monterey ensatina (*Ensatina eschscholtzii eschscholtzii*), and Santa Lucia Mountains slender salamanders (*Batrachoseps luciae*).

*Aquatic Sampling Results*

In the spring of 2007 and 2008, Pond 18 did not support appropriate hydrology to conduct aquatic surveys.

*Drift Fence/Pitfall Trap Survey Results*

A total of 10 adult and one juvenile CTS were captured in the drift fence/pitfall trapping study at Pond 18 (Figure 4). Detailed results for the CTS captured during the drift fence/pitfall trap survey effort are attached to this report in Appendix A. Six females, four males, and one unidentified juvenile CTS were captured during the drift fence/pitfall trap survey. The CTS ranged in size from 90-115 mm snout-vent length, 160-205 mm total length and in weight from 27.2-63.2 g. Ten tissue samples were collected and sent to the Shaffer Lab at U.C. Davis for genetic analysis.

## CONCLUSION

DD&A was contracted by Bollenbacher and Kelton to conduct presence/absence surveys for CTS at Pond 18 on the Ferrini Ranch property in Monterey County, California. A drift fence study was initiated October 7, 2007 at Pond 18. Pitfall traps were opened 47 times between October 10, 2007 and March 17, 2008. Eleven individual CTS were captured during the pitfall trapping survey. Other species captured during the drift fence/pitfall survey include Pacific tree frogs, western fence lizards, Monterey ensatina, and Santa Lucia Mountains slender salamanders. Ten tissue samples were collected and sent to the Shaffer Lab at U.C. Davis for genetic analysis.

Aquatic sampling was not conducted as part of the protocol-level survey effort because the pond did not develop standing water throughout the winter of 2007/2008.

Rainfall totals for the 2007/2008 season (September 1, 2007 - April 1, 2008) were 83% of the 28-year average for Salinas, California (http://www.wrh.noaa.gov/mtr/versprod.php?pil=PNS&sid=MTR).

Please note that DD&A was not contracted to prepare or submit a site assessment for the Ferrini Ranch property. This report documents the results of the described surveys at Pond 18 only and does not represent an evaluation of any other portion of the Ferrini Ranch property.

Table 2. Drift Fence/Pitfall Trap Survey Results

| Location Name | Date | Time | Animals Captured | | | | |
|---|---|---|---|---|---|---|---|
| | | | CTS | Pacific Treefrog | Monterey Ensatina | SLM Slender | W. Fence Lizard |
| Pond 18 | 10/10/2007 | 9:00 AM | | | | | 1 |
| | 10/24/2007 | 8:10 AM | | | | | 2 |
| | 10/30/2007 | 7:20 AM | | | | | 5 |
| | 10/31/2007 | 8:15 AM | | | | | 4 |
| | 11/11/2007 | 7:20 AM | | 1 | 2 | | 4 |
| | 11/12/2007 | 9:45 AM | | | | | 6 |
| | 12/7/2007 | 8:20 AM | | | 1 | | 1 |
| | 12/8/2007 | 9:40 AM | | | | | 1 |
| | 12/18/2007 | 8:15 AM | | | | | 1 |
| | 12/19/2007 | 7:55 AM | | | | | 1 |
| | 12/20/2007 | 7:55 AM | | 1 | | | 1 |
| | 12/28/2007 | 8:30 AM | | | | | 1 |
| | 1/4/2008 | 9:00 AM | | 1 | | | |
| | 1/5/2008 | 9:05 AM | 1 | 6 | | | |
| | 1/6/2008 | 8:05 AM | | 6 | | 1 | |
| | 1/7/2008 | 8:35 AM | | 2 | | | |
| | 1/8/2008 | 7:05 AM | | 4 | | | |
| | 1/9/2008 | 7:55 AM | | 4 | | | |
| | 1/10/2008 | 8:25 AM | | 4 | | | |
| | 1/11/2008 | 7:50 AM | | 3 | | | |
| | 1/12/2008 | 8:30 AM | | 1 | | | 1 |
| | 1/22/2008 | 8:05 AM | | 3 | | | |
| | 1/23/2008 | 7:55 AM | | 1 | | | |
| | 1/24/2008 | 7:50 AM | | 1 | | | |
| | 1/25/2008 | 8:05 AM | | 1 | | 1 | |
| | 1/26/2008 | 7:25 AM | 6 | 20 | | | |
| | 1/27/2008 | 8:05 AM | 1 | 23 | 1 | 1 | |
| | 1/28/2008 | 8:05 AM | 2 | 11 | | 1 | |
| | 1/29/2008 | 8:00 AM | 1 | 6 | | 1 | |
| | 1/30/2008 | 7:55 AM | 1 | 5 | | | |
| | 1/31/2008 | 8:45 AM | | 1 | | | |
| | 2/1/2008 | 8:05 AM | 1 | 2 | | | |
| | 2/4/2008 | 7:55 AM | 2 | 3 | | | |
| | 2/5/2008 | 7:05 AM | | 4 | | | |
| | 2/20/2008 | 7:50 AM | | 2 | | | |

*Climate Information*

Chart 1. Daily Temperature Range and Number of CTS Observed During the 2007/2008 Rainy Season

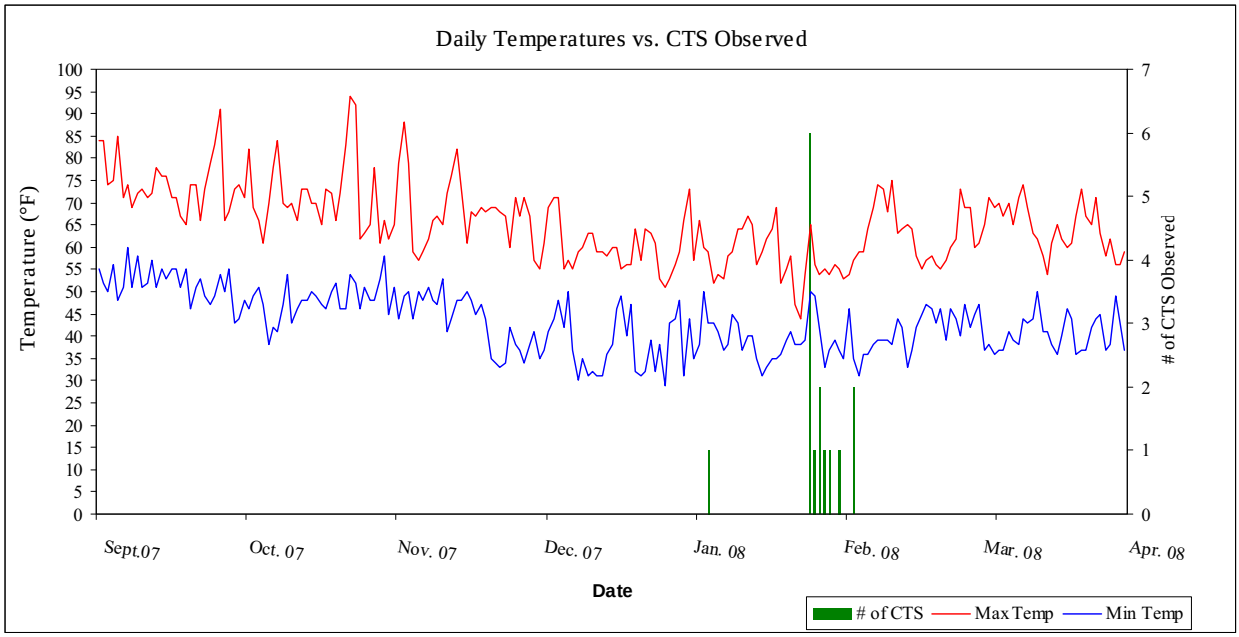
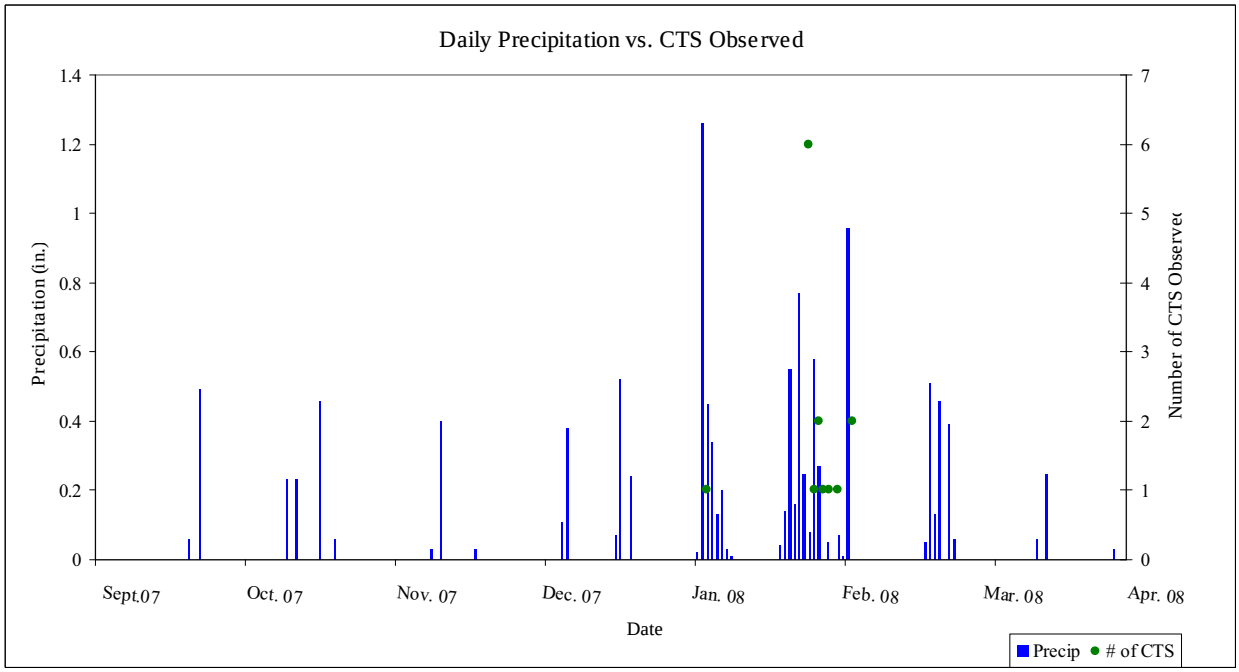



Chart 2: Daily Precipitation and the Number of CTS Observed during the 2007/2008 Rainy Season



CITATIONS

Jennings, M. R. and M. P. Hayes, 1994. Amphibian and reptile species of special concern in California. Final report to the California Department of Fish and Game, Inland Fisheries Division. 255 pp.

Loredo et al, 1996. Habitat use and migration behavior of the California tiger salamander. Journal of Herpetology, Vol. 30(2). Pp. 282-285.

Leyse, K.E., et. al. 2003. Tissue Collection Protocol for Genetic Research. Unpublished Technical Manual. University of California, Davis

National Environmental Satellite Data and Information Service. "Weather Station Salinas #2." (Online) August, 2008. http://www.ncdc.noaa.gov/oa/ncdc.html

National Oceanic and Atmospheric Administration. "National Weather Service Forecast Office." (Online) August, 2008. http://www.wrh.noaa.gov/mtr/versprod.php?pil=PNS&sid=MTR

Stebbins, R. C. 2003. Western reptiles and amphibians, 3rd edition. Houghton Mifflin Company, New York, NY. 533 pp.

Trenham et al, 2000. Life History and Demographic Variation in California tiger salamander (Ambystoma californiense). Copeia, 200(2). Pp. 365-377.

United States Fish and Wildlife Service, 2004. Endangered and threatened wildlife and plants; Determination of threatened status for the California Tiger Salamander; and special rule exemption for existing routine ranching activities; Final rule. Federal Register, Vol. 69(149). Pp. 47211-47248.

United States Fish and Wildlife Service, 2004. Endangered and threatened wildlife and plants; Designation of critical habitat for the California tiger salamander, central population; Final rule. Federal Register, Vol. 70(162). Pp. 49379-49458.

United States Fish and Wildlife Service and California Department of Fish and Game. 2003. Interim guidance on site assessment and field surveys for determining presence of a negative finding of the California tiger salamander. Available online at: http://www.fws.gov/sacramento/es/documents/cts_survey_protocol.PDF

WRA Inc., 2007. Biological Assessment Ferrini Property, Monterey County, California. Prepared for MKL Development. 23 pp.

# Appendix A

## Detailed CTS Drift Fence/Pitfall Trap Survey Results

| Location Name | ID # | Date | Time | Trap # | CTS Observed/Captured | | | | | | Total Length (mm) | S Length (mm) | Weight (g) | Recap | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Egg Masses | Larvae | Sub adults | Adults | | | | | | | |
| | | | | | | | | M | F | | | | | | |
| Pond 18 | 1 | 1/5/2008 | 9:05 AM | 20 Inside | | | | | 1 | | 160 | 100 | 31.5 | New | First capture/No tissue sample taken |
| Pond 18 | 2 | 1/26/2008 | 7:25 AM | 19 Inside | | | | | 1 | | 200 | 105 | 44.6 | New | Gravid |
| Pond 18 | 3 | 1/26/2008 | 7:25 AM | 2 Inside | | | | | 1 | | 200 | 105 | 43.8 | New | Gravid |
| Pond 18 | 4 | 1/26/2008 | 7:25 AM | 5 Inside | | | | 1 | | | 230 | 115 | 63.2 | New | Noted barred appearance |
| Pond 18 | 5 | 1/26/2008 | 7:25 AM | 9 Outside | | | | | | 1 | 185 | 95 | 27.2 | New | Very swollen vent |
| Pond 18 | 6 | 1/26/2008 | 7:25 AM | 13 Inside | | | | | 1 | | 205 | 105 | 44.7 | New | Gravid |
| Pond 18 | 7 | 1/26/2008 | 7:25 AM | 15 Inside | | | | | 1 | | 170 | 90 | 34.9 | New | Gravid |
| Pond 18 | 2 | 1/27/2008 | 8:05 AM | 17 Outside | | | | | 1 | | 200 | 105 | 43.2 | Recap | Gravid |
| Pond 18 | 8 | 1/28/2008 | 8:05 AM | 14 Inside | | | | | 1 | | 190 | 95 | 40.5 | New | Gravid |
| Pond 18 | 3 | 1/28/2008 | 8:05 AM | 18 Inside | | | | | 1 | | 200 | 105 | 41.4 | Recap | Gravid |
| Pond 18 | 8 | 1/29/2008 | 8:00 AM | 14 Outside | | | | | 1 | | 190 | 95 | 38.5 | Recap | Gravid |
| Pond 18 | 9 | 1/30/2008 | 7:55 AM | 14 inside | | | | 1 | | | 205 | 105 | 54.2 | New | |
| Pond 18 | 10 | 2/1/2008 | 8:05 AM | N/A | | | | 1 | | | 205 | 105 | 48.9 | New | Captured during search of fallen logs surrounding survey site, not in pond depression. |
| Pond 18 | 2 | 2/4/2008 | 7:55 AM | 19 Inside | | | | | 1 | | 200 | 105 | 42.4 | Recap | |
| Pond 18 | 11 | 2/4/2008 | 7:55 AM | 11 Inside | | | | 1 | | | 210 | 105 | 48.6 | New | |

**DEPARTMENT OF THE ARMY**
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

Regulatory Division

SUBJECT: File Number 400292S

Ms. Diane Noda
US Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California 93003

Dear Ms. Noda:

This letter serves as initiation of formal section 7 consultation for federally-listed California tiger salamander (CTS) (Ambystoma *californiense*) and designated critical habitat for these species. The Corps has received an application for Nationwide Permit 29, Residential Developments, pursuant to Section 404 of the Clean Water Act from Domain Corporation to place fill in 80 linear feet of jurisdictional waters of the United States. The purpose of the project would be to construct 146 market-rate lots, 23 additional market rate clustered lots/units, 43 housing units, a future winery, an emergency access road, and a pedestrian/bike path over Harper Creek. The project is located on the 895 acre Ferrini Property between River Road and San Benancio Road, south of Highway 68, in the City of Pacifica, Monterey County, California.

The purposed pathway is part of a larger development plan. In order for the purposed development to take place the County of Monterey is requiring the applicant to build a pedestrian/bike path and an emergency access road. To construct the pathway an 80 foot long by 8 foot high culvert would be placed in the creek. The culvert would be a metal arch culvert with footings on either side of the creek with rip-rap at the base of the footings within the creek. A total of 296 cubic yards of ¼ ton rip rap fill would be placed below Ordinary High Water (see attached application and plans). An additional 704 cubic yards of fine gravel and an asphalt surface would be added to the creek bank in order for the pathway to span the creek bed. The pathway will continue along the east side of the property and will run adjacent to seasonal pond number 18 (see CTS Biological Survey). The emergency access road would be approximately 2000 feet long and would run along the western side of the property next to pond 18 (see enclosed application).

The proposed project has been reviewed for its impacts to federally- listed species and their associated designated critical habitat. A California Natural Diversity Data Base (CNDDB) search conducted by Corps' personnel on January 23, 2008 and the applicants Biological Survey dated September 2008 documented CTS occurrences in pond 18 located on the north western corner of lot number 1 (see Biological Survey Figure 2). According to the Consultant, pond 18

was the only seasonal wetland surveyed on the property. The remaining seasonal wetlands on the property were not surveyed due to minimal inundation periods that have been observed over the last three years.

Possible impacts on federally-listed species from the entire project would include: 1) the development of 146 market-rate lots, 23 additional market rate clustered lots/units, 43 housing units, a future winery; 2) impacts from new roads; 3) vegetation removal and ground disturbance from construction activities; 4) the placement of 296 cubic yards of fill in to Harper Creek and an additional 704 cubic yards of fill along the creek bank; 5) removal of vegetation from creek bed and bank from construction activities; and 6) construction of the pathway and emergency road. The Corps has determined that the proposed project will have an affect and will adversely affect CTS species. Take would be likely, due to suitable CTS habitat on the property, known CTS occurrence data, and the size of the project.

Best Management Practices proposed by the applicant include:

a. Working during the dry season (from April 15 to October 15) when no water is present in the streambed

b. No heavy equipment within the streambed

c. All refueling/maintenance of equipment to occur outside of the floodplain

d. All stockpiling of soils and other materials to occur outside of the floodplain

e. Construction fencing to be installed around the work area in the floodplain. No equipment allowed outside that area.

f. Tree removal only as necessary to complete the installation of the pathway; no staging areas within the floodplain

g. Hydromulch and straw bales to be installed prior to October 15 after construction completed.

It is our understanding that your agency has sufficient information on file to initiate consultation. Should you have any questions regarding this matter, please contact Nina Cavett of our Regulatory Division at 415-503-6765 or by email: Christina.A.Cavett@usace.army.mil. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter.

Sincerely,

Mark D'Avignon
Chief, South Branch
Regulatory Division

Enclosures

Copy Furnished: w/o enclosures
Michael Josselyn, 2169-G East San Francisco blvd., San Rafaell, CA 94901

ENVIRONMENTAL CONSULTANTS

# Memorandum

To: Mark Kelton, Domain Corporation

From: Michael Josselyn, PhD PWS

Cc:

Date: January 27, 2009

Subject: Genetic testing on CTS at Ferrini Ranch: Mitigation Measure Implications

The attached document provides the outcome of the genetic testing at the Ferrini Ranch that will be provided to the US Fish and Wildlife Service during the consultation process on the California Tiger Salamander.

In our meeting with the Service in December and in subsequent discussions, the hybrid nature of the species collected at the Ferrini Ranch was discussed. As the report documents, hybrid individuals were found at the Ferrini Ranch, which is to be expected in this region where many hybrids are found. As it now stands, hybridization is not explicitly addressed by the Endangered Species Act, and the Fish and Wildlife Service does not have an official policy on the matter. Instead, FWS treats the issue on a "case-by-case" basis.

In the case of the California tiger salamander, hybridization was considered a major concern in decisions by the Service to list the species as threatened. As recently documented by Fitzpatrick and Shaffer in a scientific paper published in 2007, when the native and non-native species interbred, the resulting off-spring show "hybrid vigor", meaning that they are more fit than either parent to survive in the environment. This would mean that even a small admixture of non-native alleles (genes), will eventually lead to more hybridization from these more fit individuals with a resultant reduction in the population of native species. It is likely that this population will be considered a non-native population as found in other locations in the Salinas/Monterey area.

Out of an abundance of caution, we are identifying mitigation measures that might be utilized if these hybrids are ultimately considered by the Service to be protected under the Endangered Species Act. We will continue to work with the Service to address this issue and will advise you as to the outcome. These measures may be reduced based on our discussions; however, it is our professional opinion that the mitigation measures will be sufficient to reduce project impacts to less than significant, and are consistent with those used by the Service elsewhere to deal with California tiger salamander impacts regardless of its eventual status as covered under the Endangered Species Act.

2169-G East Francisco Blvd., San Rafael, CA 94901 (415) 454-8868 tel (415) 454-0129 fax info@wra-ca.com www.wra-ca.com

Ferrini Ranch salamander genotyping 15 May 2008

Jarrett Johnson, Erick Loomis, & Brad Shaffer
Section of Evolution and Ecology, University of California, Davis CA, 95616, USA

## Goal

Our goal was to use informative DNA markers to determine whether a collection of larval tiger salamander toes represented native *Ambystoma californiense* (California tiger salamanders), non-native *Ambystoma tigrinum mavortium* (barred tiger salamanders) or a mixture of the two genotypes (hybrids).

## Methods

We received toes from adult salamanders (N=10) collected from 26 Jan to 4 Feb 2008 by Josh Harwayne (Denise Duffy & Assoc.) from 'Pond 18'. Ferrini Ranch Pond 18 is located 3 km S of River Road, 3 km N of San Benacio Rd, just E of Hwy 68, Salinas, Monterey Co., CA (Fig. 1). Tissues were preserved in 95% ethanol and assigned HBS tissue catalogue #'s (110572-110581). We extracted DNA from each tissue sample for genotyping analyses using standard extraction techniques (Palumbi 1996). Individual tissue samples were genotyped for 10 single nucleotide polymorphism (SNP) loci (13EF6, Ctg325, Dlx3, FoxG1b, G6H6, Gnat2, HoxD8, Slc4a4, Wnt1, & Dloop; Voss et al. 2001, Voss et. al unpublished) identified as diagnostic between *A. tigrinum* and *A. californiense* through previous restriction-fragment-length polymorphism (RFLP) analyses (Fitzpatrick and Shaffer 2004) and sequencing (Voss et al. unpublished). Genotyping was performed using the Victor$^3$ plate reader (Perkin-Elmer) to perform fluorescence polarization (FP) analysis to score each individual's genotype at each locus. FP is a standard technique for the analysis of SNP loci (Xiao and Kwok 2003) and is more efficient, reliable and cost effective than RFLP analyses. At each SNP locus each individual was scored as 'aa' if homozygous for native (*Ambystoma californiense*) alleles, 'gg' if homozygous for introduced (*A. tigrinum mavortium*) alleles, or 'ga' if heterozygous. Because hybridization began in the 1950s (Riley et al. 2003) and has been ongoing for at least 20 generations, individuals may be any combination of homozygotes and heterozygotes for each locus. The loci analyzed here are known to be on separate genetic linkage groups (Voss et al. 2001, Voss et al. unpublished), so the total percentage of native and non-native alleles summed across loci provides a reasonable estimate of the "nativeness" of individuals and sites.

## Results

Raw data are presented in Appendix 1 and genotypic frequency data are presented in Table 1. Our data indicate that the Ferrini Ranch pond exhibits low levels of non-native genotypes. We summarize the "nativeness" of each individual as a Hybrid Index Score (HIS), calculated for each individual as: [# of non-native alleles]÷[total number of alleles scored]. HIS can range from 0.00 (pure native) to 1.00 (pure non-native). For the Ferrini Ranch individuals, HIS values ranged from 0.00 – 0.30 (i.e., 0-30% non-native; Table 2) indicating that some individuals (6 of 10) can be described putatively as "pure native" based on the ten loci we investigated. All individuals were at least 70% native. Furthermore, all non-native alleles were present as heterozygous genotypes and we detected no homozygous non-native genotypes.

## Conclusions

We conclude that the genotypes of salamanders present at the Ferrini Ranch pond are comprised primarily of native alleles but that this site has been subjected to invasion by introduced tiger salamander genotypes. In considering these results, it is important to remember that we are only sampling a very small fraction of the genome, and that apparently "pure native" individuals may well have non-native alleles at some unsampled genetic locus. However, the low overall HIS indicates that this population is not highly invaded by non-native genes. The Ferrini Ranch site is in a region that is geographically very highly invaded (Fitzpatrick and Shaffer 2007), and these new data from the Ferrini Ranch property are consistent with our previous results indicating that hybrid genotypes are present throughout the Salinas Valley. However, this site is somewhat unusual in terms of the extremely low levels of non-native alleles, and lack of homozygous non-native genotypes.

The abundance of native California tiger salamander alleles at most loci indicate that "pure" native California tiger salamanders may be encountered in this population. The observed levels of non-native tiger salamander genotypes indicate that this site may 1) have supported a purely native population that was invaded by a small number of hybrid salamanders, 2) consist of a native population currently receiving infrequent immigrants from adjacent sites containing hybrid individuals, or 3) be the result of colonization by individuals whose lineages originated from sites containing low levels of non-native genes. Interestingly, we have data indicating that a nearby site (Toro Creek Pond; Fig. 1) is more highly introgressed (mean HIS=0.42 in 2003; Fitzpatrick & Shaffer 2007) than the current data for the Ferrini Ranch (mean HIS=0.06; Table 2) so it was somewhat surprising to find such low frequencies of non-native alleles at the Ferrini Ranch. These two ponds are separated by only 0.8 km but dispersing salamanders are likely inhibited by a large housing development and major highway. In our opinion, scenarios 1 & 2 are more probable than scenario 3, but are indistinguishable from each other given our current landscape genetic data.

## Literature Cited


Fitzpatrick, B.M. and H. B. Shaffer. 2004. Environment-dependent admixture dynamics in a tiger salamander hybrid zone. *Evolution* 58:1282-1293.

Fitzpatrick, B.M. and H.B. Shaffer. 2007. Introduction history and habitat variation explain the landscape genetics of hybrid tiger salamanders. *Ecological Applications* 17:598-608.

Palumbi, S. R. 1996. Nucleic acids. II. The polymerase chain reaction. Pp. 205–248 in D. M. Hillis, C. Moritz, and B. K. Mable, eds. Molecular systematics. 2d ed. Sinauer Associates, Sunderland, MA.

Riley, S.P.D., H.B. Shaffer, S.R. Voss, and B.M. Fitzpatrick. 2003. Hybridization between a rare, native tiger salamander (*Ambystoma californiense*) and its introduced congener. *Ecological Applications* 13:1263-1275.

Voss SR, Smith JJ, Gardiner DM, Parichy DM. 2001. Conserved vertebrate chromosome segments in the large salamander genome. *Genetics* 158:735-746.

Xiao M, Kwok P-Y. 2003. DNA analysis by fluorescence quenching detection. *Genome Research* 13:932-939.

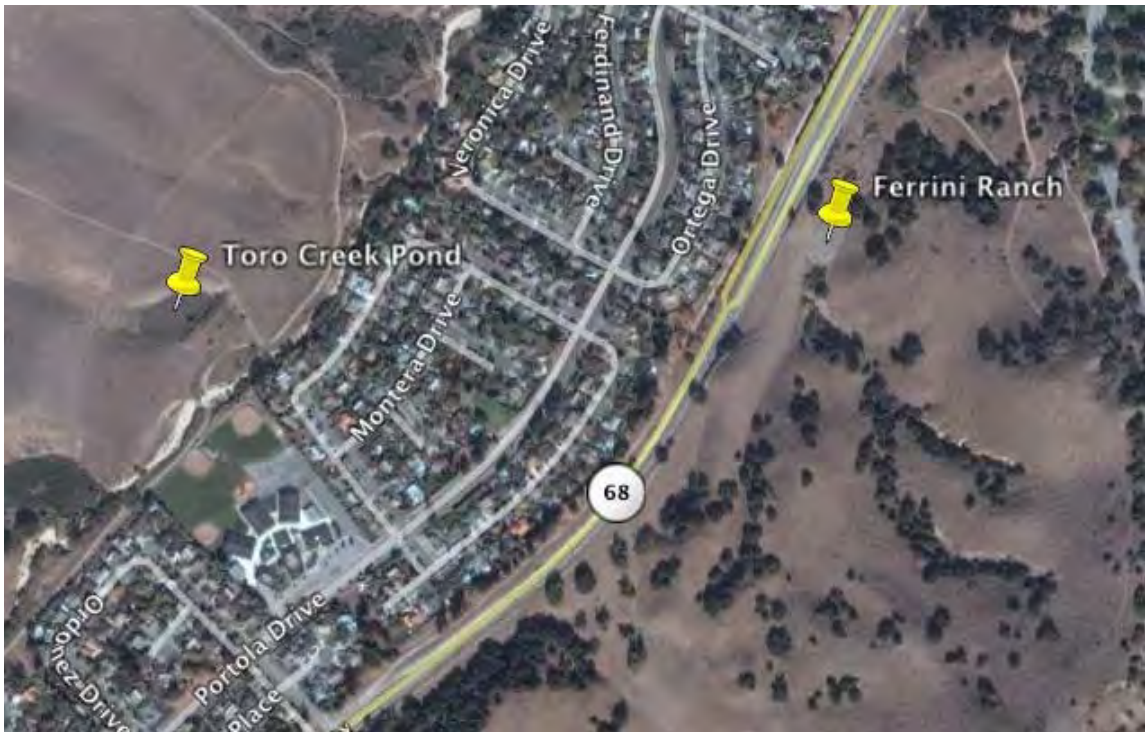
Table 1. Observed genotypic frequencies of 10 SNP loci for Ferrini Ranch. 'gg' represents homozygous introduced (*A. t. mavortium*) genes, 'aa' represents homozygous native (*A. californiense*) genes, and 'ga' represents heterozygous genotypes (one allele from each species).

| | 13EF6 | Ctg325 | Dlx3 | FoxG1b | G6H6 | Gnat2 | HoxD8 | Slc4a4 | Wnt1 | Dloop | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| gg fre | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ga fre | 0.00 | 0.00 | 0.11 | 0.40 | 0.00 | 0.13 | 0.00 | 0.10 | 0.10 | 0.00 | 0.08 |
| aa fre | 1.00 | 1.00 | 0.89 | 0.60 | 1.00 | 0.88 | 1.00 | 0.90 | 0.90 | 1.00 | 0.92 |

Table 2. Hybrid Index Scores (HIS) across 10 SNP loci for each individual genotyped from Ferrini Ranch. A HIS of 1.00 indicates pure non-native at all loci, and a HIS of 0.00 indicates pure native at all sampled loci.

| HBS# | HIS |
|---|---|
| 110572 | 0.0000 |
| 110573 | 0.0000 |
| 110574 | 0.3000 |
| 110575 | 0.1500 |
| 110576 | 0.0714 |
| 110577 | 0.0000 |
| 110578 | 0.0000 |
| 110579 | 0.0000 |
| 110580 | 0.0000 |
| 110581 | 0.0833 |
| mean | 0.0605 |

Figure 1. Aerial photo showing location of Ferrini Ranch Project.



Appendix 1 Raw genotype data for each individual genotyped at 10 SNP loci. 'gg' represents homozygous introduced (*A. t. mavortium*) alleles, 'aa' represents homozygous native (*A. californiense*) alleles, and 'ga' represents heterozygous genotypes (one allele from each species).

| HBS# | 13EF6 | Ctg325 | Dlx3 | FoxG1b | G6H6 | Gnat2 | HoxD8 | Slc4a4 | Wnt1 | Dloop |
|---|---|---|---|---|---|---|---|---|---|---|
| 110572 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110573 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110574 | NoData | aa | aa | ga | NoData | NoData | NoData | ga | ga | NoData |
| 110575 | aa | aa | ga | ga | aa | ga | aa | aa | aa | aa |
| 110576 | aa | NoData | NoData | ga | aa | NoData | aa | aa | aa | aa |
| 110577 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110578 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110579 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110580 | aa | aa | aa | aa | aa | aa | aa | aa | aa | aa |
| 110581 | NoData | NoData | aa | ga | NoData | aa | aa | aa | aa | NoData |

Denise Duffy Associates Inc.

PLANNING AND ENVIRONMENTAL CONSULTING

# CALIFORNIA RED-LEGGED FROG PROTOCOL-LEVEL SURVEY RESULTS FOR THE FERRINI RANCH DEVELOPMENT AREA

September 2008

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## SUMMAR

Denise Duffy and Associates, Inc. (DD&A) was contracted to conduct protocol-level California red-legged frog (*Rana aurora draytonii,* CRLF) surveys of El Toro Creek and Harper Creek as associated with the Ferrini Ranch property in Monterey County, California (Figure 1). These surveys were conducted to assist in a presence/absence determination for CRLF in El Toro Creek and Harper Creek within and adjacent to the project boundaries (Figure 2). Targeted, non-random surveys to detect adult, subadult, and/or larval CRLF were conducted by DD&A biologists within all portions of El Toro Creek and Harper Creek associated with the Ferrini Ranch property.

Although two surveys of Harper Creek were conducted within 24 hours of rain, no back-ponded areas were ever observed. Site conditions suggest that an active channel is occasionally present in Harper Creek (likely during flash storm events), but channel width and depth would be highly variable (i.e. between 18 inches and 5 feet wide with depths up to 18 inches). Given the lack of hydrology and a lack of appropriate breeding habitat supported by Harper Creek, it is highly unlikely that CRLF would occupy this feature.

Portions of El Toro Creek were observed to support surface inundation during all surveys (particularly depressions and backponded areas) and the entire channel of El Toro Creek supported surface flows in October and November. The width and depth of El Toro Creek varies substantially throughout the surveyed alignment (i.e. 2-10 feet wide and up to 18 inches deep) but is typically between two and four feet wide and less than six inches in depth. During the winter rainy season El Toro Creek flows rapidly, often washing out the backponded areas. With no known breeding locations for CRLF within the vicinity, it is unlikely that these areas would be colonized by CRLF. Therefore, Ferrini Ranch associated portions of El Toro Creek represent marginal CRLF breeding habitat and suitable dispersal habitat.

No CRLF at any life stage (adult, subadult, larva) were detected (audio) or observed in the course of protocol-level surveys of El Toro Creek and Harper Creek. The surveys described within this document were conducted in accordance with county, state, and federal law and with USFWS reporting requirements for protocol-level CRLF surveys. Therefore, this report serves as documentation for a negative finding for CRLF in riparian portions of the Ferrini Ranch property.

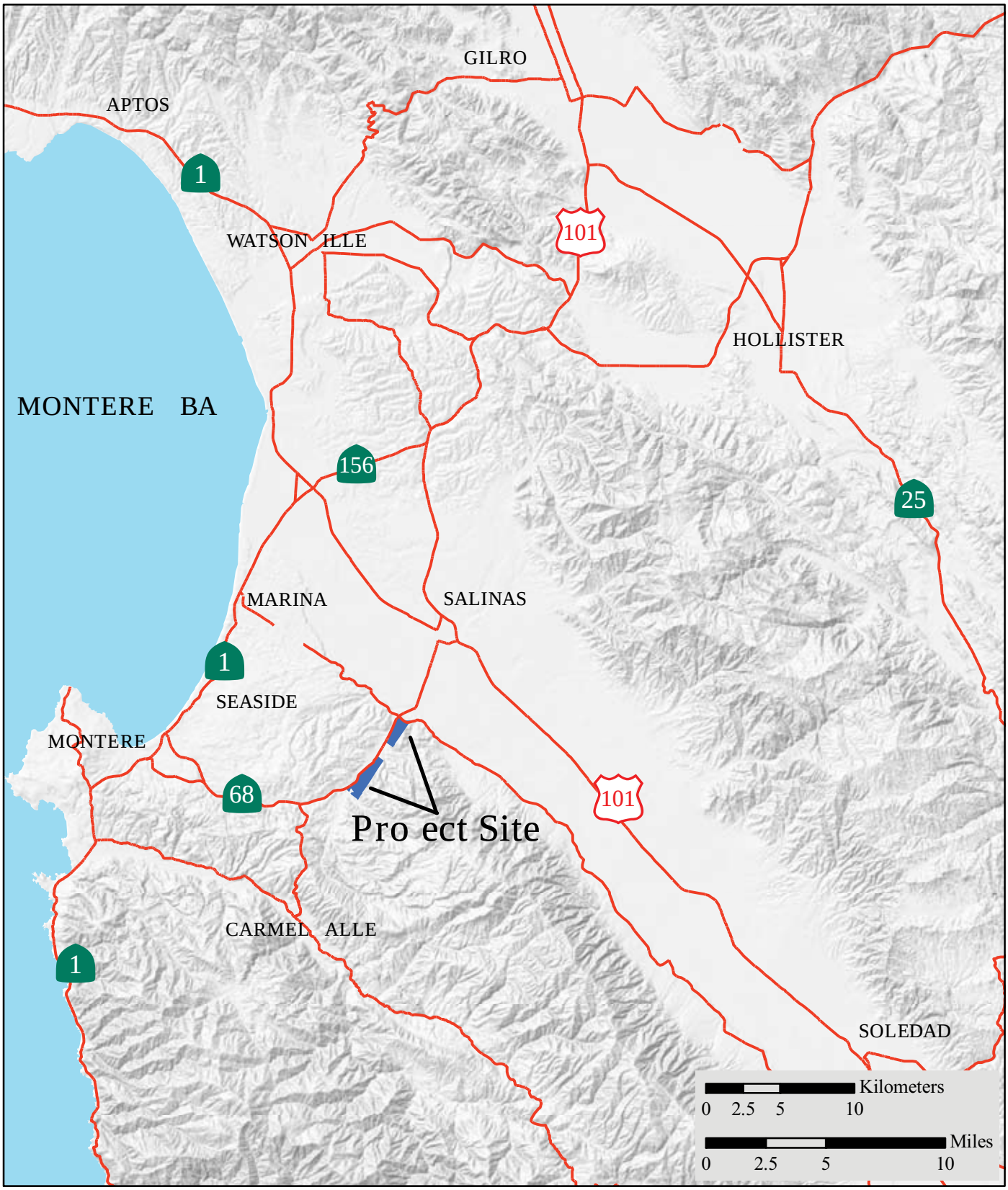
## INTRODUCTION

Denise Duffy and Associates, Inc. (DD&A) was contracted to conduct protocol-level California red-legged frog (*Rana aurora draytonii,* CRLF) surveys of El Toro Creek and Harper Creek as associated with the Ferrini Ranch property in Monterey County, California (Figure 1). These surveys were conducted to assist in a presence/absence determination for CRLF in El Toro Creek and Harper Creek within and adjacent to the project boundaries (Figure 2).

El Toro Creek and Harper Creek provide marginal habitat for a variety of special-status species, including CRLF and southwestern pond turtle (*Clemmys marmorata pallida*). In an effort to establish the presence/absence of any special-status reptiles or amphibians in Ferrini Ranch riparian areas, DD&A surveyed for all herpetofauna potentially present while conducting the CRLF protocol-level surveys. This report was prepared in accordance with USFWS standards as presented in "*Revised Guidance on Site Assessments and Field Surveys for the California Red legged Frog SF S"* (USFWS 2005).

## CALIFORNIA RED LEGGED FROG

The following natural history narrative is based on information presented by the California Wildlife Habitat Relationships Program (CDFG 2007). Additional information from general references (e.g., field guides, recovery plans, and federal register) and personal knowledge is also included. All California Natural Diversity Database (CNDDB) reported occurrences of special-status herpetofauna within 5 km of the Ferrini Ranch are presented in Figure 3.

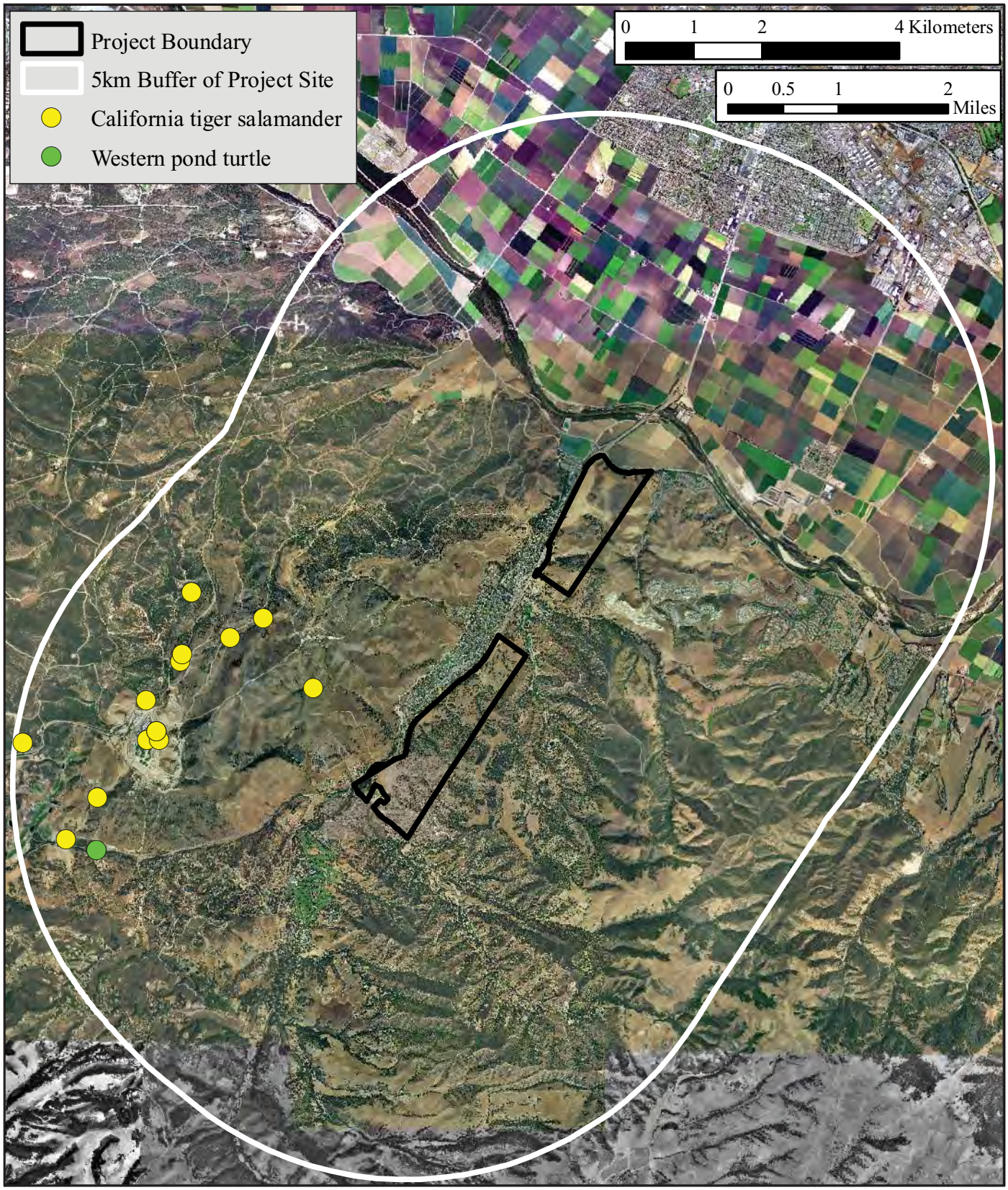



N

Ferrini Ranch Vicinity Map

Figure 1

| N | Approximate Alignment of El Toro Creek and Harper Creek | Figure 2 |
|---|---|---|




N

Occurrences of Special-Status Herpetofauna Within 5 km of the Ferrini Ranch

Figure 3

CRLF are a federally threatened, California species of special concern. On 23 May 1996, CRLF were listed as threatened by the USFWS. USFWS published a final determination of critical habitat on April 13, 2006 which became effective on May 15, 2006. CRLF are the largest native frog in California (44-131 mm snout-vent length) and were historically widely distributed in the central and southern portions of the state (Jennings and Hayes 1994). The species requires still or slow-moving water during the breeding season, where it deposits large egg masses, usually attached to submergent or emergent vegetation. Breeding typically occurs between December and April, depending on annual environmental conditions and locality. Radio-telemetry data indicates that adults engage in straight-line breeding season movements irrespective of riparian corridors or topography, and that CRLF may move up to two miles between non-breeding and breeding sites (Bulger et al. 2003). Adults generally inhabit aquatic habitats with riparian vegetation, overhanging banks, or plunge pools for cover, especially during the breeding season (Hayes and Jennings 1988). They may take refuge in small mammal burrows, leaf litter, or other moist areas during periods of inactivity or to avoid desiccation (Rathburn and Murphey 1993, Jennings and Hayes 1994). CRLF may move up to 300 feet from aquatic habitats into surrounding uplands, especially following rains, where individuals may spend days or weeks (Bulger et al. 2003). Eggs require 6 to 12 days before hatching and metamorphosis generally occurs 3.5 to 7 months after hatching, although larvae are capable of over-wintering. Following metamorphosis, generally between July and September, juveniles are 25-35 mm in size. Movements and habitat associations of metamorphs and sub-adults are poorly understood.

During the non-breeding season, a wider variety of aquatic habitats are used, including small pools in coastal streams, springs, water traps, and other ephemeral water bodies. Occurrence of this frog has been shown to be negatively correlated with presence of non-native bullfrogs (Moyle 1973; Hayes & Jennings 1986, 1998), although both species are able to persist at certain locations, particularly in the coastal zone. It is estimated that the CRLF have disappeared from approximately 75% of their historic range and have nearly been extirpated from the Sierra Nevada, Central Valley, and much of southern California (Miller et al. 1996).

## SITE DESCRIPTION

The Ferrini Ranch property consists of approximately 895 acres located between River Road and San Benancio Road, south of Highway 68 (Figure 1). The property supports a habitat mosaic of coast live oak woodland/savannah (437 acres), annual grasslands (402 acres), coastal scrub (30 acres), riparian areas (12 acres), wetlands and waters (5 acres), and developed areas (9 acres). For more specific background information on the property, please refer to the December 2007 WRA report titled "*Biological Assessment; Ferrini Property, Monterey County, California.*" Appropriate habitat exists in the riparian and perennial stream habitat of the El Toro Creek and Harper Creek confluence located in the westernmost portions of the property (Figure 2).

## METHODS

Targeted, non-random surveys to detect adult, subadult, and/or larval CRLF were conducted by DD&A biologists within all portions of El Toro Creek and Harper Creek associated with the Ferrini Ranch property. David Keegan, Senior Wildlife Biologist, was the lead biologist for all surveys. Brad Travers, Assistant Environmental Scientist, assisted David Keegan on three occasions.

Protocol-level surveys for CRLF consisted of one daytime and one nighttime survey during the non-breeding season (July 1-September 30), and two daytime and four nighttime surveys during the breeding season (October 1-June 30), for a total of eight site visits (Table 1). Site visits during the day consisted of both passive surveying (listening for calls) and actively walking El Toro Creek and Harper Creek alignments while looking for adult, subadult, and/or larval CRLF (and other sensitive herpetofauna including pond turtle). Nighttime site visits were generally conducted between one hour after true sunset (determined via NOAA website) and 0300 hours. Nighttime visits consisted of listening for frog calls periodically and walking the entire alignment of El Toro Creek and Harper Creek within and immediately

adjacent to the Ferrini Ranch property; offsets from the Ferrini Ranch property were surveyed up to 400 feet from property boundaries (past San Benancio road to the west and beyond the Hwy 68 overpass to the north). DD&A biologists used 4-cell Maglites (USFWS approved) in search of eye-shine. Leica and/or Eagle Optics 8 X 42 binoculars were also utilized to search for herpetofauna and would have been used to assist in species identification if necessary. Decontamination procedures between site visits were in accordance with USFWS endorsed methodologies; diluted Quat 128 was used to scrub all equipment (i.e. waders, machete, flashlights, etc.).

Data collected during CRLF surveys included survey date, surveyors, time, visit number, water body depth (when possible), water temperature, precipitation, cloud cover, wind speed, weather, and other appropriate comments. All data were recorded in field-notebooks, and subsequently organized onto species-specific datasheets (Appendix A).

Table 1. CRLF Survey Dates Personnel and Hours

| Survey # | Date | Surveyor(s) | Time Begin | Time End |
|---|---|---|---|---|
| *on reeding Season Surveys* | | | | |
| #1 | 7/05/07 | David Keegan<br>Brad Travers | 10:00 a.m. | 12:30 p.m. |
| #2 | 9/27/07 | David Keegan<br>Brad Travers | 1:00 a.m. | 3:00 a.m. |
| *reeding Season Surveys* | | | | |
| #3 | 10/03/07 | David Keegan | 10:30 a.m. | 1:30 p.m. |
| #4 | 10/10/07 | David Keegan | 8:20 p.m. | 11:20 p.m. |
| #5 | 10/17/07 | David Keegan | 8:15 p.m. | 11:15 p.m. |
| #6 | 10/24/07 | David Keegan | 8:40 p.m. | 11:00 p.m. |
| # | 11/01/07 | David Keegan<br>Brad Travers | 12:05 a.m. | 1:15 a.m. |
| #8 | 11/21/07 | David Keegan | 8:00 a.m. | 11:00 p.m. |

## RESULTS

Harper Creek (a tributary to Toro Creek) was not observed to support surface flows during any portion of the CRLF protocol-level surveys (Figure 4a). Although two surveys of Harper Creek were conducted within 24 hours of rain, no back-ponded areas were ever observed. Site conditions suggest that an active channel is occasionally present in Harper Creek (likely during flash storm events), but channel width and depth would be highly variable (i.e. between 18 inches and 5 feet wide with depths up to 18 inches). Dominant understory vegetation along the channel included poison oak (*To icodendron diversilobum*), stinging nettle ( *rtica dioica*), poison hemlock (*Conium maculatum*), and periwinkle ( *inca ma or*). Dominant trees along Harper Creek included willow (*Sali* sp.) and California buckeye (*Aesculus californica*). Given the lack of hydrology and a lack of appropriate breeding habitat supported by Harper Creek, it is highly unlikely that CRLF would occupy this feature.

Portions of El Toro Creek were observed to support surface inundation during all surveys (particularly depressions and back-ponded areas) and the entire channel of El Toro Creek supported surface flows in October and November (Figure 4b). The width and depth of El Toro Creek varies substantially through the surveyed alignment (i.e. 2-10 feet wide and up to 18 inches deep) but is typically between 2 and 4 feet wide and less than six inches in depth. Backponded features along El Toro Creek were observed to support Pacific treefrog (*Hyla regilla*) larvae in July. Backponded portions of El Toro Creek and deeper portions of the channel provide marginal breeding habitat for a variety of amphibian species, although it is likely that these areas are washed out in the rainy season during periods of high flow. Only Pacific treefrog were observed within the backponded portions of El Toro Creek. Dominant understory vegetation along El Toro Creek includes poison oak, stinging nettle, California mugwort (*Artemisia douglasiana*), rushes ( *uncus* sp.), and California blackberry (*Rubus ursinus*). Willow and California bay

1. Harper Creek near San Benancio Rd.

2. Center of Harper Creek

3. Harper Creek near confluence with El Toro Creek

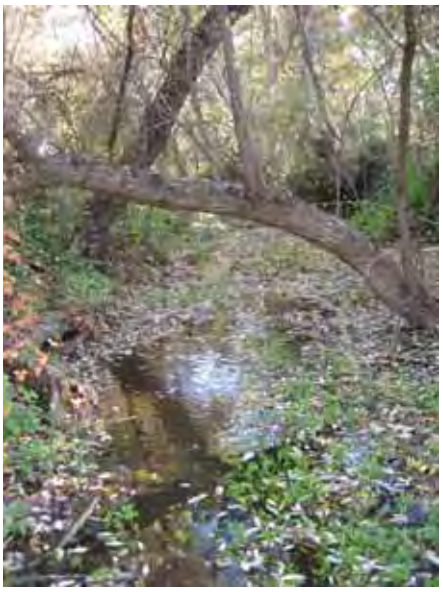
4. Confluence of Harper Creek and El Toro Creek

5. El Toro Creek north of Ferrini Ranch

| | | |
|---|---|---|
| ▲ N | Site Photos of El Toro Creek and Harper Creek | Figure 4a |

6. El Toro Creek under Highway 68

7. Middle reach of El Toro Creek



8. El Toro Creek west

9. El Toro Creek under San Benancio Road

10. El Toro Creek Backponding

| | | |
|---|---|---|
| ▲ N | Site Photos of El Toro Creek and Harper Creek | Figure 4b |

laurel ( *mbellularia californica*) are the dominant trees along El Toro Creek with buckeye and coast live oak ( *uercus agrifolia*) present to a lesser extent. Ferrini Ranch associated portions of El Toro Creek represent marginal CRLF breeding habitat and suitable dispersal habitat. However, it is likely that CRLF are not able to colonize the potential breeding habitat on and surrounding the Ferrini property because the backponded areas are washed out frequently and there are no known breeding populations within dispersal distance of the species.

No CRLF at any life stage (adult, subadult, larva) were detected (audio) or observed in the course of protocol-level surveys of El Toro Creek and Harper Creek (Table 2). As such, this report documents a negative finding for CRLF within El Toro Creek and Harper Creek within the Ferrini Ranch property. No other threatened, endangered, or special-status herpetofauna adults, subadults, or larvae were observed in the course of these surveys (i.e. pond turtles were not observed). Only one reptile species was observed: western fence lizard (*Sceloporus occidentalis*). Fence lizards were commonly observed in more upland portions of Harper Creek (please note that these observations were not recorded on datasheets). Only one amphibian species was observed: Pacific treefrog. Approximately twelve (12) Pacific treefrog larvae were observed in a back-ponded portion of the main channel of El Toro Creek on July 5, 2007, and adult treefrog vocalizations were detected on September 27 and October 17, 2007 (see Table 2).

Table 2. CRLF Protocol level Survey Data

| Survey # | Date | Survey Results |
|---|---|---|
| *on reeding Season Surveys* | | |
| #1 | 7/05/07 | 12 Pacific treefrog larvae observed in back-ponded portion of the main channel of El Toro Creek. |
| #2 | 9/27/07 | Approximately 4 adult Pacific treefrog heard. |
| *reeding Season Surveys* | | |
| #3 | 10/03/07 | No detections or observations. |
| #4 | 10/10/07 | No detections or observations. |
| #5 | 10/17/07 | Approximately two adult Pacific treefrog heard. |
| #6 | 10/24/07 | No detections or observations. |
| # | 11/01/07 | No detections or observations. |
| #8 | 11/21/07 | No detections or observations. |

## CONCLUSION

DD&A completed protocol-level CRLF surveys in all portions of El Toro Creek and Harper Creek located within and immediately adjacent to the Ferrini Ranch property. The surveys described within this document were conducted in accordance with county, state, and federal law and with USFWS reporting requirements for protocol-level CRLF surveys. DD&A biologists did not observe CRLF at any life stage (adult, subadult, larva) in El Toro Creek or Harper Creek. Therefore, this report serves as documentation for a negative finding for CRLF in riparian portions of the Ferrini Ranch property.

CITATIONS

Bulger, J.B., N.J. Scott, and R.B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs Rana aurora draytonii in coastal forests and grasslands. Biological Conservation: Vol. 110, No. 1. Pages 85-95.

California Department of Fish and Game, California Interagency Wildlife Task Group. 2007. California Wildlife Habitat Relationships Program Version 8.0 personal computer program. Sacramento, CA.

California Natural Diversity Data Base. 2007. Natural Heritage Division. California Department of Fish and Game. State of California.

Hayes, M.P. and M.R. Jennings. 1986. Decline of Ranid frog species in western North America: are bullfrogs (Rana catesbeiana) responsible? Journal of Herpetology 20 (4): 490509.

Hayes, M.P. and M.R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow legged frog (Rana boylii): implications for management. In Management of amphibians, reptiles, and small mammals in North America. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. pp. 144158.

Hayes, M.P. and M.R. Jennings. 1994. Amphibian and reptile species of special concern in California. Final report to California Department of Fish and Game report Inland Fisheries Division. Rancho Cordova, CA. 255 pp.

Miller, K. J., A. Willy, S. Larsen, and S. Morey. 1996. Endangered and threatened wildlife and plants; determination of threatened status for the California red-legged frog. Federal Register: Vol. 61, No. 101.

Moyle, P.B. 1973. Effects of introduced bullfrogs, Rana catesbeiana, on the native frogs of the San Joaquin Valley, California. Copeia 1973: 18-22.

Rathburn, G.B. and T.G. Murphey. 1996. Evaluation of Radio-belt for Ranid frogs. Herpetolgical Review. Volume 27: 187-189.

United States Fish and Wildlife Service. 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. Portland, Oregon. 26 pp.

# Appendix A.

## CRLF Datasheets and Original Field Notes

## Appendix E.
## California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (name) _____ (agency)

Date of Survey: 7/5/07 (mm/dd/yyyy)

Survey Biologist: Vieran (Last name) David (first name)

Survey Biologist: Frances (Last name) Brad (first name)

Site Location: Monterey County, Ferrini Property, Toro Creek + unnamed tributary - 36.34.47 121.48.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

**ATTACH A MAP (include habitat types, important features, and species locations)**

Proposed project name: Ferrini

Brief description of proposed action:
Residential development proposed w/i 300 feet of riparian corridor

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 10:00am

End Time: 12:30pm

Cloud cover: Ø

Precipitation: Ø

Air Temperature: 70

Water Temperature: 68

Wind Speed: <3mph

Visibility Conditions: excellent

Moon phase: last 1/4

Humidity: low

Description of weather conditions: clear sunny, warm day

Brand name and model of light used to conduct surveys: N/a

Were binoculars used for the surveys (circle one)? YES NO

Brand, model, and power of binoculars: Leica trinovid 8x42 + Eagle optics Platinum Range 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| Hyla regilla | 12 | O | larvae only | <40mm | 100% |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Raccoon & Canid (domestic dog) tracks frequently observed.

Other notes, observations, comments, *etc.*

CECH prevalent

- willow, nettle, P.O., thimble berry, lonicera, mugwort, willow herb...

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

Appendix E.

**California Red-legged Frog Survey Data Sheet**

Survey results reviewed by: _____ (Last name) _____ (first name) _____ (Date)

Date of Survey: 9/27/07 (mm/dd/yyyy)

Survey Biologist: Keegan (Last name) David (first name)

Survey Biologist: Travers (Last name) Brad (first name)

Site Location: MoCo, Ferrini Property, Toto Creek
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

**ATTACH A MAP (include habitat types, important features, and species locations)**

Proposed project name: Ferrini Property Development
Brief description of proposed action:
Development of Ferrini property; residential subdivision
Toto Creek may be impacted

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 1:00am

End Time: 3:00am

Cloud cover: 50%

Precipitation: n/a

Air Temperature: 52°

Water Temperature: _____

Wind Speed: <2mph

Visibility Conditions: excellent

Moon phase: full

Humidity: relatively high

Description of weather conditions: 50% cc, cool, little wind

Brand name and model of light used to conduct surveys: Maglite - 4cell (2x)
Leica Trinovid 8x42 Eagle optics 8x

Were binoculars used for the surveys (circle one)? YES NO
Brand, model, and power of binoculars: _____

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| Hyla | 4 | Heard | Adult | | 100% |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Raccoon / skunk tracks.

Other notes, observations, comments, *etc.*

Hyla heard infrequently

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____ _____ _____
(FWS Field Office) (date) (biologist)

**Date of Survey:** 10/3/07 (mm/dd/yyyy)

**Survey Biologist:** Keegan (Last name) David (first name)

**Survey Biologist:** _____ (Last name) _____ (first name)

**Site Location:** MoCo, Ferrari Property, Toro Creek nr Trib, 36.34.47/121.43.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Ferrari
Brief description of proposed action:
see previous datasheets

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 10:30 a.m **End Time:** 1:30 pm

**Cloud cover:** 0 **Precipitation:** n/a

**Air Temperature:** 76° **Water Temperature:** not recorded

**Wind Speed:** < 4 mph **Visibility Conditions:** Excellent

**Moon phase:** 10/3/07 - first 1/4 **Humidity:** low

**Description of weather conditions:** clear/sunny/warm

**Brand name and model of light used to conduct surveys:** Maglite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Leica Trinovid 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| none observed | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

raccoon / skunk tracks obs -

Other notes, observations, comments, *etc.*

Max $H_2O$ depth, near confluence @ 8"

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____ (FWS Field Office) (date) (biologist)

**Date of Survey:** 10/10/07 (mm/dd/yyyy)

**Survey Biologist:** Keegan (Last name) David (first name)

**Survey Biologist:** _____ (Last name) (first name)

**Site Location:** Molo. Fermi Property. Toro Creek. 36.34.37/121-43-11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Fermi Property
Brief description of proposed action:
see previous

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 8:20pm **End Time:** 11:30pm

**Cloud cover:** Ø **Precipitation:** yes, last night → 9am

**Air Temperature:** 54° **Water Temperature:** 60°

**Wind Speed:** <7 mph **Visibility Conditions:** excellent → good (later insunrise)

**Moon phase:** New Moon **Humidity:** rel. high

**Description of weather conditions:** foggy after 11-
Clear / cold

**Brand name and model of light used to conduct surveys:** Maglite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Leica Trinovid 8x42

**Appendix E.**
**California Red-legged Frog Survey Data Sheet**

**AMPHIBIAN OBSERVATIONS**

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| * None seen or heard * | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Raccoon/skunk tracks obs. Feral cat observed.

Other notes, observations, comments, *etc.*

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____ (FWS Field Office) _____ (date) _____ (biologist)

**Date of Survey:** 10/17/07 (mm/dd/yyyy)

**Survey Biologist:** Keegan (Last name) David (first name)

**Survey Biologist:** _____ (Last name) _____ (first name)

**Site Location:** Mon, Ferrini Property, Toro Creek 36.34.37 / 121.43.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Ferrini
Brief description of proposed action:
see previous

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 8:15 pm **End Time:** 11:15 pm

**Cloud cover:** Ø **Precipitation:** w/i 24 hrs.

**Air Temperature:** 54° **Water Temperature:** _____

**Wind Speed:** <2mph **Visibility Conditions:** Excellent

**Moon phase:** 1st 1/4 **Humidity:** low

**Description of weather conditions:** cool / clear

**Brand name and model of light used to conduct surveys:** Maglite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Leica. Tamand 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| Hyla regilla | 2 | Heard | Adult | | 100 % |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

Other notes, observations, comments, *etc.*

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____ (FWS Field Office) _____ (date) _____ (biologist)

**Date of Survey:** 10/24/07 (mm/dd/yyyy)

**Survey Biologist:** Kuegan (Last name) David (first name)

**Survey Biologist:** _____ (Last name) _____ (first name)

**Site Location:** Mo'o, Ferrini Property, Toro Creek 36.34.37/ 121.43.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Ferrini
Brief description of proposed action:
see previous

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 8:45 pm

**End Time:** 11:00 pm

**Cloud cover:** ∅

**Precipitation:** n/a

**Air Temperature:** 58°

**Water Temperature:** 56°

**Wind Speed:** <3mph

**Visibility Conditions:** Excellent

**Moon phase:** 1st 1/4

**Humidity:** 95%

**Description of weather conditions:** clear & cool

**Brand name and model of light used to conduct surveys:** Maglite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Lowell Terminator 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| * No observations of herps | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

_____

_____

_____

_____

| Other notes, observations, comments, *etc.* |
|---|
| |

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____
(FWS Field Office) (date) (biologist)

**Date of Survey:** 11/1/07 (mm/dd/yyyy)

**Survey Biologist:** Keegan (Last name) David (first name)

**Survey Biologist:** Travers (Last name) Brad (first name)

**Site Location:** MoCo, Ferrini Property, Jim Creek, 36.34.37 / R1.43.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Ferrini
Brief description of proposed action:
See previous

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 12:05 am **End Time:** 1:15 am

**Cloud cover:** Ø **Precipitation:** n/a

**Air Temperature:** 49° **Water Temperature:** 54°

**Wind Speed:** Ø **Visibility Conditions:** Excellent

**Moon phase:** last 1/4 **Humidity:** 86°

**Description of weather conditions:** cool / clear

**Brand name and model of light used to conduct surveys:** Maglite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Vista Tomand 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| * No observations of Leps | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

_____

_____

_____

_____

Other notes, observations, comments, *etc.*

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

## Appendix E.
## California Red-legged Frog Survey Data Sheet

**Survey results reviewed by** _____ (FWS Field Office) _____ (date) _____ (biologist)

**Date of Survey:** 11/21/07 (mm/dd/yyyy)

**Survey Biologist:** Keegan. (Last name) David (first name)

**Survey Biologist:** _____ (Last name) _____ (first name)

**Site Location:** Molo, Santa Margarita, Toro Creek, 36.31.37/ 121.43.11
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S ).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Venrim
Brief description of proposed action:
See previous

**Type of Survey** (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

**Survey number** (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

**Begin Time:** 8:00 am **End Time:** 11:00 am

**Cloud cover:** Ø **Precipitation:** Ø

**Air Temperature:** 55° **Water Temperature:** 56°

**Wind Speed:** <3 mph **Visibility Conditions:** exc.

**Moon phase:** _____ **Humidity:** Low

**Description of weather conditions:** clear / cool / little wind

**Brand name and model of light used to conduct surveys:** Mag lite 4-cell

**Were binoculars used for the surveys** (circle one)? **YES** **NO**
**Brand, model, and power of binoculars:** Leica Trinovid 8x42

## Appendix E.
## California Red-legged Frog Survey Data Sheet

### AMPHIBIAN OBSERVATIONS

| Species | # of indiv. | Observed (O) Heard (H) | Life Stages | Size Class | Certainty of Identification |
|---|---|---|---|---|---|
| * No Hops * | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: _____

_____

_____

_____

_____

| Other notes, observations, comments, *etc.* |
|---|
| |

**Necessary Attachments:**

4. All field notes and other supporting documents
5. Site photographs
6. Maps with important habitat features and species locations

Ferrini - RLF survey #1 (day time)
DK/BT Time - 10:00 - 12:30
T° - 70°
Wind - <3
7/5/07
- access by school - near end of Tow Creek + unnamed tributary

Begin @ San Bernardino Road - #1
- week day -

- walked trail to confluence -
Hyla lower present - in low #s in ponded area
- last property - on other bridge
- opposite side
Frogs, water, fence, P.O
Disturbed - Always?

Tow Creek is variable in width + depth
Crit support limited breeding habitat
- No RLF seen

Ferrini - RLF
survey #3 #3
Date: 10/3/07
time Begin: 10:30pm End: 1:30am
cc: ∅ Precip - N/a
T: 76° H.O.T°
Wind - <4mph Vis - Excellent
Moon - last 1/4 Am - low
weather - clear/sunny
Audio - ∅
Visual - ∅

X No herp Obs or detected

9/27/07
Ferrini - RLF survey #2 #2
DK Time - 1am - 3am
cc. 50% Precip - n/a
AirT° - 52° WaterT° -
Wind speed - <2 Vis - excellent
Moon - full Hum - rel. high
weather - partly cloudy - cool
Audio - only Hyla heard vocalizing

Visual n/a

X No Herps observed

10/10/07 DRC alone
2nd night survey 4
4th total 8:20 - 11:20
T° - 58 H.O.T° - 60
CC - ∅ wind - <3
Moon - new Precip - last night
Vis - Good + stop rain

Refer - foggy

Results; Nada
No herps of any kind

10/17/07 Toro #5
8:15pm - 11:15pm
conditions - cool & clear
Precip? No - Hum - 79%
cc - Ø V.S - excellent
wind - <3mph Moon - last 1/4

* Nada *

10/24/07 Perrin Ref # 6
OK
Time - 8:40pm end - 11:00 pm
T° 54° Precip - yes w/i 24 hrs.
cc. - Ø $H_2O$ T° - not recorded
WS - <2mph Vis - exc.
Moon first 1/4 Hum - low
weather - cool & clear

Audio: 7 Hyla heard

Visual: Ø

* No herps obs.

11/1/07 Toro Creek #7
Time 12:05 - 1:15
Vis - exc Wind Ø
cc - Ø Precip - Ø
Moon ? - last 1/4
Conditions - clear - cool
T° - 48° $H_2O$ T° 54°
Hum - 86°

Nada

Perrin - Final Day Survey #8
11/2/07
Time: 8:00am - 10:00am
cc - Ø Vis - exc.
Temp - 55° $H_2O$ 56
Wind - <3 Moon -
Precip - Ø

Native BB Misguat
Nettle Oak
P.O. Willow
Baccharis
* walnut & persimmon
* Channel in trib still dry
No herps
* Begin of end of algae?
Water flowing
18" - 4' wide - <10"

# Protocol level Burrowing Owl Survey Report
# Ferrini Ranch Property
# Monterey County California

Submitted to

Domain Corporation
2716 Ocean Park Blvd., Suite 3006
Santa Monica, CA 90405-5299
Contact: Mark Kelton

For Submittal to the County of Monterey

Prepared by

Denise Duffy & Associates, Inc.
947 Cass Street, Suite 5
Monterey, California 93940
Contact: Josh Harwayne

March 2008

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# Protocol level Burrowing Owl Survey Report
# Ferrini Ranch Property
# Monterey County California

## INTRODUCTION

Denise Duffy & Associates, Inc. (DD&A) was contracted by the Domain Corporation to conduct protocol-level western burrowing owl (*Athene cunicularia*) surveys at the Ferrini Ranch Property (FRP) in Monterey County, California. The burrowing owl is a California Department of Fish & Game (CDFG) State Species of Special Concern afforded planning consideration under the California Environmental Quality Act (CEQA). This report provides the results of a habitat assessment and field survey of the FRP located between River Road and San Benancio Road to the south of Highway 68 (Figure 1). Surveys for both non-breeding (overwintering) and breeding burrowing owls were conducted, and a comprehensive ground survey was completed; this report presents the results of all burrowing owl survey efforts. In addition, a description of the habitats onsite, a general description of the habitats within 2 km (2.1 miles) and the nearest known burrowing owl occurrences are provided within this report.

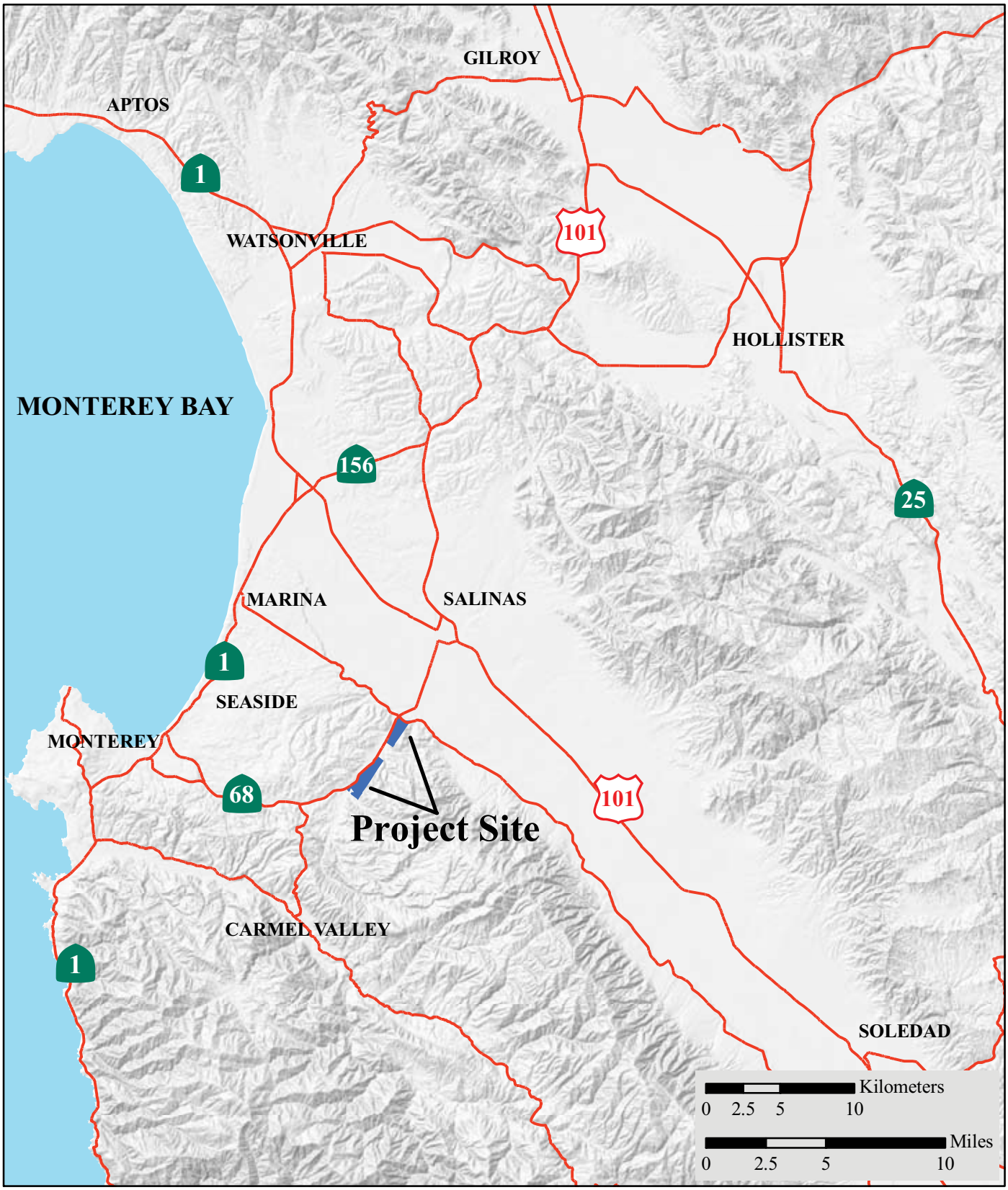
## STUD SITE

The FRP is approximately 895 acres situated between the cities of Salinas and Monterey, immediately south of Highway 68. The property is constrained by River Road to the northeast and San Benancio Road to the southwest, and is separated into two areas by Toro Regional Park (Figure 1). Both portions of the property are historically and currently grazed by livestock (cattle). The majority of the site is characterized by oak woodland and annual grassland with coastal scrub present in the upper slopes of drainages and south facing slopes (WRA 2007).

DD&A biologists conducted extensive floristic surveys and habitat mapping of the FRP in 2006/2007 and identified a habitat mosaic of coast live oak woodland/savanna (436 acres), annual grasslands (402 acres), coastal scrub (30 acres), riparian areas (12 acres), wetlands and Waters of the U.S. (4.55 acres combined), and developed areas (9 acres) (Figures 2a, 2b, and 3). The following habitat descriptions are presented in the December 2007 Wetlands Research Associates (WRA) report titled "*Biological Assessment Ferrini Property, Monterey County, California*."

### *Coast ive a oodland Savanna*

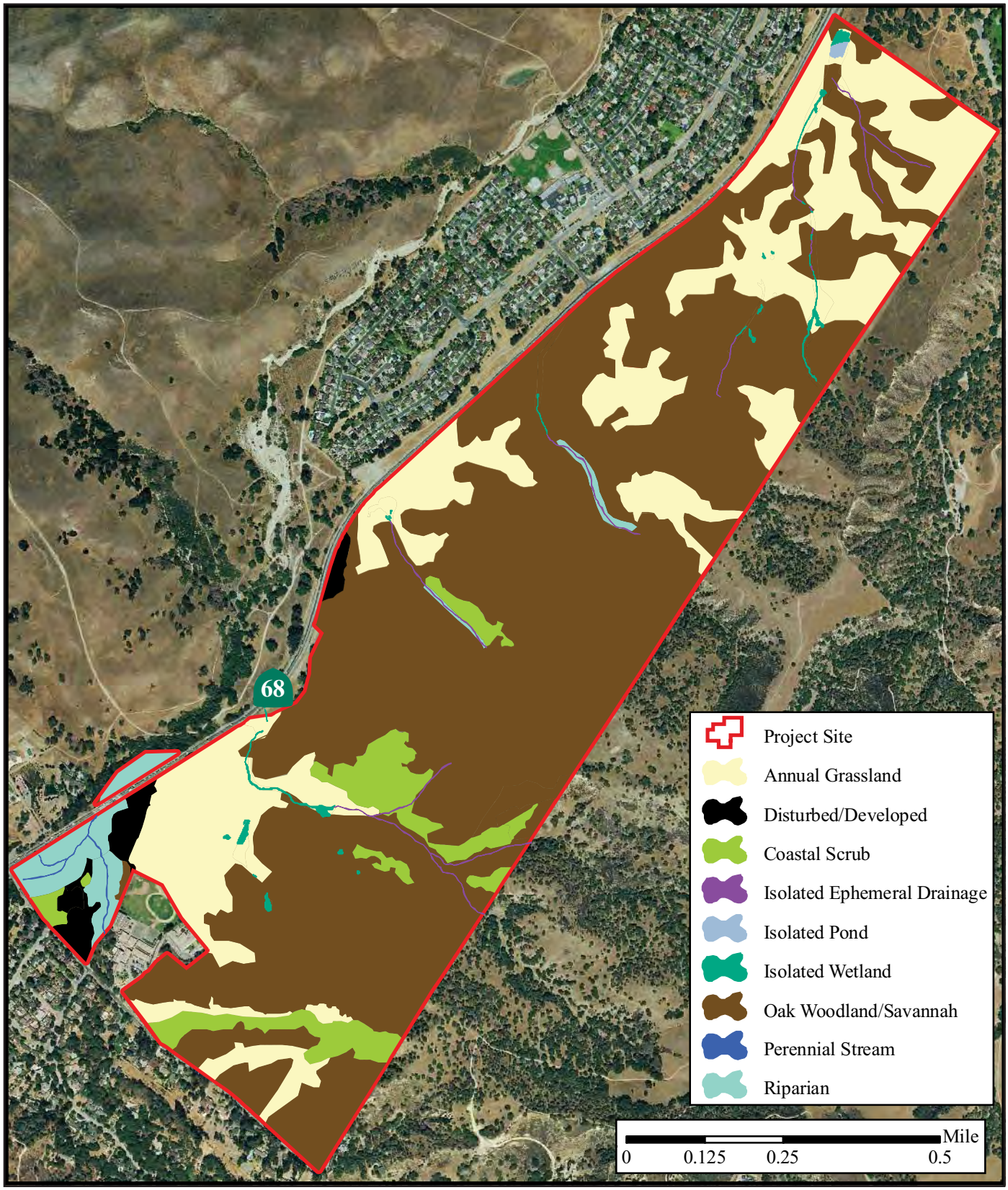
Approximately 436 acres of coast live oak woodland/savanna are present within the FRP. Oak woodland communities are dominated by open to nearly closed canopies of coast live oak ( *uercus agrifolia*) with a grass or shrub understory (Figures 2a, 2b, and 3). Savannas are transitional between woodland and grassland with trees more widely spaced and a grassland dominated understory. In general, oak savannas are found on the drier, east-facing slopes and ridge tops. Denser oak woodlands are found on mesic, north-facing slopes and canyon bottoms within the FRP. The densest oak woodlands support an understory consisting of oak leaf duff and sparse herbaceous vegetation. Oak savanna portions of the FRP support the second highest number and density of California ground squirrel (*Spermophilus beecheyi*) burrows, with annual grasslands supporting the greatest numbers/densities.




N

Ferrini Ranch Vicinity Map

Figure 1

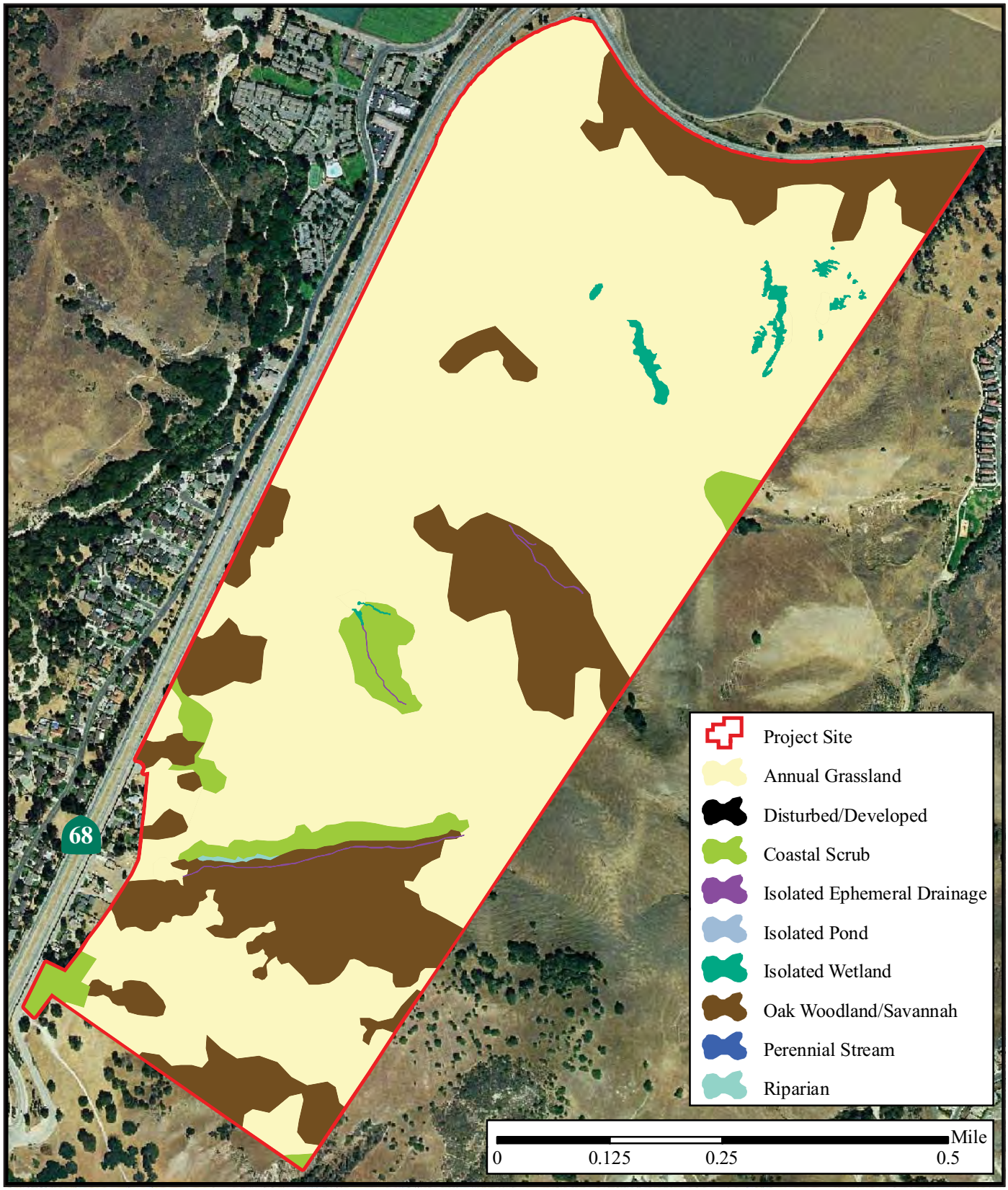



N

# Ferrini Ranch Property Habitat Map

Figure 2a

DENISE DUFFY & ASSOCIATES, INC.




N

# Ferrini Ranch Property Habitat Map

Figure 2b

DENISE DUFFY & ASSOCIATES, INC.

Annual grassland and oak savannah habitats

Annual grassland habitat

Ground squirrel burrows

Oak woodland habitat

Scrub and oak woodland habitats

Overview of annual grassland, oak savannah, and scrub habitats

N

# Ferrini Ranch Property Representative Site Photos

Figure 3

DENISE DUFFY & ASSOCIATES, INC.

*Annual Grassland*

Approximately 402 acres of annual grasslands were mapped on the FRP (Figures 2 and 3). Annual grasslands typically occur in open areas of valleys and foothills throughout California, usually on fine textured clay or loam soils that are somewhat poorly drained (Holland 1986). The annual grassland on the FRP is typically dominated by non-native annual grass species including wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), Italian ryegrass ( *olium multiflorum*), and rattail fescue ( *ulpia myuros*). Present at a very low percent cover are native perennial grasses including needlegrass ( *assella* sp.). The FRP has a long history of disturbance related to livestock grazing and currently supports cattle production. The existing non-native annual grasslands may be dominated by any of the species presented above based on site-specific soils and hydrology. In general, annual grasslands lower in elevation and with a more level topography are dominated by annual grass species which favor deeper soils with increased soil moisture or hydrology (i.e., Italian ryegrass, ripgut brome, soft chess). At higher elevations with steeper slopes and thinner soils, onsite grasslands tend to be dominated by rattail fescue and wild oat. Native grasses occur sporadically in low relative abundance within the FRP. Annual grassland portions of the site support the highest densities of small mammal burrows observed.

*Coastal Scrub*

Approximately 30 acres of coastal scrub were mapped within the FRP. Coastal scrub communities are characterized by moderate to low growing evergreen and drought tolerant shrubs adapted to shallow soils. Coastal scrub is dominated by black sage (*Salvia mellifera*) or coyote brush (*Baccharis pilularis*). Sub-dominants include sticky monkey flower (*Mimulus aurantiacus*) and California sagebrush (*Artemesia californica*). This vegetation community occurs mostly on drier, steeper slopes with shallow soils. Scrub habitats within the FRP do not support typical nesting/overwintering burrowing owl habitat; ground squirrel burrows are not present.

*Riparian*

Approximately 12 acres of riparian habitat occur within the FRP. A significant riparian corridor exists within the northwest corner of the project site adjacent to San Benancio Road. The area is dominated by riparian tree species including California buckeye (*Aesculus californica*) and willow (*Sali* spp.). Dominant understory species include California blackberry (*Rubus ursinus*), mugwort (*Artemisia douglasiana*), and poison oak (*To icodendron diversilobum*). Riparian habitats within the FRP do not support typical nesting/overwintering burrowing owl habitat; ground squirrel burrows are not present.

*etlands and aters of the .S.*

Approximately 3.61 acres of vegetated seasonal and seep wetlands are supported within the FRP. Seasonal wetlands generally occur in depressions and flat areas at the mouths of ephemeral drainages within the FRP. All wetlands in the FRP are dominated by wetland adapted plant species including iris-leaved rush ( *uncus iphioides*), Mexican rush ( *uncus me icanus*), cut-leaf plantain (*Plantago coronopus*), Bermuda grass (*Cynodon dactylon*), and Hyssop's loosestrife ( *ythrum hyssopifolia*). None of the onsite wetlands are jurisdictional under Section 404 of the Clean Water Act as determined by the Corps of Engineers; however, they may be considered "Waters of the State" by the Regional Water Quality Control Board (WRA 2007).

Approximately 2,099 linear feet (0.17 acre) of Waters of the U.S. occur at the confluence of El Toro Creek and Harper Creek in the western-most portion of the FRP (WRA 2007). This portion of El Toro Creek is perennial in all but the driest years. Waters of the U.S. were not surveyed for burrowing owls given the lack of appropriate habitat (no ground squirrel burrows). However, nearby grassland portions of the site were documented to support ground squirrel utilization.

While a number of ephemeral drainages are present in the FRP, none were determined to be jurisdictional under Section 4040 of the Clean Water Act (WRA 2007). Although ground squirrel burrows are not present within onsite ephemeral drainages, burrows are present immediately adjacent to these areas within grassland and oak woodland/savanna portions of the site.

### *isturbed eveloped*

Approximately 9 acres of "developed" lands were mapped within the FRP. Developed portions of the site include structures (homes, outbuildings, businesses [i.e., Toro Café, Blanchard's Wood Sculptures]), access and/or turn-around roads, and associated areas of disturbance. These areas often support compacted soils or gravel fill as a result of past disturbance. Ruderal vegetation species such as ripgut brome and wild oat are the typical dominants in "developed' portions of the site. Although Botta's pocket gopher (*Thomomys bottae*) burrows were evident within some developed portions of the site, no ground squirrel burrows were observed within these portions of the FRP.

## METHODOLOG AND SUR E ING PERSONNEL

Burrowing owl survey methodology followed the guidelines provided in "*Burro ing l Surveying Protocol and Mitigation Guidelines*" prepared by the California Burrowing Owl Consortium (CBOC) in 1993. A record search of the CDFG California Natural Diversity Database (CNDDB 2008) for the San Juan Bautista quadrangle and the eight surrounding quadrangles was conducted. Previous biological investigations were reviewed. Researchers with experience in the survey area were contacted for locality records.

DD&A burrowing owl surveys focused primarily on grassland, oak savanna, and oak woodland portions of the site. Field surveys for non-breeding (overwintering) burrowing owls were performed on January 17 and January 31, 2008, by David Keegan (Senior Wildlife Biologist) and Brad Travers (Assistant Environmental Scientist). Surveys for nesting burrowing owls were performed on August 2 and August 29, 2007, by David Keegan and Brad Travers (Table 1). David Keegan was the lead biologist for all surveys.

Table 1. CRLF Survey Dates Personnel and Hours

| Survey Information | Date(s) | Surveyor(s) | Time Begin | Time End |
|---|---|---|---|---|
| *on reeding Season Dec 1 an 1 Surveys* | | | | |
| #1 | 1/17/08 | David Keegan<br>Brad Travers | 5:30 a.m. | 8:30 p.m. |
| #2 | 1/31/08 | David Keegan<br>Brad Travers | 5:30 a.m. | 8:30 a.m. |
| *reeding Season Fe 1 Aug 1 Surveys* | | | | |
| #3 | 8/02/07 | David Keegan<br>Brad Travers | 5:45 a.m. | 8:45 p.m. |
| #4 | 8/29/07 | David Keegan<br>Brad Travers | 5:45 p.m. | 8:45 p.m. |
| *urro Census Surveys* | | | | |
| #5 | 2/08/08<br>and<br>2/11/08 | Jami Davis<br>Matt Johnson<br>David Keegan<br>Brad Travers | 9:30 a.m. | 4:00 p.m. |
| | 2/15//08 | Matt Johnson<br>David Keegan | 12:00 p.m. | 4:00 p.m. |

On each occasion, the project area was surveyed by 4X4 vehicle and on foot using the best available vantage points to observe appropriate habitat with binoculars and spotting scopes. Visual surveys were conducted between approximately one hour prior to sunrise and two hours after sunrise. Weather and visibility conditions were recorded. All wildlife species identified were recorded. Any observation of burrowing owls or burrowing owl "sign" (white wash, pellets, feathers) would likewise have been recorded.

Burrow census surveys of all suitable burrowing owl habitats within the FRP were completed over the course of three days: February 8, February 11, and February 15, 2008. These surveys were completed by DD&A biologists Jami Davis (Assistant Environmental Scientist), Matt Johnson (Associate Environmental Scientist), David Keegan, and Brad Travers. Survey transects were arranged to provide 100% visual coverage of the site; individual transect width was <30 meters. Any observations of burrowing owls or burrowing owl sign would have been mapped in the field. Potential burrowing owl burrows, including American badger (*Ta ida ta us*) dens, California ground squirrel burrows, and man-made features such as culverts were noted. Ground squirrel burrow clusters were ranked by density (i.e., 1-5, 5-10, 10-20, 20-50, >50) and were mapped in the field. Active and abandoned badger dens, as well as "badger diggings" were also mapped. These data were subsequently converted into GIS files.

Other data collected during the burrow census surveys included survey date, surveyors present, start and end times, temperature, cloud cover, wind speed, visibility, general weather, and wildlife species observed. All data were recorded in field notebooks. Appendix A presents all wildlife species observed onsite in the course of DD&A burrowing owl surveys of the FRP.

## SPECIES INFORMATION

The following natural history narrative is primarily based on information presented by the California Wildlife Habitat Relationships Program (CDFG 2008). Additional information from general references (e.g., field guides, recovery plans, and federal register), local and regional biologists, and personal knowledge is included.

### Burrowing Owl

As previously noted, burrowing owls are a CDFG State Species of Special Concern. Burrowing owls are a year-round resident of open, dry grassland and desert habitats, and in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats. In general, burrowing owls prefer open grasslands and desert shrub habitats where grass height is relative short, including areas that are actively grazed by livestock (Plumpton and Lutz 1993), particularly when perches (artificial or natural) are present. Burrowing owls are a small (9.5 inches), ground-dwelling species typically associated with rodent burrows (often California ground squirrel) for roosting and nesting cover (Haug, et al. 1993). These burrows are typically lined with excrement, pellets, debris, grass, and feathers (occasionally no lining is present). Pipes, culverts, and nest boxes may be substituted for burrows when available (CBOC 1993; Trulio 1997). This species demonstrates strong site-fidelity from year to year (Feeney 1997). Breeding occurs from March through August, with the peak occurring in April and May. This species is semi-colonial, and is probably the most gregarious owl in North America. Burrowing owls eat mostly insects, but small mammals, reptiles, birds, and carrion are also taken. This species usually hunts from a perch, hovers, hawks, dives, and hops after prey on the ground. Conversion of grassland to agriculture, poisoning of ground squirrels, and other forms of habitat destruction have led to the reduction in their numbers in the recent decades (Haug, et al. 1993; DeSante and Ruhlen 1995). In Monterey County, burrowing owls were historically much more common than they are currently (Roberson 2002). Intensive agricultural conversion and housing development have led to the loss of suitable grassland habitats throughout the Salinas Valley. The introduced red fox ( *ulpes vulpes*) has also been implicated as a factor in the rapid decline of the species over the past 20 years. For additional local distribution information, please refer to "Local Occurrences" discussion below.

## RESULTS

### Local Occurrences

The FRP is within the historic range of the burrowing owl (Zeiner, et al. 1998; Haug, et al. 1993; Roberson 2002). Although the CNDDB does not report any occurrences of burrowing owls within 2 km of the FRP, overwintering burrowing owls are known to occur in the former Fort Ord, north of Highway 68 from the FRP (Roberson 2002).

Burrowing owls were once widely distributed throughout the Salinas Valley, but have been much reduced. A major effort to census all of the County's nesting burrowing owls occurred in 1991 and only 14 pairs were detected in isolated groups: two small populations near Salinas and two groups in dry arroyos east of King City (Roberson 2002). One of the Salinas populations is now gone but about five pairs may remain at the Salinas Airport (Roberson 2002). Small groups of varying sizes (depending on the summer conditions) on private land in three grassy canyons east and southeast of King City, and an occasional pair is found elsewhere in this vicinity (Roberson 2002). Two nests were found with 10 fledged young during surveys of Wildhorse Canyon in July 2001 (Roberson 2002). Overwintering burrowing owls are also known to occur in coastal dunes (Asilomar State Beach and Moss Landing State Beach), and at coastal golf courses and at the

south side of the Carmel River mouth. The vast majority of burrowing owls observed in Monterey County are overwintering or vagrant.

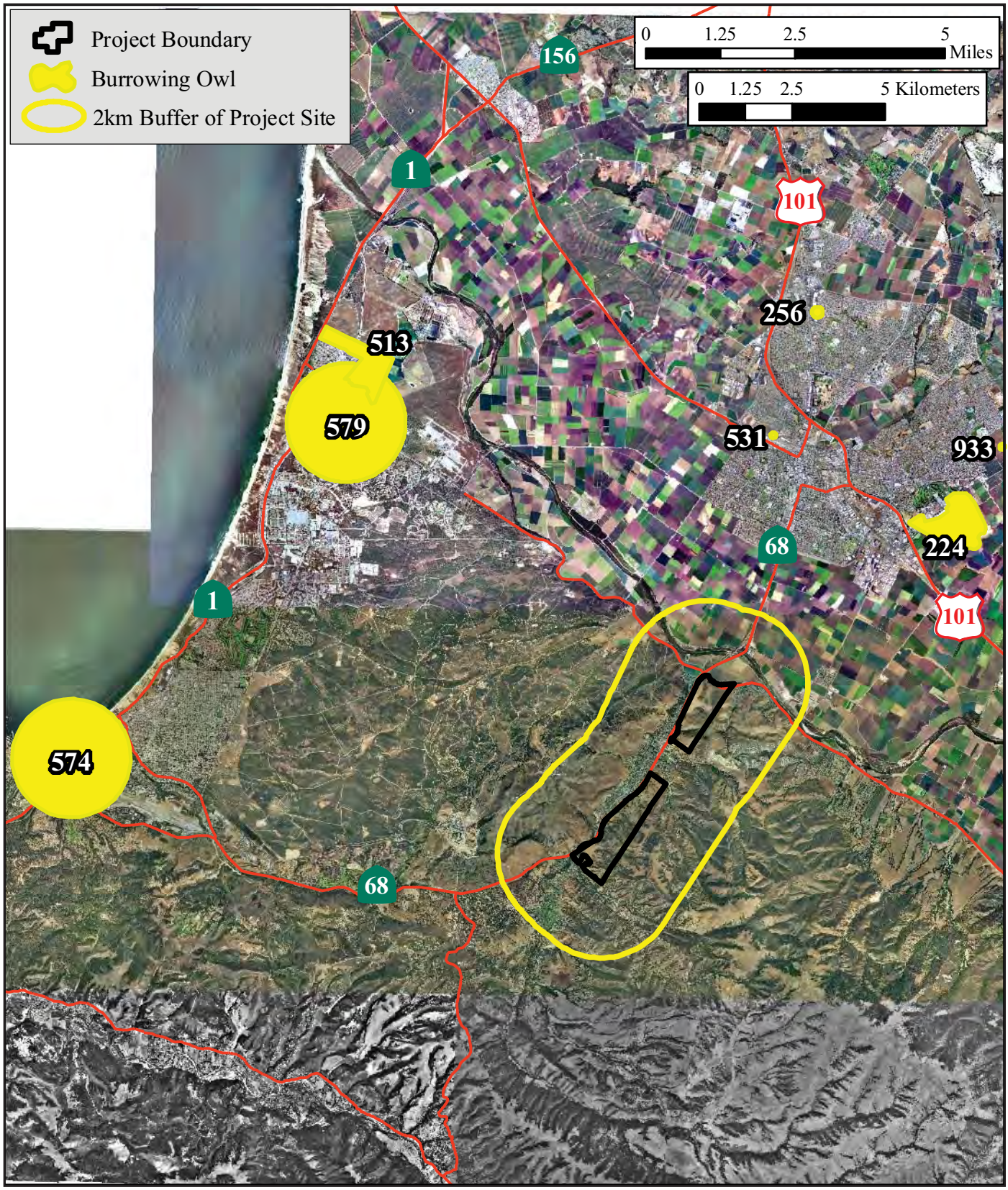
The nearest CNDDB occurrences are presented in Table 2 and Figure 4. In addition to the occurrences presented below, DD&A biologists observed overwintering burrowing owls immediately north of the City of Soledad (Gabilan Range foothills) in January 2007; although not yet reported by the CNDDB, these observations were approximately 40 km southeast of the FRP and confirm the presence of overwintering burrowing owls in portions of the Salinas Valley.

Table 2. Burrowing Owl Occurrence Data (CNDDB 2008)

| Occ # | Reported by | Date | Occurrence Information | Distance/ Direction |
|---|---|---|---|---|
| 224 | Bland, Dana | 7/16/99 | Salinas Airport. One pair observed at western end of runway. No juveniles observed. | 6 km/NW |
| | Barclay, Jack | 7/10/94 | Several pairs of burrowing owls at Salinas Airport. 4 adults and 4 juveniles at burrow. | |
| 256 | Palmisano, Terry | 8/27/97 | 7 acre lot. 6 owls observed; 2 that appeared to have nested. | 10 km/NNE |
| 513 | Bland, Dana | 3/04 | East of Hwy 1 toward Marina boundary; NE of Marina. 7 overwintering owls observed. | 11.5 km/NW |
| 531 | Siemens, Mitch | 6/28/04 | Salinas industrial area with non-native grassland. 2 adults and 4 juveniles observed at burrow entrance. | 6.5 km/NNE |
| | Mori, Bryan | 1/12/90 | 2 owls observed. | |
| 574 | Mori, Bryan | 6/11/90 | West of Hwy 1, adjacent to Monterey State Beach. 3 adult owls observed at burrow site. | 12 km/W |
| 579 | Branson, R.L. | 7/26/65 | Marina, open fields. 4 subadult owls observed at burrow site. | 10 km/NW |
| 933 | Siemens, Mitch | 2/15/07 | East of Salinas, near Alisal/Williams Rd. intersection. 1 adult observed at burrow site. | 10 km NW |

## Habitat Assessment

Annual grassland, oak savanna, and to a lesser extent, oak woodland portions of the FRP provide appropriate breeding and overwintering habitat for burrowing owls. Scrub portions of the site are typically too steep to be utilized by burrowing owls. Flat or gently sloped annual grassland portions of the site that support ground squirrel burrows/clusters are particularly well-suited to burrowing owls; fencing and fence posts in these areas provide abundant artificial roosts for burrowing owls and onsite livestock control vegetation maturity through grazing. While the project site is essentially bisected by Toro Regional Park, the habitat types present within Toro




| N | Burrowing Owl Occurrences in the Vicinity of the Ferrini Ranch Property | Figure 4 |
|---|---|---|

Regional Park are consistent with the FRP, and may provide nesting or overwintering opportunities for burrowing owls.

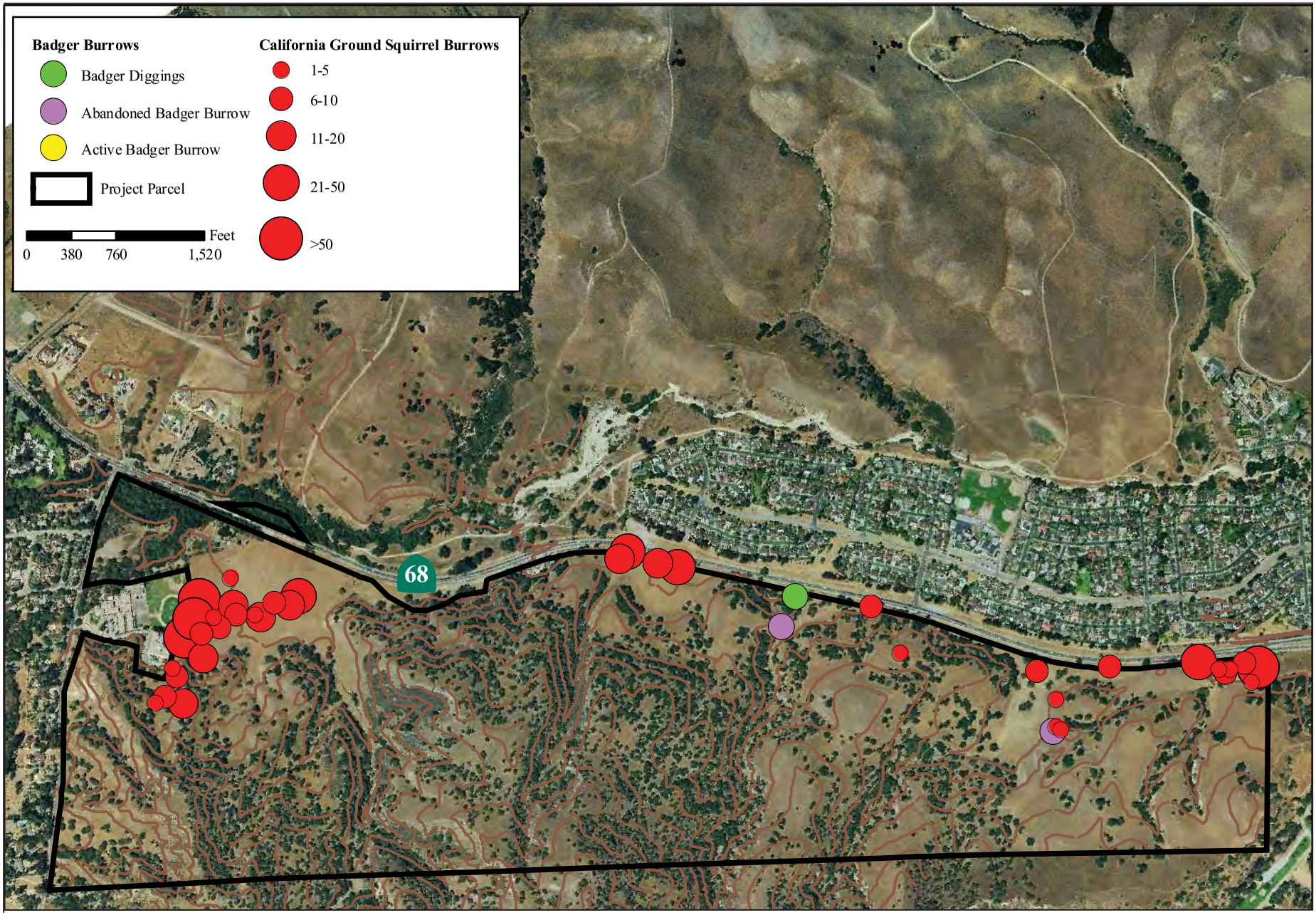
The FRP supports a habitat mosaic similar to relatively undeveloped lands present within 2 km of the site. West of the FRP, residential development and habitat fragmentation have reduced the likelihood of burrowing owl presence, though remnant burrowing owl habitat exists in relatively unmodified areas. East of the FRP, residential development, agricultural conversion, and habitat fragmentation have likewise reduced the likelihood of nesting burrowing owl occupation, though overwintering burrowing owls are known to occur in Salinas Valley as noted previously. The former Fort Ord located immediately north of the site (beyond residential development bordering Highway 68) supports overwintering burrowing owls. No burrowing owl nests have been documented within the former Fort Ord (Roberson 2002), but appropriate burrowing owl habitat is present. In general, undisturbed, gently sloping grasslands and oak savanna habitats present to the south of the FRP represent potential burrowing owl habitat, though no occurrences have been reported from these areas.

### Survey Results

The FRP was surveyed for burrowing owls on four occasions; twice during the non-breeding season (winter) and twice during the breeding season. Weather conditions on all occasions were conducive to observing burrowing owls.

No burrowing owls were observed during breeding season surveys conducted in August 2007. No evidence of burrowing owl utilization and/or occupation (i.e., white wash, pellets, prey items, or feathers) was observed at any burrow entrances during these surveys. No burrowing owls were observed during non-breeding season surveys conducted in January 2008. No evidence of burrowing owl utilization and/or occupation was observed during these surveys. In addition, though not a component of these protocol-level surveys, no burrowing owls or burrowing owl sign were identified by DD&A biologists during preliminary biological surveys of the site conducted in 2006 and 2007, or in the course of protocol-level California red-legged frog surveys of Toro/Harper Creek completed in late 2007.

Numerous burrows of appropriate size to support burrowing owls were observed during burrow census surveys of the FRP, and during preliminary biological investigations by DD&A biologists, but no burrowing owls or burrowing owl sign were detected. Ground squirrel burrows occur sporadically within the FRP, particularly in low lying and/or gently sloping grassland and oak savanna portions of the site (Figures 5a and 5b). In addition, burrows of appropriate size to support fox ( *ulpes vulpes* and *rocyon cinereoargenteus*), coyote (*Canis latrans*), and badgers were noted, although no sign of fox or coyote utilization of these burrows was observed (note: a coyote was observed onsite on August 29, 2007, but not at a den). Active and abandoned badger burrows were mapped within the FRP, in addition to "badger diggings" (Figures 5a and 5b).

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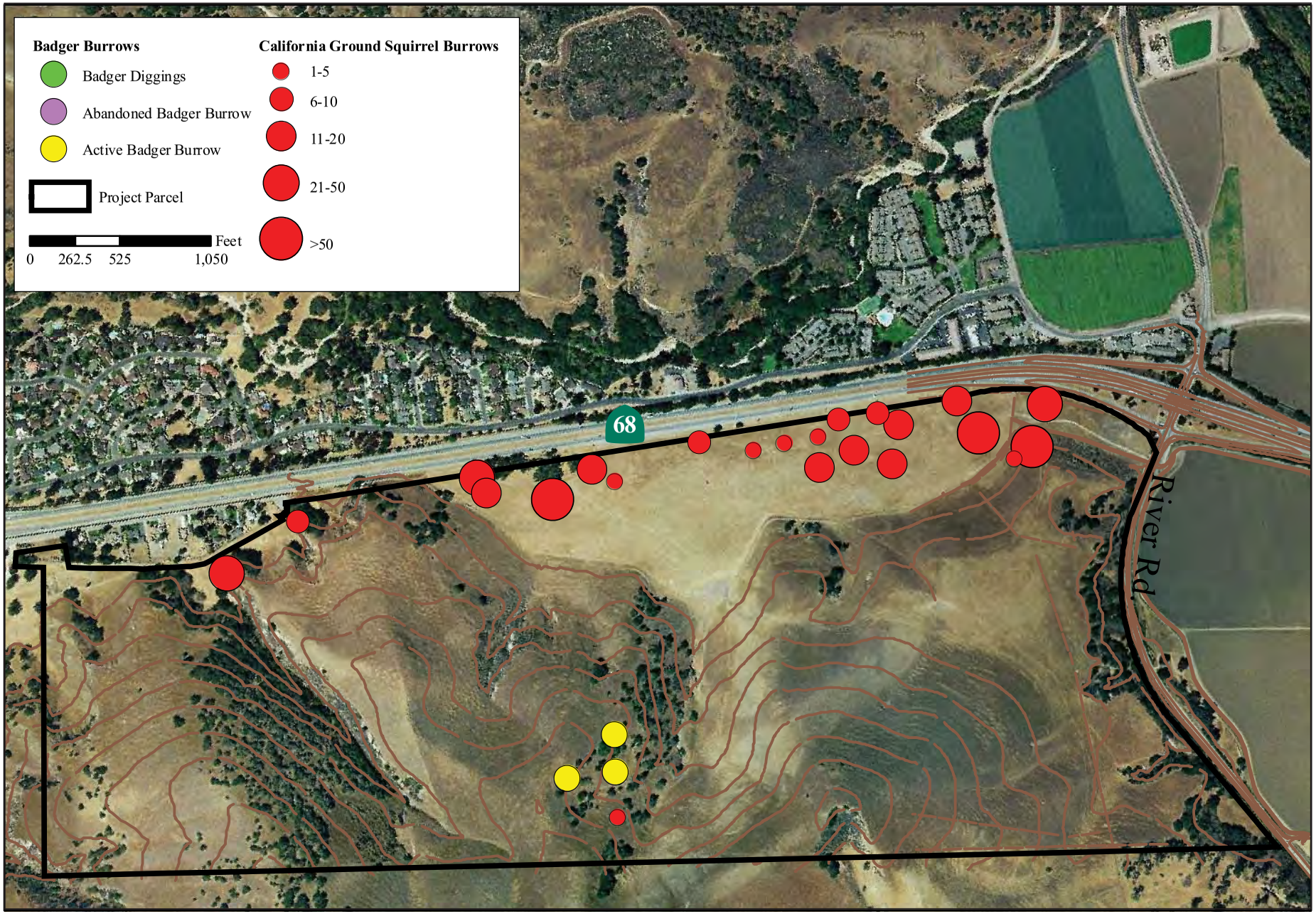
# Results of Burrowing Owl Survey at Ferrini Ranch Property

Figure 5a

DENISE DUFFY & ASSOCIATES, INC.




Results of Burrowing Owl Survey at Ferrini Ranch Property

Figure 5b

DENISE DUFFY & ASSOCIATES, INC.

## SUMMAR

Based on the results of these protocol-level surveys, the FRP is not currently utilized by breeding or non-breeding (overwintering) burrowing owls. No burrowing owls were observed, and no sign of burrowing owl utilization and/or occupation of onsite mammalian burrows were detected. This report was prepared in accordance with the recommendations of the CBOC, and is intended to document a negative finding for burrowing owl at the FRP in 2007/2008.

Although the site is not currently being utilized by burrowing owls, based on the presence of appropriate habitat, it is recommended that preconstruction surveys be completed for this species. Preconstruction surveys should be completed in all portions of the site scheduled for disturbance which support appropriate burrowing owl habitat; surveys should be completed no more than two weeks prior to initiation of construction (survey boundaries to be determined by a qualified biologist). If burrowing owls are observed during the preconstruction survey(s), CDFG should be contacted immediately to determine whether additional surveys and/or mitigation are warranted.

## CITED REFERENCES


California Burrowing Owl Consortium (CBOC). 1993. Burrowing owl survey protocol and mitigation guidelines (Appendix B). California Burrowing Owl Consortium Mitigation Committee. 13 pp.

California Department of Fish and Game. 2008. California Interagency Wildlife Task Force. 2005. CWHR Version 8.1 personal computer program. Sacramento, CA.

California Natural Diversity Database, RareFind 3. 2008. Habitat Conservation Division. Wildlife and Habitat Data Analysis Branch of California Department of Fish and Game record search.

Denise Duffy & Associates, Inc. 2008. 2007 California red-legged frog protocol-level survey report, Ferrini Property, Monterey, California. Prepared for Domain Corporation. 10 pp + appendices.

DeSante, D.F. and E.D. Ruhlen. 1995. A Census of Burrowing Owls in California, 1991-1993 (draft). The Institute for Bird Populations, Point Reyes Station, California.

Feeney, L.R. 1997. Burrowing Owl Site Tenacity Associated with Relocation Efforts. J. Raptor Res. Report 9:132-137.

Haug, E.A., B.A. Millsap, and M.S. Martell. 1993. Burrowing owl (Athene cunicularia). In the Birds of North America, No. 61 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Prepared for the California Department of Fish and Game, Sacramento, California.

Plumpton, D.L. and R.S. Lutz. 1993. Nesting Habitat Use by Burrowing Owl in Colorado. The Journal of Raptor Research 27(4): 175-179

Roberson, D. 2002. Monterey Birds, fully revised 2nd Edition. Monterey Peninsula Audubon Society. Carmel, CA. 536 pp.

Trulio, L. 1997. Burrowing Owl Demography and Habitat Use at two Urban Sites in Santa Clara County, California. J. Raptor. Res. Report: 84-89.

Wetlands Research Associates, 2007. Biological Assessment; Ferrini Property, Monterey County, California. WRA, Inc., prepared for Domain Corporation. . 23 pp + appendices.

Wetlands Research Associates, 2006. A Preliminary Determination of Potential Section 404 Wetlands and Waters on the Ferrini Property, Monterey County. WRA, Inc., prepared for Domain Corporation.

Zeiner, D.C., W.F. Laudenslayer, and K.E. Meyer. 1988. California's Wildlife, Volume 1. Amphibians and Reptiles. California Statewide Habitat Relationships Program, California Department of Fish and Game.

APPENDI A. Wildlife Species Observed

| Common Name | Scientific Name |
|---|---|
| *ammal* | |
| Coyote | *Canis latrans* |
| Mule deer | *docoileus hemionus* |
| Black-tailed jackrabbit | *epus californicus* |
| Bobcat | *yn rufus* |
| Spotted skunk (tracks) | *Mephitis mephitis* |
| California ground squirrel | *Spermophilus beecheyi* |
| American badger | *Ta idea ta us* |
| Botta's pocket gopher | *Thomomys bottae* |
| *Avian* | |
| Sharp shinned hawk | *Accipiter striatus* |
| Mallard | *Anas platyrhynchos* |
| Scrub jay | *Aphelocoma californica* |
| Great egret | *Ardea alba* |
| Canada goose | *Branta canadensis* |
| Red-tailed hawk | *Buteo amaicensis* |
| Red-shouldered hawk | *Buteo lineatus* |
| California quail | *Callipepla californica* |
| House finch | *Carpodacus me icanus* |
| Turkey vulture | *Cathartes aura* |
| Anna's hummingbird | *Calypte anna* |
| Wrentit | *Chamaea fasciata* |
| Killdeer | *Charadrius vociferus* |
| Lark sparrow | *Chondestes grammacus* |
| Northern flicker | *Colaptes auratus* |
| American crow | *Corvus brachyrhynchos* |
| Yellow rumped warbler | *endroica coronata* |
| White-tailed kite | *Elanus leucurus* |
| Brewer's blackbird | *Euphagus cyanocephalus* |
| American kestrel | *Falco sparverius* |
| Barn swallow | *Hirundo rustica* |
| Dark-eyed junco | *unco hyemalis* |
| Acorn woodpecker | *Melanerpes formicivorus* |
| Northern mockingbird | *Mimus polyglottos* |
| Brown-headed cowbird | *Molothrus ater* |
| Cliff swallow | *Petrochelidon pyrrhonota* |
| Downy woodpecker | *Picoides pubescens* |
| California towhee | *Pipilo crissalis* |
| Chestnut backed chickadee | *Poecile rufescens* |
| Ruby crowned kinglet | *Regulus calendula* |
| Black phoebe | *Sayornis nigricans* |
| Allen's hummingbird | *Selasphorus sasin* |
| Western bluebird | *Sialia me ican* |

| Common Name | Scientific Name |
|---|---|
| Western meadowlark | *Sturnella neglecta* |
| European starling | *Sturnus vulgaris* |
| Western kingbird | *Tyrannus verticalis* |
| Barn owl | *Tyto alba* |
| Orange crowned warbler | *ermivora celata* |
| Mourning dove | *enaida macroura* |
| *Reptile and Amp i ian* | |
| Arboreal salamander | *Aneides lugubris* |
| Gabilan Mountain slender salamander | *Battrocheps gavilanensis* |
| Southern alligator lizard | *Elgaria multicarinata* |
| Monterey ensatina | *Ensatina eschscholtzii eschscholtzii* |
| Western fence lizard | *Sceloporus occidentalis* |