

**Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program**

Stream Survey Report 2008



15 April 2009

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NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service. Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

We would like to acknowledge the land managers in the MSHCP Plan Area, who in the interest of conservation and stewardship facilitate Monitoring Program activities on the lands for which they are responsible. A list of the lands where this year's data collection activities were conducted is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies.

Partnering organizations and individuals contributing data to our projects are acknowledged in the text of appropriate reports. We would especially like to acknowledge the Santa Ana Watershed Association, the Center for Natural Lands Management, and the Orange County Water District for their willingness to initiate or modify their data collection to complement our survey efforts in 2008.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader who would like to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data. All Monitoring Program data, including original datasheets and digital datasets are stored in the Monitoring Program office in downtown Riverside, CA.

The primary authors of this report were the 2008 Herpetology Program Lead, Robert Packard and Staff Biologist, Sinlan Poo. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the RCA. For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

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INTRODUCTION

Four covered amphibian species inhabit stream environments in southern California: arroyo toad (*Bufo californicus*; “BUCA”), coast range newt (*Taricha torosa torosa*; “TATO”), California red-legged frog (*Rana aurora draytonii*; “RAAU”), and mountain yellow-legged frog (*Rana muscosa*; “RAMU”). For each of these species the MSHCP has specific objectives that require either the monitoring of known breeding populations within the Conservation Area once a year for the first 5 years of the permit, or across any consecutive 5 year period (BUCA). The Monitoring Program has been collaborating with the Western Ecological Research Center, U.S. Geological Survey (USGS) and U.S. Forest Service (USFS) on amphibian stream surveys in the Conservation Area since 2004 to reduce overlapping survey efforts and to ensure consistent data collection methods.

The purpose of the stream surveys since 2004 has been to assess the suitability of stream habitats and document breeding locations for BUCA, RAAU, TATO, and RAMU within a species-specific Core Area and/or one of its tributaries. Target species for stream surveys in 2008 were BUCA and RAMU. Surveys for RAAU were conducted using a night survey protocol described in the Biological Monitoring Program’s *California Red-legged Frog Survey Report 2008*. Stream surveys were not conducted in areas likely to support TATO populations as personnel availability was limited and this was a target species surveyed in recent years (see *Stream Survey Reports* from 2006 and 2007 and *Coast Range Newt Survey Report* from 2005). The species objectives, suitable habitat, and MSHCP-identified Core Areas for each target species are described under each species’ section below. The following were the overall survey goals for stream surveys in 2008:

Survey Goals:

- A) Document presence of BUCA and RAMU within as many species-specific Core Areas and potential habitats as possible (Table 1).
- B) Assess stream habitat (e.g., water quality, upland and riparian vegetation, etc.) in the Conservation Area.
- C) Train new personnel in stream survey procedures and refine the stream survey protocol to optimize methods for future surveys.
- D) Provide data to land managers for use in management decisions.

Arroyo Toad (*Bufo californicus*)

California arroyo toad has narrow habitat requirements and is typically restricted to the middle reaches of third order streams (Dudek & Associates 2003). California arroyo toad is additionally constrained by not inhabiting areas with a landscape slope of greater than 3% (Miller and Miller 1936; Sweet 1992). Records of BUCA within the MSHCP Plan Area date from the mid 1930s to the present. Currently, the known

distribution of BUCA in western Riverside County includes: Temecula Creek, Arroyo Seco Creek, Tenaja Creek, Los Alamos Creek, the San Jacinto River, Bautista Creek, and Wilson Creek. Many historic records of BUCA are taken from incidental sightings during surveys for other amphibian species and do not necessarily reflect habitats most suitable for BUCA (Stebbins 1951; Sweet 1989; Sweet 1992).

The BUCA species objectives require the maintenance of breeding populations at 80% of the conserved breeding locations across any 5 consecutive years, and conservation of the following 9 Core Areas in the MSHCP Conservation Area: 1) San Juan Creek, 2) Los Alamos Creek, 3) San Jacinto River, 4) Indian Creek, 5) Bautista Creek, 6) Wilson Creek, 7) Temecula Creek, 8) Arroyo Seco Creek, and 9) Vail Lake (Dudek and Associates 2003).

Mountain Yellow-legged Frog (*Rana muscosa*)

Mountain yellow-legged frog has specific habitat requirements that include perennial streams, creeks, and isolated pools found above 370 m in the San Jacinto Mountains. Historically, mountain yellow-legged frogs were observed in Strawberry Creek, Indian Creek, Black Mountain Creek, and lower sections of the North Fork of the San Jacinto River. Specific Core Areas for RAMU include the North Fork of the San Jacinto River (including Dark Canyon), Hall Canyon, and Fuller Mill Creek. The species objective requires documenting successful reproduction once a year for the first 5 years after MSHCP permit issuance (Dudek and Associates 2003).

METHODS

Protocol Development

We used an existing protocol, *USGS Aquatic Species and Habitat Assessment Protocol for Southcoast Ecoregion Rivers, Streams, and Creeks*, written and distributed by USGS (USGS 2005). The protocol describes a visual encounter and dipnet survey method for detecting all life stages of amphibians and includes an assessment of habitat characteristics.

Personnel and Training

On 29 March 2006, 2 members of the 2008 amphibian field crew attended a USGS training session on the use of the USGS stream survey protocol and on identifying anuran (frog and toad) and fish species in our region. In 2008, prior to conducting any formal surveys, all field crew were trained (new crew) or retrained (experienced crew) in the field by the Herpetology Program Lead to familiarize surveyors with field methods and Personal Digital Assistant (PDA) data collection techniques. Species identification training included slides addressing key distinguishing characteristics between species, in addition to observing live and preserved specimens. The following biologists conducted stream surveys in 2008:

- Robert Packard, Herpetology Program Lead (Regional Conservation Authority)
- Natalie Marioni, former Herpetology Program Lead (Regional Conservation Authority)
- Sinlan Poo (Regional Conservation Authority)
- Esperanza Sandoval (Regional Conservation Authority)
- Rika Setsuda (California Department of Fish and Game)
- Michael Zerwekh (Regional Conservation Authority)

Study Site Selection

The protocol requires that we segment all streams in the survey area into 250-m reaches and number them uniquely from downstream to upstream order. In 2008, we surveyed for BUCA and RAMU in stream segments along accessible stretches of the San Jacinto River ($n = 6$) and one of its tributaries, Strawberry Creek ($n = 11$), in the San Bernardino National Forest. A lack of available personnel during species-appropriate survey periods did not allow us to survey other Core Areas. We gave survey priority to areas most likely to yield BUCA and/or RAMU observations. We also surveyed these streams and stream segments to contribute to our ongoing effort to accomplish a complete stream and upland habitat assessment of all the streams in the Conservation Area. We did not resurvey any stream reaches that were surveyed during the 2006 and 2007 seasons (Table 1).

Survey Methods

We conducted stream surveys between 9 July and 15 July 2008 at the San Jacinto River, and between 16 July and 24 July 2008 at Strawberry Creek. Detailed survey methodology is described in *USGS Aquatic Species and Habitat Assessment Protocol for Southcoast Ecoregion Rivers, Streams, and Creeks* (USGS 2005). All targeted waterways (main creeks and tributaries) were sectioned into 250-m segments using ArcMap 9.2 GIS software (ESRI 2006) with segment numbers (i.e., Reach 1, Reach 2, etc.) beginning at a downstream confluence with a larger order waterway. At least 2 surveyors conducted visual encounter and dipnet surveys along stream banks and within the channel from downstream to upstream areas. We conducted all surveys in daylight hours (0800 h – 1700 h). Survey time per segment varied from 24 to 93 min, with an average of 51 min, depending on streambed characteristics and abundance of amphibians detected.

We recorded all data onto PDA-based forms and uploaded them each day to the USGS Pendragon database housed at the San Diego Field Station via an internet server. We transferred all data from this server to the Biological Monitoring Program's database in 2009. We collected the following data at the beginning and end of each survey segment: date, observer, time, general weather description, temperature in shade at 1 m above ground, average wind speed, presence/absence of water, water temperature, pH, dissolved oxygen (concentration and percent), conductivity, wetted depth and width of stream channel, bank width, floodprone width, water velocity, number of wetted channel braids, and slope. We also took upstream photos at the start of each segment. At the end

Table 1. Core Area designation by species (denoted with ‘X’) and the year each area was surveyed.

Core Area	BUCA	RAMU	Surveyed years
Arroyo Seco Creek	X		2006/2007
Bautista Creek	X		2006
Dark Canyon		X	2007/2008 ^a
Fuller Mill Creek		X	2007/2008 ^a
Hall Canyon		X	2007
Indian Creek	X		-
Los Alamos Creek	X		2007
San Jacinto River	X	X	2008
San Juan Creek	X		2006/2007
Temecula Creek	X		2006
Vail Lake	X		-
Wilson Creek	X		-

^aSurveyed in 2008 by USGS Biologists only.

of each survey, we recorded presence and abundance of exotic plant species, percent wet length, percent of each pool type (shallow, medium, and deep), presence and number of plunge pools, presence and type of aquatic refugia, percent of 3 most common aquatic substrates, and presence, type, and level of recent disturbance. Furthermore, slope of each stream segment was calculated using elevation of the start and end points (Beyer 2004). For non-covered species, we recorded a species record at the first encounter of each life stage (i.e., tadpole, juvenile, adult) within a stream segment.

We recorded all data onto PDA-based forms and uploaded them each day to the USGS Pendragon database housed at the San Diego Field Station via an internet server. We transferred all data from this server to the Biological Monitoring Program’s database in 2009. We collected the following data at the beginning and end of each survey segment: date, observer, time, general weather description, temperature in shade at 1 m above ground, average wind speed, presence/absence of water, water temperature, pH, dissolved oxygen (concentration and percent), conductivity, wetted depth and width of stream channel, bank width, floodprone width, water velocity, number of wetted channel braids, and slope. We also took upstream photos at the start of each segment. At the end of each survey, we recorded presence and abundance of exotic plant species, percent wet length, percent of each pool type (shallow, medium, and deep), presence and number of plunge pools, presence and type of aquatic refugia, percent of 3 most common aquatic substrates, and presence, type, and level of recent disturbance. Furthermore, slope of each stream segment was calculated using elevation of the start and end points (Beyer 2004). For non-covered species, we recorded a species record at the first encounter of each life stage (i.e., tadpole, juvenile, adult) within a stream segment.

RESULTS

We surveyed approximately 4 km of stream segments in 1 main and 1 tributary branch of the San Jacinto River (Figure 1). No BUCA of any life stage were detected at any location in 2008. Two of the 8 Core Areas not surveyed in 2008, were also not surveyed in 2005-2007 due to lack of access.

Mountain yellow-legged frog was not detected in streams surveyed by Monitoring Program biologists this year. However, USGS surveys covered the high priority locations for RAMU. In 2008 USGS biologists found evidence of breeding RAMU in the main stem of Dark Canyon and 2 of its tributaries, and two tributaries of Fuller Mill Creek. In the main stem of Fuller Mill Creek only adult RAMU were detected. No RAMU were detected in the North Fork of the San Jacinto River.

The only native frog or toad species we observed in 2008 was the California treefrog (*Hyla cadaverina*). We did not observe any exotic frog or toad species during stream surveys in 2008.

We incidentally observed a total of 31 adult TATO and 2 TATO egg masses during surveys for RAAU in 2008 (see *California Red-legged Frog Survey Report 2008* for a description of this effort). During diurnal habitat assessments of Cole Creek on 25 March 2008, we detected 2 adult TATO and 2 TATO egg masses. Additionally, we detected TATO adults during night surveys in all 4 reaches surveyed in Cole Creek and both reaches surveyed in Tributary 5 of Cole Creek.

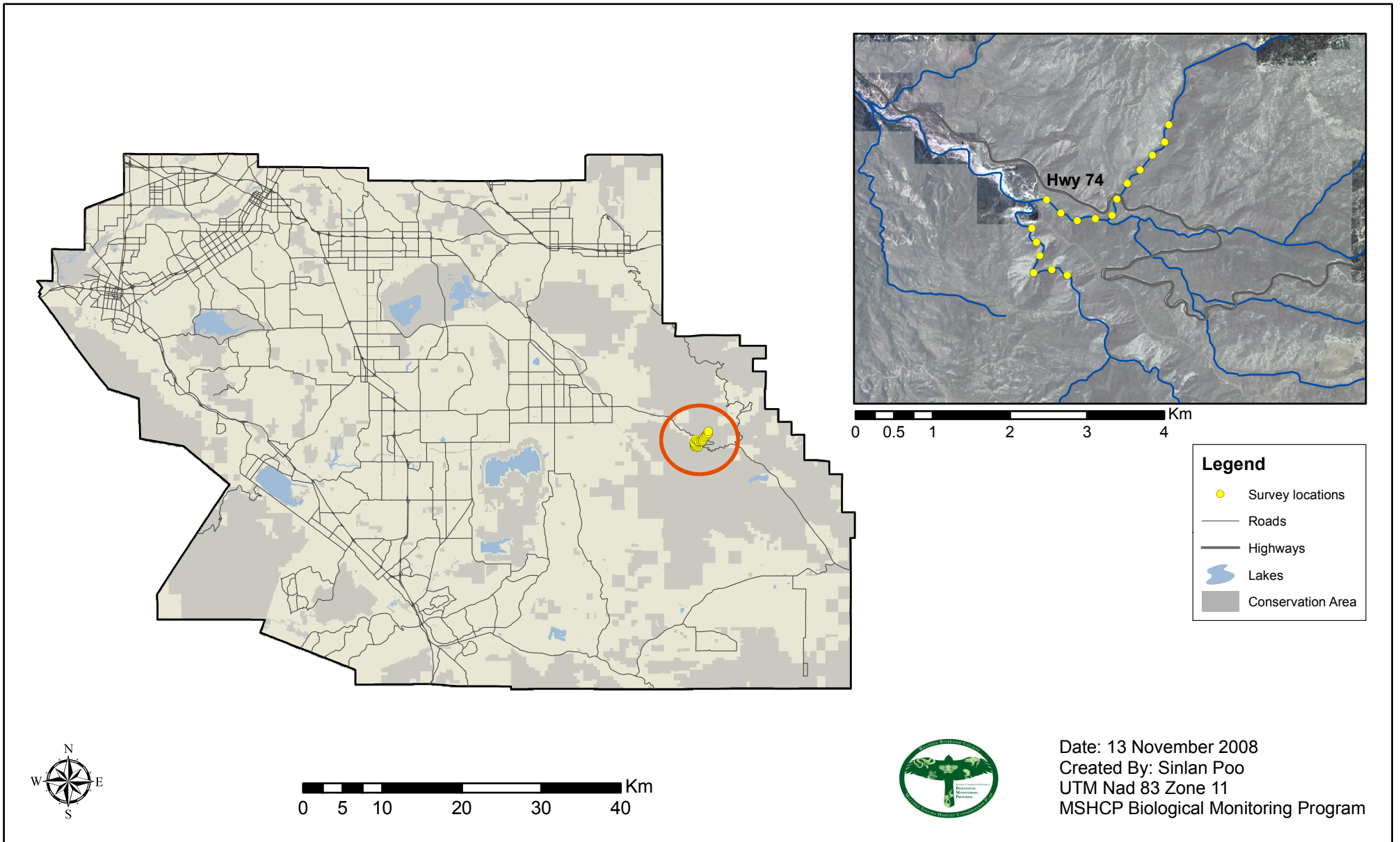
Habitat Conditions

The majority of stream segments surveyed in 2008 were surrounded by upland communities comprised primarily of mixed chaparral. Though no BUCA detections were made along any surveyed stream, suitable habitat (average $\leq 3\%$ slope, etc.) was found in all but 1 stream segment of the San Jacinto River. The most frequently dominant riparian community types were cottonwood, willow, and scrub at San Jacinto River and sycamore/alder at Strawberry Creek. Of 17 stream segments, all were at least 75% wetted, and only 1 segment had water depth greater than 1 m at the start of the reach (San Jacinto River, Reach 22). In addition, most stream reaches in the San Jacinto River had a water velocity between 0 and 2 m/s. However, water velocity at the start of reach 22 and reach 26 were 10 m/s and 5 m/s, respectively, which is generally accepted as too rapid for breeding BUCA (Sweet 1992). No exotic species were detected during stream surveys this year (Appendix A).

DISCUSSION

The focus of stream surveys in 2008 was to assess suitability of stream habitats and to document breeding locations for BUCA and RAMU within one species-specific Core Area and its tributary. We did not detect BUCA or RAMU during stream surveys or incidentally in 2008. For Strawberry Creek, the average slope within a stream segment

Figure 1. Start locations for stream reaches surveyed in 2008



was 7% (Appendix A), which is greater than the preferred habitat conditions for BUCA. In addition, portions of the creek were drying up when it was surveyed, which explain the absence of amphibian detections in general. RAMU are essentially confined to a few streams in the higher elevations of the San Bernardino National Forest, so the lack of detections in this area is not unexpected. In the South Fork of the San Jacinto River, although deep pools of water were present, the water velocity was over 5 m/sec in some of reaches, which may have made these areas unsuitable for the target species.

Recommendations for Future Surveys

The 2009 work plan will address Core Area species objectives for TATO, RAAU, and BUCA, and continue our collaboration with USGS to monitor the San Jacinto Mountains populations of RAMU in 2009. We will continue to characterize habitat along stream segments, including water depth, plant communities and abiotic conditions in the water. Identifying streams or stream segments that maintain an abundance of water (>1 m) will be informative in determining where surveys should be focused in future years and possibly in identifying stream segments with especially relevant species-specific habitat values. Breeding coast range newts, for example, have been observed to prefer pools, slow-moving runs, and riparian and upland habitat characterized as being grassland, woodland, or forest (Dudek & Associates 2003).

We will continue to survey as many streams within the Conservation Area as possible, given available field personnel and ongoing budget constraints. Once the survey is complete, we will create a habitat summary for each stream, and assess which segments to target for further surveys of focal amphibian species. These data will be most useful when there is a large enough sample size to statistically determine differences between locations where aquatic herpetofauna are found and where they are not found. At that time, monitoring of known TATO and other focal species populations should incorporate analyses of percent area occupied and population structure.

LITERATURE CITED

- Beyer JL. 2004. Hawth's Analysis Tools for ArcGIS [software]. Available at <http://www.spatioalecology.com/htools>.
- Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSCHSP, volumes I and II. Prepared for County of Riverside Transportation and lands Management Agency by Dudek & Associates, Inc. Approved June 17, 2003.
- [ESRI] Environmental Systems Research Institute ArcGIS: Release 9.2 [software]. 2006. Redlands (CA): Environmental Systems Research Institute.
- Miller L, Miller AH. 1936. The northern occurrence of *Bufo californicus* in California. *Copeia* 1936:176.
- Stebbins RC. 1951. Amphibians of western North America. Los Angeles (CA): University of California Press.
- Sweet SS. 1989. Observations on the biology and status of the arroyo toad, *Bufo microscaphus californicus*, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.
- Sweet SS. 1992. Ecology and status of the arroyo toad (*Bufo microscaphus californicus*) on the Los Padres National Forest of southern California, with management recommendations. Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California. 198 pp.
- [USGS] United States Geological Survey. 2005. Draft USGS Aquatic species and habitat assessment protocol for southcoast ecoregion rivers, streams, and creeks. Western Ecological Research Center. Sacramento, CA.

Appendix A. Habitat characteristics for stream survey locations in 2008. Most commonly represented upland and riparian community types and average habitat characteristics across all stream survey segments for a given stream.

Stream Name	n	Community		Slope ^a (%)	# Wet Segments	Water Depth (m)	% of Pools			Velocity (m/sec)
		Upland	Riparian				Shallow	Medium	Deep	
San Jacinto River (South Fork)	6	Mixed Chaparral	Cottonwood Willow Scrub	3	6	0.45	1-10	76-100	1-10	3.21
Strawberry Creek	11	Mixed Chaparral	Sycamore Alder	7	11	0.31	11-25	76-100	1-10	0.01 ^b

^aSlope was calculated using a digital elevation model, and the average was taken for all reaches surveyed in each stream.

^bAverage velocity lower than expected since streams were drying up when surveys were conducted.