



Santa Paula Creek Watershed Planning Project: Steelhead Habitat and Population Assessment

TECHNICAL MEMORANDUM

Prepared for
Santa Paula Creek Fish Ladder Joint Powers Authority
California Department of Fish and Game

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1 INTRODUCTION

Coastal populations of *Oncorhynchus mykiss* may be composed of both anadromous and freshwater resident life histories. Individuals expressing anadromous life histories are referred to as steelhead, while those that remain in freshwater for the duration of their life cycle are referred to as rainbow trout. In Santa Paula Creek, a tributary to the Santa Clara River, Ventura County, California, opportunities for expression of the anadromous life history are restricted by migration barriers preventing the upstream return of adult steelhead. A residual population of *O. mykiss* now persists in suitable stream habitat above the Harvey Diversion (Stoecker and Kelley 2005). Restoring the migratory component of *O. mykiss* within the watershed has been identified as a priority management goal. In support of feasibility studies concerning the restoration of migratory fish passage within Santa Paula Creek, the California Department of Fish and Game requested an assessment of the residual rainbow trout population be conducted to meet the following objectives:

1. Determine the spatial distribution of *O. mykiss* in Santa Paula Creek and key tributaries.
2. Determine key habitat characteristics of stream reaches occupied by *O. mykiss*.
3. Determine the relative abundance and age class structure of *O. mykiss*.

This report describes the methods and results of work completed to date, consisting of a reconnaissance-level field effort conducted in May 2007 and a more detailed population assessment of *O. mykiss* during November 2007. Results from these field efforts provide baseline information on *O. mykiss* distribution, habitat, and abundance in the Santa Paula Creek watershed under conditions which do not allow anadromy.

2 METHODS

Stream habitat and fish surveys were conducted in May and November 2007 within the Santa Paula Creek watershed. Stream habitat surveys were conducted to identify dry stream reaches, determine maximum daily stream temperatures throughout the watershed, and continuously monitor temperature throughout the summer months. Fish surveys were conducted to determine the distribution, relative abundance, and age class structure of *O. mykiss*. High stream temperatures have been identified as a factor that may limit availability of summer rearing for *O. mykiss* in the southern end of their range (Boughton *et al.* 2006), and was therefore chosen as a key characteristic of summer rearing habitat to monitor within the Santa Paula Creek watershed. Surveys were conducted in three portions of the Santa Paula Creek watershed (Map 1). Each portion was selected to include potential rearing habitat for anadromous *O. mykiss* above Harvey Diversion Dam (RM 3.9), and therefore did not extend past natural (*e.g.*, waterfall) migration barriers identified by previous surveys (Stoecker and Kelly 2005). Accessible portions of Santa Paula Creek extend from Harvey Diversion Dam (RM 3.9) to the natural waterfall barrier upstream (RM 9.8). Accessible portions of Sisar Creek extend from the confluence (RM 0.0) to barriers identified by Stoecker and Kelly (2005) in Sisar Creek (RM 5.9) and East Fork Sisar Creek (RM 0.5). The survey reaches are:

- **Little Santa Paula Creek:** from the confluence with Sisar Creek (RM 6.6) to the East Fork of Santa Paula Creek just upstream of the natural waterfall barrier (RM 9.8).
- **Sisar Creek:** beginning at the confluence with Santa Paula Creek (RM 0.0) upstream past the Forest Service Gate (RM 4.1).
- **Mainstem Santa Paula Creek:** downstream of the Sisar Creek confluence, near the downstream end of Steckel Park (RM 4.5) upstream to the confluence with Santa Paula Creek and Sisar Creek (RM 6.6).

2.1 Dry Reach and Stream Temperature Surveys

Dry stream reaches were identified in May and November by walking the stream channel and mapping the extents of completely dry stream channel on aerial photographs (scale of 1:1,274). The field maps were then digitized in a geographic information system (GIS) and the length of dry channel was measured from using 2005 color orthophotos and 1 meter LIDAR DEM.

Summer stream temperature monitoring consisted of detailed mapping of maximum daily stream temperatures at the beginning of the dry summer season and continuous temperature monitoring at selected sites throughout the watershed. On May 23, 2007, instantaneous measurements of maximum daily stream temperature were collected with a YSI 85 thermometer and mapped on aerial photographs at 1°C intervals. All instantaneous measurements were taken between 2:00pm–4:30pm, when stream temperatures were hottest and temperature fluctuation was lowest. Preliminary continuous temperature data from confirmed that maximum daily stream temperatures occurred during the afternoon hours between 2:00pm and 4:30pm (Figure 2-1).

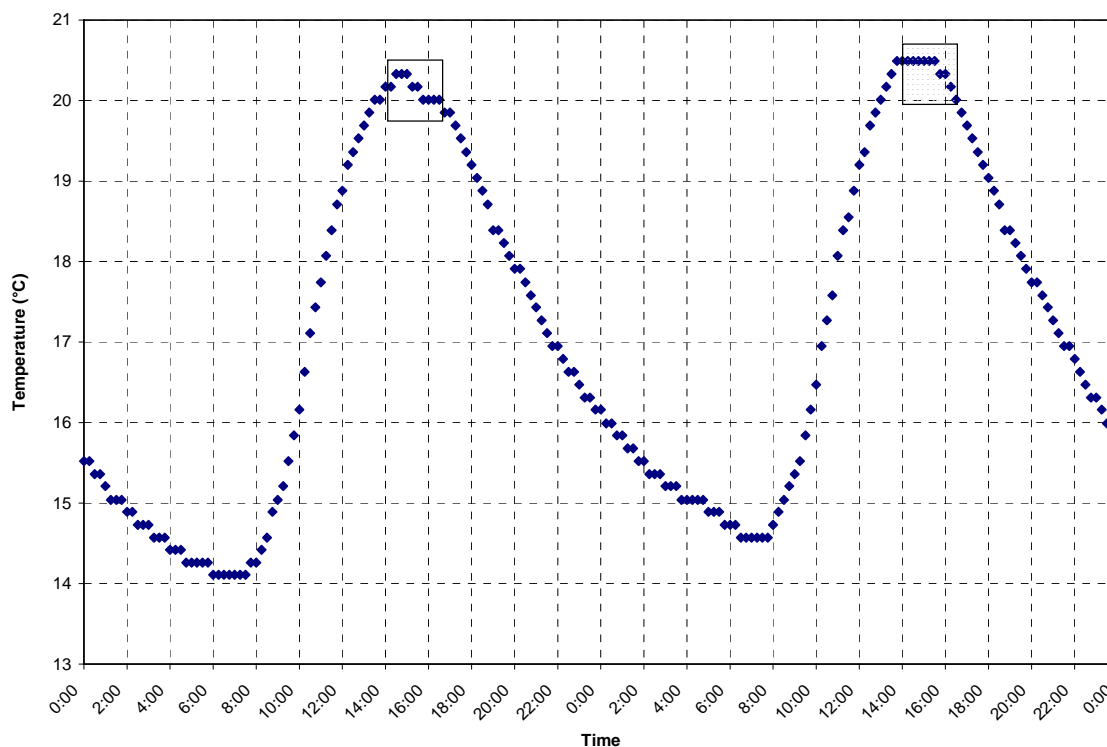


Figure 2-1. Continuous stream temperature in 15-minute intervals in Sisar Creek, above the confluence with Santa Paula Creek, May 2007. The time period during which instantaneous measurements of maximum daily stream temperature were taken is highlighted.

In addition to the maximum daily stream temperature measurements, continuous stream temperature monitoring was initiated during our May survey. Continuous temperature loggers were deployed at 22 locations throughout the watershed (Map 1). Sites were selected based on the results of maximum temperature mapping to capture the range of temperatures in potentially suitable summer rearing habitat. Thermographs used were Stowaway TidBits (Onset Computer Corporation, Pocasset, MA) and were set to record water temperature at 15-minute intervals. Two additional thermographs were attached to riparian vegetation to record ambient air temperature in areas adjacent to stream temperature monitoring sites. Upon retrieval in November, two thermographs were not recovered and six were no longer submerged (Table 2-1).

Table 2-1. Location and condition of continuous temperature monitors placed throughout the Santa Paula Creek watershed, from May to November 2007.

Creek	Thermograph ID	River Mile	Condition
Mainstem Santa Paula Creek	1A (air)	3.9	air temp
	1B (water)	3.9	missing
	2	6.6	in water
Little Santa Paula Creek	3	6.7	missing
	4	6.9	in water
	5	7.3	dry channel bed
	6	7.4	in water
	7	7.6	in water
	8	8.0	in water
	9	8.3	in water
	10	8.5	in water
	11	8.8	in water
	12	9.0	in water
	13	9.5	in water
Sisar Creek	14	0.0	in water
	15	0.5	dry channel bed
	16	0.6	dry channel bed
	17	1.6	not submerged
	18 A (air)	2.2	air temp
	18 B (water)	2.2	in water
	19	2.4	in water
	20	3.3	not submerged
	21	3.8	not submerged
	22	4.1	in water

2.2 *O. mykiss* Presence and Absence Surveys

To identify the distribution of *O. mykiss* during May, a protocol for quickly determining presence of *O. mykiss* in pool habitats within study reaches was developed using a combination of visual surveys and electrofishing. Although age 0+ *O. mykiss* were documented during the survey, we focused our effort on age 1+ and older *O. mykiss* (defined as fish >75 mm at the time of the May survey) because we believed that their survival through the previous summer made their presence a more reliable indicator of reaches providing suitable summer rearing habitat. Additionally, age 0+ *O. mykiss* may still have been emerging during the May survey, and so their potential absence from stream reaches might not be a reliable indicator of summer habitat quality.

Presence and absence surveys proceeded in a stepwise fashion. First, streamside observations were made by slowly walking upstream along the streambank and observing all pool habitat for *O. mykiss*. In pools where no age 1+ or older fish were observed during streamside observations, the pool was snorkeled to search for age 1+ and older fish. If age 1+ and older fish were still not observed while snorkeling, the pool was subsequently electrofished using a single pass to verify the absence of fish. An exception to this protocol occurred in mainstem Santa Paula Creek where we relied solely on electrofishing to determine fish presence because water visibility was not sufficient for streamside or underwater observations.

The extent of stream surveyed varied by study reach. In Sisar Creek, where habitat quality and stream temperatures were relatively consistent, we focused pool habitat in areas near the upstream and downstream extent of wetted reaches to document where *O. mykiss* persisted in relation to stream de-watering. Presence and absence surveys in pool habitat was continuous in Little Santa Paula Creek (*i.e.*, all pools were sampled) to verify the presence of *O. mykiss* within portions of the stream that exhibited high temperature variability and habitat quality over relatively short distances. All pools sampled were given unique identification numbers, and locations were documented on aerial photographs and recorded using a GPS unit. Sample pools were then digitized in GIS.

In November, we revisited pool habitat within the warmest portions of Little Santa Paula Creek to determine if pools where fish were present in May still contained fish at the end of the dry season. We did not differentiate between age classes during the November survey because the sizes of some age 0+ and age 1+ fish were similar by the end of summer and we therefore did not have a practical sized-based determination of fish age to use in the field. Because the survey was inclusive of all age classes, it provides a conservative assessment of fish persistence over the summer (*i.e.*, the absence of fish of any age class should be a more reliable indicator of unsuitable habitat than the absence of a particular age class of fish).

2.3 *O. mykiss* Population Surveys

In November 2007, habitat and electrofishing surveys were conducted to determine *O. mykiss* densities and age class structure with Little Santa Paula Creek and Sisar Creek. Population surveys were conducted at three reaches within the Santa Paula Creek watershed (Map 2):

Little Santa Paula Creek:

- Middle Little Santa Paula Creek: from RM 8.0 to RM 8.3.

Sisar Creek:

- Lower Sisar Creek: just upstream of the Osborn road crossing (RM 2.2) to ~ 200 ft below the Koenigstein Road crossing (RM 2.4).
- Upper Sisar Creek: ~ 500 ft upstream of the Sisar Road crossing (RM 3.9) upstream to the confluence with a dry tributary (RM 4.0).

Study reaches were chosen to represent locations within Little Santa Paula Creek and Sisar Creek that appeared to provide relatively high quality habitat. The Little Santa Paula Creek and Lower Sisar Creek reaches were chosen because of relatively cool stream temperatures and previous observations of *O. mykiss* during the May survey. The Upper Sisar Creek reach was selected to determine whether densities or age classes of *O. mykiss* differed in a portion of Sisar Creek with different channel conditions (*e.g.*, higher channel gradient). However, we combined estimates in Sisar Creek after we determined that habitat-specific densities were similar in the two reaches. These population surveys were intended to compare densities of “good habitat” within the two creeks, and were not necessarily intended to provide values to extrapolate throughout the watershed. A more comprehensive population survey including a number of sites over a variety of reaches designated by differences in slope, confinement, and substrate would allow for extrapolation of densities to a watershed-wide population estimate.

Reach-level habitat measurements occurred by obtaining general habitat parameters such as habitat type, average length and average width to determine habitat type frequency and area

within each reach. Habitat types were determined using definitions described by the California Department of Fish and Game (Flosi *et al.* 1998). Four habitat types were identified during the course of the survey: pools, pocketwater, riffles, and runs. Pocketwaters were defined as a unit with exposed boulders creating eddies and scour holes throughout the unit (Flosi *et al.* 1998). Pools exhibited slow velocity habitat with consistent depth and scour throughout the majority of the channel width. Riffle and runs were rare habitat types, where riffles were shallow with little surface flow with exposed substrate, whereas runs had more volume, little surface agitation and exposed substrate. In cases where sections of creek seemed to be distinct habitat types but were not as long as they were wide, they were lumped in with adjacent habitat units.

Units chosen for electrofishing surveys were selected by identifying the two most dominant habitat types that existed within each reach that likely provided suitable habitat for *O. mykiss*. The two dominant habitat types were identified by the habitat measurements for each reach, and were determined to be pool and pocketwater habitat. Within each reach up to four units of the dominant habitat types (pools and pocketwater) were selected. These units were selected by choosing representative sample units that were spatially distributed throughout the length of each reach. Additional detailed habitat measurements were taken at each electrofished unit and included average lengths, widths, depths, maximum depth, and percent cover. All units were given a unique identification number, and locations were documented on aerial photographs and recorded using a GPS unit.

Electrofishing surveys occurred in each sample unit by using a Smith-Root LR-24 backpack electrofisher. Each unit was blocked off with nets to prevent movement of fish in or out of the sampling areas. The bottoms of the block nets were sealed off with rocks, and the tops of the nets were propped above the water surface with dowels or PVC pipe. Each field technician carrying a backpack electrofisher was accompanied by one or two netters. One backpack electrofisher with two netters was sufficient for coverage of the sampling areas. The sampling crew, to the degree possible, maintained a line perpendicular to the stream channel while moving upstream to maximize capture probabilities. A multiple-pass depletion method was employed at each sample unit, starting with a minimum of three passes and continuing with additional passes if a sufficient depletion was not obtained. After each pass, all fish were processed by measuring fork length (FL) to the nearest millimeter (mm) and weight to the nearest 0.1 gram. Scales were taken from a subset of *O. mykiss* over 80 mm (FL) to archive for aging if desired at a later date. After processing, fish were kept in a live well in an adjacent habitat unit and were released into their original habitat once they had sufficiently recovered from the effects of handling.

Densities were calculated by determining estimates of abundance for each sampled unit based on multiple-pass depletion electrofishing. A robust, jackknife estimator of abundance was applied (Pollock and Otto 1983), as proposed by Mohr and Hankin (2005) for estimation of fish abundance in small streams:

$$\tilde{y}_J = \sum_{i=1}^{r-1} c_i + rc_r,$$

where \tilde{y}_J is the estimate of abundance for unit J, c_i is the number of fish captured on the i th pass, r is the total number of passes, and c_r is the number of fish captured on the final pass. These estimates of unit abundance were then divided by the respective measured habitat areas to obtain fish densities by unit.

Density estimates are often calculated separately for each age class of *O. mykiss* to determine variations of abundance for each age class. These calculations were not possible for the Santa Paula Creek watershed due to the difficulty of determining age class delineations by length frequency histograms (see *O. mykiss* Age Class Structure). Scale samples taken during electrofishing surveys could be analyzed at a later date to determine age class specific densities.

3 RESULTS AND DISCUSSION

3.1 Stream Temperature Surveys

The following sections provide results and discussion for stream temperature surveys conducted in May and November 2007.

3.1.1 Dry Reaches

In May 2007, all tributaries to the Little Santa Paula Creek reach were completely dry, with the exception of Sisar Creek. An additional dry reach of 0.06 miles was identified within Little Santa Paula Creek (near RM 7.1) and two dry reaches were identified within Sisar Creek (RM 0.6 to RM 1.4 and RM 2.5 to RM 3.2). Dry reaches observed in May 2007 are shown in Map 1.

By the end of summer, the length of the dry reaches in Little Santa Paula and Sisar creeks increased significantly (Map 2). In Little Santa Paula Creek, the extent of the dry reach increased from a 0.06 miles in May to 0.3 miles in November, extending from RM 7.0 to RM 7.3. In Sisar Creek, the two dry reaches increased in length by 0.6 miles combined, with one reach extending from RM 0.2 to RM 1.4, and the other reach extending from RM 2.4 to RM 3.3. Cumulatively, the dry reaches in Sisar Creek reduced the available summer rearing habitat by 2.1 miles, which is equivalent to 32% of the stream length potentially accessible to anadromous *O. mykiss* in Sisar Creek. Recent surveys during the beginning of a wet water year, in November 2004, reported no dry reaches in either Little Santa Paula Creek or Sisar Creek (Stoecker and Kelley 2005). Although these surveys were not continuous in each creek, some of their sites were within reaches that were dry during our November 2007 surveys, indicating the extent of available habitat for *O. mykiss* may vary considerably from year to year.

3.1.2 May Maximum Daily Stream Temperatures

Maximum daily stream temperatures in May ranged from 16 to 28 °C within the study reaches. Little Santa Paula Creek had the highest maximum daily stream temperatures and the highest variability in daily temperature. Maximum daily stream temperatures in Little Santa Paula Creek ranged from 19 to 28 °C. Measurements in Little Santa Paula Creek demonstrate a repeating pattern of cooling and warming of surface temperatures (Map 3). This pattern appears to correspond with variation in valley-bottom width (defined as the distance between valley walls perpendicular to the stream channel) and surface flow volume. As the valley-bottom widens, surface flow diminishes and maximum daily stream temperatures increase rapidly due to a combination of diminishing flow and direct insolation to the entire wetted channel (riparian shading is currently negligible). In areas where the valley-bottom width narrows, surface flow increases and temperatures cool abruptly, presumably due to increasing groundwater contributions to surface flow. The relationship of valley-bottom width (measured from using 2005 color orthophotos and 1 meter LIDAR DEM in GIS) and maximum daily stream temperature is illustrated in Figure 3-1 .

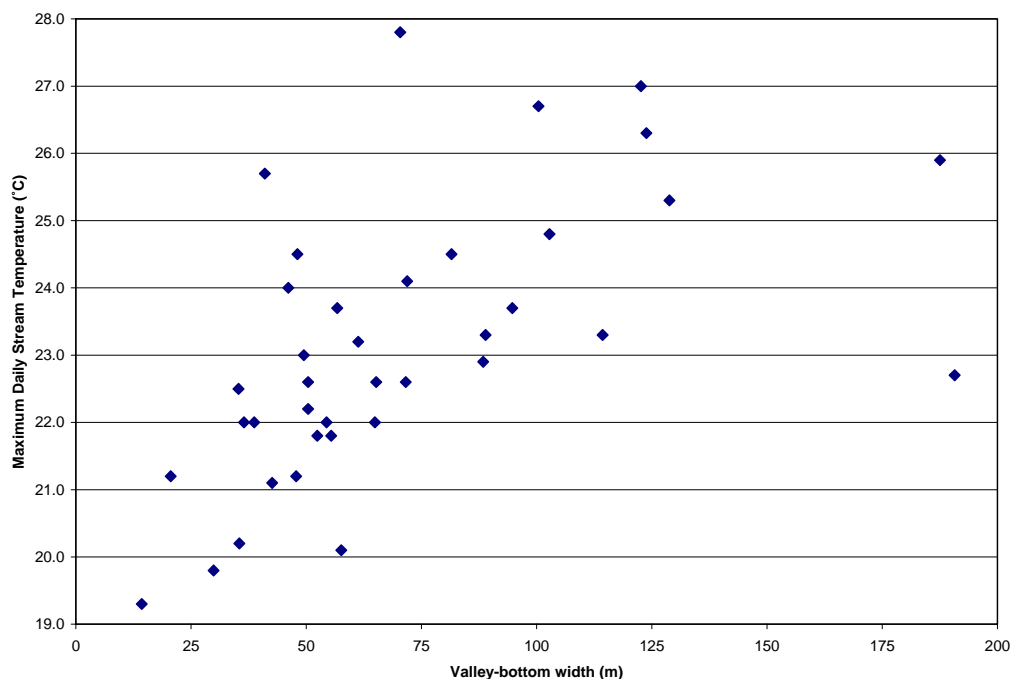


Figure 3-1. Relationship of valley-bottom width and maximum daily stream temperature in Little Santa Paula Creek, May 2007.

Sisar Creek maintained cooler and less variable stream temperatures than Little Santa Paula Creek, likely due to the extensive riparian cover throughout Sisar Creek. Maximum daily stream temperatures in May were below 18.0°C (Map 3) with the exception of the lower 0.6 miles of Sisar Creek, in which temperatures reached 21°C. Within this portion of Sisar Creek stream temperature increased from 16.0°C to 19.0°C within 330 ft, likely due to a near total absence of riparian shading. Variation in valley-bottom width was less significant in Sisar Creek than in Little Santa Paula Creek, and although groundwater recharge was observed, it was less obvious from field observations how the geology and geomorphology of Sisar Creek contribute to patterns of surface flow. Dry reaches tended to be found in areas where water diversions or in-channel pumping occurred, suggesting that human water use contributes to stream drying in Sisar Creek.

Mainstem Santa Paula Creek had consistently high maximum daily stream temperatures ranging from 21.6°C to 26°C (Map 3), although fewer stream measurements were taken in this reach due to the small number of *O. mykiss* observed (see *O. mykiss presence and absence surveys* below).

3.1.3 Continuous Temperature Monitoring

Temperature was monitored continuously from May through November. Stream temperatures reached maximum weekly average temperatures (MWAT) in early September. The greatest variability in MWAT occurred in Little Santa Paula Creek, ranging from 21.4°C to 25.8°C. Sisar Creek had lower and more consistent MWAT values than Little Santa Paula Creek, ranging from 20.4°C to 21.8°C (Figure 3-2). Longitudinal patterns in MWAT were similar to the repeated cooling and warming observed in maximum daily temperature in May (Figure 3-2; Map 3).

Two thermographs were deployed in mainstem Santa Paula Creek but only one was retrieved in November 2007. The only retrieved thermograph was immediately below the confluence and

was not representative of the reach, therefore preventing comparisons of MWAT to other creeks. The retrieved thermograph was located just downstream of the confluence with Little Santa Paula Creek and resulted in an MWAT of 22.0°C, a value in-between the most downstream sites in both creeks above the confluence. Although the most downstream thermograph was not retrieved, we can infer by the close relationship of MWAT to maximum daily measurements in May, that stream temperatures warm with distance downstream from the confluence of Sisar Creek and Santa Paula Creeks.

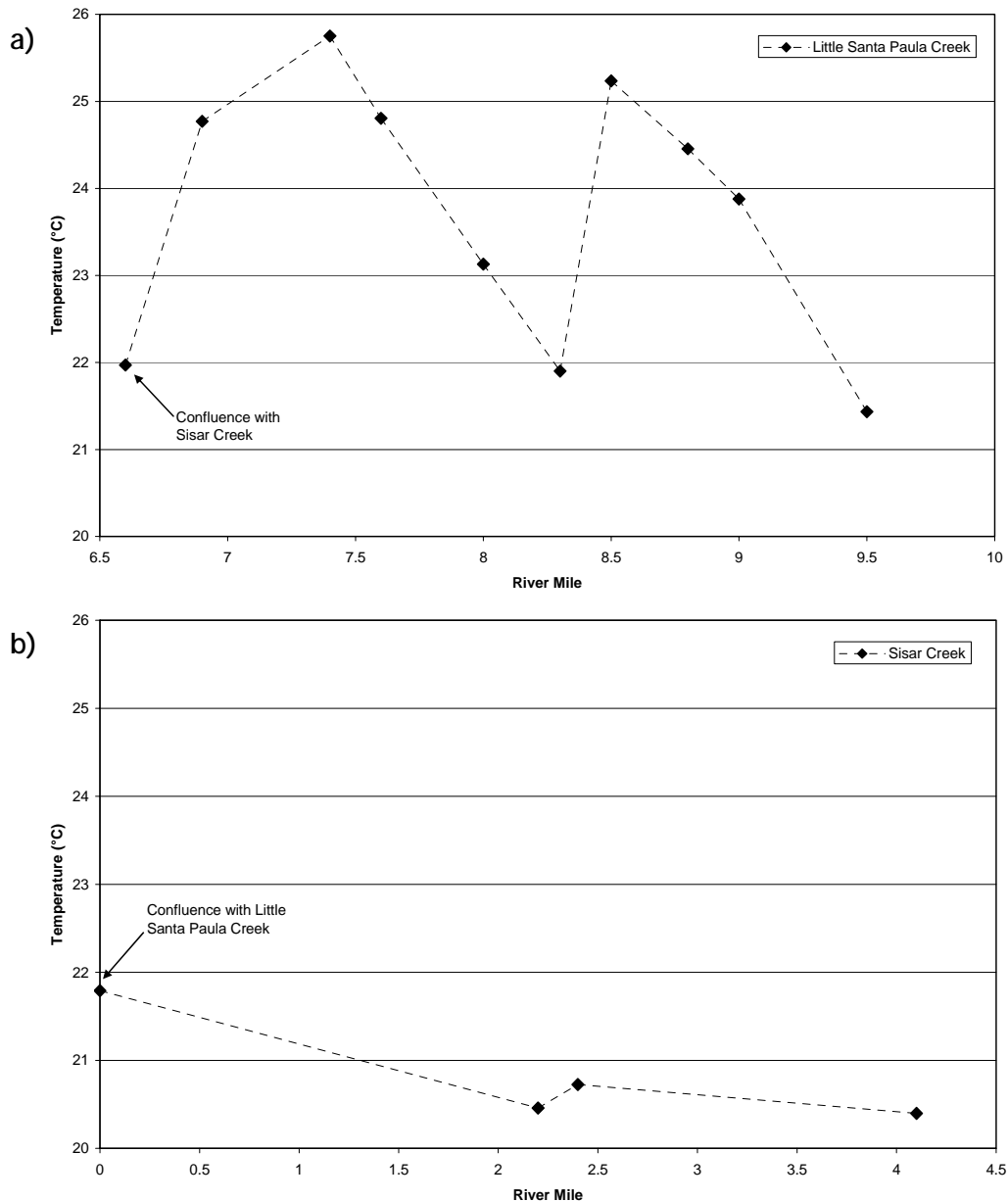


Figure 3-2. Maximum Weekly Average Temperature (MWAT) in a) Little Santa Paula Creek and b) Sisar Creek. All MWATS occurred during weeks ending in early September (9/4, 9/5, or 9/6), 2007.

Instantaneous data during the warmest week of the year indicated that sites with the highest stream temperatures also had the greatest daily fluctuation. Figure 3-3 show a daily fluctuation in stream temperature from representative “hot”, “warm”, and “cool” sites in Little Santa Paula Creek and a representative site in Sisar Creek. Instantaneous measurements indicate that at sites where MWAT remains below reported lethal limits for *O. mykiss*, instantaneous stream temperatures may exceed these limits for a significant portion of the day. Sites 6 (RM 7.4) and 7 (RM 7.6) exceeded critical thermal maximum temperatures in early September (Figure 3-3), defined as 29.6°C for the Central Valley steelhead (Myrick and Cech 2001).

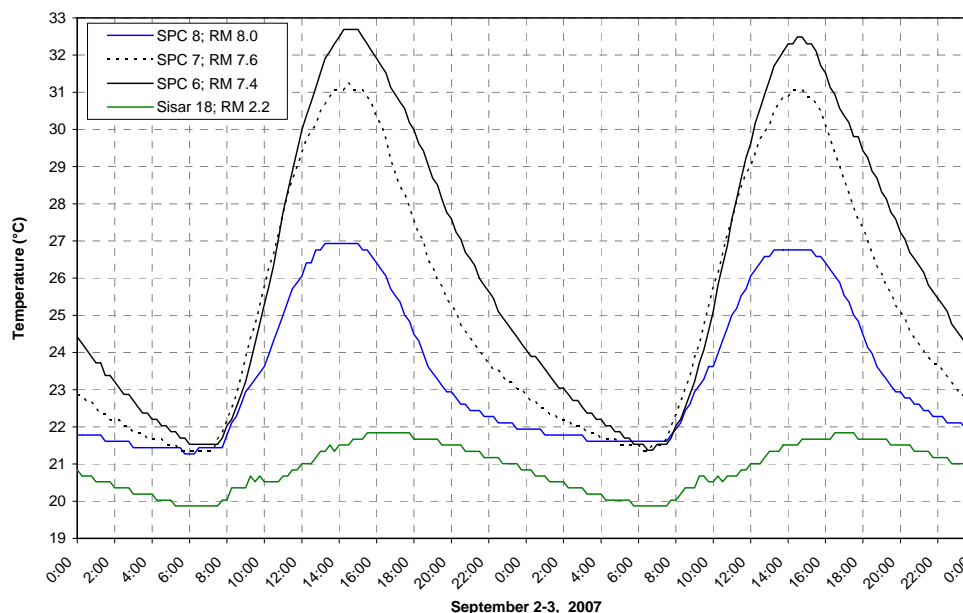


Figure 3-3. Continuous stream temperature in 15-minute intervals at four locations within the Santa Paula Creek watershed, September 4-5, 2007.

3.2 *O. mykiss* Presence and Absence Surveys

Potential summer rearing habitat for anadromous fish is primarily limited to Little Santa Paula Creek extending upstream 3.2 miles from the confluence with Sisar Creek to waterfall barriers, and all portions of Sisar Creek below the barriers at RM 5.9. All other tributaries to Santa Paula Creek were completely dry by May. A total of 278 pools were surveyed for *O. mykiss* within the Santa Paula Creek watershed. The rates of observation for age 1+ *O. mykiss* in May were highest in Sisar Creek (75 out of 86 pools), lower in Little Santa Paula Creek (102 out of 148 pools), and extremely low in mainstem Santa Paula Creek, where only two age 1+ *O. mykiss* were observed (2 out of 44 pools). A summary of pools with observed age 1+ *O. mykiss* is provided in Table 3-1.

Table 3-1. Age 1+ *O. mykiss* presence in pools within the Santa Paula Creek watershed, May 2007.

Reach	# of Pools with Age 1+	Total Pools Surveyed	% of Total Pools with Age 1+
Little Santa Paula	102	148	69%
Sisar Creek	75	86	87%
Mainstem Santa Paula	2	44	<1%
Totals	179	278	64%

The mainstem Santa Paula Creek, downstream of the confluence with Sisar Creek, supported age 1+ *O. mykiss* in only 2 out of the 44 pools surveyed in this reach (Table 3-1; Map 4), but also provided habitat for other species such as Santa Ana Sucker, Arroyo Chub, and threespine stickleback. This is consistent with observations made by Stoecker and Kelley (2005), where stream bank and direct observation surveys below the confluence of Sisar Creek and Little Santa Paula Creek resulted in zero observations of *O. mykiss* and the most consistent observations of non-salmonid species. This reach had the lowest pool frequency and exhibited warmer temperatures in comparison to locations throughout Little Santa Paula Creek and Sisar Creek. In addition to these habitat characteristics, natural oil and tar seeps, as well as milky sulfur seeps contribute to poor habitat quality for *O. mykiss* in the mainstem Santa Paula Creek.

Of the three main reaches surveyed, Sisar Creek contained the highest percentage of pools containing age 1+ *O. mykiss* (87%; Table 3-1, Map 5). In wetted reaches between RM 0.6 and RM 4.1, almost every pool surveyed contained age 1+ *O. mykiss*. Riparian cover was more consistent in this section of Sisar Creek, resulting in cooler stream temperatures that provided habitat for a higher frequency of age 1+ *O. mykiss* than the first 0.6 mile of Sisar Creek. Our May 2007 surveys did not extend upstream of RM 4.1 to the two barriers identified by Stoecker and Kelley in 2005 (Sisar Creek at RM 5.9 and East Fork Sisar Creek RM 0.5). Within this reach, Stoecker and Kelley (2005) observed the highest densities of *O. mykiss* over 6", indicating good habitat quality and suggesting *O. mykiss* presence would likely extend to the two barriers. Our May 2007 field work did not repeat Stoecker and Kelley's (2005) survey of this upper reach because our objective was to survey areas that had not already been surveyed.

Fewer observations of age 1+ *O. mykiss* within the first 0.6 miles of Sisar Creek may be a result of lower surface flow and decreased riparian shading. Although this reach exhibited the warmest temperatures in Sisar Creek, temperatures did not exceed 21.0° C (a temperature at which *O. mykiss* were commonly observed in Little Santa Paula Creek) indicating other factors may be acting in concert with stream temperature to influence habitat quality for age 1+ *O. mykiss* within this reach (Map 3, Map 5).

In Little Santa Paula Creek, age 1+ *O. mykiss* were observed throughout the reach for the exception of one portion, between the confluence with Sisar Creek (RM 6.6; Map 6) and La Broche Creek (RM 7.9). The relatively low rate of occurrence in this section of Little Santa Paula Creek could be related to high stream temperatures in that reach. At the time of the May survey, maximum daily stream temperatures were already at 27.8°C, approaching previously reported lethal limits for *O. mykiss* (29.6°C; Myrick and Cech 2001). Even though there was a low rate of occurrence in this reach, *O. mykiss* were present, indicating these temperatures did not exceed lethal values during May.

During our November 2007 survey, *O. mykiss* were not present in the warmest location where relatively low rate of occurrence was observed in May, near thermograph Site 6 (RM 7.4; Map 7). This location consistently exceeded 30.0°C for three months, from July through August, with maximum temperatures over 33°C during the hottest day of the year (Figure 3-3; Map 7). However, *O. mykiss* were observed just upstream near thermograph Site 7 (RM 7.6), where temperatures exceeded 30°C for a much shorter duration (only 6 days out of the summer), but reached 31.4°C during the hottest day of the year (Figure 3-3; Map 7). These temperatures and the presence of *O. mykiss* are not consistent with laboratory experiments where 29.6°C is defined as the critical thermal maximum temperature for steelhead (Myrick and Cech 2001), and indicates southern steelhead may have higher critical thermal maximum temperature than northern populations.

An exception to these patterns of temperature and *O. mykiss* presence was the observation of one age 1+ *O. mykiss* that was observed in an isolated pool in the middle of the dry reach (RM 7.1; Map 7). Although data on small seeps was not gathered, some observations of local pockets of cool water in warm pools was observed during the previous survey, and may explain the rare presence of age 1+ *O. mykiss* within the dry reach. Stream temperature data is not available within the proximity of this isolated pool, making it difficult to come to conclusions on thermal tolerances at this location.

3.3 *O. mykiss* Population Surveys

The following sections provide results and discussion for *O. mykiss* habitat and population surveys conducted in May and November 2007.

3.3.1 Habitat measurements

Reach-level habitat measurements identified pool and pocketwater habitat as the most common habitat types in both Little Santa Paula Creek and Sisar Creek and were therefore chosen as the two habitat types to compare *O. mykiss* densities for the November 2007 population surveys. Riffles occurred infrequently, and quick single-pass electrofishing in these habitats confirmed they provided little or no habitat for *O. mykiss* within our surveyed reaches. Run habitat was present at only one site, and comprised a small percentage of the stream channel when it was present. Table 3-2 summarizes the area of each habitat type within each reach.

Table 3-2. Habitat type areas (m² and percent of total) in reaches of Little Santa Paula Creek (SPC) and Sisar Creek (Lower Sisar Creek [LSC] and Upper Sisar Creek [USC]), November 2007.

Creek	Reach	Pool Area		Pocketwater Area		Riffle Area		Run Area		Total Area
		m ²	%	m ²	%	m ²	%	m ²	%	m ²
Little Santa Paula Creek	SPC	401	22.4	1,305	73.0	0	0.0	82.5	4.6	1,788
Sisar Creek	LSC	237	32.3	468	63.9	28	3.8	0	0.0	733
	USC	174	42.8	223	54.6	10	2.6	0	0.0	408

Detailed habitat measurements were taken at each habitat unit that was electrofished. Maximum depths in the units sampled in Little Santa Paula Creek ranged from 2.1 to 2.8 ft (0.64 to 0.85 m) deep for pools and from 1.0 to 1.8 ft (0.30 to 0.55 m) deep for pocketwater habitat. Maximum

pool depth in units sampled in Sisar Creek ranged from 2.0 to 2.5 ft (0.61 to 0.76 m) at the lower sample reach and 2.7 to 3.2 ft (0.82 to 0.98 m) at the upper sample reach. Pocketwater depth in Sisar Creek was consistent at all sites, ranging from 1.2 to 1.4 ft (0.36 to 0.43 m) deep. The amount of available cover varied little between reaches and primarily consisted of unembedded cobble/boulder complexes and some aquatic vegetation at most sampled units. One exception was a unit in Little Santa Paula Creek, that was a bedrock dominated pool with little cobble/boulder substrate for cover. This unit also resulted in the lowest *O. mykiss* densities out of all the sites, indicating cobble/boulder substrate may provide the majority of usable cover within the Santa Paula Creek watershed.

Sample site selection was not random. We chose relatively “good habitat” in both Little Santa Paula Creek and Sisar Creek and these habitat measurements are not necessarily representative of habitat in other reaches potentially supporting *O. mykiss*. Extrapolations of our densities could lead to an overestimate of the *O. mykiss* population in Santa Paula Creek. A more comprehensive habitat and population survey including representative reaches would be necessary to determine the *O. mykiss* population throughout the watershed.

3.3.2 *O. mykiss* Density Surveys

A total of 18 units (nine pools and nine pocketwaters) were surveyed for *O. mykiss* densities within Little Santa Paula Creek and Sisar Creek. Densities were similar in Little Santa Paula Creek (ranging from 0.10 fish/m² to 0.96 fish/m²) and in Sisar Creek (ranging from 0.31 fish/m² to 0.87 fish/m²). Densities were also similar between habitat types, although pool habitats resulted with the highest densities of *O. mykiss* in both creeks. Since age classes were difficult to distinguish (see *O. mykiss* Age Class Structure), *O. mykiss* densities were inclusive of all age classes. Figure 3-4 shows densities for both habitat types in each reach.

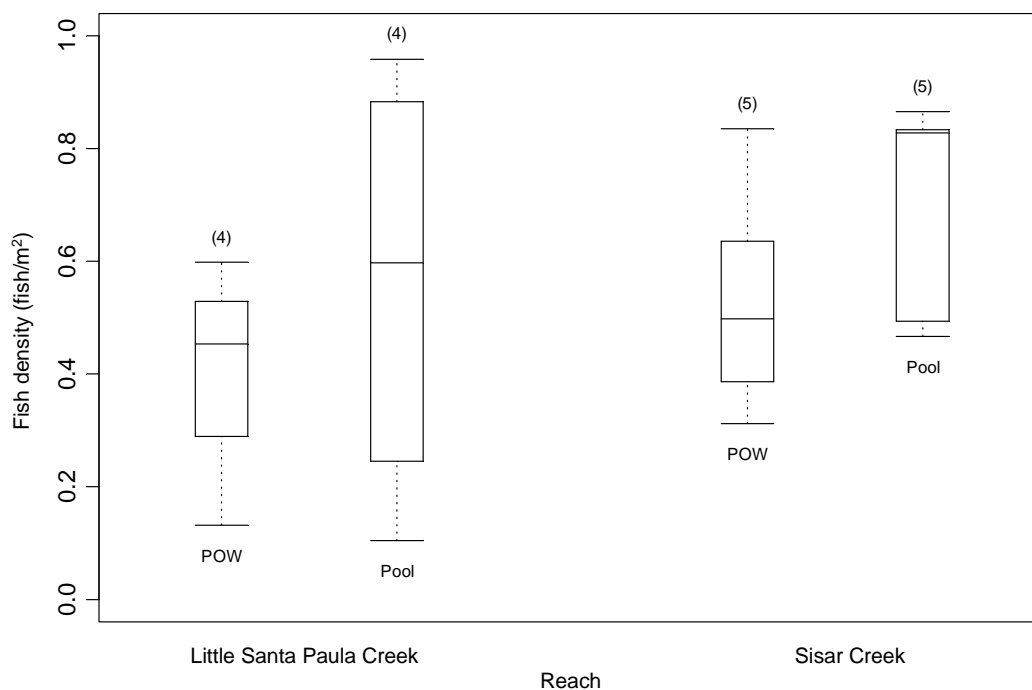


Figure 3-4. Boxplots for *O. mykiss* densities in pocket water (POW) and pool habitat types between Little Santa Paula Creek and Sisar Creek. Center line of the box is the median; upper and lower edges are upper quartile and lower quartile respectively. The range is represented by horizontal bars above and below the boxes. Sample sizes are in parentheses above the boxplots.

Pool habitat in Little Santa Paula Creek exhibited the largest range of *O. mykiss* densities, ranging from 0.10 fish/m² to 0.96 fish/m². The pool with the lowest density was in the only unit that was a bedrock controlled pool and provided little cobble/boulder complexes for cover. Pocketwater habitat ranged from 0.13 fish/m² to 0.60 fish/m² and resulted in slightly lower *O. mykiss* densities than pool habitat, but field observations during electrofishing surveys noted sections of pocketwater that provided a combination of depth and cobble/boulder cover often provided habitat for *O. mykiss*. This suggests that *O. mykiss* use both pool and pocketwater habitat as long as cobble/boulder cover and depth are available. More detailed habitat measurements within each unit would be required to determine if there is a minimum depth requirement for *O. mykiss* in this reach.

Sisar Creek had similar ranges for *O. mykiss* densities in both pool and pocketwater habitat, ranging from 0.47 fish/m² to 0.87 fish/m² and 0.31 fish/m² to 0.84 fish/m², respectively. When compared to Little Santa Paula Creek, *O. mykiss* densities in Sisar Creek are similar, indicating both creeks provide important habitat for juvenile rearing.

O. mykiss densities observed in pool habitat in the Santa Paula Creek watershed resulted in higher densities than most tributaries in Sespe Creek, the neighboring watershed east of Santa Paula Creek (Dvorsky 2000). Although snorkel surveys were used in Sespe Creek, we have used them as a comparison to densities in Santa Paula Creek because previous studies within the region show results from electrofishing and snorkel surveys are similar (Chubb, USFS, unpublished data, as cited in Dvorsky 2000). The relatively high densities in Santa Paula creek are consistent with

previous reports that suggest Santa Paula Creek has high habitat quality relative to other Santa Clara River tributaries, and has been identified as one of the greatest potential creeks for recovery of the Southern California *O. mykiss* DPS (Stoecker and Kelley 2005).

3.3.3 *O. mykiss* Age Class Structure

A total of 440 *O. mykiss* were captured during the electrofishing surveys. Throughout the watershed, fork lengths ranged from 52–214 mm, with over 90% of all captured *O. mykiss* measuring between 70–140 mm. Length frequency histograms can usually be used to determine length at age for *O. mykiss* populations, however differentiating length at age for populations in Santa Paula Creek watershed is difficult.

Up to four age classes are potentially identifiable from the length frequency data. In Little Santa Paula Creek, over 62% of the *O. mykiss* measured ranged from 70–145 mm (FL) and most likely were comprised of a combination of age 0+ and age 1+ fish (Figure 3-5). Similar to Little Santa Paula Creek, a majority of *O. mykiss* were in a similar range of 55–145 mm and also display a possible overlap of age 0+ and age 1+ fish. The exact size range of each age class is difficult to determine because of the lack of obvious modes in length frequencies. In more northern populations such as Devil's Gulch, a tributary to Lagunitas Creek (Marin County, California), length at age is better identifiable because seasonality separates growing seasons and results in a clearer separation in modes for each age class (Figure 3-5).

The difficulty in distinguishing between the age 0+ and age 1+ fish length frequency graphs could indicate that sublethal effects of temperature have influenced the growth potential for *O. mykiss*. The length frequencies indicate age 0+ *O. mykiss* are large at the end of their first summer suggesting good growth opportunities, however, age 1+ fish are relatively small. Previous studies in the Napa River (Napa County, California) have found that smaller fish are able to achieve positive growth under warm conditions whereas the larger age 1+ fish have difficulty achieving bioenergetic demands in warm reaches. Without scale analyses, it is impossible to reach conclusions about age class structure and to determine whether the growth of age 1+ *O. mykiss* is reduced due to bioenergetic limitations in Santa Paula Creek.

Another pattern apparent of the length frequency is the observation of few *O. mykiss* over 145 mm in both creeks. From Figure 3-5, fish above 145 mm could be potentially separated into two additional age classes, with an age 2+ class ranging from 170–195 mm (FL) and an age 3+ class with lengths above 210 mm (FL). There are two possible explanations for the few observations of *O. mykiss* in these age classes. The first possibility is that food availability was not sufficient for larger fish (e.g., >145 mm) to meet the metabolic demands required to forage in the relatively warm reaches, and resulted in reduced survival. The second possibility is the high flows in January and February 2005 (maximum flood of record) resulted in redd scour and displacement of fry in 2005, which would have represented the age 2+ and older age classes we observed few of during our 2007 surveys. Conclusions regarding these hypotheses cannot be reached without aging from scale samples to determine growth and age class structure.

Scale samples were taken from each unit during the electrofishing surveys, but the limitations of the scope of this project did not include analyses of these samples. Future studies could potentially analyze these scale samples, resulting in determination of age class specific densities and to determine difference in growth rates for each age class.

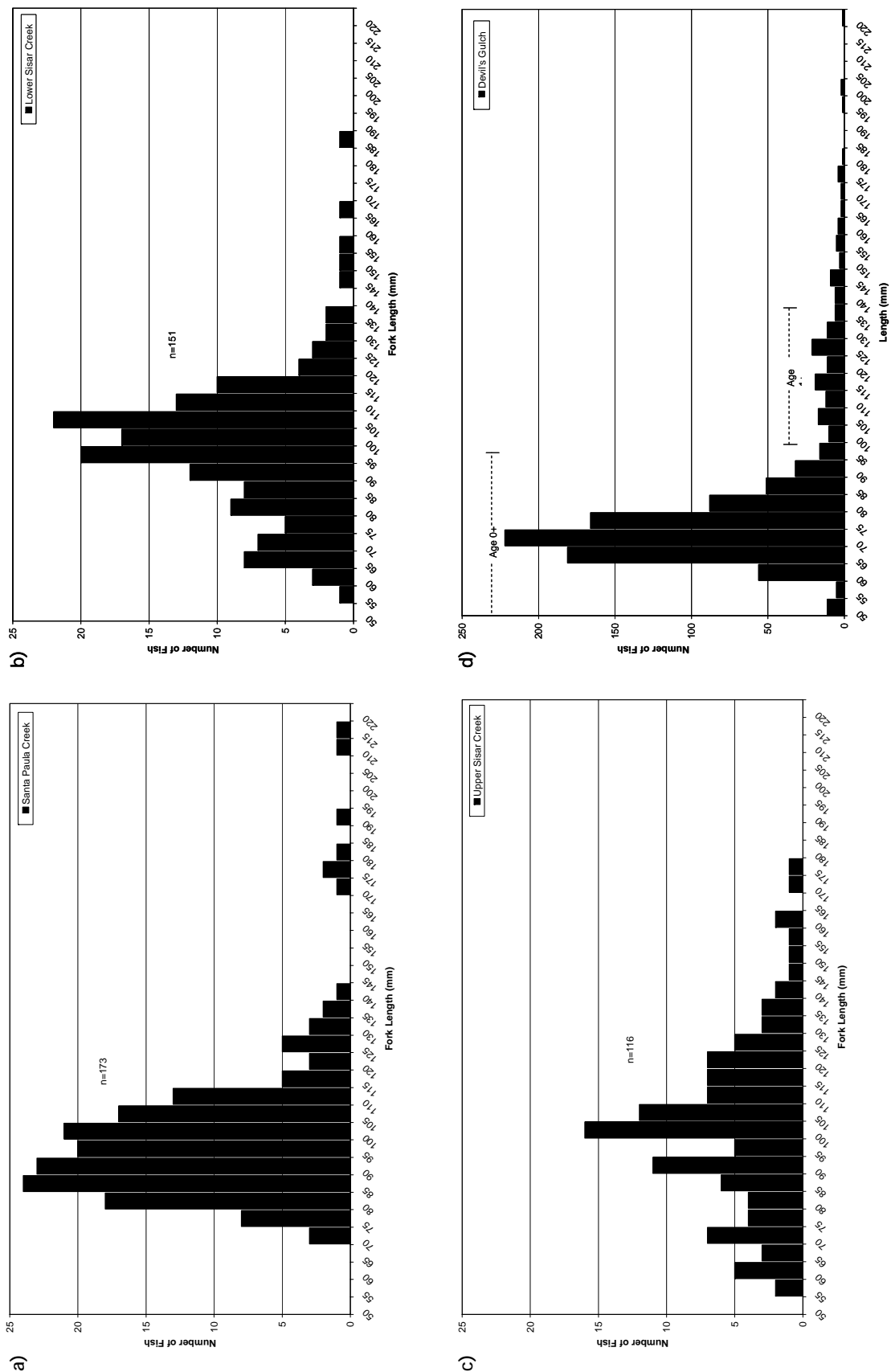


Figure 3-5. Comparison of length frequency histograms for *O. mykiss* in a) Little Santa Paula Creek, b) Lower Sisar Creek, and c) Upper Sisar Creek in November 2007, and d) Devil's Gulch (Lagunitas Creek, Marin Co.) in October 2006 (Stillwater Sciences, in progress).

4 CONCLUSIONS

Potential summer rearing habitat for restored anadromous populations of *O. mykiss* is limited to the extent of Little Santa Paula Creek from the confluence with Sisar Creek upstream to the natural waterfall barrier at the confluence of Little Santa Paula Creek and East Fork Santa Paula Creek (RM 9.8), and in Sisar Creek from its mouth upstream to barriers on Sisar Creek (RM 5.9) and East Fork Sisar Creek (RM 0.5). These creeks provided consistent observations of age 1+ *O. mykiss* during our May survey, and similar densities during our November survey. This indicates both creeks provide important juvenile rearing habitat for these species and passage restoration efforts should focus on access allowing migration to upstream of their confluence. The densities observed were high compared to neighboring streams and supports previous reports suggesting Santa Paula Creek as having some of the highest potential for restoration of anadromous *O. mykiss* within the Santa Clara watershed. In the few locations where *O. mykiss* were not observed in these reaches, it was a result of either a dry channel or relatively warm stream temperatures, indicating dry reaches and temperature are the primary environmental controls on juvenile rearing habitat quality.

The mainstem Santa Paula Creek appeared to provide poor habitat for *O. mykiss* based on the few observations of age 1+ fish during our May survey. Although temperatures were relatively warm in this reach, qualitative observations of poor visibility and water quality also likely contribute to the lack of *O. mykiss*. Natural oil and tar seeps, as well as milky sulfur seeps throughout the mainstem Santa Paula Creek contribute to poor habitat quality for *O. mykiss*.

Spatial patterns of stream temperature are markedly different between Sisar Creek and Little Santa Paula Creek. In Sisar Creek, extensive riparian shading maintains relatively cool stream temperatures in the majority of the wetted reaches despite the stream losing surface flow in two locations. The effects of riparian shading are evident in the lower portion of Sisar Creek which in May heated from approximately 16.0°C to 19.0°C in just 330 ft in a reach that completely lacked riparian vegetation. In comparison to Sisar Creek, Little Santa Paula Creek had much greater variability in stream temperature. In contrast to a more typical pattern in which stream temperature gradually increases as a stream flows to lower elevations, temperature in Little Santa Paula Creek exhibits a repeated pattern of cooling and warming. This pattern is predictable, with warmer temperatures occurring in reaches with wider valley-bottom widths and diminishing surface flow, and cooler temperatures occurring in reaches with narrower valley-bottom widths where cool hyporheic flow resurfaces. Because Little Santa Paula Creek currently has virtually no riparian vegetation, water temperature heats rapidly in wider valley segments, approaching 33°C maximum daily temperature in some areas.

The consequence of these temperature dynamics is that *O. mykiss* may be restricted from some reaches due to high stream temperatures. In Little Santa Paula Creek, we found *O. mykiss* in habitat with stream temperatures exceeding 29.6°C, the reported lethal limit for the Central Valley steelhead (Myrick and Cech 2001). Central Valley steelhead temperature thresholds were used for comparison because we are not aware of published temperature thresholds for southern steelhead, and the presence of *O. mykiss* in temperatures exceeding this published value provides evidence for higher thermal tolerances in southern populations. However, despite potential adaptation for warmer conditions, we also found that fish did not persist over the summer in the warmest reach of Little Santa Paula Creek. The results of a comparison of fish presence in May and November suggests that fish were found in pools where maximum daily stream temperature

approached 31.5°C, but were absent in pools exceeding in 33°C, suggesting upper thermal limits for *O. mykiss* in Santa Paula Creek may be within this range.

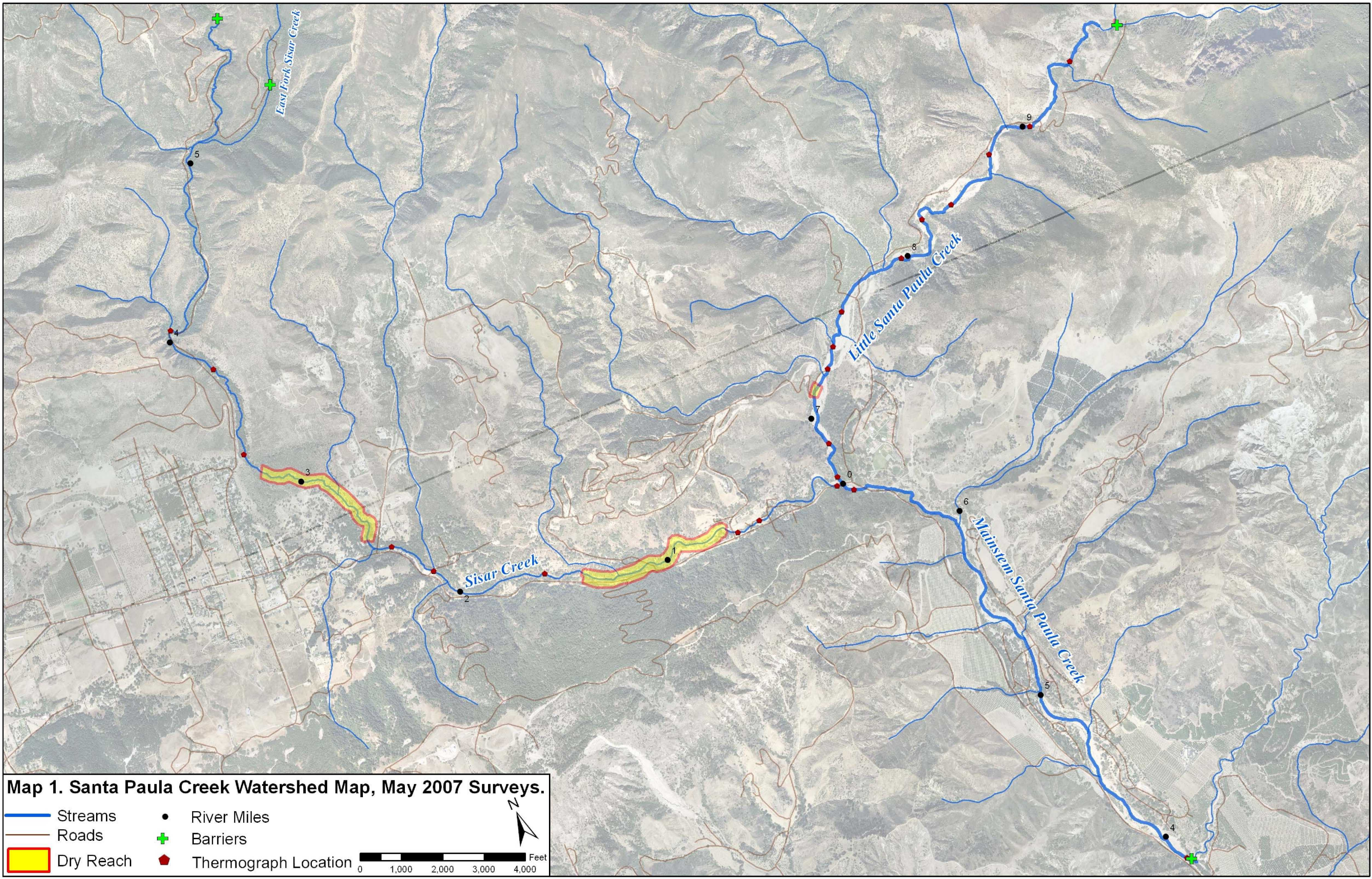
In addition to acute effects of temperature on fish persistence, there may be sublethal effects of high stream temperature on fish growth. Length frequency histograms may provide some evidence for sublethal effects of high stream temperatures. Although we were not able to conclusively differentiate between age 0+ and age 1+ fish from their length frequencies, the unimodal pattern in November suggests that growth of age 0+ fish was good but opportunities for age 1+ and older fish may be limited.

Together, these results provide important information on habitat conditions and fish abundance in the Santa Paula Creek watershed that can be readily incorporated into an expanded study of factors limiting the *O. mykiss* populations. In and of themselves, the results suggest that, to the extent possible, maintenance of riparian vegetation and protection of groundwater resources would be important components of a management plan for *O. mykiss* in the watershed. The results also suggest several future studies that could reduce uncertainty about factors limiting the *O. mykiss* populations. First, we recommend that scale samples be analyzed to confirm the length-at-age for fish. This information would help test hypotheses regarding growth potential and bioenergetic limitations for fish. If high warm temperatures are preventing large fish from reaching suitable sizes for successful smolting, then bioenergetic studies including analyses of macroinvertebrate food availability could help identify reasons for limited growth. The information could also be used to develop age-class specific density information from the data already collected and could be an important tool for identifying potential recruitment bottlenecks for fish populations. Second, continuous stream temperature monitoring could be paired with additional studies to document the persistence of *O. mykiss* using pit tags. Individually marked fish in different thermal environments would provide more detailed empirical evidence for stream temperature thresholds for southern populations of *O. mykiss*.







5 REFERENCES

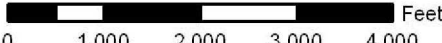

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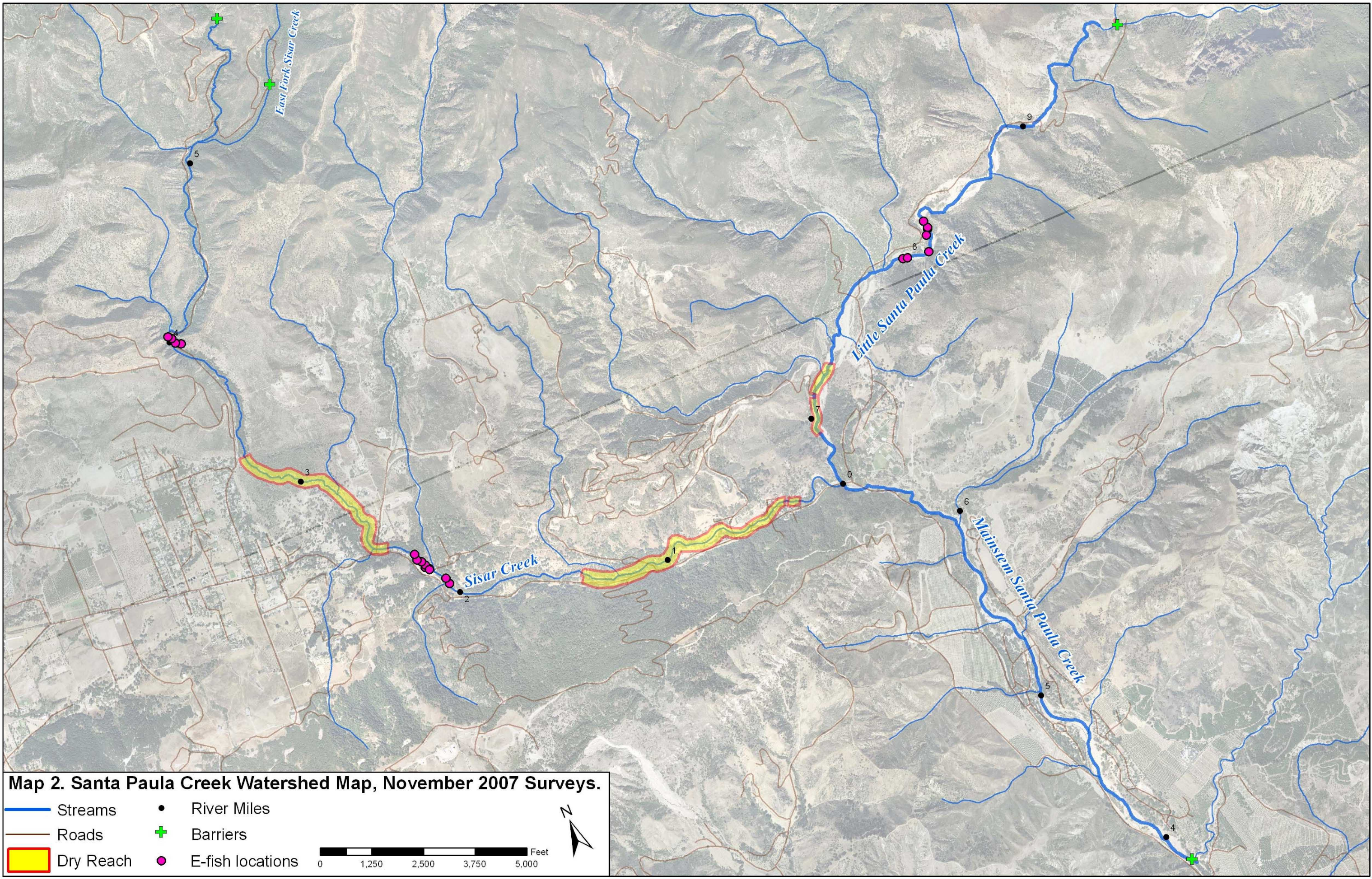
MAPS

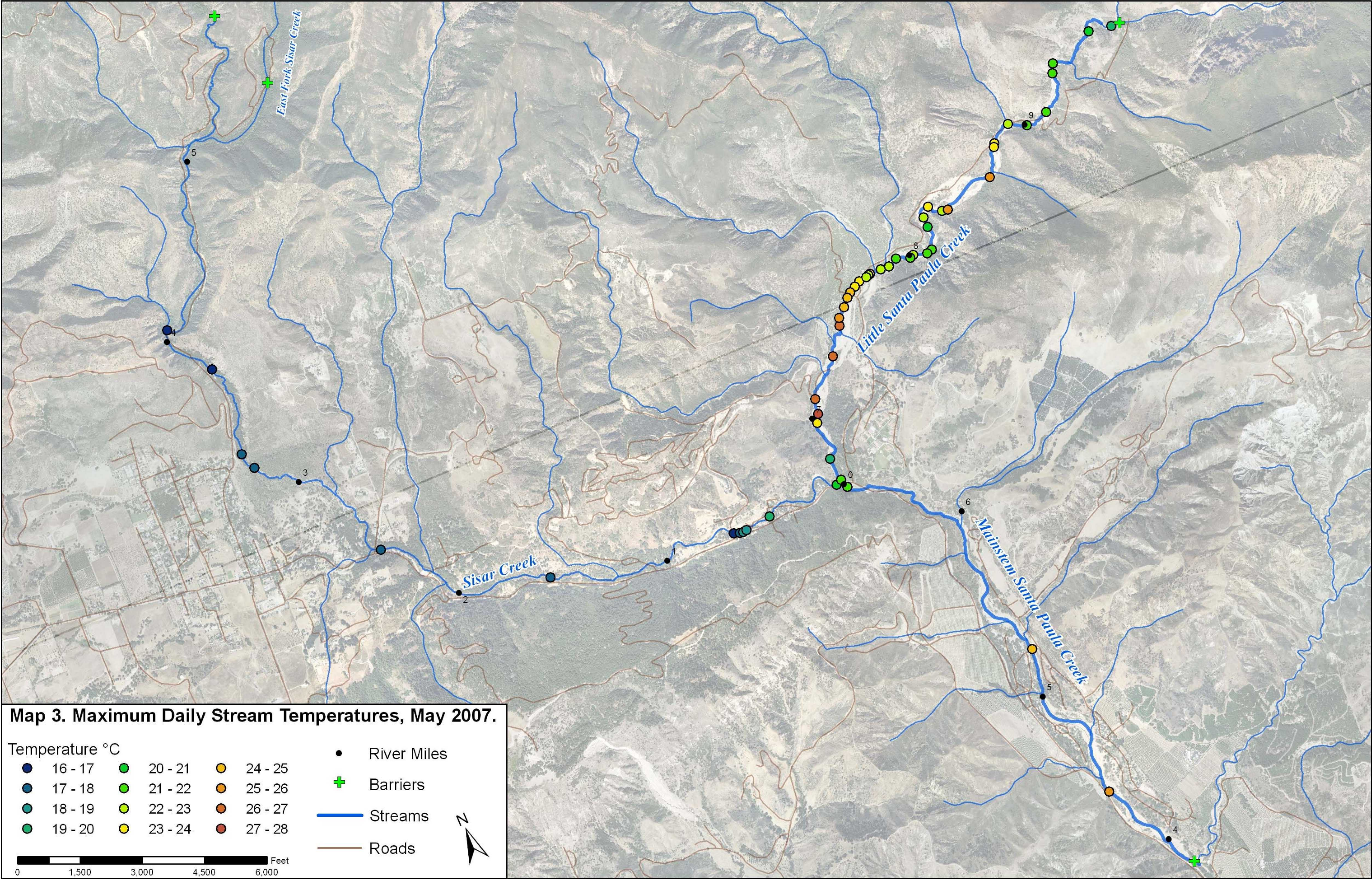


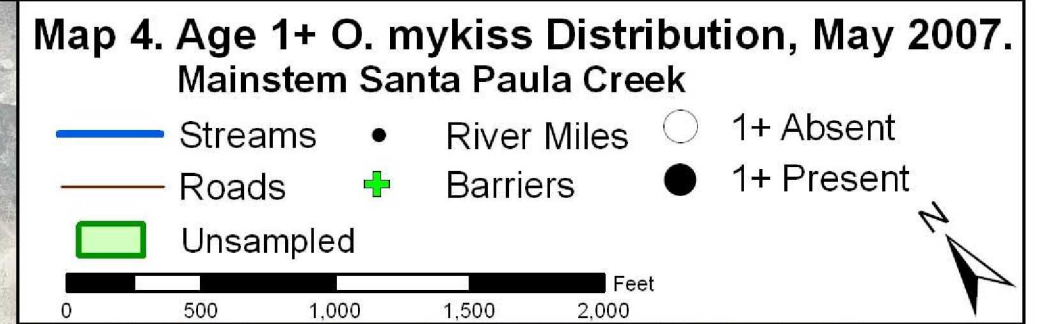
Map 1. Santa Paula Creek Watershed Map, May 2007 Surveys.

 Streams	 River Miles
 Roads	 Barriers
 Dry Reach	 Thermograph Location

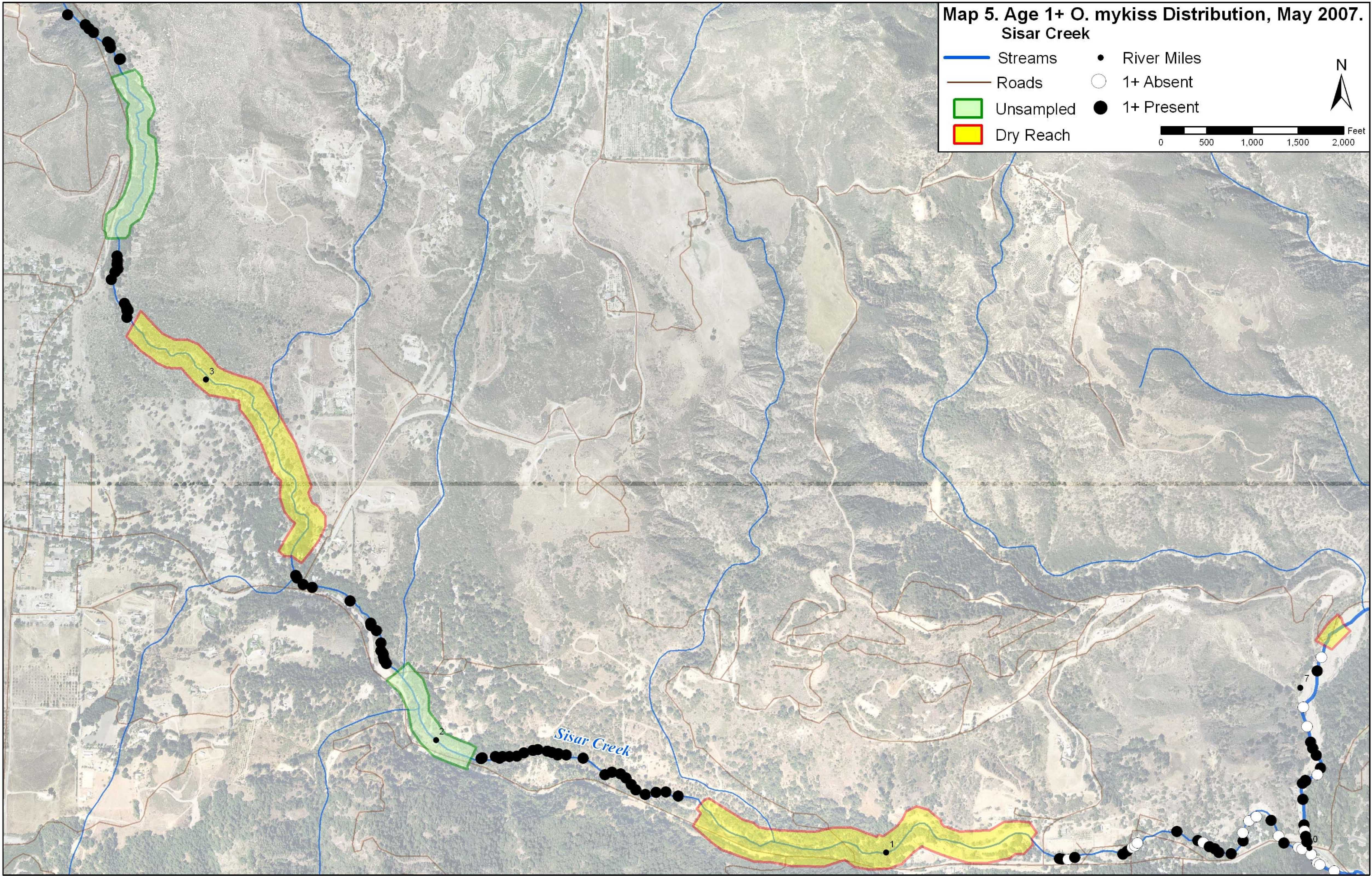
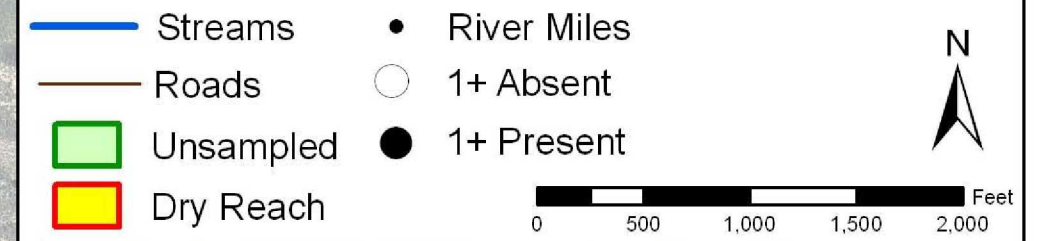




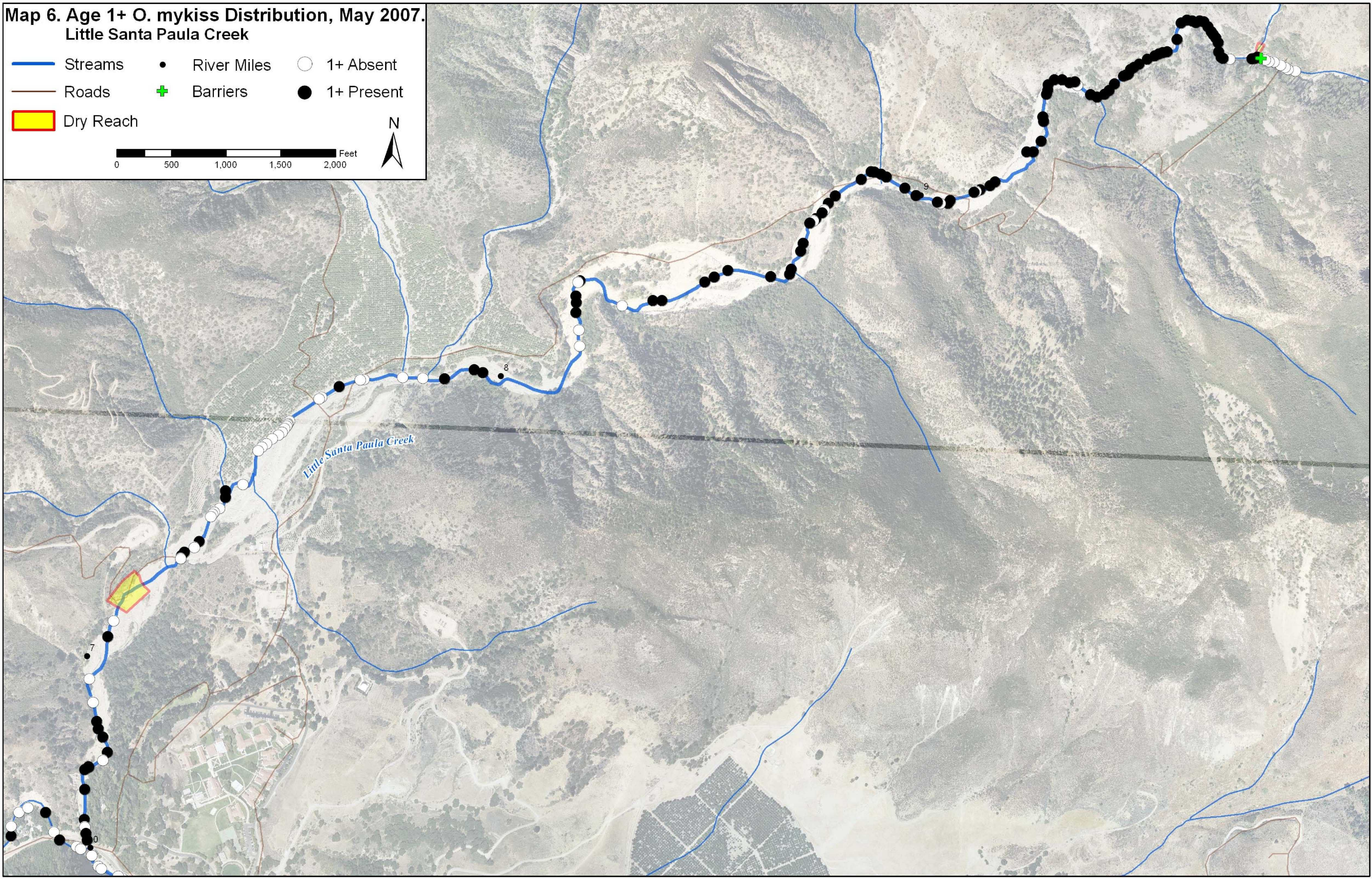
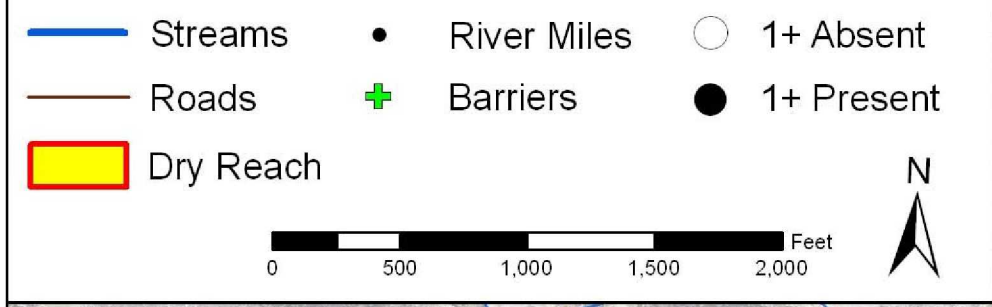




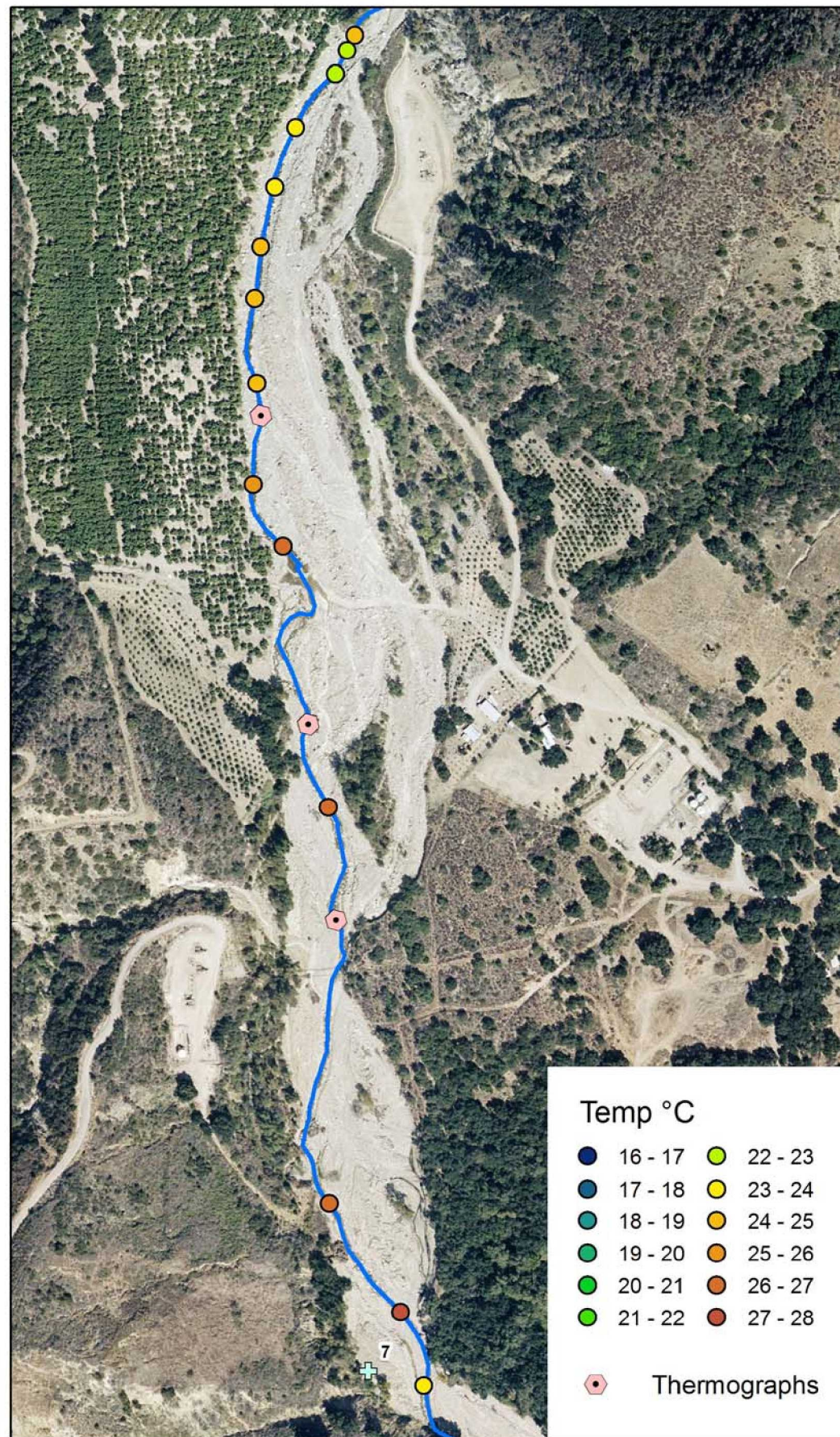
Map 5. Age 1+ *O. mykiss* Distribution, May 2007.
Sisar Creek



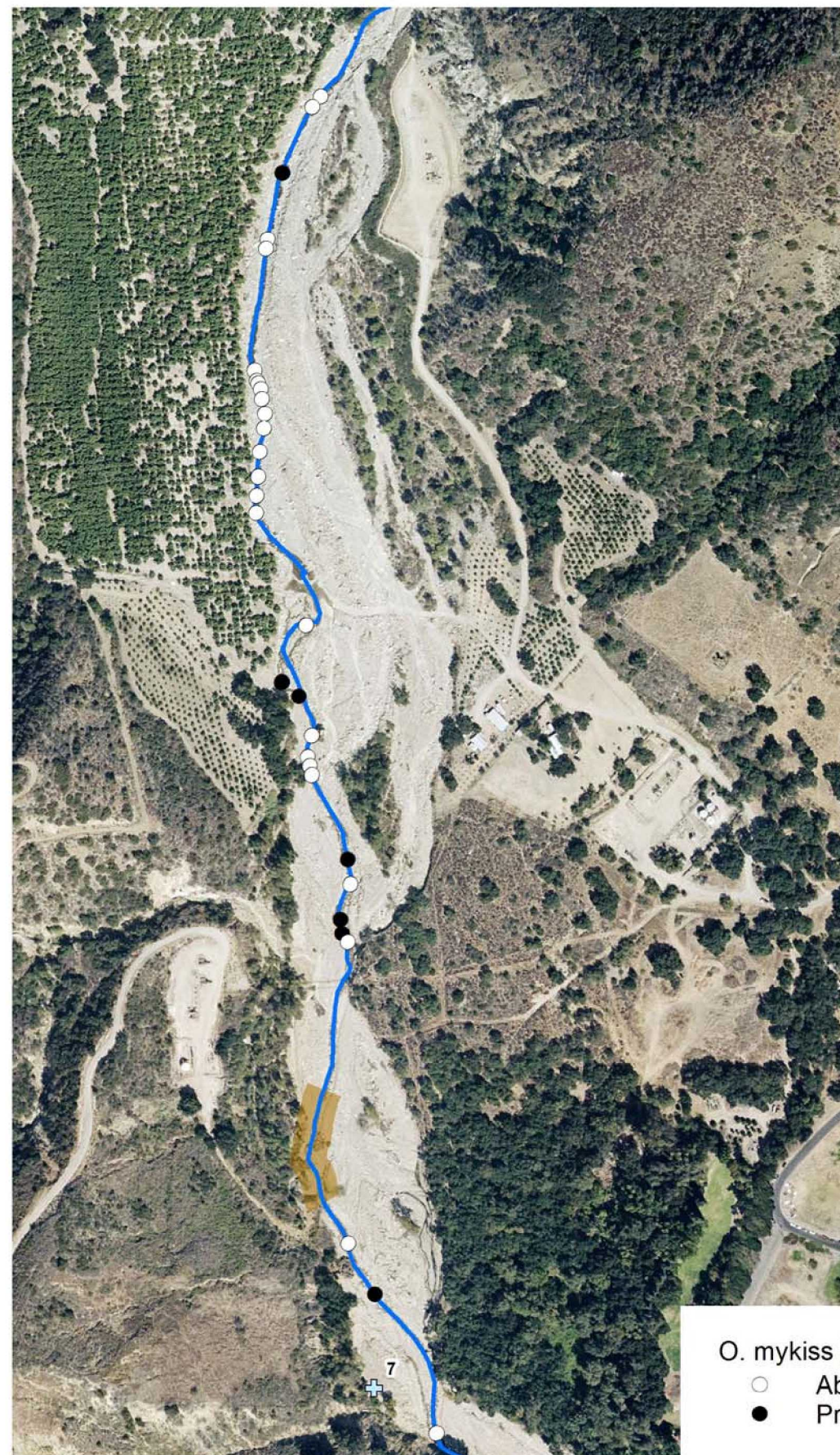
Map 6. Age 1+ *O. mykiss* Distribution, May 2007.
Little Santa Paula Creek



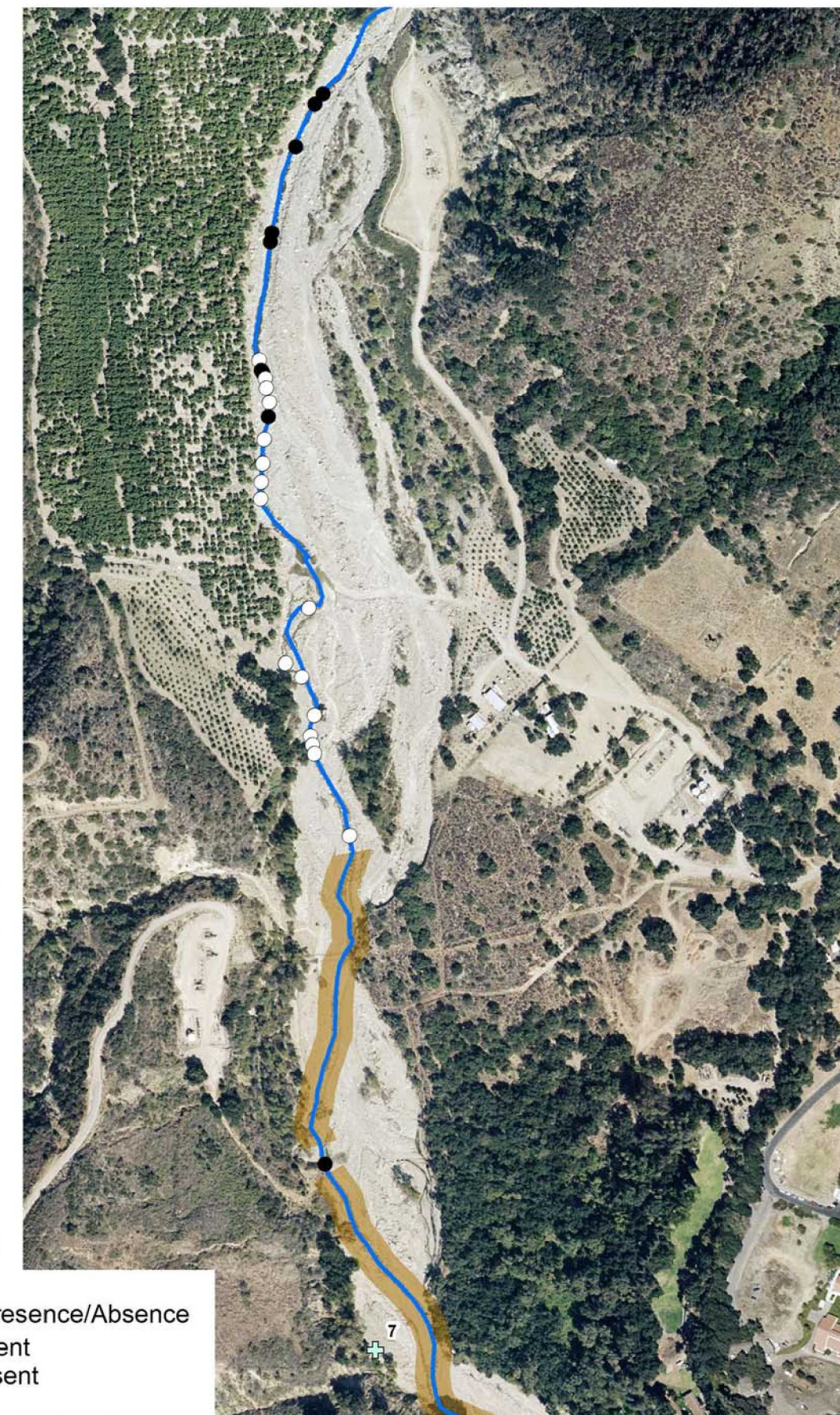
Maximum Daily Temperature May 2007



May 2007 Age 1+ Presence and Absence



November 2007 Age 0+ and 1+ Presence and Absence



— Santa Paula Creek
+ River Miles

— Dry Reaches

0 250 500 750 1,000 Feet



Map 7. *O. mykiss* Distribution and Maximum Daily Stream Temperature Comparisons.

Santa Paula Creek Fish Rescues (September 4 and 11, 2014)

Date: 9/4/2014

Participating Personnel (affiliation): Dana McCanne (CDFW), Kate McLaughlin (PSMFC), Patrick Saldana (PSMFC), Terra Dressler (CDFW), Erin McCann (CDFW)

Results:

Species	# Rescued/collected	# Released	# Retained	# Mortalities
<i>O. mykiss</i>	16	16	0	0

Summary:

On September 4, 2014, the CDFW performed a fish rescue at Santa Paula Creek in the Santa Clara watershed. Trout (*O. mykiss*) were collected from drying isolated pools just behind Thomas Aquinas College at 34.42966°N, -119.09052°W. The main rescue pool was 17.23°C with a conductivity of 0.08 ms/cm and 7.65 mg/l dissolved oxygen. The main rescue pool was 4m long and 3m wide with a maximum depth of 0.3m. Fish were captured by electro-fishing and transported upstream in buckets. No mortalities occurred during collection, transport, or release of the trout to the relocation pool. Lengths of each fish were taken and genetic samples were taken from 7 fish in the form of fin clips. The fish were relocated to a step pool upstream of the rescue site at 34.44571°N, -119.06346°W. The pool had a length of 4m, an average width of 3.05m, and a maximum depth of 0.52m. The water quality was 19.25°C, 0.648ms/cm conductivity, and 8.77 mg/l dissolved oxygen. The fish ranged from 59mm to 137mm in length.

Date: 9/11/2014

Participating Personnel (affiliation): Dana McCanne (CDFW), Tim Hovey (CDFW), John O'Brian (CDFW), Sam Bankston (PSMFC), Tom VanMeeuwen (PSMFC), Ben Lakish (PSMFC), Kate McLaughlin (PSMFC), Patrick Saldana (PSMFC), Erin McCann (CDFW), Terra Dressler (CDFW)

Results:

Species	# Rescued/collected	# Released	# Retained	# Mortalities
<i>O. mykiss</i>	96	95	1	1
<i>C. santaanae</i>	24	24	0	0

Summary:

On September 11, 2014, CDFW performed a fish rescue at Santa Paula Creek in the Santa Clara watershed. *O. mykiss* and *C. santaanae* were collected from a pool located behind the Thomas Aquinas College (34.42956, -119.09068). This pool had a significant decrease in depth and was in immediate risk of drying up. On the day of the rescue, the rescue pool had a max depth of 0.67m, a length of 12.2m, and an average width of 2.3m. The temperature was 59.4 °C, dissolved oxygen was 9.76mg/l, and conductivity was 0.831mS/cm. The rescue team used a combination of

electrofishing and seining as the primary methods for fish capture. Once the fish were collected, they were transported in buckets equipped with aerators to a series of relocation pools.

A total of 96 *O. mykiss* ranging in size from 50mm to 225mm were collected from the rescue pools including one mortality. Therefore 95 *O. mykiss* were released into the relocation pools while the deceased trout was brought back to the lab. The relocation site is a 0.34 mile stretch of the creek located approximately 2.18 miles upstream of the rescue pool. This stretch consists of several pools that are very well connected. Due to the large quantity of fish captured during this rescue, we chose three relocation pools within this 0.34 mile stretch. At Site 1 (34.44572, -119.06354), 20 *O. mykiss* were released (size range = 53mm to 89mm). No genetics were taken of these fish due to their small size. At Site 2 (34.44496, -119.06476), 44 *O. mykiss* were released (size range = 55mm to 184mm). Genetics were taken from nine of these fish. At Site 3 (34.44827, -119.06057), the remaining 31 *O. mykiss* were released (size range = 50mm to 225mm). No genetics were taken of these fish due to the fact that we ran out of genetics collection materials. This information, along with pool measurements and water quality measurements for each of the relocation sites can be found in the table on the next page.

A total of 24 *C. santaanae* were collected from the rescue pools. The relocation pool for these fish is located approximately 1.3 miles upstream of the rescue pools. Tim Hovey and John O'Brian released 21 of the suckers into their designated relocation pool. They also took genetics samples of all 21 of these fish. Once we reached the steelhead relocation sites, we realized that three Santa Ana suckers remained in the *O. mykiss* buckets. We released one of them into Relocation Site 2 while the final two were released into Relocation Site 3. No genetics were taken on these final three *C. santaanae*. Pool measurements and water quality measurements of the *C. santaanae* Relocation Pool can be found in the table below.

The pool measurements and water quality at all relocation sites will continue to be monitored by CDFW in order to ensure the wellbeing of these fish.

Relocation Site	Number of <i>O. mykiss</i> released	Number of <i>C. santaanae</i> released	Size range	Max Depth	Average Depth	Length	Average Width	Temperature	Dissolved Oxygen	Conductivity
1	20	0	53 – 89mm	0.55m	0.30m	3.96m	3.05m	18.19 °C	9.56 mg/l	0.665 mS/cm ^c
2	44	1	55 – 184mm	0.55m	0.24m	9.14m	3.66m	20.44 °C	8.4 mg/l	0.675 mS/cm ^c
3	31	2	50 – 225mm	1.10m	0.55m	10.67m	2.44m	18.44 °C	9.28 mg/l	0.667 mS/cm ^c
C. santaanae Relocation Pool	0	21	--	0.79m	0.43m	16.46m	2.44m	--	--	--

Map of Rescue and Relocation Sites at Santa Paula Creek:





Steelhead Pre-Rescue Data Form

Fill in form to the maximum extent feasible. If information is not readily available, place 'NA' in the field. Additional data collection may be necessary prior to determining if a rescue is warranted. Please call Rick @ 562.980.3562 to relay this information, and email form to: Long_Beach_Steelhead_Team@noaa.gov.

1. Date of First Steelhead Observation: 5/14/2014 TIME: _____
2. Date of Follow Up Observation: 9/2/2014 TIME: 12:00

3. Point of Contact (include both NMFS & CDFG staff person contacted):

NAME: Benjamin Larkish DATE/TIME: 9/3/2014 10:00
AFFILIATION: CDFW/PSMFC PHONE: 218 256 6151
NMFS CONTACT: Rick Bush CDFG CONTACT: Dana McCanne

4. Location of Proposed Rescue Site:

WATERSHED: Santa Clara STREAM: Santa Paula
ACCESS: Behind Thomas Aquinas College GPS: 34.43009 -119.09068

5. Reason for Rescue Situation (i.e., loss of flow, anthropogenic cause, pool drying up, etc.):

loss of flow. pool isolated

6. Estimated time before fish rescue needs to occur:

WEEKS: _____ DAYS: 1 HOURS: _____

7. Number of steelhead observed in each size class: (Guesstimate or Actual Count)

>400 mm: _____ 200-400 mm: _____ <200 mm: 5-10

8. Rescue Habitat (circle one): POOL / GLIDE / RIFFLE

Maximum Depth: 0.3m Average depth: 0.18m

Length: 4m Average Width: 3m

Temperature (@ 0.3m above substrate): 17.7°C Time of Day: 8/27/2014 10:30

Can you install a temperature logger (@ 0.3m above substrate)? YES / NO When? _____

Dissolved Oxygen: 4.5 mg/l Conductivity: 0.868 mS/cm

Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGE

Flow entering habitat? No Inflow channel width: _____ Inflow depth: _____

9. Feasibility of Capture (circle one): High / Medium / Low

Potential Problems for Capture: Excessive Depth / Boulder-Riprap / Large Area / Access

10. Proposed relocation areas (Up/Downstream, GPS, length, width, max depth, temp, DO, inflow?):

a.) 34.44571 -119.06346 See additional Word Document

b.) 4m length, 3m width, 0.4m Ave Depth, 0.6m Max Depth 20.5°C, 8.5mg/l DO, good in flow.



Steelhead Relocation Data Form

Capture Site Information

Location: 34.42966° N, -119.09052° W

Rescue Date: 09/04/14 Time Period: 9:45 - 13:17

Personnel Present During Rescue (Affiliation):

Dana McCarne Kate McLaughlin Patrick Saldana
Terra Dressler Erin McCann

Flow entering habitat? none Inflow channel width: none Inflow depth: none

Max depth: 0.3 m Length: 4 m Width: 3 m

Temp: 17.23 °C DO: 7.65 mg/l Cond: 0.0800 ms/cm

Capture: Seine / Dip Net / E-fishing (Initial V: 100 Hz: 20 Pulse: Duty Cycle: 15)

Steelhead Transported in: Cooler w/ aerator / Buckets / Hatchery Truck

Number of Steelhead Rescued: ADULTS 0 SMOLTS 0 PARR/FRY 16

Observed Mortalities: ADULTS 0 SMOLTS 0 PARR/FRY 0

Tissue Samples Taken: YES / NO Description: 7 caudal fin clippings

Relocation Site Information

Same Watershed: YES / NO Relocate (circle one): Upstream / Downstream / Estuary / Ocean

Location Description: Pool w/ bubble curtain @ head; 20% cover from boulders

Access: Santa Paula Creek trail. 1.3 mi from oil rigs

GPS Coordinates: 34.44571, -119.06346

Relocation Habitat Type (circle one): POOL / GLIDE / RIFFLE

Maximum Depth: 0.52 m Average depth: 0.3 m

Length: 4.0 m Average Width: 3.05 m

Temperature (@ 0.3 m above substrate): 19.25 °C Time of Day: 13:17

Temperature Logger Installed: Y / N Description:

Dissolved Oxygen: 8.77 mg/l Time of Day: 13:17

Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGE

Will site monitoring occur: Y / N Who will monitor: CDFW

Description of monitoring activities: water quality and measurements

Comments: Picture # 2641 - 2643

NMFS STEELHEAD CAPTURE & MONITORING FORM

DATE 9/4/14 CREW Dana McCanne, Kate McLaughlin
 WATERSHED Santa Clara TEMP 19.25 °C DO 8.77 mg/L COND 0.048 uS/cm
 TRIBUTARY Santa Paula Creek LAT 34.44571 LONG -119.06346
 REACH _____ CAPTURE METHOD E-fishing
 FINAL SETTINGS (V, Hz, Pulse, Duty Cycle) 100V, 20 Hz, Std pulse, 25 duty cycle EFFORT 8125 sec

Steelhead Data

Fish #	Fork Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
✓ 1	137		Pic # 2629; Genetics
✓ * 2	122		Pic # 2633; Genetics
✓ * 3	111		Pic # 2636; Genetics
✓ 4	128		Pic # 2637; Genetics
✓ 5	105		No Picture; Genetics
6	62		No Picture
7	65		No Picture
8	64		No Picture
9	59		No Picture
10	97		No Picture
11	74		No Picture
12	87		No Picture
13	102		No Picture
14	94		No Picture
✓ 15	109		No Picture; Genetics
✓ 16	115		Pic # 2640; Genetics
17			
18			
19			
20			
21			
22			
23			
24			
25			

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			

* indicates scale sample collected from fish

✓ indicates DNA sample collected from fish

_____ = Page total scale samples

7 = Page total DNA samples



Steelhead Pre-Rescue Data Form

Fill in form to the maximum extent feasible. If information is not readily available, place 'NA' in the field. Additional data collection may be necessary prior to determining if a rescue is warranted. Please call Rick @ 562.980.3562 to relay this information, and email form to: Long_Beach_Steelhead_Team@noaa.gov.

1. Date of First Steelhead Observation: 5/14/2014 TIME: _____
2. Date of Follow Up Observation: 9/8/2014 TIME: 12:30
3. Point of Contact (include both NMFS & CDFG staff person contacted):
NAME: Thomas Van Meeuwen DATE/TIME: 9/9/2014, 10:00
AFFILIATION: CDFW/PSMFC PHONE: (805)636-0545
NMFS CONTACT: Rick Bush CDFG CONTACT: Dana McCarne
4. Location of Proposed Rescue Site: _____
WATERSHED: Santa Clara STREAM: Santa Paula
ACCESS: Behind Thomas Aquinas College GPS: 34.42956°N, -119.09068°W
5. Reason for Rescue Situation (i.e., loss of flow, anthropogenic cause, pool drying up, etc.):
pool drying up
6. Estimated time before fish rescue needs to occur:
WEEKS: _____ DAYS: 1 HOURS: _____
7. Number of steelhead observed in each size class: (Guesstimate or Actual Count)
>400 mm: _____ 200-400 mm: _____ <200 mm: 10-15
8. Rescue Habitat (circle one): (POOL) / GLIDE / RIFFLE
Maximum Depth: 0.52m Average depth: 0.37m
Length: 12.5m Average Width: 2.1m
Temperature (@ 0.3m above substrate): 18.8°C Time of Day: 12:30 pm
Can you install a temperature logger (@ 0.3m above substrate)? YES / (NO) When? _____
Dissolved Oxygen: 11.04 mg/l Conductivity: 0.813 mS/cm^c
Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGE
Flow entering habitat? yes Inflow channel width: 0.15m Inflow depth: 0.03m
9. Feasibility of Capture (circle one): (High) / Medium / Low
Potential Problems for Capture: Excessive Depth / Boulder-Riprap / Large Area / Access
10. Proposed relocation areas (Up/Downstream, GPS, length, width, max depth, temp, DO, inflow?):
a.) 34.44571, -119.06346 4m length, 3m width, 0.4m avg. depth,
b.) 0.6m max. depth 20.5°C, 8.5 mg/l DO, good inflow



STEELHEAD RELOCATION DATA FORM

Capture Site Information

Location: Santa PaulaRescue Date: 9/11/2014 Time Period: 8:30 am - 1300

Personnel Present During Rescue (Affiliation):

Tim Hovey (CDFW) John O'Brian (CDFW) Sam Barkston (PSMFC)
Tom VanMeeuwen (PSMFC) Patrick Saldaña (PSMFC) Dana McCanne (CDFW)

Flow entering habitat? yes, trickle Inflow channel width: 0.4 ft Inflow depth: 0.1 ftMax depth: 0.67 m Length: 12.2 m Width: 2.3 mTemp: 59.4 °F DO: 9.76 mg/L Cond: 0.831 mS/cm^cCapture: Seine / Dip Net / Electrofishing (Initial V: 100 Hz: 20 Pulse: Std Duty Cycle: 20)Steelhead Transported in: Cooler w/ aerator / Buckets / Hatchery TruckNumber of Steelhead Rescued: >400 mm _____ 200-400 mm _____ <200 mm 95Observed Mortalities: >400 mm _____ 200-400 mm _____ <200 mm 1Tissue Samples Taken: YES / NO Description: Caudal Fin Clips for genetics

Relocation Site Information

Same Watershed: YES / NO Relocate (circle one): Upstream / Downstream / Estuary / Ocean

Location Description: _____

Access: Road off Thomas Aquinas College - 1.5 mi hike up trailGPS Coordinates: 34.44572, -119.06354 (Site #1)Relocation Habitat Type (circle one): POOL / GLIDE / RIFFLEMaximum Depth: 0.55 m Average depth: 0.3 mLength: 3.9 m Average Width: 3.0 mTemperature (@ 0.3m above substrate): 64.74 °F Time of Day: 1030Temperature Logger Installed: Y / (N) Description: _____Dissolved Oxygen: 9.56 mg/L Time of Day: 1030Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGEWill site monitoring occur: (Y) / N Who will monitor: CDFWDescription of monitoring activities: Measurements + water qualityComments: Relocated fish to 3 different sites (each page of this form represents each relocation site)Took total lengths on fish

STEELHEAD CAPTURE & MONITORING FORM

DATE 9/11/14
 WATERSHED Santa Clara
 TRIBUTARY Santa Paula
 REACH _____

CREW Ben Lakish, Patrick Saldaña, Terra Dressler, Erin McCann
 TEMP 64.74 °F DO 9.56 mg/L COND 0.665 uS/cm
 LAT 34.44572 LONG -119.06354
 CAPTURE METHOD E-fish, seine

FINAL SETTINGS (V, Hz, Pulse, Duty Cycle) 100, 30, std, 30 EFFORT 1880 sec

(Relocation Site #1)

Steelhead Data

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
1	53		
2	73		
3	74		
4	74		
5	83		
6	72		
7	62		
8	57		
9	74		
10	75		
11	65		
12	82		
13	71		
14	73		
15	78		
16	77		
17	64		
18	65		
19	75		
20	89		
21			
22			
23			
24			
25			

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			

*indicates scale sample collected from fish

✓indicates DNA sample collected from fish

_____ = Page total scale samples

_____ = Page total DNA samples



STEELHEAD RELOCATION DATA FORM

Capture Site Information

Location: Santa PaulaRescue Date: 9/11/14

Time Period: _____

Personnel Present During Rescue (Affiliation): _____

Flow entering habitat? _____ Inflow channel width: _____ Inflow depth: _____

Max depth: _____ Length: _____ Width: _____

Temp: _____ DO: _____ Cond: _____

Capture: Seine / Dip Net / Electrofishing (Initial V: _____ Hz: _____ Pulse: _____ Duty Cycle: _____)

Steelhead Transported in: Cooler w/ aerator / Buckets / Hatchery Truck

Number of Steelhead Rescued: >400 mm _____ 200-400 mm _____ <200 mm _____

Observed Mortalities: >400 mm _____ 200-400 mm _____ <200 mm _____

Tissue Samples Taken: YES / NO Description: _____

Relocation Site Information

Same Watershed: (YES) / NO Relocate (circle one): Upstream / Downstream / Estuary / Ocean

Location Description: _____

Access: Pool 1.5 mi up from road leading to trail from ThomasGPS Coordinates: 34.44496, -119.06476 (Site #2) Aguinas CollegeRelocation Habitat Type (circle one): POOL / GLIDE / RIFFLEMaximum Depth: 0.55m Average depth: 0.24mLength: 9.1m Average Width: 3.6mTemperature (@ 0.3m above substrate): 68.8 °F Time of Day: 1130Temperature Logger Installed: Y / (N) Description: _____Dissolved Oxygen: 8.4 mg/l Time of Day: 1130Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGEWill site monitoring occur: (Y) / N Who will monitor: CDFWDescription of monitoring activities: Measurements + water qualityComments: This is Relocation site #2(See page 1 for Rescue site info)

STEELHEAD CAPTURE & MONITORING FORM

DATE 9/11/14
 WATERSHED Santa Clara
 TRIBUTARY Santa Paula
 REACH _____

CREW BL, PS, TD, EM
 TEMP 68.8 °F DO 8.4 mg/L COND 0.675 uS/cm
 LAT 34.44496 LONG -119.06476
 CAPTURE METHOD E-fish/Seining

FINAL SETTINGS (V, Hz, Pulse, Duty Cycle) 100, 30, Std., 30 EFFORT 1880 sec

(Relocation Site # 2)

Steelhead Data

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
21	71		
22	132		✓ Genetics
23	184		✓ Genetics
24	112		✓ Genetics
25	112		
26	84		
27	104		
28	106		
29	124		✓ Genetics
30	117		
31	116		
32	114		
33	113		
34	121		✓ Genetics
35	101		
36	67		
37	97		
38	130		✓ Genetics
39	127		✓ Genetics
40	138		✓ Genetics
41	124		
42	115		
43	123		
44	109		
45	93		

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
46	69		
47	108		
48	106		
49	110		
50	99		
51	129		✓ Genetics
52	58		
53	70		
54	67		
55	62		
56	65		
57	108		
58	71		
59	55		
60	77		
61	67		
62	83		
63	70		
64	72		
45			
46			
47			
48			
49			
50			

*indicates scale sample collected from fish

✓ indicates DNA sample collected from fish

_____ = Page total scale samples

_____ = Page total DNA samples



STEELHEAD RELOCATION DATA FORM

Capture Site Information

Location: Santa PaulaRescue Date: 9/11/14 Time Period: _____

Personnel Present During Rescue (Affiliation): _____

Flow entering habitat? _____ Inflow channel width: _____ Inflow depth: _____

Max depth: _____ Length: _____ Width: _____

Temp: _____ DO: _____ Cond: _____

Capture: Seine / Dip Net / Electrofishing (Initial V: _____ Hz: _____ Pulse: _____ Duty Cycle: _____)

Steelhead Transported in: Cooler w/ aerator / Buckets / Hatchery Truck

Number of Steelhead Rescued: >400 mm _____ 200-400 mm _____ <200 mm _____

Observed Mortalities: >400 mm _____ 200-400 mm _____ <200 mm _____

Tissue Samples Taken: YES / NO Description: _____

Relocation Site Information

Same Watershed: YES / NO Relocate (circle one): Upstream Downstream / Estuary / Ocean

Location Description: _____

Access: Pool 1 3/4 mi up from road leading to trail from ThomasGPS Coordinates: 34.44816, -119.06059 (Site #3)Aguias
CollegeRelocation Habitat Type (circle one): POOL / GLIDE / RIFFLEMaximum Depth: 1.1 m Average depth: 0.54 mLength: 10.7 m Average Width: 2.4 mTemperature (@ 0.3m above substrate): 65.19 °F Time of Day: 1300Temperature Logger Installed: Y / N Description: _____Dissolved Oxygen: 9.28 mg/L Time of Day: 1300Cover Present (circle all that apply): LWD / RIPARIAN / BOULDER / UNDERCUT / BRIDGEWill site monitoring occur: Y / N Who will monitor: CDFWDescription of monitoring activities: measurements + water qualityComments: This is Relocation site #3(See page 1 for Rescue site info)

STEELHEAD CAPTURE & MONITORING FORM

DATE 9/11/15
 WATERSHED Santa Clara
 TRIBUTARY Santa Paula
 REACH _____

CREW BL, PS, TD, EM
 TEMP 65.19 °F DO 9.28 mg/L COND 0.667 uS/cm
 LAT 34.44816 LONG -119.06059
 CAPTURE METHOD e-fish / seine

FINAL SETTINGS (V, Hz, Pulse, Duty Cycle) 100, 30, Std., 30 EFFORT 1880 sec

(Relocation Site #3)

Steelhead Data

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
65	114		
66	150		
67	150		
68	130		
69	72		
70	120		
71	130		
72	150		
73	180		
74	110		
75	70		
76	95		
77	110		
78	80		
79	115		
80	70		
81	85		
82	225		
83	155		
84	105		
85	100		
86	95		
87	110		
88	60		
89	98		

Fish #	Length (mm)	Weight (g)	Mark / Tag / Comment (PIT = last 10 digits)
90	70		
91	135		
92	90		
93	65		
94	155		
95	50		
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			

*indicates scale sample collected from fish

✓indicates DNA sample collected from fish

_____ = Page total scale samples

_____ = Page total DNA samples

ANALYST:

Form # 1 of 2

Water Flow (cfs): 2.5

Age Code: 1 = new; 2 = Previously ID'd & measurable; 3 = Can't measure but visible; 4 = No redd only flag; 5 = Poor conditions can't see substrate

[illegible]

Notes: START: 34.42945, -119.09122
34.42945, -119.09070
Main rescue pool Temp: 57.84°F DO: 7.8 mg/L Pies: 6-11

U.S. Rescue Pool
34.4301 - 119.0708 PIC 12/8/13 Temp: 57.48°F DO: 6.9 mg/L
END: 34.4301 6A - 119.07790

~~Canon~~ ~~APS~~ ~~VSL~~ ~~Studio Red~~ ~~thermometers~~

* Denotes data to record for a hatch observation

Date: 1/26/15

Creek Name/Reach: SP/

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin & bones no head; L= Live.

Surveyor(s): TD EM LG

[illegible]

Notes:

[illegible]

Form # 1 of 2

54

Age Code: 1= new; 2 = Previously ID'd & measurable; 3= No redd only flag; 5= Poor conditions can't see substrate

[illegible]

DROUGHT DATA

[illegible]

Notes

Notes

Star+@ 34.43966, -119.07790 End @ Purch bowl 34.44904, -119.05663

Photos 20-22 - metal barrier @ purch bowl

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermometers	181		
------	--------	-----	-------	------------	---------	--------------	-----	--	--

INDIVIDUAL & BATCH OBSERVATION FORM

* Denotes data to record for a batch observation

Form # 8 of 2

Date: 1/27/15

Creek Name/Reach: SP2

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s): EM TD

[illegible]

Notes:

[illegible][illegible]

Notes

Start @ 34.42915, -119.09094 Deer prints @ main wetland pool photos: 227 + 228

end @ Horseshoe pool 34.44531, -119.06803 (end survey due to rain)

Gear		
Camera	GoPro	Stadia Rod
GPS	Compass	Thermometers
	YSI	Hannah DO

* Denotes data to record for a batch observation

Date: _____ Creek Name/Reach: _____

Surveyor(s):

Notes:

SCAN
EM

Date: 2/26/15

Weather: partly cloudy

Creek Name/Reach: SP2 (second half)

Air Temp (°C): 58°F

Water Temp (°C): 52.7 F

Water Visibility: 999

Water Flow (cfs): 2 cfs

Surveyor(s): TD BH

Camera: black pentax

GPS Unit: Blossom

Age Code: 1= new; 2 = Previously ID'd & measurable; 3 = c
No redd only flag; 5= Poor conditions can't see substrate

[illegible]

DROUGHT DATA

[illegible]

Notes

start @ 34.44530 - 119.66805 (horseshoe)

End survey: 34.44872 - 119.05669

Redd #2: small redd, ~4 in seen near redd.

Gear	
Camera	
GPS	
GoPro	
Stadia Rod	
Compass	
Thermometers	
YSL	
Hannah DO	

8533

* Denotes data to record for a batch observation

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s): TD B/H

[illegible]

Notes:

Score 200

Form # 1 of 2

Weather: Sunny

Air Temp (°C): 56.5°F

Water Temp (°C): 53.5 F

Water Visibility: 999

Water Flow (cfs):

cfs

Surveyor(s): EM TD

Camera: Batman

GPS Unit: Buttercup

Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate

DROUGHT DATA

Notes

Start @ 34.92908, -119.69119

Maybe Redd??

43985 - 119.08014

5 mi U.S. of

possible kiddo 34.44512, -119.00859 (Just D.S. of Herselhoe) ← photos: 305-327

Redd #2

Scan

Scan FM

Date: 3/11/15

Weather: Overcast

Creek Name/Reach: SP2

Air Temp (°C): 63 °F

Water Temp (°C): 56.0°F

Water Visibility: 999

Water Flow (cfs): 2.0 cfs

Surveyor(s): TD FM

Camera: Batman

GPS Unit: Buttrick

Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4=

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0311001	34.44514, -119.06758	12	-	2.3	31	100	2	36	38	28	3	2	1	-	* 2 reds right next to each other
0311002	↓	12	-	2.5	29	60	2	30	30	26	2	1	1	-	* Focusing upstream, #1 is on the left #2 on right #328-330
0311003	34.44492, -119.06706	13	-	2	25	33	3	29	27	19	3	1	1	-	* possibly 2, overlapping? pic #332-334
0311004	34.44827, -119.06642	18	-	2.2	22	40	4	30	29	20	4	2	1	-	pic #337-338
0311005	34.44847, -119.06790	16	-	2	33	95	6	46	58	37	3	2	2	yes	Redd #1 from 2/26/11 possibly 3 overlapping reds
0311006	34.44953, -119.05676	12	-	2	20	40	4	27	18	12	2	1	1	-	ON the other side of channel from #5 pic of reds
0311007	↓	12	-	2	20	35	5	24	19	13	2	1	1	-	2 reds side against left right #8 looking US
0311008	34.44865, -119.05704	29	-	1.1	20	42	7	22	22	15	4	2	2	yes	Redd #2 from 2/26/15

DROUGHT DATA

[illegible]

Notes

START 34.44532, -119.06805 (Horseshoe) *NO COMPASS*
 (corner teams took them) possible red? 34.44873, -119.05955 (unclear)
 (check next time)

END 34.44905, -119.05666

Gear								
Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan

* Denotes data to record for a batch observation

Form # 2 of 2

Date: 3/11/15

Creek Name/Reach: S

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus;
4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s): TD EM

[illegible]

Notes:

Scanned 3/20/2015

DROUGHT DATA

Notes

End \Rightarrow 34.44210 -119.07603

Gear									
Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan	

*** Denotes data to record for a batch observation**

Form # 2 of 2

Creek Name/Reach: SP1

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s): TD, KE

[illegible]

1) Fish from in France pool #2, possibly suckers

2000

↑
SP1
↓
SP2
5 Reads
all
next
to
each-
other
old Redd
(#11)
pic 3x5-
3x8

Redd #16 not measurable b/c pot was covered by the tail spill of Redd #7

Gear									
Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan	

INDIVIDUAL & BATCH OBSERVATION FORM

* Denotes data to record for a batch observation

Form # 2 of 3

Date: 3/23/15 Creek Name/Reach: SP1/2

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus;
4= Carcass, skin & bones w head; 5= Carcass, skin & bones no head; L= Live.

Surveyor(s): EM JD

Fish Record Number (Individual Fish only)	GPS*	GPS Error (ft)*	Condition? (live? Spawmed?)	Species*	Sex (if fish on redd)	Length	Length type (FL, TL)	Fish on redd?	Comments* (for batch-length estimates, etc)
1	34.44453 -119.06937	± 8	live	Omykiss	-	2-4	FL	N	2 fish near Redd #3
2	34.44500 -119.06886	± 9	live	Omykiss	-	2-4	FL	N	3 fish
3	34.44530 -119.06802	± 9	live	Omykiss	-	2-4 +4	FL	N	2=2-4 1=4-6 Horse shoe pool
4	34.44521 -119.06757	± 9	live	Omykiss	-	2-4	FL	N	1 fish
5	34.44487 -119.06535	± 16	live	Omykiss	-	2-4	FL	N	2 fish
6	34.44546 -119.06397	± 7	live	Omykiss	-	2-4	FL	N	1 fish
7	34.44428 -119.06309	± 22	live	Omykiss	-	4-6	FL	N	1 fish
8	34.44785 -119.06232	± 10	live	Omykiss	-	2-4 4-6	FL	N	1 2-4 1 4-6
9	34.44786 -119.06220	± 20	live	Omykiss	-	4-6	FL	N	1 fish
10	34.44861 -119.05695	± 12	live	Omykiss	-	2-4	FL	N	1 fish

Notes:

DROUGHT REDD SURVEY FORM

SCOTT
9/11/15

Form # 3 of 3

Date: 8/23/15	Weather: Sunny	Water Temp (°C): 55 F		Water Visibility: 999	Water Flow (cfs): 2
Creek Name/Reach: SP2	Air Temp (°C): 63 F	GPS Unit: Tabbles		Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate	
Surveyor(s): EM TD	Camera: Batman				

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture file #, fish on?, etc)
0311003	34.44498 -119.06705	± 22	50	2	22	39	3	27	30	26	4	1	2	Y	Old redd right of new redd (#10) when factored U.S.
0323009	34.44753 -119.06164	± 14	180	4	31	32	4	23	34	27	1	0.25	1	-	Pic: 369-370
0311004	34.44823 -119.06042	± 21	345	2.2	33	37	2	23	30	24	3	1	2	Y	
0226001	34.44854 -119.06001	± 20	-	2	-	-	-	-	-	-	-	-	3	N	
0311005	↓	↓	-	2	-	-	-	-	-	-	-	-	3	N	
0323010	34.44865 -119.05943	± 21	42	2.4	28	44	3	32	27	24	2	1	1	-	Pics: 371-373
0311006	34.44954 -119.05867	± 13	136	2	-	-	-	-	-	-	-	-	3	N	
0311007	↓	↓	136	2	19	22	5	18	17	13	2	1	2	Y	
0323011	34.44950 -119.05853	± 35	125	3	31	48	6	29	28	24	3	1	1	-	Pics: 374-377
0226002	34.44861 -119.05702	± 12	248	1.2	29	31	8	22	20	16	4	2	2	Y	

DROUGHT DATA

DO	Temp	GPS	Relocation Pool #1	Relocation Pool #2	Relocation Pool #3										
			34.44498 -119.06478	34.44571 -119.06347	34.44810 -119.06058										
	58.94 F		59.44 F	60.20 F											
	10.71 m/L		10.68 m/L	11.38 m/L											

Notes: End @ 34.44867, -119.05672

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan
------	--------	-----	-------	------------	---------	---------------	-----	-----------	------

Scor

[illegible]

END at redd #2

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan	
------	--------	-----	-------	------------	---------	---------------	-----	-----------	------	--

Scam Jam

* Denotes data to record for a batch observation

Creek Name/Reach: SP1

Surveyor(s): TD Elm

[illegible]

17

Date:	4/6/15	Weather:	sunny	Form #	2	of	4								
Creek Name/Reach:	SPI/SPT	Air Temp (°C):	65°F	Water Temp (°C):	57°F	Water Visibility:	999	Water Flow (cfs):	2						
Surveyor(s):	EM TD JT	Camera:	Batman	GPS Unit:	Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate									
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date:	4/6/15	Weather:	sunny	Form #	2	of	4								
Creek Name/Reach:	SPI/SP2	Air Temp (°C):	65°F	Water Temp (°C):	57°F	Water Visibility:	999	Water Flow (cfs):	2						
Surveyor(s):	EM TD JT	Camera:	Batman	GPS Unit:	Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate									
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date:	4/6/15	Weather:	sunny	Form #	2	of	4								
Creek Name/Reach:	SPI/SPT	Air Temp (°C):	65°F	Water Temp (°C):	57°F	Water Visibility:	999	Water Flow (cfs):	2						
Surveyor(s):	EM TD JT	Camera:	Batman	GPS Unit:	Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate									
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date:	4/6/15	Weather:	sunny	Form #	2	of	4								
Creek Name/Reach:	SPI/SPT	Air Temp (°C):	65°F	Water Temp (°C):	57°F	Water Visibility:	999	Water Flow (cfs):	2						
Surveyor(s):	EM TD JT	Camera:	Batman	GPS Unit:	Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate									
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date: 4/6/15	Weather: sunny	Form # 2 of 4													
Creek Name/Reach: SPI/SPT	Air Temp (°C): 65°F	Water Temp (°C): 57°F	Water Visibility: 999	Water Flow (cfs): 2											
Surveyor(s): EM TD JT	Camera: Batman	GPS Unit: Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate												
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date: 4/6/15	Weather: sunny	Form # 2 of 4													
Creek Name/Reach: SPI/SPT	Air Temp (°C): 65°F	Water Temp (°C): 57°F	Water Visibility: 999	Water Flow (cfs): 2											
Surveyor(s): EM TD JT	Camera: Batman	GPS Unit: Blossom	Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate												
Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323002	34.44253, -119.07094	±19											2	2	
0323003	34.44458, -119.06943	±12											2	2	
0323004	34.44521, -119.06757	±12											2	2	
0311001													3	-	
0311002													3	-	
03122005													3	-	
0323006													3	-	
0323007													2	2	
0311003	34.44495, -119.06709	±14											2	2	
0323008													2	2	

Date: 4/6/15

Form # 3 of 4

Water Flow (cfs):

Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flav; 5= Poor conditions can't see substrate

[illegible][illegible]

Notes

[illegible]

* Denotes data to record for a batch observation

Form # 4 of 4

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= carcass, no eye, heavy fungus;
4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s):

[illegible]

Notes:

Scanned 11/6/2017

DROUGHT DATA

Notes

Notes

* Denotes data to record for a batch observation

Form # 2 of 4

Date: 14 April 2015

Creek Name/Reach: SP1

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Surveyor(s): G, D

[illegible]

Notes:

Scanned by

DROUGHT DATA

Notes

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan	
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* Denotes data to record for a batch observation

Date: _____

Creek Name/Reach: _____

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

**Fish Record Number
(Individual Fish only)**

GPS*

GPS Error
(ft)*

Condition?
(live?
Spawned?)

Species*

Sex (it
fish on
redd)

Length

Length
type
(FL, TL)

Fish on
redd?

Comments* (for batch-length estimates, etc)

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119.07685

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Mykiss

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* Denotes data to record for a batch observation

Form # 6 of 6

Date: 14 April 2015

Creek Name/Reach: Sp

Condition: 1 = Carcass, fresh eye; 2 = Carcass, cloudy eye; 3 = Carcass, no eye, heavy fungus; 4 = Carcass, skin & bones w head; 5 = Carcass, skin & bones no head; 1 = Live.

Surveyor(s): LG, TD

[illegible]

Notes:

DROUGHT REDD SURVEY FORM

Date: 4/15/15

Weather: sunny

Form # 1 of 4

Creek Name/Reach: SP2

Air Temp (°C): 67°F

Water Temp (°C): 54°F

Water Visibility: 999

Water Flow (cfs): 1 cfs

Surveyor(s): TD BL

Camera: Batman

GPS Unit: Blossom

Age Code: 1= new; 2= Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0323004	34.44513, -119.06358	26	90°	2	18	30	2.5	21	20	14	1.5	0.7	2	4	
0311001													3		
0311002													3		
0323005													3		
0323006													3		
0323007													2	N	
0311003	34.44492, -119.06309	21	60°										3		
0323008													3		
0415001													1		
0323009	34.44449, -119.06162	65											4		pic # 0513-0514

DROUGHT DATA

	Rescue Pool #1	Rescue Pool #2	Relocation Pool #1	Relocation Pool #2	Relocation Pool #3										
GPS	34.42950, -119.09070	34.43003, -119.09058	34.44494, -119.06181	34.44576, -119.06343	34.44795, -119.06068										
Temp	56.04°F	56.39°F	58.63°F	59.85°F	61.32°F										
DO	9.53 mg/l	8.01 mg/l	10.61 mg/l	10.61 mg/l	10.15 mg/l										

Notes

start @ 34.41524, -119.06804 (horseshoe)

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan
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* Denotes data to record for a hatch observation

Form # 1 of 43

Surveyor(s):

[illegible]

REDD SURVEY FORM

Date: 4/15/15

Weather: 51 mm

10

Creek Name/Reach: S77

Air Temp (°C): 16.8°C

Water Temp (°C): 26.1

Michael V. Smith

Form

Surveyor(s): TD R1

Camera:

emp (c).

GPS Unit.

Age Code: 1= new; 2 = Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate

[illegible]

Notes:

Gear
Camera
GPS
GoPro
Stadia Rod
Compass
Thermometers
Scan

DROUGHT REDD SURVEY FORM

Date: 4/27/15

Weather: windy, sunny

Form # 1 of

Creek Name/Reach: SP1

Air Temp (°C): 71°F

Water Temp (°C): 58°F

Water Visibility: 999

Water Flow (cfs): 1.5 cfs

Surveyor(s): TD BH KE

Camera: Robin

GPS Unit: Blossom

Age Code: 1= new; 2= Previously ID'd & measurable; 3= Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0402001	34.43649, -119.08129	9	-	-	-	-	-	-	-	-	-	-	3	2	
0402002	34.43682, -119.08126	9	-	-	-	-	-	-	-	-	-	-	3	2	
0414001	34.43819, -119.08114	9	-	-	-	-	-	-	-	-	-	-	3	2	
0414002													3	2	
0414003													3	2	
0309001	34.43885, -119.08115	9	-	-	-	-	-	-	-	-	-	-	4	2	
0309002	34.43905, -119.08435	9	-	-	-	-	-	-	-	-	-	-	4	2	
0319001	34.43921, -119.08411	9	-	-	-	-	-	-	-	-	-	-	4	2	
0406001, 0406002	34.43943, -119.08320	9	-	-	-	-	-	-	-	-	-	-	4,4	2	
0406003													4	2	

DROUGHT DATA

DO	Temp	GPS	Rescue Pool #1	Rescue Pool #2											
6.92mg/l	58.48°F	34.42947, -119.09068	34.43004, -119.09058												

Notes

Start @ 34.42913, -119.09116 ± 9

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan
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REDD SURVEY FORM

Date: 4/27/15		Weather: windy, sunny		Form # 2 of 1	
Creek Name/Reach: SP1		Air Temp (°C): 72°F		Water Temp (°C): 59°F	
Surveyor(s): TD BH KE		Camera: Robin		GPS Unit: B1055 am	
Redd Record Number		GPS Coordinates		GPS Error (ft)	
0406004		34.43945, -119.08303		9	
0414004		34.43956, -119.08277		9	
0414005		34.43955, -119.08114		9	
0414006		34.43976, -119.08044		9	
0309003		34.43969, -119.07964		9	
0406005		34.43975, -119.07750		9	
0414008		34.44029, -119.07688		9	
0414009		34.44080, -119.07683		9	
0427001		34.44183, -119.07480		9	
0427002		32°		9	

Notes:

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermometers	Scan
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REDD SURVEY FORM

Date: 4/29/15 Weather: Sunny Form # 8 of 4

Creek Name/Reach: SPB Air Temp (°C): 14.5 Water Temp (°C): 14 Water Visibility: 999 Water Flow (cfs): 627.5

Surveyor(s): TD BHK Camera: Robin GPS Unit: Blossom Age 1 = 1st year, 2 = 2nd year, 3 = 3rd year, 4 = 4th year, 5 = 5th year, 6 = 6th year, 7 = 7th year, 8 = 8th year, 9 = 9th year, 10 = 10th year, 11 = 11th year, 12 = 12th year, 13 = 13th year, 14 = 14th year, 15 = 15th year, 16 = 16th year, 17 = 17th year, 18 = 18th year, 19 = 19th year, 20 = 20th year, 21 = 21st year, 22 = 22nd year, 23 = 23rd year, 24 = 24th year, 25 = 25th year, 26 = 26th year, 27 = 27th year, 28 = 28th year, 29 = 29th year, 30 = 30th year, 31 = 31st year, 32 = 32nd year, 33 = 33rd year, 34 = 34th year, 35 = 35th year, 36 = 36th year, 37 = 37th year, 38 = 38th year, 39 = 39th year, 40 = 40th year, 41 = 41st year, 42 = 42nd year, 43 = 43rd year, 44 = 44th year, 45 = 45th year, 46 = 46th year, 47 = 47th year, 48 = 48th year, 49 = 49th year, 50 = 50th year, 51 = 51st year, 52 = 52nd year, 53 = 53rd year, 54 = 54th year, 55 = 55th year, 56 = 56th year, 57 = 57th year, 58 = 58th year, 59 = 59th year, 60 = 60th year, 61 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INDIVIDUAL & BATCH OBSERVATION FORM

* Denotes data to record for a batch observation

Form # 4 of 4

Date: 4/27/15

Creek Name/Reach: SR1

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin & bones no head; L= Live.

Surveyor(s): TD BH KE

Fish Record Number (Individual Fish only)	GPS*	GPS Error (ft)*	Condition? (live? Spawned?)	Species*	Sex (if fish on redd)	Length	Length type (FL, TL)	Fish on redd?	Comments* (for batch-length estimates, etc)
1	34.42947, -119.09068	9	live	Omykiss	-	4-6 in, 6-8 in	FL	N	10 fish (54-6, 5-68)
2	34.42980, -119.09053	11	live	Omykiss	-	2-4 in	FL	N	1 fish
3	34.43649, -119.08729	9	live	Omykiss	-	0-2 in	FL	N	1 fish (fry)
4	34.43879, -119.08476	9	live	Omykiss	-	0-2 in	FL	N	1 fish (fry)
5	34.43962, -119.08800	13	live	Omykiss	-	2-4 in	FL	N	2 fish
6	34.44233, -119.07664	12	live	Omykiss	-	2-4 in	FL	N	1 fish
7	34.44270, -119.07234	9	live	WPT	M	12.5 cm	-	-	Not captured (length not determined)
8	34.44393, -119.06998	9	live	Omykiss	-	2-4 in	FL	N	2 fish
9	34.44498, -119.06888	9	live	Omykiss	-	1-4 in, (3) 4-6 in (1)	FL	N	4 fish
9	34.44527, -119.06802	9	live	Omykiss	-	2-4 in, (3) 4-6 in, (4) 6-8 in (1)	FL	N	8 fish (Horseshoe pool)

Notes:

DROUGHT REDD SURVEY FORM

[illegible]

DROUGHT DATA

[illegible]

GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan
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Form # 3 of 7

* Denotes data to record for a batch observation

Date: _____ Creek Name/Reach: _____

Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin& bones no head; L= Live.

Survivor(s):

[illegible]

Notes:

Date: 26 May 2015

Creek Name/Reach: SD 1

Water Temp ($^{\circ}\text{C}$): 57.0

Water Visibility: 000

Water Flow (cfs): 0.5

Form # 1 of 2

Surveyor(s): LG, JT, EH

Camera: Robin

GPS Unit: *Blanco*

Age Code: 1= new; 2 = Previously ID'd & measurable; 3 = Can't measure but visible; 4= No redd only flag; 5= Poor conditions can't see substrate

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0414000 2015													4		
035977 2015	34.83969 -119.07967	11											4		
032372 2015	34.44181 -119.07480 34.44461 -119.06738	9 14									could not find reds		4?		Part of *flag ripped off (22) reds

DO	Temp	GPS
84.6%	59.81	RP 1
8.7 mg/L	60.25	RP2
7.25 mg/L		
30.60/g		

lotes

Gear									
Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan	

DROUGHT REDD SURVEY FORM

Date: 5/26/15

Weather: Cloudy

Form # of

Creek Name/Reach: SP2

Air Temp (°C): 61°F

Water Temp (°C): 56°F

Water Visibility: 999

Water Flow (cfs): 0.5 cfs

Surveyor(s): TD EM PT

Camera: Batman

GPS Unit: Bubbles

Age Code: 1 = new; 2 = Previously ID'd & measurable; 3 = Can't measure but visible; 4 = No redd only flag; 5 = Poor conditions can't see substrate

Redd Record Number	GPS Coordinates	GPS Error (ft)	Bearing	Distance (m)	Pot L (cm)	TS L (cm)	Pot D (cm)	Pot W (cm)	TS W 1 (cm)	TS W 2 (cm)	Pot Substrate (cm)	TS Substrate (cm)	Age Code	Re-measured?	Comments (Picture File #, fish on?, etc)
0423007	34.44517, -119.06356	7	-	-	-	-	-	-	-	-	-	-	3	2	
0428001	34.44492, -119.06312	7	-	-	-	-	-	-	-	-	-	-	2	2	
0428002	-	-	-	-	-	-	-	-	-	-	-	-	1	2	
0428003	-	-	-	-	-	-	-	-	-	-	-	-	4	2	
0415002	34.44865, -119.05974	9	-	-	-	-	-	-	-	-	-	-	3	2	
0415003	-	-	-	-	-	-	-	-	-	-	-	-	4	2	
0415004	-	-	-	-	-	-	-	-	-	-	-	-	4	2	
0424004	-	-	-	-	-	-	-	-	-	-	-	-	4	2	
0415005	34.44868, -119.05968	9	-	-	-	-	-	-	-	-	-	-	3	2	
0415006	34.44872, -119.05954	19	-	-	-	-	-	-	-	-	-	-	3	2	

DROUGHT DATA

Redd #1	Redd #2	Redd #3	Temp	GPS
34.44491, -119.06486	34.44565, -119.06361	34.44811, -119.06060	59.86°F	9.20m
34.44517, -119.06356	34.44492, -119.06312	34.44865, -119.05974	59.84°F	9.31m
34.44868, -119.05968	34.44872, -119.05954	-	60.72°F	9.18m

Notes

Start 34.44526, -119.06807

Flags pulled

Gear	Camera	GPS	GoPro	Stadia Rod	Compass	Thermo-meters	YSI	Hannah DO	Scan
------	--------	-----	-------	------------	---------	---------------	-----	-----------	------

INDIVIDUAL & BATCH OBSERVATION FORM

* Denotes data to record for a batch observation

Form # of

Date:	Creek Name/Reach:	Condition: 1= Carcass, fresh eye; 2= Carcass, cloudy eye; 3= Carcass, no eye, heavy fungus; 4= Carcass, skin & bones w head; 5= Carcass, skin & bones no head; L= Live.							Surveyor(s):
Fish Record Number (Individual Fish only)	GPS*	GPS Error (ft)*	Condition? (live? Spawned?)	Species*	Sex (if fish on redd)	Length (FL, TL)	Fish on redd?	Comments* (for batch-length estimates, etc)	
1-4	34.44511, -119.06750	8	live	O. mykiss	-	2-4 in	N	4 fish	
4-6	34.44192, -119.06712	7	live	O. mykiss	-	0-2 in (2) 2-4 in (1)	N	3 fish (1 YOY)	
7-8	34.44785, -119.06238	7	live	O. mykiss	-	0-2 in	N	2 fish (YOY)	
9-10	34.44784, -119.06208	9	live	O. mykiss	-	0-2 in	N	2 fish (YOY)	
11	34.44758, -119.06027	7	live	O. mykiss	-	2-4 in	N	1 fish	
12	34.44811, -119.06060	14	live	O. mykiss	-	0-2 in	N	1 fish (YOY) underparts pool	
13-17	34.44833, -119.06044	14	live	O. mykiss	-	0-2 (2) 2-4 (1) 4-6 (1) YR	N	5 fish (2 YOY)	
18-21	34.44855, -119.06003	19	live	O. mykiss	-	0-2 (2) 2-4 (1) 6-8 (1)	N	4 fish (2 YOY)	
22	34.44865, -119.05979	9	live	O. mykiss	-	0-2	N	1 fish (YOY)	
23-27	34.44868, -119.05968	9	live	O. mykiss	-	0-2	N	5 fish (all YOY)	
28-29	34.44917, -119.05798	12	live	O. mykiss	-	0-2	N	2 fish (YOY)	
30	34.44865, -119.05672	20	live	O. mykiss	-	6-8	N	1 fish	

Notes:

DROUGHT SURVEY DATA FORM ver 08.13.14

Form # 1 of 4

Date: 6/17/15	Time: 10:00	Stream Name: Santa Paula	Reach:
Snorkelers: EM	Data Recorder: TD BH		
Start Lat: 34.43960	Start Long: -119.08184	GPS Error: 9	ft
Camera: Mr. Freeze	GPS: Buttercup	Weather Desc: Sunny	

Unit #	001	002	003	004	005	006	007	008	009	010
Lat.	34.43960	34.43956	34.43956	34.43956	34.43953	34.43959	34.43959	34.43981	34.43989	34.43976
Long.	-119.08184	-119.08183	-119.08150	-119.08130	-119.08125	-119.08092	-119.08081	-119.08044	-119.08014	-119.07973
Mean Length	43	39	46	13	9	15	42	9	15	21
Mean Width	9	5.5	7	7.5	6	7	7.5	7	7	7
Mean Depth	0.7	0.6	0.6	0.5	0.5	0.7	0.9	0.7	0.6	0.8
Max Depth	1.5	0.7	1	0.7	0.7	1.0	1.7	1.2	1.0	1.4
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos	0007	0008-0009	0010	0011	0012	0013	0014	0015	0016	0017
Shelter (0-3)	2	2	2	2	2	2	2	2	2	2
Visibiliy (1-3)	3	3	3	3	3	3	3	3	3	3
o. mykiss size (in)										
0-1.99	1	1	2	1	2		4	1		
2-3.99			2	1		1	3	1		3
4-5.99	4		1				2	1		1
6-7.99							0	1		
8-9.99							2			
10-11.99										
12-13.99										
14-15.99										
Other Species										
Water Quality										
Temp (F)	60°F									
Conductivity (ms/cm ²)										
DO (mg/l)										
Air	71°F									
Other Comments		*series of step pools, snorkled as one unit	*series of step pools, snorkled as one unit							

Date: 6/17/15	Time: 11:00	Stream Name: Santa Paula	Reach:
Snorkelers: EM	Data Recorder: TD BH		
Start Lat:	Start Long:	GPS Error: 17	ft
Camera: Mr. Freeze	GPS: Buttercup	Weather Desc: Sunny	

Unit #	011	012	013	014	015	016	017	018	019	020
Lat.	34.43959	34.43964	34.43966	34.43970	34.43980	34.43987	34.43987	34.43998	34.44014	34.44022
Long.	119.07954	119.07925	119.07867	119.07775	119.07746	119.07731	119.07744	119.07706	119.07696	119.07690
Mean Length	25	19	7	8	8	20	5.5	7	35	16
Mean Width	7	5	5	5	4	4	3.5	4	4	4
Mean Depth	0.7	1.0	0.7	0.6	0.8	0.7	0.7	0.7	0.6	0.6
Max Depth	1.0	2.1	1.1	0.7	1.1	0.7	1.1	0.8	0.9	1.0
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos	0018	0019	0020-0021	0022	0023	0024	0025	0026	0027	0028
Shelter (0-3)	2	2	2	2	2	2	2	2	2	2
Visibily (1-3)	3	3	3	3	3	3	3	3	3	3
o. mykiss size (in)										
0-1.99	1								1	2
2-3.99	2	2	1		2	2			1	
4-5.99	1	1					1			
6-7.99										
8-9.99										
10-11.99										
12-13.99										
14-15.99										
Other Species	WPT		10:00							
Water Quality	Temp (F)	61°F								
Conductivity (ms/cm)										
DO (mg/l)										
Air	78°F									
Other Comments		*dead fish pool (from last year)	WPT 0.3 ft long Female pic 0021							

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 3 of 4

Date: 6/17/15	Time: 11:35	Stream Name: Santa Paula	Form # 5 or 1
Snorkelers: EM	Data Recorder: TD BH	Camera: Mr. Freeze	Reach:
Start Lat:	Start Long:	GPS: Buttercup	GPS Error: 17 ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

[illegible]

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 4 of 4

Date: 6/17/15	Time: 12:26	Stream Name: Santa Paula	Form # _____ of _____
Snorkelers: EM	Data Recorder: TD BH	Camera: Mr. Freeze	Reach: _____
Start Lat: _____	Start Long: _____	GPS: Buttercup	GPS Error: 13 ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

[illegible]

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st/ 2nd / Data

Form # 1 of 3

7 JUN 2015	Time: 9:48	Stream Name: Santa Paula	Reach: 1
Snorkelers: KE	Data Recorder: LG	Depth: JT	Camera: Batman
Start Lat: 34.42873	Start Long: -119.09114	GPS: Bubbles	GPS Error: 21 ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

GPS error

	± 8	± 12	± 13	± 10	± 13	± 15	± 13	± 12	±	
Unit #	001	002	003	004	005	006	007	008	009	010
Lat.	34.42865	34.42870	34.42882	34.42889	34.42926	34.42944	34.42948	34.42975	34.42999	34.43010
Long.	-119.09113	-119.09190	-119.09112	-119.09117	-119.09108	-119.09090	-119.09071	-119.09045	-119.09046	-119.09046
Mean Length	11 ft	17.2 ft	18 ft	16.0 ft	19 ft	23 ft	58.0 ft	57.5 ft	19 ft	31 ft
Mean Width	4.7 ft	5.5 ft	5.3 ft	5.0 ft	14.2 ft	9.0 ft	17.5 ft	11 ft	10.5 ft	12 ft
Mean Depth	0.7 ft	0.6 ft	0.5 ft	0.6 ft	0.9 ft	0.7 ft	2.1 ft	1.7 ft	0.6 ft	1.2 ft
Max Depth	1.2 ft	1 ft	0.8 ft	0.9 ft	2.1 ft	1.1 ft	3.6 ft	2.8 ft	1.1 ft	2.5 ft
Depth Change?										
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Isolated Pool?	N	N	N	N	N	N	N	N	N	
Reloc. Pool?	N	N	N	N	N	N	Y	N	N	
Watch Pool?	N	N	N	N	N	N	N	N	N	
Photos										
Shelter (0-3)	1	1	2	1	2	2	2	1	1	2
Visibiliy (1-3)	3	3	3	3	3	3	3	3	3	3
Bankside Obs?										
0-1.99		3		2	3			4		1
2-3.99	4	2		1	2	4	6			3
4-5.99	1				1	1	5	8		2
6-7.99		1						4		
8-9.99										
10-11.99										
12-13.99							1			
14-15.99										
Other Species	Stichelbark		1							
Temp (F)										
Conductivity (ms/cm ²)										
DO (mg/l)										
Other Comments	Start pool due to oil present from bridge	low gradient					fighting poles in pool			Goes dry after this pool. 34.43009 -119.09058

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data		Form # <u>2</u> of <u>3</u>	
Date: <u>6/17</u>	Time: <u>11:35</u>	Stream Name: <u>Santa Paula</u>	Reach: <u>1</u>
Snorkelers: <u>KE</u>	Data Recorder: <u>LG</u>	Camera: <u>batman</u>	GPS: <u>bubbles</u>
Start Lat: <u>34.43119</u>	Start Long: <u>-119.09108</u>	GPS Error: <u>8</u> ft	

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

GPS Error		± 8	± 7	± 7	± 7	± 7	± 7	± 9	± 9	± 7	± 7
Data Recorder	Unit #	011	012	013	014	015	016	017	018	019	020
	Lat.	34.43119	34.43209	34.43211	34.43288	34.43331	34.43357	34.43357	34.43372	34.43377	34.43381
	Long.	-119.09108	-119.09088	-119.09087	-119.09050	-119.09035	-119.09021	-119.09012	-119.09032	-119.09024	-119.09000
	Mean Length ft	22.5 ft	17 ft	10.5 ft	10 ft	64 ft	21 ft	8.0 ft	20 ft	16 ft	20
	Mean Width	9.3 ft	8.2 ft	7.16 ft	7.5 ft	11.7 ft	7.8 ft	6.5 ft	13.5 ft	8.5 ft	11
	Mean Depth	1.5 ft	0.7 ft	0.7 ft	0.7 ft	1.2 ft	0.75 ft	0.7 ft	1.0 ft	0.8 ft	1.2
	Max Depth	2.6 ft	1.1 ft	1.2 ft	1.8 ft	2.2 ft	1.4 ft	1.0 ft	2.3 ft	1.6 ft	2.6
	Depth Change?										
	Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Outflow?	O	Y	Y	Y	Y	Y	Y	Y	Y	Y
Snorkeler	Isolated Pool?	N	N	N	N	N	N	N	N	N	N
	Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
	Watch Pool?	?	N	N	N	N	N	N	N	N	N
	Photos										
	Shelter (0-3)	2	1	1	1	2	1	2	2	1	2
	Visibiliy (1-3)	3	3	3	3	3	3	3	3	3	3
	Bankside Obs?										
	0-1.99	1				4					
	2-3.99					4					0
	4-5.99					1			1		
o. mykiss size (in)	6-7.99										
	8-9.99										
	10-11.99										
	12-13.99										
	14-15.99										
	Other Species										
	Water Quality	Temp (F)	WARM!						WARM		WARM
Conductivity (ms/cm ²)											
DO (mg/l)											
Other Comments	wet @ 34.4319 -119.09108 If inflow stops potential to dry up warm water potential watch pool								dead trout! 2.8 in		

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

(1st / 2nd / Data)

Form # 3 of 3

Date: 17 Jun 2015	Time: 1302	Stream Name: Santa Paula	Reach:
Snorkelers: KE / JT	Data Recorder: LG / JT	Camera: Batman	GPS: Bubbler
Start Lat: 34.43492	Start Long: -119.08833	GPS Error: ± 7	ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

GPS Error		± 7	± 7	± 7	± 12	± 12	± 9	± 8	± 8	± 10	± 12
Data Recorder	Unit #	021	022	023	024	025	026	027	028	029	030
	Lat.	34.43492	34.43501	34.43516	34.43723	34.43714	34.43774	34.43787	34.43517	34.43821	34.43897
	Long.	-119.08833	-119.08816	-119.08798	-119.08624	-119.08645	-119.08614	-119.08559	-119.08555	-119.08553	-119.08456
	Mean Length	8 ft	11.0	24	18 ft	12.5 ft	17.5 ft	22 ft	10.0 ft	17.0 ft	32 ft
	Mean Width	9 ft	8.6	8.5	11 ft	10 ft	9.5 ft	8 ft	7.0 ft	7.0 ft	9 ft
	Mean Depth	0.7 ft	1.0	1.3	0.8 ft	0.7 ft	0.7 ft	0.9 ft	0.7 ft	0.8 ft	0.7 ft
	Max Depth	1.3 ft	1.7	1.8	1.5 ft	1.1 ft	1.4 ft	1.2 ft	0.9 ft	1.2 ft	1.0 ft
	Depth Change?										
	Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Isolated Pool?	N	N	N	N	N	N	N	N	N	N
	Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
	Watch Pool?	N	N	N	N	N	N	N	N	N	N
	Photos										
Snorkeler	Shelter (0-3)	1	1	1	2	2	2	2	2	2	2
	Visibili (1-3)	3	2	1	3	3	3	3	3	3	3
o. mykiss size (in)	Bankside Obs?										
	0-1.99	0	0	0	1						1
	2-3.99				2	1	4	1			
	4-5.99				1	1	1	6	1	4	2
	6-7.99									1	
	8-9.99										
	10-11.99										
	12-13.99										
	14-15.99										
Other Species											
Water Quality	Temp (F)										
	Conductivity (ms/cm)										
	DO (mg/l)										
Other Comments					GPS: 34.43570, -119.08775 Stream sp lib left = dry * followed right = flowing dynamometer 119.08708 ± 7 119.08656 ± 8						
					GPS: 34.43635, -119.08620 ± 14 road crossing with						

34.4389
-119.08447
ENC

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 1 of

Date: 6/22/15	Time: 10:05	Stream Name: Santa Paula	Reach: 1
Snorkelers: TD	Data Recorder: BH	Camera: Robin	GPS: Buttercup
Start Lat: 34.42864	Start Long: 119.09103	GPS Error: 9	ft

Measurements in ft.

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

Unit #	001	002	003	004	005	006	007	008	009*	010
Lat.	34.42864	42870	42875	42888	42897	42915	42928	42937	42949	42976
Long.	119.09103	09106	09114	09113	09114	09116	09109	09087	09067	09045
Mean Length	14 ft	8.5 ft	41 ft	8.0 ft	6.0 ft	12.0 ft	14 ft	9.0 ft	42 ft	38 ft
Mean Width	8.0	4.5	6.0	2.5	3.0	7.5	13 ft	5.0 ft	10 ft	20 ft
Mean Depth	0.5	0.7	0.6	0.5	0.6	0.6	0.8	0.6	2.5	1.6
Max Depth	0.8	1.1	1.0	1.0	0.8	0.8	1.8	1.0	3.3	2.4
Depth Change?										
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	(Y)	N
Photos										
Shelter (0-3)	2	1	2	2	2	2	2	2	2	2
Visibility (1-3)	3	3	3	3	3	2	2	2	2	1
Bankside Obs?										
0-1.99	2		1							
2-3.99		1	2	2						
4-5.99	1								2	
6-7.99										
8-9.99										
10-11.99										
12-13.99										
14-15.99										
Other Species	SAS		1		1					
Temp (F)	60°F									
Conductivity (ms/cm ²)										
DO (mg/l)										
Other Comments	Am	77°F							*Rescue pool last year	

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

Date: 6/22/15		Time: 12:18		1st / 2nd / Data		Form # 3 of 5	
Snorkelers: BH		Data Recorder: TD		Stream Name: Santa Paula		Reach:	
Start Lat:		Start Long:		Camera: Robin		GPS: Buttercup	
						GPS Error: 9 ft	

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths

cm? ✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Data Recorder	Unit #	021	022	023	024	025	026	027	028	029	030
	Lat.	34.43729	34.43745	34.43761	34.43771	34.43788	34.43790	34.43806	34.43819	34.43822	34.43836
	Long.	-119.08646	-119.08658	-119.08622	-119.08610	-119.08596	-119.08587	-119.08567	-119.08555	-119.08549	-119.08547
	Mean Length	12	8.5	7.5	10.5	4	14	25	9	17	7
	Mean Width	10	9.5	5	5	5	5	6.5	5	6.5	9.5
	Mean Depth	0.9	0.7	0.6	0.8	0.9	0.9	0.8	0.7	0.9	0.8
	Max Depth	1.5	1.1	0.9	1.4	0.7	1.2	1.2	0.9	1.3	1.2
	Depth Change?										
	Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Isolated Pool?	N	N	N	N	N	N	N	N	N	N
	Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N	
Photos											
Snorkeler	Shelter (0-3)	2	2	1	2	2	2	2	1	2	2
	Visibilliy (1-3)	3	3	3	2	3	3	3	3	3	2
o. mykiss size (in)	Bankside Obs?			1							
	0-1.99			1							2
	2-3.99	4			2	1		1			
	4-5.99	2				1		2			
	6-7.99				1						
	8-9.99										
	10-11.99										
	12-13.99										
Other Species	14-15.99										
Water Quality	Temp (F)	64°F									
	Conductivity (ms/cm ²)										
	DO (mg/l)										
	Air	78°F									

Other Comments

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 9 of 5

Date: 6/22/15	Time: 13:20	Stream Name: Santa Paula	Form # 1 of 5
Snorkelers: BH	Data Recorder: TD	Camera: Robin	Reach:
Start Lat:	Start Long:	GPS: Buttercup	GPS Error: 9 ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

[illegible][illegible]

Smackler	Shelter (0-3)	2	2	2	2	2	2	2	2	2
	Visibilty (1-3)	2	2	2	2	3	3	2	3	2

[illegible][illegible][illegible][illegible]

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 1 of 5

Date: 6/24/15	Time: 10:00	Stream Name: Santa Paula	Reach:
Snorkelers: TD	Data Recorder: BH	Camera: Batman	GPS: Bubbles
Start Lat: 34.44248	Start Long: 119.07320	GPS Error: 7	ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

[illegible]

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 2 of 5

Date: 6/24/15	Time:	Stream Name: Santa Paula	Reach:
Snorkelers: TD	Data Recorder: BH	Camera: Batman	GPS: Bubbles
Start Lat:	Start Long:	GPS Error: 18	ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

[illegible]

DROUGHT/SNORKEL SURVEY DATA FORM ver 09.29.14

1st / 2nd / Data

Form # 3 of 5

Date: 6/24/15	Time: 11:20	Stream Name: Santa Paula	Reach:
Snorkelers: TD	Data Recorder: BH	Camera: Batman	GPS: Bubbles
Start Lat:	Start Long:	GPS Error: 19	ft

PREVIOUS SURVEY DATA:

Date of Previous Survey:

Prev. Max Depths	0	0	0	0	0	0	0	0	0	0
CMP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unit #	021	022	023	024	025	026	027	028	029	030
Lat.	34.44406	34.44475	34.44491	34.44504	34.44507	34.44518	34.44520	34.44534	34.44529	34.44513
Long.	119.06881	119.06892	119.06885	119.06884	119.06854	119.0685	119.06841	119.06826	119.06803	119.06754
Mean Length	8.0	12.0	13.5	13.0	10.0	9.5	20.5	8.0	32.0	12.5
Mean Width	8.5	10.0	11.5	9.0	6.0	5.5	9.3	11.5	8.5	8.5
Mean Depth	0.9	1.7	1.4	1.3	1.0	1.1	1.7	0.9	1.7	1.9
Max Depth	1.1	2.2	1.8	1.8	1.3	1.5	2.0	1.6	2.3	2.2
Depth Change?										
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos										
Shelter (0-3)	2	2	2	2	2	2	2	2	2	2
Visibilty (1-3)	3	3	3	3	3	3	3	2	2	3
Bankside Obs?			2							
0-1.99				1		2			1	1
2-3.99		2	2	5	4	2	5	1	8	2
4-5.99	2	4			1				8	1
6-7.99		2					1		1	1
8-9.99			1							
10-11.99										
12-13.99										
14-15.99										
Other Species	Sucker		1	3						
	WPT				1					
Water Quality	Temp (F)	61°F								
	Conductivity (ms/cm)									
	DO (mg/l)									
	Air Temp	78°F								
Other Comments	Measurements in ft									
	Too many fish already in pool to be relocation side									

1st / 2nd / Data

Date: 6/24/15	Time: 13:05	Stream Name: Santa Paula	Reach:
Snorkelers: TD	Data Recorder: SB	Camera: Batman	GPS:
Start Lat:	Start Long:	GPS Error:	ft

Prev. Max Depths

1. CMP

[illegible]

1st / 2nd / Data

Form # 5 of 5

Date: 6/24/15	Time: 13:40	Stream Name: Santa Paula	Reach:
Snorkelers: TD	Data Recorder: PT	Camera: Batman	GPS: Bubbles
Start Lat:	Start Long:	GPS Error: ±10 ft	

Date of Previous Survey:

[illegible][illegible]

DROUGHT SURVEY DATA FORM ver 08.13.14

Form # 1 of

Date: <u>08/01/15</u>	Time: <u> </u>	Stream Name: <u>Santa Rita</u>	Reach: <u> </u>
Snorkelers: <u>ST</u>	Data Recorder: <u>PS</u>		
Start Lat: <u>34.44589</u>	Start Long: <u>-119.06336</u>	GPS Error: <u>21</u>	ft
Camera: <u>Satin</u>	GPS: <u>Bubbles</u>	Weather Desc: <u>Hot, overcast</u>	

Unit #	51	52	53	54	55	56	57	58	59	60
Lat.	34.44589	34.44594	34.44603	34.44612	34.44619	34.44630	34.44631	34.44638	34.44642	34.44647
Long.	-119.06336	-119.06325	-119.06326	-119.06317	-119.06310	-119.06315	-119.06305	-119.06306	-119.06301	-119.06294
Mean Length	202	13	15	12	27	29	19	18	11	16
Mean Width	11	12	12	12	5	10	12	8	7	8
Mean Depth	0.9	0.5	0.3	0.5	0.5	0.7	1.4	0.8	0.9	0.8
Max Depth	1.4	0.8	0.7	0.9	0.9	1.4	2.4	1.4	0.6	1.4
Inflow?	Yes	Yes	Yes	Y	Y	Y	Y	Y	Y	Y
Outflow?	Yes	Yes	Yes	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	No	No	N	N	N	N	N	N	N	N
Reloc. Pool?	No	No	N	N	N	N	N	N	N	N
Watch Pool?	No	No	N	N	N	N	N	N	N	N
Photos										
Shelter (0-3)	2	2	1		1	2	2	2	2	2
Visibility (1-3)	3	3	2		3	2	2	3	3	2
o. mykiss size (in)										
0-1.99								1		
2-3.99	1		1	6	1		1			3
4-5.99	5	1				45	1	4	2	1
6-7.99	1	1				4	1			1
8-9.99										
10-11.99										
12-13.99										
14-15.99										
Other Species										
Temp (F)	64									
Conductivity (ms/cm ²)										
DO (mg/l)										
Other Comments	Alders: 72				Rifle					

Form # 2 of _____[illegible]

DROUGHT SURVEY DATA FORM ver 08.13.14

Form # 3 of

Date: 07/01/15	Time: 1321	Stream Name: Santa Paula	Reach:
Snorkelers: 2 ST	Data Recorder: PS		
Start Lat: 34.44779	Start Long: -119.06298	GPS Error: 19	ft
Camera: Barman	GPS: Bubbles	Weather Desc: Sunny, warm, overcast	

Unit #	71	72	73	74	75	76	77	78	79	80
Lat.	34.44779	34.44787	34.44785	34.44794	34.44789	34.44790	34.44790	34.44786	34.44787	34.44788
Long.	-119.06298	-119.06288	-119.06290	-119.06283	-119.06274	-119.06261	-119.06249	-119.06239	-119.06226	-119.06219
Mean Length	26	7	8	14	13	8	17	41	11	11
Mean Width	10	10	7	10	7	6	9	12	6	9
Mean Depth	0.7	0.5	0.5	1.7	0.4	0.6	0.5	1.4	0.6	1.1
Max Depth	1.3	0.7	1.1	2.2	0.6	1.0	0.9	2.1	1.0	2.0
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos										
Shelter (0-3)	2	2	2	2	2	1	2	2	2	2
Visibiliy (1-3)	3	2	2	3	3	2	3	3	3	3
o. mykiss size (in)										
0-1.99	2	1		3	1	6	5	4		
2-3.99	6	1	1	13	1	2	5	4	2	2
4-5.99	4							2	1	1
6-7.99	1			2				4		2
8-9.99	1			2						
10-11.99										
12-13.99										
14-15.99										
Other Species										
Water Quality										
Temp (F)	64									
Conductivity (ms/cm)										
DO (mg/l)										
Other Comments	Air: 71									

measuring only what is snorkelable or whole unit?
 If whole unit, this poking head under rocks method doesn't make sense

need system
 for defining
 units

DROUGHT SURVEY DATA FORM ver 08.13.14

Form # 4 of

Date: 07/01/15	Time: 1406	Stream Name: Santa Paula	Reach:
Snorkelers: JT	Data Recorder: PS		
Start Lat: 34.44787	Start Long: 119.06213	GPS Error: 10	ft
Camera: Bertman	GPS: Bubbles	Weather Desc: Low Overcast	

Unit #	61	62	63	64	65	66	67	68	69	70
Lat.	34.44787	34.44787	34.44770	34.44765	34.44759	34.44766	34.44751	34.44751	34.44752	34.44760
Long.	119.06213	119.06209	119.06191	119.06182	119.06180	119.06152	119.06147	119.06143	119.06138	119.06127
Mean Length	10	35	15	15	13	16	13	11	7	15
Mean Width	13	8	7	8	12	12	16	18	5.7	11
Mean Depth	0.7	0.8	0.8	0.5	0.6	1.1	0.8	0.9	0.7	1.2
Max Depth	1.7	1.5	1.3	0.9	1.0	1.8	1.3	1.7	1.4	1.9
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos										
Shelter (0-3)	2	2	2	2	1	2	2	2	2	2
Visibility (1-3)	3	3	2	3	3	3	3	3	3	3
o. mykiss size (in)										
0-1.99		2			1		1			
2-3.99	1	6	1	1		12	4	1	5	
4-5.99		1	1	1		5	1	1	1	
6-7.99		1	1				2		1	
8-9.99	1									
10-11.99										
12-13.99										
14-15.99										
Other Species										
Temp (F)	61									
Conductivity (ms/cm ²)										
DO (mg/l)										
Other Comments	Kiss. 76						124.42			171

DROUGHT SURVEY DATA FORM ver 08.13.14

Form # 1 of 4

Date: 07/01/15 Time: 11:00 Stream Name: Santa Paula Reach:
 Snorkelers: LG KE Data Recorder: KE
 Start Lat: 34.44829 Start Long: -119.06013 GPS Error: 45 ft
 Camera: MC, Freeze GPS: Buttercup Weather Desc: overcast, humid, hot

Unit #	1	2	3	4	5	6	7	8	9	10
Lat.	34.44829	34.44840	34.44849	34.44849	34.44853	34.44864	34.44868	34.44886	34.44889	34.44894
Long.	-119.06013	-119.05996	-119.05991	-119.05984	-119.05978	-119.05966	-119.05956	-119.05934	-119.05930	-119.05907
Mean Length	17	21	4	24	12	26	18	24	13	9
Mean Width	9	13	2	5	33	17	6	11	6	10
Mean Depth	0.6	0.7	0.3	0.5	0.6	0.8	0.5	0.7	0.4	1.2
Max Depth	0.9	1.2	0.4	0.7	2	1.4	0.9	1	0.5	1.7
Inflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outflow?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Isolated Pool?	N	N	N	N	N	N	N	N	N	N
Reloc. Pool?	N	N	N	N	N	N	N	N	N	N
Watch Pool?	N	N	N	N	N	N	N	N	N	N
Photos										
Shelter (0-3)	2	2	1	2	2	2	2	2	2	2
Visibility (1-3)	3	2	3	2	3	3	3	3	3	3
0-1.99					2	3	1			
2-3.99		1		2	10	4	1	6	1	3
4-5.99		1			1		2	1	1	2
6-7.99					1	2				1
8-9.99					1					
10-11.99										
12-13.99										
14-15.99										
Other Species										
Temp (F)										
Conductivity (ms/cm)										
DO (mg/l)										
Other Comments										

#1 = Lower Hobo = ^{new} SN=10584741 \Rightarrow gps = 34.44495, -119.06477 \pm 9 = Surprised with SN=10605824 Pic #964
 #2 = Middle Hobo = ^{new} SN=10605836 = gps = 34.44574, -119.06348 \pm 18 = Surprised all SN=10605828 Pic #965
 #3 = Upper Hobo = ^{new} SN=10605838 = gps = 34.44814, -119.06052 \pm 44 = Surprised old SN=10605832 Pic #0072
 MR FINE 007

written = 63

[illegible]

Form # 3 of 4

Water = 64

Form # 3 of 4

Date: 07/01/15	Time: 12:18	Stream Name: Santa Paula	Reach:
snorkelers: LG	Data Recorder: KE		
Start Lat: 34.44954	Start Long: -119.05875	GPS Error:	ft
Camera: MR Freeze	GPS: Button Cup	Weather Desc: Overcast, humid	

[illegible]

Air = 77 water = 64

Form # 4 of 4

[illegible]

SNORKEL SURVEY DATA FORM ver 06.19.15

Drought

Form # 1 of

Date: 07/10/15	Time:	Stream Name: Santa Paula	GPS: Blossom
Snorkelers: 2 BL	Data Recorder: PS	Camera: Robin	GPS Coordinate System:
Start Lat: 34.44762	Start Long: -119.06106	GPS Error:	ft
Weather: Sunny	Air Temp: 70	Water Temp: 60	

Unit #	1	2	3	4	5	6	7	8	9	10
Latitude	34.44762	34.44771	34.44771	34.44781	34.44785	34.44788	34.44790	34.44804	34.44806	34.44806
Longitude	-119.06120	-119.06110	-119.06106	-119.06103	-119.06095	-119.06085	-119.06079	-119.06078	-119.06069	-119.06065
Type (P, R, E)										
Mean Length	35	22	30	6	21	11	53	7	6	31
Mean Width	5	6	10	5	10	8	10	6	10	12
Mean Depth	0.5	0.6	0.4	0.5	0.9	0.7	0.6	0.4	0.6	1.9
Max Depth	0.9	1.0	0.9	0.7	1.8	1.7	1.1	0.7	1.1	3.2
LWD Count	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cover Rating (0-5)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cover Area (sq ft)	N	N	N	N	N	N	N	N	N	N
% Cover	N	N	N	N	N	N	N	N	N	N
100% Unit Y/N	N	N	N	N	N	N	N	N	N	N
Photos										685 (in) -688
Flag										
Snorkelable?										
To be Snorkeled										
Electrofishable?										
To be E-fished										
Snorkeler										
Cover Rating (0-5)	2	2	2	2	2	1		2	2	3
Cover Area (sq ft) Vis	3	2	3	3	3	2		3	3	3
% Cover										
Visibility (ft)										
O. mykiss observed										
0-1.99			1	2	7	1	7	1	3	4
2-3.99	3	1	4	1	7	5	3	2	1	10
4-5.99					1					5
6-7.99					2					1
8-9.99										
10-11.99										
12-13.99										
14-15.99										
Other Species	Santa A. Sucker									1
Other Comments	Starting where PS 1st ended, finishing up until where lat 4.66 started, only about 50ft.					Brick under Pool				

SNORKEL SURVEY DATA FORM ver 06.19.15

Form # _____ of _____

Date: 07/10/15	Time: 1124	Stream Name: Santa Paula	GPS: Blossom
Snorkelers: B L	Data Recorder: P.S	Camera: Robin	GPS Coordinate System:
Start Lat: 34.44815	Start Long: 119.06050	GPS Error: 17	ft
Weather: Sunny	Air Temp: 67	Water Temp: 59	

Unit #	11	12	13	14	15	16	17	18	19	20
Latitude	34.44815	34.44818	34.44823	34.44826	34.44831	34.44837	34.44841			
Longitude	119.06050	119.06052	119.06058	119.06063	119.06064	119.06081	119.06089			
Type (P,R,F)										
Mean Length	14	20	19	13	22	8	27			
Mean Width	7	24	14	9	14	7	13			
Mean Depth	1.0	0.5	0.5	0.9	1.5	0.7	1.9			
Max Depth	1.7	1.1	1.0	1.2	2.8	0.9	2.6			
LWD Count	Y	Y	Y	Y	Y	Y	Y			
Cover Rating (0-5)	Y	Y	Y	Y	Y	Y	Y			
Cover Area (sq ft)	N	N	N	N	N	N	N			
% Cover	N	N	N	N	N	N	Y			
100% Unit Y/N	N	N	N	N	N	N	N			
Photos										
Flag										
Snorkelable?										
To be Snorkeled										
Electrofishing?										
To be E-fished										
Snorkeler										
Cover Rating (0-5)	3	2	2	2	2	1	2			
Cover Area (sq ft)	3	3	3	3	3	3	3			
% Cover										
Visibility (1-3)										
O. mykiss observed										
0-1.99	3	2	1	2	12		10			
2-3.99	4	2		1	2		10			
4-5.99		1			1		3			
6-7.99										
8-9.99										
10-11.99										
12-13.99										
14-15.99										
Other Species										
Other Comments						No fish	possible (old pool)			
							End KEL 6/14/15 started at 4:15 am + on 07/10/15			