ENTRIX, Inc., "Focused Special-Status Aquatic Species Assessment—Santa Clara River, Mission Village Project, Newhall Ranch, California" (2006; 2006A)

ENTRIX

SPECIAL STATUS AQUATIC SPECIES HABITAT ASSESSMENT - SANTA CLARA RIVER

MISSION VILLAGE PROJECT
NEWHALL RANCH, CALIFORNIA

Prepared for:
Newhall Land
Valencia, CA

Prepared by:
ENTRIX, Inc.
Ventura, CA

Project No. 3109005

November 27, 2006

E N T R I X

Special Status Aquatic Species Habitat Assessment
Santa Clara River

Mission Village Project
Newhall Ranch, California

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1. INTRODUCTION

This report summarizes the focused assessment of potential effects of the Mission Village Project (Project) on threatened or endangered aquatic species inhabiting the Newhall Ranch reach of the Santa Clara River, from the Castaic Creek confluence through the boundary of the proposed Mission Village Project. Specifically, this report focused on potential impacts to unarmored threespine stickleback (UTS), arroyo toad, and California red-legged frog (CRLF) as these species are listed as threatened or endangered by the State and Federal Endangered Species Act. In addition, this assessment includes discussion of potential impacts to southwestern pond turtle and two-stripe garter snake designated by the State as "Species of Concern." The primary focus of this assessment is to examine potential impacts to the habitat of the above species resulting from alterations to local hydrology and corresponding habitat areas through implementation of the Project.

1.1 MISSION VILLAGE PROJECT

The Newhall Land and Farming Company (Newhall) plans to develop approximately 1,250 acres of property in Los Angeles County (Figure 1, Mission Village Project Location) east of Castaic Creek along the southern terrace of the Santa Clara River. The Project site is currently used for agricultural and oil production, and is the second phase of the Newhall Ranch Specific Plan. Newhall retained ENTRIX to assess the potential effects of the Project on selected special-status aquatic species, including UTS, arroyo toad, CRLF, southwestern pond turtle, and two-stripe garter snake. The primary features examined in this assessment include buried soil cement bank stabilization along the south bank of the Santa Clara River at San Jose Flats and construction of the Commerce Center Bridge over the river, which would include bridge abutments and piers, and exposed rock rip rap (Figure 2. Mission Village Existing Conditions, Proposed Project Elements and Land Use). Additional features examined include a utility corridor that will be placed adjacent to Highway 126 and a regional water quality basin that will be located on a terrace above the south bank of the Santa Clara River. The footprint of the buried bank stabilization will be placed at the toe of the existing San Jose Flats cliff or terrace along the margin of the active channel. The bridge abutments will be placed at the extreme north and south banks of the Santa Clara River and the piers will be placed strategically within the floodplain. This assessment addresses the construction footprint of the bank protection, the bridge abutments and piers, the utility corridor, regional water quality basin, as well as the anticipated hydrologic influences of the Project on in-stream habitat utilization of aquatic species.

1.2 SPECIAL STATUS SPECIES BACKGROUND AND DISTRIBUTION

1.2.1 Unarmored Threespine Stickleback

The unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) was designated a federally endangered species in 1970 under the Endangered Species Conservation Act of 1969 (the precursor to the Endangered Species Act of 1973), and a state endangered species in 1971. Populations are restricted to three sections of the upper Santa Clara River including the Newhall Ranch reach, which represents the downstream demarcation of the unarmored subspecies. UTS are small, primarily annual fish that require shallow, slow, marginal stream flows with abundant aquatic vegetation for cover. The male guards territories and builds a small nest of decaying vegetation where he guards the eggs until they hatch. Large numbers of stickleback can exist in the summer and fall with the long breeding season in southern California, and breeding can be almost all year in dry years when a stream is minimally disrupted by storm flows. Under optimum conditions, up to a few hundred stickleback can exist within approximately 10 meters of stream. Strong storm flows can severely reduce localized populations until the streams stabilize in spring and the numbers can build up again. Backwater habitats within the Santa Clara River are utilized by UTS as refugia during storm events.

Populations are restricted to three sections of the upper Santa Clara River including the Newhall Ranch reach, which represents the downstream demarcation of the unarmored subspecies. Although UTS are found within the Mission Village project area of the Santa Clara River, larger populations occur upstream of the Project site both in Soledad Canyon above Lang Station (about 8 miles upstream) and in San Francisquito Canyon from just below Drinkwater Reservoir to the vicinity of the old St. Francis Dam location upstream (about 7.5 miles upstream of the river). Recently, a population was discovered in upper Bouquet Canyon (Jonathan Baskin, pers. comm.) about 11 miles above its mouth at the Santa Clara River.

1.2.2 Southwestern Arroyo Toad

Arroyo toads (*Bufo californicus*) occupy the margins of permanent and seasonal streams in coastal foothill canyons and valleys and to a limited extent in the desert, but they require extremely specialized and limited microhabitat within that general habitat type. Most spawning occurs in shallow overflow pools adjacent to inflow channels of third and higher-order streams that lack suspended silt, aquatic predators, and dense woody bordering vegetation (Sweet 1993). During the remainder of the year, adults occupy adjacent sandbars and sandy terraces, nearly always within 100 meters of suitable spawning pools. Suitable bordering sandbars are usually dampened by capillarity and often include sparse emergent vegetation. The moist substratum keeps metamorphosing juveniles from desiccating during warm summer weather (Sweet 1993; Jennings and Hayes 1994). Suitable terrace habitat includes at least some dense

overgrowth, such as California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), and willows (*Salix* sp.), but the understory is usually barren except for layers of dead leaves (Sweet 1993). Adult and metamorphosed juvenile arroyo toads are known to forage for various invertebrates around the drip line of large oaks (*Quercus*). They also forage extensively on ants (Sweet 1992, 1993). Little is known of arroyo toad winter hibernaculum requirements, but these toads are believed to hibernate exclusively in the riverine terrace, above the level of frequent winter floods (USFWS 1999a).

The 2001 Critical Habitat designation for the arroyo toad was vacated by court order, but the U.S. Fish and Wildlife Service (2004b) proposed substantially revised Critical Habitat on 28 April 2004 which would place three reaches (6a, 6b and 6c) of the upper Santa Clara River as Critical Habitat. On April 13, 2005 the U.S. Fish and Wildlife Service redesignated Critical Habitat for Arroyo Toad. Under this new rule, the Santa Clara River proposed Critical Habitat designations were withdrawn due to economic reasons. The 2004 proposed Subunit 6b would have included approximately 6 miles of the Santa Clara River from its confluence with the South Fork of the Santa Clara River down to its confluence with Castaic Creek, and San Francisquito Creek from the Newhall Ranch Road bridge, downstream to its confluence with the Santa Clara River (subject study area) (Federal Register, Final Rule, Vol. 70, No. 70, April 13, 2005).

1.2.3 California Red-legged Frog

California red-legged frog (*Rana aurora draytonii*) habitat components include spawning pools and their terrestrial borders, spring/summer refuges, and subterranean hibernation sites. These may be combined at single sites or they may be separated by aquatic or terrestrial “dispersal corridors” (Hayes & Jennings 1989; Jennings & Hayes 1994). Spawning pools are the ecologically central components of CRLF habitat, because they support all elements of the species’ reproductive biology and also provide forage for all red-legged frog life stages. Spawning pools are typically permanent or extended seasonal ponds (through August), or stream/spring pools of 0.7-1.2 meters in depth, with dense bordering, emergent, and surface vegetation. Such pools may be as small as $1m^2$ in surface area, with no known upper area limit. Always present at spawning habitat is a large complex invertebrate fauna for juvenile forage, extensive submerged herbaceous and algal vegetation for tadpole forage, and small terrestrial mammals such as voles (*Microtus*) that are an important component of adult frog forage (Jennings & Hayes 1994). Most suitable ponds are also partially to fully sunlit with mud or silt substrata, environmental factors essential to promote dense floating and emergent vegetation. Known CRLF spawning pools, where these frogs are successful, are usually absent of large populations of exotic predators such as bullfrogs and exotic centrarchid fish. Nearly all of the known CRLF populations have been documented below 1,050 meters (3,500 feet) (USFWS 2002b). Its known elevational range extends from near sea level to around 1500 meters (Hayes and Jennings 1989).

Riparian vegetation that structurally appears to be most suitable for this species is described as arroyo willow (*Salix lasiolepis*), cattails (*Typha* sp.), and bulrushes (*Scirpus* sp.) that provide shade over a large portion of the water's surface. The California red-legged frog can occur in both ephemeral and permanent streams or in ponds. However, populations of this species cannot be maintained in areas in which all surface water disappears. Water salinity should be at or below 4.5 percent to ensure the survival of embryonic stages (Jennings and Hayes 1989). Water quality and water flow regimes are important to maintain this species. CRLF appear to be absent when temperatures exceed 22 degrees Celsius (70 degrees Fahrenheit), particularly when the temperature throughout a pool was high, and there are no cool, deep portions (USFWS 2002b).

Newly constructed or impounded ponds rarely support CRLF populations and most spawning sites have existed in stable, relatively undisturbed form for decades (Hayes & Jennings 1989). Likewise, red-legged frog spawning habitat is usually absent from river bottomland, presumably because high springtime flows would disrupt spawning success by scouring spawning pools and discouraging long-term aquatic vegetative growth. California red-legged frogs are vulnerable to early season floods because they spawn in early to mid-winter.

Adult California red-legged frogs may migrate in late spring and summer to shaded pools along streams where undercut banks and exposed root masses offer secure refuges. However, an isolated summer refuge component appears not to be critical to population survival because many adult frogs may be found throughout the summer at spawning pools. Hibernaculum preferences probably include lentic substrata (pond bottoms) or any secure subterranean site near spawning or summer refuge habitat, such as rodent burrows, vegetation mats, and root channels.

California red-legged frog “dispersal habitat” refers usually to stream courses that do not offer spawning or summer habitat but could be dispersal corridors between populations (USFWS 2002b). “Dispersal habitat” discussed in this report refers to any habitat that could be occupied temporarily by California red-legged frogs; it does not necessarily imply that California red-legged frogs might use such habitat to disperse or move among spawning pool habitats.

The 2001 Critical Habitat designation for the CRLF was vacated by court order, but the U.S. Fish and Wildlife Service (2004a) reproposed Critical Habitat with substantially the same boundaries on 13 April 2004. The Final Rule was issued on April 13, 2006 that included a newly recognized ranching activities exemption (USFWS 2006). The final Critical Habitat designations for the Santa Clara River watershed include Piru Creek (VEN-3) and San Francisquito Creek (LOS-1). Neither the 2001 nor 2006 Critical Habitat designation included any part of the Santa Clara River or tributaries in the Mission Village Project Area.

1.2.4 Two-striped Garter Snake

The two-striped garter snake (*Thamnophis hammondii*) occurs from southern Baja California north to central Monterey and western Fresno Counties (Rossman and Stewart 1987). These snakes are found most frequently along the margins of rocky and sandy streams with fairly fast water, and they were formerly ubiquitous and abundant in association with such habitat throughout coastal southern California (Jennings and Hayes 1994). The two-striped garter snake is a California Species of Concern because most of its characteristic habitat in the lowlands of Southern California has been severely degraded and consequently this species has disappeared from substantial portions of its range (Jennings and Hayes 1994). Two striped garter snakes are believed to feed almost exclusively on fish and tadpoles, which they catch in shallow water by stalking, ambushing, or by cornering against submerged rocks or root masses (Jennings and Hayes 1994). Thus, even though they are fundamentally terrestrial, they depend entirely on aquatic habitat for forage.

Although the preferred microhabitat for this species is poorly understood, the greatest numbers seemingly occur in areas along stream courses where the combination of in-stream rocky cover, terrestrial vegetative cover, and easy access to aquatic forage species of the appropriate size range exists. For example, along relatively undisturbed reaches of the San Gabriel River in the San Gabriel Mountains these snakes are frequently found along relatively shallow rocky pools that laterally border somewhat deeper reaches, and they also frequent exposed root masses associated with pools created by the fallen trees. Smaller fish and tadpoles are typically abundant and easy for the snakes to capture in the shallow sections and the root mass pools, and larger fish occur in the adjacent deeper sections. Shoreline rocks, burrows, and dense vegetation (including root masses) offer excellent terrestrial cover, and submerged rocky aggregations offer aquatic refugia. Thus, although these wary snakes are often abundant and easily observed in such habitat, they are difficult to capture because they rarely stray far from secure cover and they flee rapidly into the water when approached.

Two-striped garter snakes are active nearly year-round in the Southern California lowlands, but in higher elevations they hibernate for a variable time span during the winter, and emerge as early as February. They usually mate soon after emergence, but females of this species can become gravid with sperm stored from matings that occurred as long as two years previously (Stewart 1972). Two-striped garter snakes bear live young in litters that average 8-10, usually in late July (Rossman and Stewart 1987). Mortality in newborns is probably fairly high, in particular because newborns may have difficulty securing small amphibian or fish prey in disturbed waterways (Jennings and Hayes 1994).

1.2.5 Southwestern Pond Turtle

Southwestern pond turtles (*Clemmys (Emys) marmorata pallida*), a California Species of Concern, require exposed permanent or extended seasonal (through August) slow or still water, bordered by or in the vicinity of suitable upland oviposition (egg deposition) habitat. Suitable oviposition areas are usually gently sloping treeless hillsides well above floodplains, with southern or southwestern exposure and clay or possibly sandy soil (Holland 1991). Eggs are deposited in flask-shaped vertical excavations from late spring through summer, and hatchlings apparently remain in the nest until the following spring (Holland 1991). All life history stages of post-emergent pond turtles are highly aquatic. Suitable aquatic habitat for adult pond turtles usually includes relatively deep water (at least 0.5 meter) with secure basking sites (logs, exposed banks, etc) within reach of secure subsurface concealment. The aquatic substratum may be silty, muddy, or rocky. Juveniles are generally more secretive than adults and may favor more secure basking habitat such as densely vegetated sections of ponds and stream pools. A complex invertebrate fauna and relatively high primary productivity typically also characterize southwestern pond turtle aquatic habitat (Jennings and Hayes 1994). The most important forage for hatchlings is nektonic plankton, but adults utilize a variety of plant and animal forage sources (Bury 1986).

1.3 STUDY SCOPE

The scope of this assessment is on the potential effects of the Mission Village Project on the target aquatic species described above. The assessment is based on a review of technical and regulatory documents provided by Newhall Land (Section 2.1) and a field reconnaissance level habitat survey of the Project site. Additionally, the preparers of this assessment have relied upon their extensive knowledge and experience on this subject. See Section 6, below, for a list of the preparers of this assessment. In addition, please refer to Appendix B for copies of the resumes of the preparers. No new quantitative surveys or analyses were conducted as part of this study.

1.4 ORGANIZATION OF DOCUMENT

The remainder of this report is organized as follows:

- **Section 2** describes the methods used in the development of the assessment.
- **Section 3** discusses the results of this assessment.
- **Section 4** discusses project related impacts to habitats of special status species

- **Section 5** cites literature and technical references used in the preparation of this assessment.

- **Section 6** includes a list of preparers of this assessment.

- **Appendix A** includes figures and field survey photographs.

- **Appendix B** includes the preparers' resumes.

2. METHODS

The methods used to conduct this assessment are based on review of technical and regulatory documentation provided by Newhall, and field reconnaissance surveys of the Project area. The methods are described in greater detail below.

2.1 REVIEW OF EXISTING PROJECT REPORTS AND DOCUMENTATION

The following technical reports and supporting documentation were reviewed in assessing the potential effects of the Mission Village Project on sensitive aquatic species inhabiting the Santa Clara River and their habitat:

These documents are listed in chronological order.

- *Biological Resources of the Upland Areas of the West Ranch. Newhall Land and Farming Company, Valencia, California, Dames and Moore, Santa Barbara, California, July 1993.*

- *Biota Report, Newhall Ranch Specific Plan, Los Angeles County Department of Regional Planning, Los Angeles, California, September 7, 1995, July 1996 revision.*

- *Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County*. *Valencia Company, August 1998.*

- *SEATAC Biota Report, Combined San Francisquito Canyon Projects (West Creek (VTTM 52455) and East Creek (VTTM 44831, 52667), Newhall Land and Farming Company, Significant Ecological Area 19, San Francisquito Canyon, Los Angeles County, California, Los Angeles County Department of Regional Planning, Frank Hovore & Associates, San Marino Environmental Associates, Planning Consultants Research, August 19, 1998.*

- *Natural River Management Plan: Permitted Projects and Activities*. *Santa Clara River and tributaries. Valencia Company, November 1998.*

- *Survey for arroyo southwestern toad for Newhall Ranch. Newhall Ranch Company, July 12, 1999.*

- *Biological Resources Assessment of the Proposed Santa Clara River Significant Ecological Area. Los Angeles County Department of Regional Planning. PCR Services Corporation, Frank Hovore and Associates, FORMA Systems, November 2000.*

- *Letter from David Crawford (Impact Science, Inc, Agoura Hills, CA) to Mark Subbotin, Newhall Land and Farming, Subject: Brief summary of arroyo toad survey results in NRMP area, June 18, 2001.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Rick Farris, U.S. Fish and Wildlife Service, Ventura, CA, Subject: Permit submittal requirements, TE 808242, arroyo toad surveys, Los Angeles County, California, August 2, 2001.*

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Newhall Ranch Area, Los Angeles County, California. Newhall Land and Farming,* Impact Sciences, Inc., *September 19, 2001.*

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Natural River Management Plan Area, Valencia, California.* Impact Sciences, September 2001.

- *Aquatic Surveys Along the Santa Clara River Part I: Castaic Junction Project Area, Los Angeles County, California.* Aquatic Consulting Services, Inc., April 2002.

- *Aquatic Surveys Along the Santa Clara River Part III: West of Commerce Center Bridge to the Ventura County Line, California.* Aquatic Consulting Services, Inc., June 2002.

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of focused arroyo toad surveys, Auto Center Expansion Project and Hart Baseball and Softball Complex (Hart Complex Area), Santa Clarita, California, June 24, 2002.*

- *Biological Opinion for the Natural River Management Plan, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH)*. U.S. Fish and Wildlife Service, November 2002.

- *Results of Focused Surveys for Unarmored Threespine Stickleback and Other Special-Status Fish Species, Newhall Ranch, Valencia California.* Impact Sciences, Inc., January 2003.

- *Amended 404 Permit (No. 940050400-BAH) for Natural River Management Plan.* U.S. Army Corps of Engineers, June 2003.

- *Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Program EIR, Volume VIII (May 2003), Section 2.3, Floodplain Modifications.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Hart/Pony Commercial Site, Santa Clarita, California, August 21, 2003.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Soledad Site, Santa Clarita, California, August 23, 2003.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Round Mountain Site, Santa Clarita, California, August 25, 2003.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Castaic Reservoir Site, Santa Clarita, California, August 27, 2003.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, NRMP Project Area, Santa Clarita, California, August 31, 2003.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Castaic Creek, Santa Clarita, California, August 31, 2003.*

- *Proposed Designation of Critical Habitat for the California red-legged frog (Rana aurora draytonii), U.S. Fish and Wildlife Service, April 13, 2004, 69 FR 19620-19642.*

- *Proposed Designation of Critical Habitat for the Arroyo Toad, U.S. Fish and Wildlife Service, April 28, 2004, 69 FR 23254-23328.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Castaic Creek, Santa Clarita, California, August 11, 2004.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Portions of Santa Clara River/South Fork, Santa Clarita, California, August 21, 2004.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, San Francisquito Creek, Santa Clarita, California, August 25, 2004.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Susan Tebo, Impact Sciences, Camarillo, CA, Subject: Results of Focused Arroyo Toad Surveys, NRMP Solodad/Riverpark Area, Santa Clarita, California, August 29, 2004.*

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians, River Village Project; Newhall Ranch, Valencia, California. Newhall Ranch Company, Compliance Biology, Inc, Camarillo, CA, October 2004.*

- *Special Status Aquatic Species Habitat Assessment Santa Clara River, Landmark Village Project, Newhall Ranch, California. ENTRIX, Inc. 2005*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Sam Rojas, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, Castaic Creek, Santa Clarita, California, August 17, 2005.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Sam Rojas, Newhall Ranch Co, Valencia, CA, Subject: Results of Focused Arroyo Toad Surveys, San Francisquito Creek, Santa Clarita, California, August 21, 2005.*

- *Balance Hydrologics, Inc. 2005. Assessment of Potential Impacts Resulting From Cumulative Hyromodification Effects, selected Reaches of The Santa Clara River, Los Angeles County, California.*

- *U.S. Fish and Wildlife Service. 2005. 50 CFR, Federal Register, Final Rule, Vol. 70, No. 70, April 13, 2005. Final Designation of Critical Habitat for the Arroyo Toad.*

- *U.S. Fish and Wildlife Service. 2006. 50 CFR, Federal Register, Final Rule, Vol. 71, No. 71, April 13, 2006. Designation of Critical Habitat for the California Red-Legged Frog and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities.*

- *Flood Technical Report for the Mission Village Project (2006). Pacific Advanced Civil Engineering, Inc. (PACE)*

- *Results of Focused Western Spadefoot Toad Surveys on the Mission Village Project Site. Compliance Biology, Inc. May 26, 2006*

2.2 REVIEW OF RECORDS AND LITERATURE

Information on the special-status wildlife of the proposed Mission Village Project Area was obtained through a search of the *California Natural Diversity Database* (CNDDB; CDFG, 2004); from searches of the specimen catalogues of the major California vertebrate museum collections (detailed below); from the U.S. Fish and Wildlife Service (USFWS), Ventura Office, Endangered Species Division's species list (http://www.fws.gov/ventura/es/spplists/spplists.html); and from reports on biological studies completed in the Project vicinity. Preliminary identification of potential habitat for sensitive aquatic species within the Project site was determined by reviewing aerial photography provided by Newhall Land. The site visit on February 22, 2005 verified the presence or absence of sensitive habitats.

The first step to evaluate Project effects on potential populations of the target special-status aquatic species is to determine the historical presence of these species within the Project area. ENTRIX biologists queried the California Natural Diversity Database (CDFG 2004), the collection catalogue of the Los Angeles County Museum of Natural History (LACM), and the online collection databases of the Museum of Vertebrate Zoology, University of California, Berkeley (UC Berkeley 2004); and the California Academy of Sciences (CAS 2004), to obtain this information. Various literature sources were also used. (Disclaimer: CNDDB and museum records always carry some degree of uncertainty because of potential misidentifications or incorrect locality data. Further, the absence of species records from any given site does not imply that the species is absent from the site).

The ENTRIX and Ecological Sciences biologists then examined maps and aerial photographs to locate aquatic habitat within and near the banks of the Santa Clara River within the Project site. Aquatic habitat suitability for any of the reptile and amphibian species was determined by comparison with previously published assessments (e.g., Holland 1991; Jennings and Hayes 1994; Sweet 1992, 1993; USFWS 1999b, 2002), as well as by the ENTRIX and Ecological Sciences biologists' extensive experience with the species in various parts of California. To assess the potential effects of the proposed Project on unarmored threespine stickleback, arroyo toad, California red-legged frogs, southwestern pond turtles, and two-striped garter snakes, ENTRIX and Ecological Sciences biologists consulted the USFWS Biological Opinion for the Natural River Management Plan (NRMP), Santa Clarita, Los Angeles County, California

(1-8-02-F-4R), dated 15 November 2002; various natural history accounts for these species (e.g., Jennings and Hayes 1994; Holland 1991; Sweet 1992; Swift et al. 1993; Stebbins 1951); Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Program EIR, Volume VIII (May 2003), Section 2.3, Floodplain Modifications; and the PACE Flood Technical Report for the Mission Village Project (2006).

2.3 FIELD RECONNAISSANCE HABITAT SURVEY METHODS

ENTRIX biologists, Dr. Camm Swift and Steve Howard and Scott Cameron from Ecological Sciences, Inc. conducted a reconnaissance-level habitat survey that focused on the habitats of unarmored threespine stickleback, arroyo toad, California red-legged frog, southwestern pond turtle and two-striped garter snake. This survey was conducted on February 22 2005. The Santa Clara River channel was surveyed from just upstream of the mouth of Middle Canyon to the downstream extent of San Jose Flats. Middle Canyon and Long Canyon were surveyed by direct observation at various spots visible from the road or within the channel when access was possible. The purpose of the field survey was to analyze the potential effects of the Mission Village Project on these species and their associated habitats. The survey focused mainly on evaluating habitat conditions within this reach and in establishing the relative proximity of proposed floodplain enhancement structures to instream habitats. Water temperature was taken with a hand held thermometer in degrees Celsius. Photos were taken of representative habitats with a digital camera.

3. RESULTS

This section discusses the results of the Special Status Aquatic Species Habitat Assessment of the Mission Village Project area. First, analyses of historic and recent records are summarized for each species. Finally, the results of the field habitat assessment are summarized for each species. The results of this assessment are described further below:

3.1 SANTA CLARA RIVER FISH ASSEMBLANGES

Historically, the local fish fauna in this reach of the Santa Clara River was typical of southern California but appears to have had only one species of freshwater fish (Swift et al. 1993). This was the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*). Steelhead are not known to migrate to the upper Santa Clara River, likely not ascending above the system beyond Piru Creek. However, several native species from elsewhere in southern California became established in the Santa Clara River in the late 1920s and the 1930s. These include the currently established arroyo chub and Santa Ana sucker. Records of speckled dace from upper Castaic Creek are considered to be introductions. The Owens sucker is also found in the drainage from the mouth of Piru Creek downstream. Owens suckers are not, however, reported to be in the Mission Village area. The most common fish in the Santa Clara River is the Arroyo chub, which became established in 1930's around the time when brown trout were commonly planted by the California Department of Fish and Game. Fisherman who used them as bait for trout supposedly introduced this native fish of the Los Angeles basin to the Santa Clara River. Currently the river in the Mission Village area consists of a subset of a typical Los Angeles Basin native fish community.

Several other fishes occur as introductions that have been widespread in southern California as well as the southwestern United States. These include green sunfish, largemouth bass, and mosquitofish, which have been recently reported in the Mission Village area. Several other non-native fish species are known to occur both up and downstream of this immediate area, most of which are found downstream of the mouth of Castaic Creek, suggesting it may be the local source of these fish. These fish are known to adversely affect unarmored threespine stickleback and should be controlled or managed for the benefit of native species.

Another non-native predator in the area is the clawed frog, which can prey on stickleback but its complete effect is not well known.

3.2 HISTORICAL PRESENCE/ABSENCE SURVEY RESULTS

This section summarizes historic and recent survey results from studies conducted in the Mission Village area and within the entire Newhall Reach of the Santa Clara River.

3.2.1 Unarmored Threespine Stickleback

Historical and Recent Vicinity Records

Unarmored threespine stickleback collections have been few and widely scattered in the Del Valle Zone of the Santa Clara River with a few notable exceptions (Aquatic Consulting Services, Inc. 2002a and Impact Sciences 2003a). One exception is the refuge area identified during the surveys for the Mobil and Arco 1994 oil spill investigations. This is an area of marshy habitat just north-northeast of Magic Mountain that is typically wetted and contains numerous stickleback. During the oil spill, this refuge area was not affected due to the main river flow directing the contamination away from this area. Thus, it was also considered a site for relocating rescued stickleback that could not be returned to the main river immediately because of the oil contamination. A stickleback survey conducted by ENTRIX of the entire Newhall reach of the Santa Clara River in September 2005 found stickleback only in this refuge area (ENTRIX 2006 in production).

3.2.2 Southwestern Arroyo Toad

Historical and Recent Vicinity Records

Neither of the museum database queries (CAS 2004; UC Berkeley 2004) yielded records of the arroyo toad from the main channel of the Santa Clara River. However, mainstem Santa Clara River CNDDB records for the arroyo toad exist from the “Santa Clara River, just east of Interstate 5” (1994), which is about two miles east of the Project site, and from “Bear Canyon at the Santa Clara River, six miles upstream of Solemint” (2001), which is about eleven miles east of the Project site. Arroyo toads were also found recently at the confluence of San Francisquito Creek and the Santa Clara River (Impact Sciences 2001). Further, the Aquatic Consulting surveys (2002a) reported arroyo toad tadpoles from pools adjacent to the Valencia Water Treatment Plant and from a pool just upstream of the Project site (site 26). Among north tributaries to the Santa Clara River, arroyo toads are well-known from the Blue Point area along Piru Creek (CNDDB, LACM, and CAS records); from several sites along Sespe Creek (Ventura County) (CNDDB and LACM records and Sweet (1992)); and from at least one location along Castaic Creek north of Castaic Lake (CNDDB 2004; Compliance Biology 2004; U.S. Fish and Wildlife Service 2004b). The existence of tributary records upstream and downstream of the Project area, as well as the in-channel Santa Clara River records west of Interstate 5, indicate

that arroyo toad has the potential to occur within the project site. However, standardized USFWS "protocol" surveys conducted on the project site as recently as 2004 (Compliance Biology 2004) failed to document the occurrence of arroyo toads even though components of its habitat exist within the project reach.

3.2.3 California Red-legged Frog

Historical and Recent Vicinity Records

There are no California Natural Diversity Database records for the California red-legged frog from the Santa Clara River watershed, Los Angeles and Ventura Counties. However, the Museum of Vertebrate Zoology (UC Berkeley 2004) lists 17 specimens from Soledad Canyon (Santa Clara River channel) in its collection, from as recently as 1953. More precise locality data are unavailable. The California Academy of Sciences (CAS 2004) also lists a Soledad Canyon specimen, from 1950. The nearest specific locality to the Project site is some 15 miles upstream near the Santa Clara River's confluence with Agua Dulce Creek. Jennings and Hayes (1994) and the CNDDB indicate that this species still occurs in the Santa Clara River watershed, in sites along San Francisquito Creek 5-10 miles northeast of the Project site, and in tributaries to the Santa Clara River in Ventura County. The closest documented Ventura County occurrence is in Piru Creek 4.5 miles north of Piru, about 10 airline miles west to north-west of the Project site (USFWS 2002a). The species is also in decline in Piru Creek due to changes in flow regimes since the construction of Pyramid Dam (USFWS 2002a).

3.2.4 Two-striped Garter Snake

Historical and Recent Vicinity Records

Santa Clara River records for the two-striped garter snake in the Newhall Ranch region are absent from the CNDDB and the museum collections, yet the various reports reviewed for this document and personal communications with local biologists indicate that this species occurs somewhat commonly along this reach of the river. Impact Sciences (2001) report states that during surveys conducted within the NRMP survey area, two-striped garter snakes were observed numerous times at unspecified sites within the NRMP reaches. In addition, Ecological Sciences reports observing two-stripe garter snakes during various focused arroyo toad surveys within the NRMP survey area. Species was observed in the River Corridor within Newhall Ranch in 2004 (Compliance Biology).

3.2.5 Southwestern Pond Turtle

Historical and Recent Vicinity Records

Southwestern pond turtles are probably distributed throughout the Santa Clara River watershed, wherever there are sufficient permanent or near-permanent water and oviposition sites to support populations. However, the CNDDB includes only two Santa Clara River records of southwestern pond turtles, from near Castaic Junction (2000) and from downstream near the Ventura County line (1998). Neither of the museum databases includes records for southwestern pond turtle within the Santa Clara River watershed. Conversely, the Impact Sciences (2001) report states that during surveys conducted within the NRMP survey area, pond turtles were observed numerous times at unspecified sites within the NRMP reaches, presumably where sufficient water existed to satisfy the aquatic habitat requirements discussed previously. Compliance Biology Survey in 2004 indicated its presence within the Newhall Ranch River Corridor.

3.3 HABITAT SURVEY RESULTS

The following section describes the results for field reconnaissance habitat surveys conducted on February 22, 2006.

3.3.1 Environmental Setting

The Santa Clara River along the north edge of the Mission Village project consists of a wide, flat sandy floodplain. Extensive temporal meandering of the river has deposited sand and gravel creating long elevated bars and terraces within the active channel. Depending on the flow, lateral side channels exist that can provide good habitat for stickleback and other fish species. Typically most of the smaller side channels do not carry water during the dry season although some do persist from upwelling ground water. In some cases larger isolated pools have formed on the order of tens of yards in length and up to 3-6 feet deep. These pools can remain year-round if they are deep enough and near areas of upwelling.

Beyond the typical active floodplain that usually contains the high flows; elevated terraces of varying heights exist and represent the 20 to 100 year floodplain zones only rarely inundated by the river. On the north side of the channel these represent the wide flat areas that are presently farmed. On the south side of the channel and along the north side of Mission Village these are much smaller due to the uplifting of the steep cliffs. These terraces typically support a more mature forest of oaks and sycamores with soil development rather than sand and gravel.

Sparse aquatic vegetation has developed along the main river channel, probably because short-term fluctuations in water level discourage growth of marginal vegetation and because of the 2004/2005 flood events that scoured and deposited excessive amounts of sediment throughout the Newhall Reach of the Santa Clara River. Smaller spring-fed wetted channels are choked with vegetation since they have been nearly constant in flow or change only slowly with the

seasons and are usually on the margins of the floodplain hidden from the effects of high flow events. The fluctuation in treated wastewater effluent can probably be determined by examination of their records but variation in ground water flow may not be known. In addition, various wells exist along the river and their activity certainly affects ground flow. At least four water supply agencies can affect the flows in the Santa Clara River within the Mission Village area. The Metropolitan Water District (MWD) can and has released water into San Francisquito Canyon from their pipeline. The Department of Water and Power (DWP) of the City of Los Angeles can release water from Drinkwater Reservoir and Bouquet Reservoir down San Francisquito and Bouquet canyons, respectively. In addition the DWP pipeline crosses the main Santa Clara River and has valves for releasing water on occasion. Finally, perennial flow is present from the Los Angeles County Sanitation Districts' Water Reclamation Plant in the reach (No. 32), as well as from the upstream plant (No. 26). All of these releases disrupt the natural hydrograph to some extent depending on the time of year and the volume of discharge. Historically this area of the river in the Castaic Junction vicinity was known to have permanent flows and was the site of some of the first settlements in the area. In addition the early train depot depended on the water supply for stage lines that went through the area between Los Angeles and northern destinations.

3.3.2 Unarmored Threespine Stickleback Habitat

The Santa Clara River floodplain during the survey was largely open and sandy and the wetted channel was located 300 yards or more north of the base of the cliffs on the south side of the floodplain. The flow was approximately 35 cubic feet per second (cfs) and contained a mixture of sand, gravel, and cobble substrate depending on gradient within mesohabitat units (i.e. pools, riffles, runs). The water was clear and 18º C. at 1000 hours. Pool depths averaged approximately 2 feet along the approximate 300 meters of river examined. South and somewhat parallel to the wetted channel were two small spring fed side channels attached to the main channel that ranged from 1-6 inches deep. The flow was less than 0.5 cfs or less. These small spring channels were choked with green algae and were 15º C. at 1015 hours. No fish were seen in the main wetted channel or the adjacent side channels.

Along the southern margin of the floodplain a small isolated spring fed side channel existed within the upper one third of the San Lose Flats area. The isolated side channel had less than 0.1 cfs and water temperatures ranging from 11-14º C. at 1130 to 1230 hours. This small channel was choked with aquatic grass, watercress, and marginal herbaceous vegetation for about another 150 meters upstream where it was bordered by low willows and mule fat. Farther upstream the banks consisted of mostly bare mud and sand within a forest of larger willows, cottonwoods, and Arundo. The upper extent of the side channel near Middle Canyon originates within a thick forest of mostly mature trees and blackberries bushes. Two springs appear to feed the side channel. This source flow was clear and 15º C. About 150 fish were observed at

various locations along this spring fed side channel. The majority of these fish appeared to be arroyo chubs; however, a few may have been mosquito fish. Unarmored Threespine Stickelback were not observed. Further, no fish were observed in the relatively lower shallows, approximately 50 yards or so in the agricultural reclaim area. Farther upstream the channel was better defined with greater flow and many areas were approximately to 8-12 inches deep. Groups of small arroyo chubs (up to 40 mm Standard Length) were intermittently scattered in these areas.

3.3.3 **Southwestern Arroyo Toad Habitat**

The survey area within the river channel supports a mosaic of riparian and terrace habitats, barren sandbars, and various densities of riparian scrub that are consistent with arroyo toad primary constituent elements. This reach supports multiple small channels that range from shallow open and braided to relatively deep (±2 feet) and under dense cover. Due to higher than average rainfall during the 2005 season, the river had been extensively scoured and much of the relatively overgrown and dense vegetation from previous years had been removed by major water flow. Perennial flow is present from the Los Angeles County Sanitation Districts' Water Reclamation Plant in the reach (No. 32), as well as from the upstream plant (No. 26).

As described above, the survey area was largely open and sandy with the wetted channel located 300 yards or more north of the base of the cliffs on the south side of the floodplain. Along the southern margin of the floodplain, a small isolated spring fed side channel that was choked with aquatic and herbaceous vegetation and was bordered by low willows and mule fat. Farther upstream the banks consisted of mostly bare mud and sand within a forest of larger willows, cottonwoods, and giant reed. Amphibians detected included Pacific chorus frog (*Pseudacris regilla*). The river provided sufficient low gradient segments to support shallow pools with suitable substrates for arroyo toad. There are also some suitable upland terrace habitats between the banks of the river to support foraging and over-wintering arroyo toad. There are no manmade barriers present in this reach that could completely or substantially impede upland movement of arroyo toads. However, some stretches of the riverbank in the survey area are near vertical (e.g., southern cliff areas) and of a height that would significantly impede migration out of the stream channel.

3.3.4 California Red-legged Frog Habitat

Based on known correlative habitat information for CRLF, suitable habitat for CRLF does not appear to be present within the subject study area. Habitat for CRLF is extremely limited due to the overall absence of deep water (e.g., greater than 10 inches), lack of emergent vegetation throughout the project site, and absence of a consistent hydrological regime throughout the year (hydro-geomorphologic characteristics of the River). Floods periodically scour vegetation in the

active channel where low flows are present. This reduces necessary cover around pools needed by CRLF. The small freshwater spring area on the southern floodplain could potentially serve as habitat for the species (e.g., water was relatively deep in small isolated areas), but this area is likely affected by cattle grazing and scouring, and the occurrence potential would nonetheless be considered extremely low. Accordingly, habitat appropriate for the red-legged frog did not appear to be present within the proposed development area.

3.3.5 Two-striped Garter Snake Habitat

Suitable habitat for the two-striped garter snake is present within portions of the study area. Accordingly, this species has a high potential to occur near freshwater and riparian habitats throughout the study area where water is present most of the year.

3.3.6 Southwestern Pond Turtle Habitat

Potentially suitable habitat is present for the southwestern pond turtle within portions of the study area where ponded or flowing water is present. As such, it is reasonable to predict that the length of the river adjacent to the project site may contain southwestern pond turtles at any given time, as well as some of the moist canyons leading away from the River.

4. PROJECT RELATED IMPACTS

The majority of development will be upslope of the Santa Clara River floodplain. Two floodplain modifications within the Santa Clara River floodplain are proposed for the Mission Village project. These two modification structures are the San Jose Flats Bank Stabilization and the Commerce Center Drive Bridge (including the bridge piers and southern abutment).

4.1 PROPOSED FLOODPLAIN MODIFICATIONS

Please refer to Figure 2, Mission Village Existing Conditions, Proposed Project Elements and Land Use, for a view of the proposed floodplain modifications and their locations with the Mission Village project area.

4.1.1 San Lose Flats Bank Stabilization

The bank stabilization structure will be placed at the toe of the cliff at San Jose Flats on the Santa Clara River. San Jose Flats is located just west of Middle Canyon on the south bank of the Santa Clara River. This structure will be constructed of buried soil cement.

4.1.2 Commerce Center Drive Bridge

The Commerce Center Drive Bridge will include the southerly extension of Commerce Center Drive from the approved Commerce Center Interchange. The bridge will begin from the northerly abutment (which was approved in conjunction with the interchange) and will traverse the river and connect with the south bank just east of Middle Canyon. The southerly bridge abutment will be constructed of rip rap and gunite.

4.1.3 Utility Corridor

The utility corridor will be located outside of the river channel adjacent to Highway 126 on the north side of the Santa Clara River. The utilities will either be attached to bridges or placed under tributary drainage crossings. Due to its location, set back in most cases from the river corridor, no impacts to fish species including unarmored threespine stickleback are expected.

4.1.4 Regional Water Quality Basin

A regional water quality basin will be placed outside of the Santa Clara River channel on the south side of the Santa Clara River. Water will discharge from this basin only during high flow events.

4.2 POTENTIAL PROJECT RELATED IMPACTS

The Santa Clara River is a dynamic, episodic system that experiences ”re-set” flood events that can be expected every 5-15 years (Balance Hydraulics, Inc. 2005). This re-set condition occurred in 2005 resulting from the 2004-2005 flood events. Impacts to aquatic habitats from floodplain modification due to the implementation of the project are minimal as compared to a re-set event. This section summarizes potential impacts to the special status species covered in this report based on the results from hydraulic modeling conducted by PACE in 2006 and the water quality technical report by GeoSyntec 2006.

4.2.1 Unarmored Threespine Stickleback

Project Impacts

The potential impacts to unarmored threespine stickleback (UTS) due to the construction and persistence of the Project's bank stabilization features and the bridge construction are expected to range from no impact to a less than significant impact (Table 1).

Based on hydraulic modeling conducted by PACE 2006, there will be no impact to stickleback during the 2-year and 5-year flood frequency occurrences. This means that no increase in water velocities or loss of rearing habitat will occur during those events. During the 10, 20, 50, and 100 year flood frequency occurrences there will be minimal localized increases in water velocity due to the implementation of the project; however this impact is not anticipated to be significant. When high flood flows occur in rivers, stickleback either become washed downstream and/or migrate to backwater habitats for shelter. Hydraulic modeling results, found in Table 1.0, indicate sufficient backwater habitat for stickleback exists during these events as the project improvements are set back from the existing riparian corridor. In summary, the hydrologic influence of the project on UTS will essentially be transparent when viewed in conjunction with flood flow conditions.

UTS are known to inhabit the Newhall Ranch reach of the Santa Clara River adjacent to the Mission Village Project area. Based on reconnaissance surveys conducted following recent flood events (January and February 2005), high flow conditions appear to have dislocated and dispersed aquatic organisms downstream.

The Flood Technical Report (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian

habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no significant impacts to UTS populations are expected.

TABLE 1 – Impact Matrix by flood occurrence for the south bank stabilization structure and the Commerce Center Bridge.

Locale	Feature	Potential UTS Impacts By Flood Event Occurrence											
		2-yr		5-yr		10-yr		20-yr		50-yr		100-yr	
		Rearing Habitat	Water Velocity	Rearing Habitat	Water Velocity	Rearing Habitat	Water Velocity	Rearing Habitat	Water Velocity	Rearing Habitat	Water Velocity	Rearing Habitat	Water Velocity
Mission Village Reach of the Santa Clara River													
South Bank	Buried, Gunite Bank Stabilization	NI	NI	NI	NI	G	LS*	G	LS	G	LS*	G	LS*
Commerce Center Bridge	Bridge, Rip Rap, Gunite Bank Stabilization	NI	NI	NI	NI	G	LS*	G	LS	G	LS*	G	LS*

PI = Potential Impact
NI = No impact
LS = Less Than Significant Impact
G = Gain in Backwater Habitat resulting from the project (Project design features will have an effect on the hydraulics within the floodplain. The gain in backwater habitat is assumed to occur as a result of the project design features at certain flood event occurrences)

* Increase in flow velocity less than significant due to already high velocity conditions that exist during high flow events.

Impact Matrix is based on loss of backwater habitats and increased velocities from proposed floodplain modification features. Hydraulic modeling results produced by PACE, Inc (2006).

The Mission Village Water Quality Technical Report (GeoSyntec 2006) indicates that the modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to adjacent or downstream populations of UTS are expected.

4.2.2 **Southwestern Arroyo Toad**

Project Impacts

Although the arroyo toad has not been recorded within the Project area, suitable habitat exists within the Project boundaries in the Santa Clara River. It is not anticipated that the proposed Project's bank stabilization feature or bridge structure will substantially alter the local sediment transport regime or otherwise affect in-stream habitat (spawning, foraging) for arroyo toad. The Project area falls within an extremely dynamic reach of the Santa Clara River where high disturbance flood events occur every 5 to 15 years and change the existing stream structure.

An EIR/EIS for the NRMP, located adjacent to and upstream of the project, stated that the widening of the river channels within the areas of bank protection (i.e., stabilization) would not cause system-wide channel or bed erosion, or aggradation. In its 1998 and 2002 Biological Opinions on the NRMP (page 30 of the 1998/2002 NRMP), the U.S. Fish and Wildlife Service accepted the NRMP's findings, and stated further that the NRMP would not affect arroyo toad habitat negatively within the Santa Clara River mainstem.

The Flood Technical Report (PACE 2006) for Mission Village found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the arroyo toad are expected.

The Mission Village Water Quality Technical Report (GeoSyntec 2006) indicates that the modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to potential adjacent or downstream populations of arroyo toad are expected.

4.2.3 California Red-legged Frog

Project Impacts

Suitable habitat for CRLF does not appear to be present within the subject study area. Habitat for CRLF is extremely limited due to the overall absence of deep water (e.g., greater than 10 inches), lack of emergent vegetation throughout the project site, and absence of a consistent hydrological regime throughout the year (hydro-geomorphologic characteristics of the River).

The Flood Technical Report (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the California red-legged frog are expected.

The Mission Village Water Quality Technical Report (GeoSyntec 2006) indicates that the modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to potential adjacent or downstream populations of California red-legged frogs are expected.

4.2.4 Two-striped Garter Snake

Project Impacts

Project impacts on two-stripe garter snake will be less than significant since the proposed Project's bank stabilization feature and bridge abutments will be constructed at the toe of steep cliffs, outside of the riparian corridor and away from existing snake habitat. No adverse change to foraging habitat is expected from implementation of the Project.

The Flood Technical Report (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the two-striped garter snake are expected.

The Mission Village Water Quality Technical Report (GeoSyntec 2006) indicates that the modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to potential adjacent or downstream populations of two-striped garter snakes are expected.

4.2.5 Southwestern Pond Turtle

Project Impacts

Project impacts on southwestern pond turtles will probably include temporary or permanent alteration of aquatic channel foraging habitat consequent to construction activities (primarily related to the construction of bridge piers) and possible loss of basking areas. However, no long-term effects from bank stabilization are expected as long as adjacent channels continue to exist. Oviposition habitat on the south bank and downstream will likely not be affected by bank stabilization or bridge abutments.

The Flood Technical Report (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent

to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the southwestern pond turtle are expected.

The Mission Village Water Quality Technical Report (GeoSyntec 2006) indicates that the modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to potential adjacent or downstream populations of southwestern pond turtles are expected.

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U.S. Fish and Wildlife Service, 1999b. Recovery Plan for the Arroyo Southwestern Toad. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service. 2001. Final determination of critical habitat for the California red-legged frog. Federal Register 66(49): 14626-14758.

U.S. Fish and Wildlife Service. 2002a. Biological Opinion for the Natural River Management Plan, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH). U.S. Fish and Wildlife Service, November 2002.

U.S. Fish and Wildlife Service. 2002b. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

U.S. Fish and Wildlife Service. 2004a. Proposed Designation of Critical Habitat for the California red-legged frog (*Rana aurora draytonii*). 50 CFR Part 17, 69 FR 19620-19642, April 13, 2004.

U.S. Fish and Wildlife Service. 2004b. Proposed Designation of Critical Habitat for the Arroyo Toad. 50 CFR Part 17, 69 FR 23254-23328, April 28, 2004.

U.S. Fish and Wildlife Service. 2005. 50 CFR, Federal Register, Final Rule, Vol. 70, No. 70, April 13, 2005). Final Designation of Critical Habitat for the Arroyo Toad; Final Rule. April 13.

U.S. Fish and Wildlife Service. 2006. 50 CFR, Federal Register, Final Rule, Vol. 71, No. 71, April 13, 2005). Designation of Critical Habitat for the California Red-Legged Frog and Special Rule Exemption Associated With Final Listing for Existing Routine Ranching Activities; Final Rule. April 13.

Valencia Company. 1998. Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County. Valencia Company, August 1998.

Valencia Company. 1998 Natural River Management Plan: Permitted Projects and Activities. Santa Clara River and tributaries. Valencia Company, November 1998.

6. LIST OF PREPARERS

ENTRIX, Inc. and Ecological Sciences, Inc.

- Camm Swift, Ph.D., Senior Fisheries Scientist, ENTRIX, Inc: conducted field reconnaissance survey and background document review; prepared technical discussion of issues related to stickleback and fish.

- Steve Howard, Project Manager and Project Fisheries Scientist, ENTRIX, Inc: coordination and management of ENTRIX and Ecological Sciences technical staff, assisted field reconnaissance survey and background document review; supported technical discussion of issues related to stickleback and fish.

- Scott Cameron, Principal Biologist, Ecological Sciences, Inc: assisted field reconnaissance survey and background document review; supported technical discussion of issues related to special-status amphibians and reptiles.

- Resumes for these preparers are included in Appendix B.

APPENDIX A

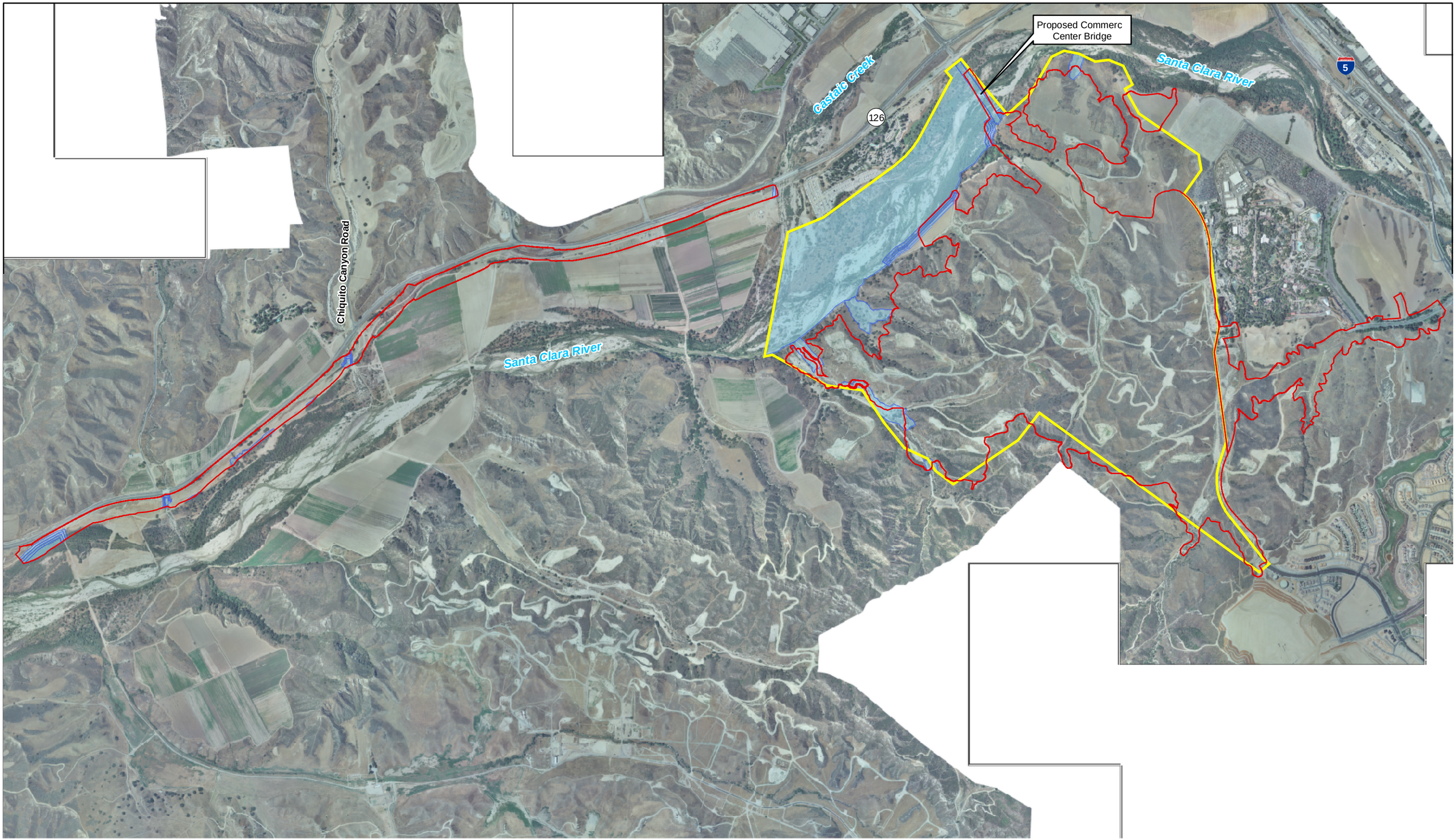
FIGURES

0 0.125 0.25 0.5 Miles

Figure 1 - Newhall Ranch
Mission Village Project

Mission Village Planning Boundary
Mission Village Grading Limit Line

Source: Imagery - 2003, Grading Limit and Planning Bnd. - 2006, PSOMAS.



0 0.25 0.5 1 Miles

Figure 2
Mission Village Project Floodplain Modification Features

Mission Village Grading Limit Line
Mission Village Planning Boundary
Bank Stablization Areas

Source: Imagery - 2003, Grading Limit and Planning Bnd. - 2006, PSOMAS.
Bank Stabilization Areas - (d2-05_BankStab_pc042505.shp) - 2006, PACE.

APPENDIX B

RESUMES OF PREPARERS

ENTRIX
ENVIRONMENTAL CONSULTANTS

Camm Churchill Swift, Ph.D.

Sr. Project Scientist

Discipline/Specialty

- Ichthyology
- Fishery Biology
- Estuarine Biology

Education

- Ph.D., Department of Biology, Florida State University, Tallahassee, 1970
- M.A., Department of Zoology, University of Michigan, Ann Arbor, 1965
- A.B., Department of Zoology, University of California, Berkeley, 1963

Professional Affiliations

- American Fisheries Society, including California-Nevada Chapter
- Estuarine Research Federation, including California Estuarine Research Society
- Southern California Academy of Sciences
- Western Field Ornithologists, and California Native Plant Society

Summary of Qualifications

Swift is one of the leading authorities on the biology, management, and conservation of the fresh and brackish water fishes of coastal southern California. He has worked with a wide variety of public and private agencies for many years to conserve these species and advise on habitat restoration for their benefit. He was appointed to the Unarmored Threespine Stickleback Recovery Team and currently serves on the Technical Recovery Teams for tidewater goby (U. S. Fish and Wildlife Service) and southern steelhead (National Marine Fisheries Service).

Relevant Experience

Research Interests

The biology, conservation, and paleontology of freshwater and estuarine fishes, recently in coastal southern California, including the federally endangered brackish water species, the tidewater goby, *Eucyclogobius newberryi*, the migratory (anadromous) and federally listed steelhead (*Oncorhynchus mykiss*), and the federally threatened Santa Ana sucker (*Catostomus santaanae*). Of about eight species of freshwater fishes native to the Los Angeles Basin, the Santa Ana sucker, Santa Ana speckled dace (*Rhinichthys csculus ssp*.), and arroyo chub (*Gila orcutti*) are endemic here and have been highly impacted by man. The tidewater goby, narrowly adapted to the upper brackish estuarine zone of the aquatic habitat continuum, contributes to the understanding of the evolution of organisms into the estuarine habitat, and the evolution of north Pacific marine faunas in general. The severe alteration of freshwater and estuarine habitat in much of California has led to most of the freshwater and brackish water species having special conservation status. For years several of my studies on the biology, distribution, and conservation of all four of these species have helped shape management and recovery strategies for them

Contracts and Consulting

Freshwater fishes of southern California.

Supervised crews of three to six graduate students surveying the estuarine and freshwaters of southern California for fishes for four months and prepared report for the California Department of Fish and Game on the status and distribution of these fishes, at Natural History Museum of Los Angeles County.

Status of the native freshwater fishes of southern California, including the status of the estuarine tidewater goby, *Eucyclogobius newberryi*, with recommendations for preserves to maintain their existence. California Department of Fish and Game Contract FG-7455, one year. Compiled data bases on fish records collaborating with Peter Moyle, U. C. Davis, to incorporate data into the California Department of Fish and Game's Natural Heritage Data Base, at Natural History Museum of Los Angeles County.

Cooperative Agreement between National Biological Service (now part of USGS) and Loyola Marymount University for study of the biology of the federally endangered tidewater goby on Vandenberg Air Force Base, Santa Barbara County. Included three to four paid undergraduate research assistants at Loyola Marymount University.

Analyzed bottom samples from Delta Mendota Canal, central California, for invertebrate densities of the Asiatic clam, *Corbicula fluminea*, as a research assistant Zoology Department, University of California, Berkeley.

Identified freshwater and coastal fish habitats to determine Significant Ecological Areas for Regional Planning Department, Los Angeles County, via contract to Natural History Museum of Los Angeles County.

Co-author, U.S. Fish and Wildlife Service Recovery Plan for Endangered Unarmored Threespine Stickleback, as member of Unarmored Threespine Stickleback Endangered Species Recovery Team.

Expert panel, habitat suitability criteria and curves for three native cyprinoid fishes (state species of special concern) of the Santa Ana River, southern Calif., EA Engineering and Technology (Lafayette, CA) for Southern California Edison Company.

Surveyed for freshwater fishes of the Los Angeles River. Field work and report writing, as part of contract from the California Department of Fish and Game to the Natural History Museum of Los Angeles County, to assess the fauna and flora of the river.

Monitored populations of native federally endangered fish species during streambed alterations in the Santa Clara River, southern California with San Marino Environmental Associates, San Marino, CA. Both field work and report writing.

Advised Six Agency committee [of southern California water and power purveyors, including Metropolitan Water District of Southern California] on the quality and rationale for U.S. Fish and Wildlife Service Critical Habitat designations for endangered big river fishes of the Colorado River, southwestern United States, with San Marino Environmental Associates, San Marino, CA. Literature research, report writing.

Surveyed for the proposed endangered fish, the tidewater goby, in coastal estuaries of Camp Pendleton Marine Base, southern California, contract through San Marino Environmental Associates, San Marino, CA. Field work and report preparation.

Surveyed for the federally endangered tidewater goby in the estuarine Shuman Lagoon, Vandenberg Air Force Base, Santa Barbara County, CA. for U.S. Fish and Wildlife Service, Ventura Field Office,

Analyzed diet of the endangered bird, the least tern, with Patricia Baird, Department of Biology, California State University, Long Beach. Under U.S. Navy contract (to P. Baird) at Long Beach, with three undergraduate research participants at Loyola Marymount University.

Prepared draft recovery plan for tidewater goby, with U. S. Fish and Wildlife Service, Ecological Services, Ventura California.

Prepared historical analysis of coastal estuaries, habitat change, and restoration options for the estuary at the mouth of the Santa Maria River, Santa Barbara County, CA for California Department of Fish and Game Oil

Response Team, for its contribution to the Trustees of Guadalupe Site, through Hagler-Bailly Inc., Boulder, Co. Field work, research and report writing.

Surveyed for the endangered fish species, the tidewater goby on Marine Corps Base Camp Pendleton, coastal southern California, and provide recommendations for maintenance and improvement of habitat for the species on the Base. With Dan Holland, Camp Pendleton Amphibian and Reptile Survey, Fallbrook, CA for Marine Corps Base Camp Pendleton

Prepared management plan for exotic fishes on Marine Corps Base Camp Pendleton, including methods for removal of exotics and for prevention or minimizing their impact on native aquatic species. With Dan Holland (Principal Investigator), Camp Pendleton Amphibian and Reptile Survey, Fallbrook, CA.

Surveyed for native and introduced freshwater fishes in the middle Santa Ana River in the Prado Dam vicinity with special reference to Santa Ana sucker and arroyo chub. For U. S. Army Corps of Engineers, Los Angeles through Larry Muncey International, Tustin, CA.

Survey, downstream trapping, and analysis of habitat quality for the three endangered fishes (southern steelhead, tidewater goby, and unarmored threespine stickleback) in San Antonio Creek, Santa Barbara County for Vandenberg Air Force Base, with Tetra Tech, Inc., Santa Barbara.

Survey, downstream trapping, and food habit studies of Santa Ana suckers in the Santa Ana River to document movements into diversions and impact of exotic species on suckers. Phase II for Santa Ana Water Project Authority, Riverside, through Larry Muncey International, Tustin, CA.

Expert witness on Southern California Minnow/sucker community for California Department of Fish and Game in their arbitration with Foothill Golf and Development, State Superior Court, Los Angeles, No. 99-0600-DW (This fish community consists of Santa Ana sucker, Santa Ana speckled dace, and arroyo chub).

Prepared preliminary assessment of impacts of shore dredging on the fisheries of Big Bear Lake, for Big Bear Municipal Water District with Montgomery and Watson, Pasadena.

Surveyed and estimated population sizes of endangered unarmored threespine stickleback and tidewater goby, and analyze steelhead habitat on several drainages on Vandenberg Air Force Base with Tetra Tech, Inc., Santa Barbara.

Monitored population of tidewater goby in San Luis Obispo Creek Lagoon in relation to Avila Beach clean up site. For Unocal through Essex Environmental, San Luis Obispo.

Surveyed for tidewater gobies in Santa Clara River Lagoon, Ventura County. For City of Ventura with Entrix, Inc., Oxnard, CA.

Surveyed for populations of sensitive native freshwater fish in the Santa Ana River near Colton and Loma Linda for ENSR, Camarillo, CA.

Surveyed for populations of native fishes in the Santa Ana River in the vicinity of the Interstate 210 crossing. For Cal Trans with Sapphos Environmental, Pasadena, CA.

Monitored for Santa Ana suckers and assess effects of bridge maintenance, sand mining, and alternative bridge design on this fish. For Riverside County Transportation Department, through Tierra Madre Associates and Ogden Environmental (now AMEC Earth and Environmental, Ltd.), Riverside, CA.

Surveyed for the federally endangered tidewater goby in lower San Luis Rey River, CA. with Camp Pendleton Amphibian and Reptile Survey, Fallbrook, CA and MBC Applied Environmental Sciences, Inc., Costa Mesa, CA.

Surveyed and monitoring for the federally endangered tidewater goby in San Mateo Lagoon, Camp Pendleton Marine Corps Base with recommendations for restoration and recovery with Merkel and Associates, San Diego CA.

Interaction of native and exotic freshwater fishes during El Nino disturbance in the Santa Margarita River, southern California. With USGS Laboratory, San Diego State University with partial support of the Nature Conservancy.

Determined possible effects on steelhead of UNOCAL remediation of soil contamination in the vicinity of the lower Santa Maria River. With Jordan Environmental Services, Atascadero, CA.

Reviewed and assessed mitigation features for Seven Oaks Dam on the Santa Ana River in relation to populations of Santa Ana sucker downstream. For the U. S. Army Corps of Engineers via MEC Analytical Inc., Carlsbad, CA.

Reviewed and assessed mitigation plans and Biological Assessments for tidewater goby and steelhead in relation to Lower Mission Flood Control Project of U. S. Army Corps of Engineers. For City of Santa Barbara, CA.

Surveyed for fishes and assess possible impacts of the construction of a pipeline crossing over Dominguez Channel in Wilmington. With RAM Environmental Engineering Services, Inc., Bakersfield.

Directed surveys for Santa Ana speckled dace in lower Fremont, Blackstar, and Silverado canyons, Orange County. With Harmsworth and Associates, Inc., Dove Canyon, CA.

Surveyed for native freshwater fishes and advise on mitigation for quarry operations at the mouth of Fish Canyon, near Azusa, CA. For Cal Mat Corporation through Chambers Group, Irvine, CA.

Implemented eradication plan for exotic fishes in Los Angeles County Public Works mitigation area of lower Big Tujunga Canyon-Haines Creek area. With Camp Pendleton Amphibian and Reptile Survey, Fallbrook, CA, subcontract with Chambers Group, Irvine, CA, for Los Angeles County Department of Public Works.

Identified freshwater fossil fish remains from a variety of late Pleistocene freshwater sites in Riverside County. With L and L Environmental, Riverside, CA and Paleo Environmental Associates, Pasadena, CA .

Monitored, rescued, and transferred federally threatened Santa Ana suckers from diversion of Santa Ana River, Orange County. For U. S. Corps of Engineers through San Marino Environmental Associates, San Marino, CA.

Provideed assessment of impacts of changes in water flow from San Bernardino Infiltration and Extraction Wastewater Treatment Facility (RIX) on populations of Santa Ana sucker. For City of San Bernardino with Albert Webb Associates, Riverside.

Surveyed for native fishes in relation to highway crossing of streams at Temecula Creek, San Diego County and Chino Creek, San Bernardino county. For CalTrans with AMEC Earth and Environmental, Ltd., Riverside, CA.

Provided assessment of impacts and mitigation possibilities for native sensitive fish species in lower San Juan Creek, Orange County and lower San Mateo Creek, northern San Diego County for various alternatives of the proposed new highways. For Foothill/Eastern Transportation Corridor Agency with P and D Consultants, Orange, CA.

Provided expertise and field work to study steelhead in Topanga Creek including snorkel surveys, habitat assessment, and up and downstream migrant trapping. With Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Employment History

- ENTRIX, Inc., Senior Project Scientist, Ventura, CA, September, 2003-present
- Emeritus Associate Curator, Natural History Museum of Los Angeles County, January, 1993-present
- Part-time instructor, Mount San Antonio College, 1993-1994
- Visiting Assistant Professor of Biology, Loyola Marymount University, Los Angeles, 1994-1998.
- Part-time instructor, East Los Angeles, Rio Hondo, and Valley colleges, 1993-1994, 1998-1999.
- Associate Curator of Fishes, Natural History Museum of Los Angles County; and Adjunct Assistant Professor of Biology, University of Southern California, 1970-1993.

Publications

Peer-Reviewed, Published Papers

- 1993. Swift, T. H. Haglund, M. Ruiz, and R. Fisher. Status and distribution of the freshwater fishes of southern California. Bull. S. Calif. Acad. Sci., 92(3):101-168.
- 1996. Chapter 30. Distribution and migration. Pp. 595-630. (excluding literature cited in single collection at end of book). In: Carl Bond. Biology of Fishes, (textbook) Second Edition. Harcort, Brace, and Co., Philadelphia.
- 1996. Lafferty, K., R. Swenson, and C. C. Swift. Tidewater goby; endangered species profile. Environmental Biology of Fishes, 46:254.
- 1998. The fish fauna of Ballona Marsh, an urban estuary on the western of the Los Angeles Basin. p. 1427 (Abst). In: Orville T. Magoon, et al. Eds, California and the World Ocean ’97. 2 vols. American Society Civil Engineers, Reston, VA
- 1999. K. Lafferty, C. C. Swift and R. Ambrose. Postflood persistence and recolonization of endangered tidewater goby populations. North American Journal of Fisheries Management, 19(2):618-622.

- 1999. Lafferty, K., C. C. Swift, and R. Ambrose. Extirpation and recolonization in a metapopulation of an endangered fish, the tidewater goby. Conservation Biology, 13(6):1447-1453.
- 2002. Swift, K. Hieb, and R. Swenson. Family Gobiidae. pp. 7-9. IN: William S. Leet, Christopher M. Dewees, Richard Klingbeil, and Eric J. Larson (editors), California's Living Marine Resources: A status report. The Errata. California Department of Fish and Game, Sacramento, CA (December, 2001) (www.dfg.ca.gov/mrd) [The larger work appeared in hard copy in earliest 2002 minus this Gobies article later added to an electronic Errata on the web site for inclusion in the Section on Bay and Estuarine Finfish Resources]
- 2002. M. N. Dawson, K. D. Louie, M. Barlow, D. K. Jacobs, and C. C. Swift. Comparative phylogeography of sympatric sister species, *Clevelandia ios* and *Eucyclogobius newberryi* (Teleostei, Gobiidae), across the California transition zone. Molecular Ecology, 11, 1065-1075.
- 2002. Swift and D. C. Holland. Exotic Fish species and their impacts on small costal lagoons in southern California. (Abst.) Bull. S. Calif. Acad. Sci., 101(2), Supplement, p. 32
- 2002. Interaction between native fish, habitat, and exotic fish species in the middle Santa Ana River, southern California. (Abst.) Bull. S. Calif. Acad. Sci., 101(2), Supplement, p. 32.
- 2002. Chapter 29. Distribution. Pp. 601-638. In: Michael Barton. Bond's Biology of Fishes. 3rd Edition. Thompson Brooks/Cole, Belmont, CA (publication date of 2007 mistakenly printed inside cover)
- (In preparation) with Richard Feeney. Description and ecology of free-swimming larvae and juveniles of Santa Ana sucker, Santa Ana speckled dace, and arroyo chub.

Grants

- Research collaborator with Dr. George Dales. Use of freshwater, estuarine, and marine fishes by the Harappan Culture of coastal Pakistan. Smithsonian Foreign Currency Program, 3 years.
- Co-principal investigator with Lawrence Barnes and Edward D. Mitchell. NSF EAR-7916508, Paleoecology of the Sharktooth Hill Bonebed. 2 years.
- Research collaborator with Drs. Brent Berlin and James L. Patton. (co-principal investigators). NSF BSN-7916746. Field research in ethnobiological anthropology in the Peruvian Amazon, 3 years.
- Co-principal investigator with Robert J. Lavenberg. NSF DEB-8008088. Development of Ichthyological Resources (at the Natural History Museum of Los Angeles County), 3 years.
- Co-principal investigator (with Judith Chovan). A national traveling exhibition on the biology of sharks. NSF Pre-College Education Grant MDR-8751868, 2 years.

Curatorial and Field Experience

- Curated wet fish specimens and dry fish skeletons in the collections of the Museum of Zoology, University of Michigan; Florida State University; and Section of Fishes, Natural History Museum of Los Angeles County. Expeditionary work in Caribbean Honduras; Pacific coastal Mexico and Costa Rica; Indus Delta, Pakistan; Amazonian foothills, northern Peru; and Miocene Sharktooth Hill Bonebed, California. Numerous smaller trips for recent freshwater and estuarine fishes, particularly in the southeastern United States and coastal California.

Professional Activities

- Various elected and appointive positions in the California-Nevada Chapter of the American Fisheries Society, Southern California Academy of Sciences, and American Society of Ichthyologists and Herpetologists. Secretary, Vice-president, and President of the Academy; elected President-elect, and proceeded to President, and past President of California Nevada Chapter, 1997-1999. Served on host committees for Los Angeles meetings of the American Society of Ichthyologists and Herpetologists (twice), Society of Vertebrate Paleontology, California-Nevada Chapter of the AFS, and the Southern California Academy of Sciences (three times).

- Member, Unarmored Threespine Stickleback Endangered Species Recovery Team (1972-1995), the Technical Recovery Team for the Tidewater Goby (2003-present), both for U.S. Fish and Wildlife Service, and member of the Southern Steelhead Technical Recovery Team (2003-present) for the National Marine Fisheries Service.

Awards, Honors

- Elected Fellow of the Southern California Academy of Sciences, 1991; Emeritus Associate Curator of Fishes, Natural History Museum of Los Angeles County, 1993; Award of Excellence from California Nevada Chapter of the American Fisheries Society, 1997.

Presentations (1999 onward, Swift presented unless otherwise noted)

- The disappearing fishes of southern California. In: Swimming Upstream: Restoring California's rivers and streams for salmon, steelhead and other species. Educational Workshop sponsored by the Sierra Club and California Trout, 12 June 1999, Los Angeles Zoo, Los Angeles, CA

- Biodiversity and conservation of the freshwater fishes of southern California. (with Jonathan Baskin) In: Planning for Biodiversity: Bringing research and management together. A symposium sponsored by the USDA Forest Service and USGS Western Ecological Research Center. California State Polytechnic University, Pomona, 29 February-2 March 2000.

- Dramatic effects of rainfall on species distributions in the Santa Margarita River. (with Manna Warburton [presenter] and Robert N. Fisher), California-Nevada Chapter, American Fisheries Society, 34th Annual Meeting, Ventura, CA 31 March-1 April 2000.

- Freshwater fishes of the Los Angeles River, southern California. (with Jeffrey Seigel and Dan Holland), and Fish population fluctuations 1997-2000 in small lagoons on Marine Corps Base Camp Pendleton. (with Dan Holland), Annual Meeting, Southern California Academy of Sciences, University of Southern California, Los Angeles, CA 19-20 May 2000.

- El Nino effects on the native and exotic fish populations of the Santa Margarita River southern California. (with Robert N. Fisher [presenter] and Manna Warburton). Society for Conservation Biology Annual Meeting, Hilo Hawaii, 29 July-Aug. 1, 2001.

- El Nino effects on estuarine fish populations associated with the southernmost populations of tidewater goby, 1990-2001 (with Dan Holland), and The federally threatened Santa Ana sucker in the Santa Ana River-Distribution, habitat, and exotic predators. Ann. Meeting, California Nevada Chapter American Fisheries Society, Tahoe City, CA April 19-20, 2002

- Exotic fish species and their impacts on small coastal lagoons in southern California (with Dan Holland, presenter), and Interaction between native fish, habitat, and exotic fish species in the middle Santa Ana

River, southern California. Annual. Meeting, Southern California Academy of Sciences, Claremont, CA June 7-8, 2002.

- Fish populations of small coastal lagoons in southern California. California Estuarine Research Society, Inaugural Meeting, Hubbs Sea World Research Institute, San Diego, CA, April 14, 2003

- Status of and prognosis for the freshwater fishes of coastal southern California. Swift [presenter], Jonathan N. Baskin, Robert Fisher, and Thomas Haglund; Status, Habitat, and restoration of southern Steelhead in Topanga Creek and State Park, just south of Malibu Creek. Rosi Dagit [presenter] and Swift; Visual Display of stream habitat survey profiles using GIS: An example from Topanga Creek, coastal Southern California. Kevin Reagan [presenter], Rosi Dagit, and Swift; and a Poster: Genetic structure in the staghorn sculpin from Alaska to southern California. Kristina D. Louie [presenter], K. P. Kloepfli, D. K. Jacobs, and Swift. Western Division/Cal-Neva Chapter of American Fisheries Society, Joint Annual Meeting, San Diego, April 14-17, 2003. In addition Swift organized two days of symposia on the freshwater fish, amphibian, and aquatic reptile fauna of coastal southern California.

Professional Societies

- American Fisheries Society, including California Nevada Chapter, Estuarine Research Foundation, American Society of Ichthyologists and Herpetologists, Desert Fishes Council, Southeastern Fishes Council, Society of Vertebrate Paleontology, Sigma Xi (Loyola Marymount University Chapter), American Association for the Advancement of Science, Southern California Academy of Sciences, Society for Conservation Biology, Society of Systematic Biology, Biological Society of Washington, Japanese Ichthyological Society, Western Field Ornithologists, and California Native Plant Society

ENTRIX
ENVIRONMENTAL CONSULTANTS

Steven R. Howard

Project Scientist

Discipline/Specialty

- Aquatic Invertebrate Ecology
- Fisheries Biology
- Habitat Assessments and Mapping
- IFIM/PHABSIM
- Limnology
- Salmonid Biology
- Stream and Estuarine Ecology
- Water Quality Assessment
- Environmental Monitoring

Education

- B.S., Fisheries: Humboldt State University, Arcata, CA, 1999

Training/Certifications

- California Department of Fish and Game. Resident Scientific Collecting Permit No. 801226-04
- USFWS Project Permitted Tidewater Goby Specialist in Ventura and Santa Cruz Counties
- Theory and Application of the Physical Habitat Simulation System, Utah State University, May 2002
- Sampling Theory and Design Workshop, Humboldt State University, March 2002
- Aquatic Ecological Assessment Workshop, CDFG, March 2002

Affiliations

- American Fisheries Society, Oregon and Cal-Neva Chapters since 1998

Summary of Qualifications

Mr. Howard is an interdisciplinary scientist with an emphasis on aquatic studies including fishery habitat assessment and population surveys, fish species identification, fisheries techniques, fish passage assessment, fish and aquatic invertebrate population analysis, water quality assessment, and wildlife population and escapement surveys. Mr. Howard has preformed numerous projects in aquatic habitats ranging from high elevation lakes and streams to coastal estuaries. Mr. Howard has also conducted projects including subsurface soil and groundwater investigations, environmental impact studies, environmental monitoring, and site closure and remediation. Mr. Howard has been involved in permitting large power projects and smaller instream projects throughout California.

Mr. Howard has conducted numerous fish population studies throughout many of the western states. Representative projects include chinook, steelhead and bull trout studies in northern California and Oregon, steelhead studies in central and southern California, various trout species studies in California, Oregon and Idaho, and native fish studies in Oregon and southern California. Mr. Howard has also conducted fish population surveys in southern and central California estuaries for the endangered tidewater goby.

Mr. Howard manages the majority of the aquatic projects in southern California. Proven management skills along with technical expertize with special status aquatic species, instream flow studies and mitigation compliance has been a key factor in the retention of on-call services contracts with several clients in southern California.

Relevant Experience

Fish and Wildlife Studies

McKenzie River Watershed Spring Chinook Population Study – Lane County, Oregon

Mr. Howard conducted chinook salmon spawning surveys, obtained biological samples from spawned-out salmon, collected downstream migrants, monitored fish passage though leaburg dam, and monitored bull trout migration under the Western Oregon Research and Monitoring Program. Mr. Howard conducted these projects for the Oregon Department of Fish and Wildlife.

Oregon State Elk Population Study – Lane County, Oregon

Mr. Howard managed an initial statewide effort to obtain elk teeth and tissue samples throughout the state of Oregon. This effort was successful and set precedent for future Oregon Department of Fish and Wildlife elk tissue collection efforts.

United Water Conservation District FERC Relicensing Project – Ventura County, California

ENTRIX, Inc. designed multiple studies under agency consultation during the FERC application process. Mr. Howard conducted fish population studies and identified fish species present in Piru Creek below Santa Felecia Dam, within Piru Lake and above the lake in Piru Creek.

United Water Conservation District Steelhead Migration Project – Ventura County, California

ENTRIX, Inc. directed fish passage monitoring and fish rescue consultation involving steelhead on the lower Santa Clara River. Mr. Howard was the lead fisheries biologist for the project. The Vern Freeman Diversion fish passage facility includes a fish ladder, fish screens, and a downstream migrant fish trap. During steelhead migration, facilities at the diversion were inspected for stranded steelhead and resident rainbow trout for relocation to the appropriate habitat. These operations were interim mitigation measures for section 10 incidental steelhead take.

PacifiCorp FERC Relicensing Project – Jackson County, Oregon

ENTRIX, Inc. conducted numerous aquatic studies under agency consultation during the FERC reliscencing application process. Mr. Howard analyzed fish population data in the upper Rogue River watershed to estimate salmonid population densities above and below dams.

Moyie River Fish Population Study – Bonner County, Idaho

ENTRIX, Inc. conducted a salmonid relative abundance survey in the Moyie River in Idaho. The survey was performed utilizing four divers at several gas pipeline river crossings. This was conducted in conjunction with past monitoring and a proposed expansion of the pipeline at the crossings in the Moyie River. Mitigation for each crossing consisted of installing Riprap wings to prevent bank Scour and rock-drop structures to form rearing and holding pools.

Ventura County Flood Control Tidewater Goby Project – Ventura County, California

ENTRIX, Inc. served as fisheries professional to the Ventura County Flood Control District during pipe maintenance in the Hueneme drain. A temporary impoundment was placed around the work area which trapped numerous fish including tidewater gobies. Mr. Howard identified fish species within the impoundment and relocated all fish away from the work area.

Ventura County Flood Control Bank Stabilization Project – Ventura County, California

ENTRIX, Inc. served as fisheries professional for Ventura County Flood Control District during a bank stabilization and habitat restoration project on the Sespe River. Mr. Howard was in charge of identifying fish species for relocation outside of the project boundary.

San Clemente Dam Retrofit Drawdown Project – Monterey County, California

ENTRIX, Inc. is conducting annual fish rescues upstream of San Clemente Dam and fish trapping and relocation activities to appropriate habitats downstream of San Clemente Dam for California-American Water Company. Water quality monitoring was also an important part of this project during the drawdown activities. Dissolved oxygen can drop dramatically during these types of projects. Aerators were installed throughout the reservoir to maintain adequate DO levels during the project. A low percentage of steelhead mortalities occurred during this project. Mr. Howard conducted fish rescues and relocations and water quality monitoring during this project. Mr. Howard was one of a few biologists permitted by NOAA Fisheries to conduct electrofishing and fish relocation activities during this project.

Haines Creek Native Fish Population Monitoring and Exotic Species Removal Project – Los Angeles County, California

ENTRIX, Inc. is involved in a multi-year fish population monitoring project on Haines Creek. Haines Creek is one of a few creeks that has sustaining populations of Santa Ana suckers and Santa Ana speckled dace. Numerous exotic species are also found in Haines Creek such as largemouth bass, green sunfish, mosquito fish and crawfish. Sampling is conducted by a 2-pass seining method in 200-meter sample sites.

San Lorenzo River Steelhead and Tidewater Goby Relocation Project – Santa Cruz County, California

ENTRIX, Inc. conducted steelhead and tidewater goby rescue and relocation activities during a bank stabilization project in the tidally influenced reach of the San Lorenzo River. A portadam was constructed around the work area and water was pumped out the impoundment. During fish rescue operations, Mr. Howard discovered the first known tidewater goby in the San Lorernzo River, which prompted further consultation to complete the project. Entrix, Inc. assisted in expediting this consultation process with the USFWS and NOAA Fisheries by monitoring water quality within the impoundment and describing tidewater goby habitat and in the San Lorenzo River.

Habitat Assessment Studies

Habitat Typing Projects – California and Oregon

ENTRIX, Inc. performs numerous habitat typing investigations for multiple clients throughout the United States. Mr. Howard has performed habitat typing field projects in northern California coastal rivers and in mountain streams in southern California and Oregon.

Steelhead Habitat and Passage Assessment – Ventura County, California

ENTRIX, Inc. conducted a steelhead habitat and passage assessment for the City of Ventura to be included in the Ventura River Habitat Conservation Plan. Mr. Howard was the lead fisheries biologist in charge of assessing steelhead habitat on North Fork Matilija Creek. A diversion facility on the Ventura River currently blocks access to headwater steelhead habitat in North Fork Matilija Creek and its tributaries. A fish passage facility is planned for construction in the near future allowing upstream migration to important steelhead habitat in the North Fork Matilija. This habitat assessment quantified spawning and rearing habitat for southern California steelhead trout.

Matilija Creek Steelhead Habitat Evaluation – Ventura County, California

ENTRIX, Inc. conducted a steelhead habitat evaluation for the Matilija Dam Ecosystem Restoration Project. Mr. Howard assisted a project team during this evaluation. The report supplemented the F3 Feasibility Study prepared by the US Army Corps of Engineers and Ventura County Flood Control District. The Matilija Dam project is the largest dam removal and restoration activity ever proposed in California. Restoration will connect endangered southern California ESU steelhead with nearly 50 percent of its historic Ventura River basin spawning and rearing habitat.

Salsipuedes Creek Fish Passage Project – Santa Barbara County, California

ENTRIX, Inc. modified an existing concrete apron to provide for fish passage along Salsipuedes Creek near Lompoc, California. Responsibilities included surveying, conducting site reconnaissance studies, preparing design drawings, permit information, and a grant application, and construction oversight. Mr. Howard assisted the project engineer on anadromous fish passage criteria for the project.

Bioassessment and Invertebrate Studies

Olympic View Sanitary Landfill Wetland Evaluation – Kitsap County,Washington

ENTRIX, Inc. conducted statistical analysis of previously collected data to evaluate relationships between chemical and physical water parameters and the abundance and diversity of macroinvertebrates in a wetland adjacent to the landfill. Stepwise regression analysis attempted to correlate species abundance and richness with water quality and chemistry to assess localized impacts. Mr. Howard conducted this statistical analysis and assisted the project team with the final report.

Santa Clara River Estuary Bioassessment – Ventura County, California

ENTRIX, Inc. designed and conducted this bioassessment study which involved stratified sampling of several estuarine habitats for benthic macroinvertebrates in the Santa Clara River Estuary. Mr. Howard was the lead field biologist on this project. The macroinvertebrate data characterized the assemblage diversity and develops relationships between species abundance, density, richness and microhabitat preferences (grain size, salinity tolerances, etc.). The objective of this study was to support the City and LAWRQCB in the development of defensible site-specific NPDES limits for metals discharged to the estuary.

Big Creek FERC Relicensing Bioassessment Project - Sierra National Forest, California

ENTRIX, Inc. performed this study under agency consultation for the SCE Big Creek FERC relicensing application process. Mr. Howard was a lead biologist on this bioassessment project. The project was conducted in a large portion of the South Fork San Joaquin River watershed. Macroinvertebrate sampling occurred above and below large dams and small diversions to assess Southern California Edison project impacts.

Instream Flow Studies/PHABSIM Modeling

United Water Conservation District FERC Relicensing IFIM Project – Ventura County, California

ENTRIX, Inc. conducted an instream flow study to determine the impacts of Santa Felicia Dam on the steelhead habitat in Piru Creek. Mr. Howard lead a crew comprised of client staff and sub-contractors.

United Water Conservation District FERC Relicensing Steelhead Migration Project– Ventura County, California

ENTRIX, Inc. conducted a migration study on the Santa Clara River downstream of Piru Creek to determine adequate flow releases that would facilitate steelhead upstream migration to Piru Creek.

Ventura River IFIM Project – Ventura County, California

ENTRIX, Inc. conducted this instream flow study to determine the impacts of dams and diversions on the steelhead habitat in the Ventura River. The results of this study will assist in the identification of factors potentially limiting fish populations in the effected reaches of the Ventura River and to determine appropriate minimum instream flows. Mr. Howard conducted the field investigation, PHABSIM Modeling and produced the final report. Instream Flow Incremental Methodology (IFIM) studies in Oregon and California including the Ventura River. These projects use multiple flow regimes in determining fish habitat suitability downstream from dams and diversions.

Matilija Creek IFIM Project – Ventura County, California

ENTRIX, Inc. conducted this instream flow study to determine the impacts of releases from Matilija Dam on Steelhead rearing and spawning habitat from the dam to the Robles Diversion on the Ventura River. The

results of this study will assist in the identification of factors potentially limiting fish populations in the effected reach and to determine appropriate release flows and ramping rates. Mr. Howard conducted the field investigation, data collection, and modeling setup.

PacifiCorp FERC IFIM Project – Jackson County, Oregon

ENTRIX, Inc. conducted this instream flow study to determine the impacts of dams and diversions on fisheries habitat in the upper Rogue River watershed. Mr. Howard assisted in the field investigation and data collection.

Water Quality Studies

Santa Clara River Estuary Metals Translator Study – Ventura County, California

ENTRIX, Inc. conducted a yearlong investigation focused on determining the metals translators for copper, nickel, zinc, and lead in the Santa Clara River Estuary. There are chemical differences between the Ventura Water Reclamation Facilities (VWRF) discharged effluent and the receiving Santa Clara River water. The Metals Translator Study determined what fraction of metals in the VWRF effluent were dissolved in the receiving water, and therefore bioavailable. Mr. Howard was the lead investigator on the Santa Clara River Estuary Metals Translator Study for the City of San Buenaventura.

Big Creek FERC Relicensing Water Quality Project – Sierra national Forest, California

ENTRIX, Inc. conducted a water quality study related to the hydroelectric relicensing of Southern California Edison's Big Creek system in the San Joaquin River watershed. Study sites were selected by ENTRIX and a combined agency working group targeting large reservoirs, small impoundments, and streams below project facilities. Mr. Howard was in charge of multiple sampling teams working throughout the San Joaquin watershed.

Environmental Monitoring

360 Networks Fiber Optics Project – Modoc, Lassen, Tehama, Glenn, Butte, Yuba, and Sutter Counties, California

ENTRIX, Inc. monitored fiber optic installation that occurred within a variety of sensitive habitats including rivers, wetlands, vernal pools, caves, and cultural resource areas. Many species listed under the California and Federal endangered species acts were of special concern on this project. Mr. Howard was the lead environmental monitor on this fiber optics project for the California Public Utilities Commission. No significant environmental impacts, under the adopted environmental mitigation measures, occurred on this project.

Southern Trails Gas Pipeline Project – Riverside County, California

ENTRIX, Inc. monitored fiber optic installation that occurred within a variety of sensitive dessert habitats including rivers, washes, reptile and bird habitats, and cultural resource areas in the Mojave Dessert near Palm Springs, California. Mr. Howard was the Lead Field Coordinator for the California State Lands Commission on this project. The pipeline right-of-way was 8 miles long which crossed numerous washes including the San Gorgonio River. No significant environmental impacts, under the adopted environmental mitigation measures, occurred on this project.

Ventura County Water Protection District Sediment Removal- Ventura County, California

ENTRIX, Inc. monitored a sediment removal and channel maintenance project on Pole Creek in Fillmore, California. Mr. Howard served as fisheries professional and Environmental Monitor to the Ventura County Flood Control District on this project. This creek is a tributary to the Santa Clara River which supports a small population of endangered southern California steelhead trout. Mr. Howard assessed steelhead habitat quality and steelhead migration barriers. Additionally, Mr. Howard monitored construction to eliminate the possibility of project related steelhead impacts.

Ventura County Water Protection District Emergency Instream Restoration Projects- Ventura County, California

ENTRIX, Inc. assisted the County of Ventura during and following the floods events that caused extensive damage to private property, flood control and fish passage facilities, and the agricultural communities throughout Ventura County in 2004 and 2005. Mr. Howard managed 15 projects for the county following the flood events. Mr Howard, along with other ENTRIX biologists permitted to work with local endangered fish species including steelhead and tidewater gobies captured and relocated fish species prior to instream construction activities. Construction monitoring was also conducted to ensure emergency permit compliance and to minimise potential take of endangered species and their habitat.

El Paso Natural Gas Conversion Project- San Berbardino County, California

ENTRIX, Inc. monitored pipeline installation that occurred within a variety of sensitive desert habitats including rivers, washes, reptile and bird habitats, and cultural resource areas near Blythe, California. Mr. Howard was the Lead Field Coordinator for the California State Lands Commission and the BLM on this project. The pipeline right-of-way was 80 miles long. This project had multiple compliance challenges that were identified and managed onsite with oversite by the Lead Field Coordinator and Project Manager. No significant environmental impacts, under the adopted environmental mitigation measures, occurred on this project.

ECOLOGICAL SCIENCES, Inc.

CURRICULUM VITAE

Scott Cameron, Principal Biologist

Overview of Professional Experience

Mr. Cameron is the Principal Biologist of Ecological Sciences, Inc. Mr. Cameron has extensive experience in sensitive biological resources inventories, endangered species surveys, general wildlife biology, environmental mitigation monitoring, and wildlife and botanical habitat evaluations in the California counties of Riverside, San Bernardino, Los Angeles, Kern, San Diego, Orange, Fresno, Kings, Tulare, Santa Barbara, Alameda, Ventura, Santa Barbara, Monterey, Imperial, Del Norte, Sacramento, and San Joaquin. Mr. Cameron has extensive survey experience in Wyoming and Nevada as well. He provides project management and direction, preparation of environmental documents under the Endangered Species Act (ESA) and California Environmental Quality Act (CEQA), endangered species expertise, biological resources consultation, biological construction monitoring and sensitive biological resources educational training for a wide range of projects. He develops and implements mitigation and monitoring plans, permitting strategies, manages construction monitoring, and provides endangered species permitting assistance. Mr. Cameron also conducts wetland delineations and permitting per U.S. Army Corps of Engineers (USACOE) and California Department of Fish and Game (CDFG) requirements.

Documentation experience includes preparation of numerous environmental and biological assessments, biology sections of Environmental Impact Reports (EIRs), and mitigation/monitoring plans. Mr. Cameron also has extensive experience in CEQA compliance, preparation of Habitat Conservation Plans, federal Section 7 consultations, and Riverside County Multiple Species Habitat Conservation Plan (MSHCP) documents. Mr. Cameron has handled thousands of small mammals (55,000+ cumulative trapnights and over 5,000+ individual captures) in California and Wyoming, and has been included in multiple Memoranda of Understanding (MOUs) throughout California and Nevada. He has designed numerous study plans to evaluate the presence/absence of special-status invertebrates, birds, reptiles, amphibians, and small mammals. He has also handled and/or surveyed for sensitive, threatened, and endangered birds, reptiles, and mammals under federal and state permits.

Mr. Cameron currently holds five federal Section 10(a) permits to conduct focused surveys for Pacific pocket mouse, coastal California gnatcatcher, arroyo toad, California red-legged frog and Delhi sands flower-loving fly (1996-2008). Mr. Cameron is also certified to conduct surveys for the flat-tailed horned lizard by the Arizona Department of Fish and Game and approved by USFWS to conduct desert tortoise surveys. Mr. Cameron also holds a State of California Scientific Collectors Permit (SC-6864).

Selected Herpetological Experience (1994-2005)

Principal Investigator for conducting focused surveys for, and translocation of, ±1,000 arroyo toads (*Bufo microscaphus californicus*) for a river diversion (Santa Margarita River) project on USMC Camp Pendleton. Established numerous pitfall trap lines and drift fencing within extensive areas of arroyo toad habitat over a several month period.

Principal Permitted Investigator for conducting numerous focused arroyo toad surveys along portions of the Santa Clara River in 2001-2005 for Newhall Land.

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email: scameron@ecosciencesinc.com

Principal Investigator for management and implementation of The Southern California Gas Company's Programmatic Permit/Biological Opinion, Northern Service Territory. Responsible for environmental compliance throughout the permit area, which includes Fresno, Kings, Kern, and Tulare counties. Performed focused surveys for arroyo toad and California red-legged frog (*Rana aurora draytonii*) in portions of the Cherry Creek watershed, Ventura County.

Project Ecologist for numerous surveys for arroyo toad in Orange and San Diego counties, primarily along San Mateo Creek. Surveys were conducted per USFWS protocol and involved identifying toads by vocalization and direct observation (including juveniles and tadpoles). Additionally, all arroyo toad locations were mapped for future population estimates and distributional information. Observed hundreds of arroyo toads during the course of these surveys including adults, juveniles, and tadpoles.

Project Ecologist for conducting numerous focused and/or habitat evaluations surveys over a two-year period along the proposed Foothill Transportation Corridor (FTC) located in Orange and San Diego counties, California. Focused surveys included those for arroyo toad, spadefoot toad, silvery legless lizard, coastal rosy boa, orange-throated whiptail, San Bernardino ring-necked snake, coast patch-nosed snake, southwestern pond turtle, San Diego horned lizard, and red diamond rattlesnake. Recorded and observed numerous arroyo toads during the survey efforts.

Principal Investigator for conducting focused sensitive amphibian surveys including California red-legged frog for Ventura County Flood Control.

Senior Biologist for herpetological surveys associated with several Newhall Ranch projects located in the Santa Clara River and San Francisquito Creek area. Conducted focused nighttime surveys for arroyo toad, southwestern pond turtle, and two-striped garter snake. Documented presence of arroyo toad.

Principal Investigator for evaluating habitats potentially suitable to support sensitive amphibians, reptiles, and mammals at the Playa Vista project site. Conducted mammal inventory on the project site located in the Playa del Rey area, Los Angeles County, California. Tasks included designing formal study plan for surveys for western spadefoot toad, southwestern pond turtle, coastal western whiptail (*Cnemidophorus tigris multiscutatus*), silvery legless lizard, coast patch-nosed snake, and two-striped garter snake.

Project Ecologist for a California Department of Corrections electrified fence EIR project. Duties included evaluating correctional facilities throughout California that involved evaluating wildlife mortality along perimeter fences. Observed hundreds of northern red-legged frogs (*Rana aurora aurora*) and tadpoles during the surveys conducted in northern California. Developed various methods to prevent or reduce "take" of special-status wildlife species.

Staff Biologist for baseline biological inventories for wildlife and botanical resources, including sensitive wildlife species surveys for the proposed Elsmere Solid Waste Facility landfill site in Los Angeles County. Fieldwork involved surveys for foothill yellow-legged frog (*Rana boylii*) and California red-legged frog.

Principal Investigator for the performance of habitat-based investigations performed to evaluate aquatic habitats potentially suitable to support California red-legged frog in portions of the Arroyo Conejo, Conejo, and Calleguas Creek drainage system for the Camrosa Water District (CWD).

Senior Biologist for the performance of surveys for potentially occurring sensitive amphibian species such as the California red-legged frog on portions of Tejon Ranch, California.

Senior Biologist for focused surveys in Calleguas Creek for special-status amphibians and reptiles including: California red-legged frog, southwestern pond turtle (*Clemmys marmorata pallida*), two-striped garter snake (*Thamnophis hammondii*), and south coast garter snake (*Thamnophis sirtalis* sp.). Habitat characterization included an evaluation of riparian vegetation, flow regimes, and salinity measurements.

Principal Investigator for evaluating suitable habitat to support the mountain yellow-legged frog, San Bernardino mountain kingsnake, southern rubber boa, two-striped garter snake, and southwestern pond turtle in the Big Bear area of the San Bernardino Mountains.

Senior Biologist for Greystone Homes' Dos Vientos project located in Newberry Park, Ventura County. Conducted focused surveys for California red-legged frog, southwestern pond turtle, and two-striped garter snake. Captured and translocated individual pond turtles and garter snakes away from areas proposed for impacts.

Senior Biologist for conducted surveys for the western spadefoot toad on the Parker Ranch site located in Simi Valley, California. Identified tadpoles, juveniles, and adult toads.

Research Biologist for the capture, electronic passive infrared transmitter tagging (P.I.T.T.), and release of blunt-nosed leopard lizard (*Gambelia silus*) on the Elkhorn and Carrizo Plains. Worked with San Joaquin Endangered Species Recovery Program Team, and the CSU Stanislaus Foundation. The dispersal and reproductive data gathered was used to develop future species recovery plans for sensitive reptiles.

Project Biologist for a sensitive biological resources study on 6,250 acres of land between the Algodones Dunes and the Chocolate Mountains. Directed six biologists conducting surveys for desert tortoise (*Gopherus agassizii*), flat-tailed horned lizard (*Phrynosoma mccallii*), and Colorado Desert fringe-toed lizard (*Uma notata*). Acquired certification from the Arizona Department of Game and Fish to survey for the flat-tailed horned lizard.

Principal Investigator for conducting surveys for the flat-tailed horned lizard in the LaQuinta area of southern California.

Staff Biologist for preconstruction surveys to evaluate areas that support desert tortoise in Nevada and California along the 900 mile-long Kern River natural gas pipeline ROW. Evaluations based upon presence/ abundance of burrows, scat, tracks, drinking depressions, and carapace remains, as well as the use of fiber-optic scopes to visually inspect deep burrows for tortoise occupation. Monitored all phases of construction throughout known tortoise habitat. Documented all tortoise encounters, removed tortoises from the construction site, and performed handling procedures following USFWS protocol, which included marking scutes, painting and numbering, photographing, and monitoring overnight before release. Included on the MOU for the Kern River Pipeline project and was certified to handle and inventory desert tortoises by USFWS.

Selected Small Mammal Experience (1994-2005)

Senior Biologist/Principal Investigator for the performance of general small mammal live-trapping survey efforts on portions of Tejon Ranch, Los Angeles County, California.

Principal Investigator/**Senior Biologist** for conducting focused small mammal trapping surveys for sensitive biological resources including the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), near the City of Chatsworth, Los Angeles County. Project is located in a Significant Ecological Area (SEA), and as such involved preparation of a Biota Report and subsequent planning meetings with the SEA Technical Advisory Committee (SEATAC).

Staff Biologist for trapping project for the Trust for Public Lands in Los Angeles County. Species captured, weighed, measured, and released include California mouse, brush mouse, Pinion mouse (*Peromyscus truei*), deer mouse, Pacific kangaroo rat, California pocket mouse, dusky-footed woodrat, desert woodrat, and California meadow vole.

Principal Investigator for evaluating habitats potentially suitable to support Pacific pocket mouse (*Perognathus longimembris pacificus*) at the Playa Vista project site in Los Angeles County. Conducted

mammal inventory on the project site located in the Playa del Rey area, Los Angeles County, California (a type locality for the Pacific pocket mouse). Tasks included designing and submitting a formal study plan to USFWS and conducting a focused field survey effort for the Pacific pocket mouse and other sensitive small mammal species. Principal investigator for the 3,000+ trapnight effort utilizing both Sherman live-traps and pitfall trapping arrays. Performed these surveys under the authority of federal permit (PRT-808242).

Project Ecologist/Trap Manager for 45,000+ trapnight program to evaluate the presence/absence of the Pacific little pocket mouse (*Perognathus longimembris pacificus*). Trap manager for 9,900 trapnights, and supervised trap assistants involved in the project. Species captured, identified, measured, weighed, and released include the endangered Pacific pocket mouse, California pocket mouse (*Chaetodipus californicus*), San Diego desert woodrat (*Neotoma lepida intermedius*), dusky-footed woodrat (*Neotoma fuscipes*), deer mouse (*Peromyscus maniculatus*), California mouse (*Peromyscus californicus*), brush mouse (*Peromyscus boylii*), cactus mouse (*Peromyscus eremicus*), pocket gopher (*Thomomys bottae*), California vole (*Microtus californicus*), harvest mouse (*Reithrodontomys megalotis*), pacific kangaroo rat (*Dipodomys agilis*), house mouse (*Mus musculus*), and Virginia opossum (*Didelphis virginiana*).

Principal Investigator for Section 7 consultation regarding the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) for a project located in Redlands, California.

Principle Investigator/Project Biologist for a small mammal inventory program conducted in the northeastern portion of Wyoming. Permitted as Principal Investigator to conduct the trapping program by Wyoming Department of Game and Fish (WDGF). The trapping program was a component of a Gap Analysis project that was a cooperative effort between WDFG, Bureau of Land Management (BLM), The Nature Conservancy (TNC), and the University of Wyoming (UW). Specific job related duties included conducting over 8,500+ trapnights, ground-truthing GIS vegetation polygons for accuracy, evaluating habitat quality, and identifying dominant and subdominant plant communities occurring in a tri-county area. All small mammals captured were measured and identified to species. Species captured and identified include olive-backed pocket mouse (*Perognathus fasciatus*), plains pocket mouse (*Perognathus flavescens flavescens*), deer mouse, western harvest mouse, least chipmunk (*Tamias minimus*), Southern red-backed vole (*Clethrionomys gapperi*), prairie vole (*Microtus ochrogaster*), montane vole (*Microtus montanus*), masked shrew (*Sorex cinereus cinereus*), Merriam's shrew (*Sorex merriami*), Northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), and white-footed mouse (*Peromyscus leucopus aridulus*). Additional work involved hantavirus research, collection for museum specimens, and raptor rehabilitation. Responsible for supervising trapping assistants and producing final report for journal publication.

Senior Biologist for numerous biological studies in the Newhall area of Los Angeles County, California. Tasks included designing and implementing small mammal live-trapping programs and evaluating small mammal habitat usage of selected study areas. Study evaluated small mammal home range size and movement patterns to determine appropriate buffer widths for development projects located adjacent to sensitive resources.

Principal Investigator for a small mammal live-trapping program to evaluate the presence/absence of the federal-listed endangered Pacific pocket mouse in the Del Mar area, San Diego County, California. Performed these surveys under the authority of federal permit (PRT-808242).

Principal Investigator for a small mammal live-trapping program to evaluate the presence/absence of the federal-listed endangered Pacific pocket mouse in the Silver Strand area, San Diego County, California. Performed these surveys under the authority of federal permit (PRT-808242).

Principal Investigator for a small mammal live-trapping program to evaluate the presence/absence of the federal-listed endangered Pacific pocket mouse in Crystal Cove State Park, Orange County, California. Performed these surveys under the authority of federal permit (PRT-808242).

Senior Biologist/Trap Manager for evaluating habitats potentially suitable to support Pacific pocket mouse on USMC Camp Pendleton (Base). Directed trap assistants, established trapping transects, and handled endangered Pacific pocket mice during the course of a large trapping study conducted throughout the Base located in San Diego County, California.

Staff Biologist for baseline biological inventories for wildlife and botanical resources, including sensitive wildlife species surveys for a proposed Los Angeles County landfill site. Fieldwork involved small mammal trapping for Los Angeles little pocket mouse (*Perognathus longimembris brevinasus*), and sensitive bat surveys using mist nets, night-vision scopes, and hand-held bat echolocation detectors.

Staff Biologist for baseline inventory of flora and fauna for multiple Caltrans highway projects in the Fresno and Coalinga areas. Surveys included small mammal trapping [included in MOU for short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*)], scent station monitoring for San Joaquin kit fox (*Vulpes macrotus mutica*), spotlighting, and focused reptile and avian surveys.

Senior Biologist for conducting biological assessment on over 700 acres located in Ventura County, California. Conducted general wildlife surveys, special-status species surveys, vegetation mapping, and conducting a focused small mammal sampling program effort.

Senior Biologist for performing a biological assessment of an approximately 100-acre site located in the Mountaingate area of Los Angeles County. Conducted a small mammal live-trapping program, performed general avian and reptile surveys of the project site, developed a plant compendium of the site, mapped vegetation communities, and established scent stations.

Project Ecologist for California Department of Corrections (CDC) involving mitigation monitoring of a Pacific Gas and Electric (PG&E) along a pipeline corridor. Included on MOU to trap and translocate short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*) in Kern and Fresno counties.

Research Biologist for the capture, electronic passive infrared transmitter tagging (P.I.T.T.), and release giant kangaroo rats (*Dipodomys ingens*) on the Elkhorn and Carrizo Plains. Worked with San Joaquin Endangered Species Recovery Program Team, and the CSU Stanislaus Foundation. The dispersal and reproductive data gathered was used to develop future species recovery plans for sensitive small mammals and reptiles.

Project Ecologist for barn owl (*Tyto alba*) pellet analysis to provide information on the presence and relative distribution of the Pacific pocket mouse. Individually examined and identified over 500 small mammal skulls and bone fragments of various species occurring in Orange and San Diego counties that included Botta's pocket gopher, San Diego desert woodrat, dusky-footed woodrat, white-footed mouse (*Peromyscus* sp.), harvest mouse, California meadow vole, pocket mice (*Chaetodipus* sp.), Pacific kangaroo rat, desert shrew (*Notiosorex crawfordi*), ornate shrew (*Sorex ornatus*), Audubon's cottontail (*Sylvilagus audubonii*), old world rat (*Rattus* sp.), house mouse, and mole (*Scapanus* sp.).

Staff Biologist for over 35 proposed small energy development projects, including linear facilities, such as pipelines and transmission lines, for the Westside Development Program and Kern River Oilfield Development Program, Kern and Monterey Counties. As staff biologist, was responsible for inventory of rare, threatened, and endangered plant and animal species using various field and literature search techniques, including transect surveys, small mammal trapping surveys under MOU with CDFG, and scent station and burrow monitoring, and evaluations based on animal sign, such as scat, tracks, claw marks, diggings, prey remains, dust baths, hay stacking, and nesting. Evaluated presence of sensitive habitat. Also responsible for training and management of field biologists and coordination of field activities.

Biological Technician for black-footed ferret (*Mustela nigripes*) trapping project in Medicine Bow, Wyoming for the Wyoming Department of Game and Fish. Conducted spot-light surveys for captive-bred introduced ferrets, and assisted biologists set live-traps, bar-code scan, and release captured ferrets.

Selected Avian Experience (1994-2005)

Project Ecologist/Principal Investigator for over 200 field days of California gnatcatcher surveys conducted in San Diego, Orange, San Bernardino, Riverside, Ventura, and Los Angeles counties for various clients throughout southern California. Observed hundreds of gnatcatchers during the course of these surveys over the past 10 years. Mapped nesting territories and documented numerous fledglings.
Principal Investigator for over 30 western burrowing owl surveys conducted in San Bernardino, Riverside, Imperial, Kern, Sacramento, Ventura, and Los Angeles counties for various clients throughout southern California. Observed hundreds of owls during the course of these surveys. Mapped nesting territories and documented/photographed numerous fledglings. Employed passive relocation techniques.

Project Ecologist for conducting numerous focused and/or habitat evaluations surveys over a two-year period along the proposed Foothill Transportation Corridor (FTC) located in Orange and San Diego counties. Focused surveys included, but were not limited to: coastal California gnatcatcher, grasshopper sparrow, tricolored blackbird, Bell's sage sparrow, California horned lark, coastal cactus wren, loggerhead shrike, northern harrier, western burrowing owl, and southern California rufous-crowned sparrow.

Project Ecologist/Principal Investigator for numerous nesting bird surveys conducted in San Bernardino, Imperial, Ventura, Orange, San Diego, Los Angeles, and Riverside counties. Mapped nesting territories and documented numerous fledglings.

Senior Biologist/Principal Investigator for several least Bell's vireo surveys conducted in San Bernardino, Riverside, Ventura, and Los Angeles counties.

Selected Delhi Sands Flower-loving Fly Experience (1996-2005)

Senior Biologist/Principal Investigator for 70+ focused USFWS protocol survey efforts to determine the presence/absence of the endangered Delhi Sands flower-loving fly (DSF) for numerous public and private sector clients located in Riverside and San Bernardino counties. Conducted focused surveys following USFWS protocol under the authority of federal Section 10(a) permit TE-808242-4 issued to Scott Cameron. Measured and recorded characteristics of occupied Delhi Sands flower-loving fly habitat at sites known to support this species in all Recovery Units in the region. Observed and documented numerous DSF during the course of these surveys.

Senior Biologist/Principal Investigator for conducting 50+ habitat-based surveys for Delhi sands flower-loving fly located in San Bernardino and Riverside counties. Survey efforts included habitat evaluations based on existing site conditions. Existing documentation pertinent to the distribution and habitat requirements of the DSF in the vicinity of each project area was reviewed and analyzed. Field visits to each site were conducted to note the habitat characteristics of each site. Comparative analysis of currently occupied DSF habitat was also completed for each habitat-based evaluation. Habitat characteristics were documented (e.g., soils, plant species, percentage ground cover, percentage vegetative cover, etc.), and photographs of each site were taken in an attempt to discern any differences in biological characteristics, which may relate to habitat suitability for the endangered fly species.

Principal Investigator for the preparation of a Habitat Conservation Plan (HCP) in support of a Section 10(a) permit application. Plan involves the federally endangered Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) located in the City of Ontario.

Professional History

Ecological Sciences, Inc. – Principal Biologist
EcoSciences – Principal Biologist
Impact Sciences, Inc. - Senior Biologist
Michael Brandman Associates - Project Ecologist/Manager
The Nature Conservancy - Project Biologist/Principle Investigator
Wyoming Department of Game and Fish - Biological Technician

Professional History-*continued*

Dames and Moore - Staff Biologist
San Joaquin Endangered Species Recovery Program/CSU Stanislaus Foundation-Research Assistant
County of Santa Barbara, Department of Environmental Review – Intern

Education/Permits/Certifications

- B.A., Environmental Studies (Natural Resource Management Emphasis; graduate-level courses in Ecology), University of California, Santa Barbara
- Certification, ***Flat-tailed Horned Lizard*** Survey Techniques, Arizona Department of Game and Fish
- Certification, ***Desert Tortoise*** Handling, burrow construction, and egg handling Techniques, U.S. Fish and Wildlife Service
- Certification, Marine Sciences Program, Santa Barbara City College
- Certification, Rescue Diver, PADI
- CDFG agreement to trap and release ***small mammal California Species of Special Concern***
- CDFG Scientific Collecting Permit, 2003-2005
- Federal Section 10(a) Permit to capture and release an endangered small mammal species, ***Pacific pocket mouse***, 1996-2008 (TE-808242-4).
- Federal Section 10(a) Permit for performance of ***Delhi sands flower-loving fly*** surveys (TE-808242-4), 1997-2008
- Federal Section 10(a) Permit to capture and release threatened and endangered amphibian species, ***arroyo toad***, 1996-2008 (TE-808242-4)
- Federal Section 10(a) Permit to capture and release threatened and endangered amphibian species, ***California red-legged frog***, 1996-2008 (TE-808242-4)
- Federal Section 10(a) Permit for performance of ***coastal California Gnatcatcher*** surveys, 1994-2008 (TE-808242-4)

Professional Affiliations

The Wildlife Society
American Society of Mammalogists
Society for the Study of Reptiles and Amphibians
California Native Plant Society

Publications/Submittals

Cameron, S. D. and C. S. Garber. *Inventory and Monitoring of Small Mammal Distribution in the Bureau of Land Management's Casper District, Buffalo Resource Area.* The Nature Conservancy, Wyoming Natural Diversity Database. Cooperative Agreement Number K910-A4-0011, Task Order TO-002.

Cameron, S. D. and R. W. Hanson. 1994. *Range Extension of the Western Patchnose Snake* (*Salvadora hexalepis mojavensis*). Herpetological Review, 25 (1): 34-35.