

SANTA ROSA CREEK STEELHEAD HABITAT AND POPULATION SURVEY



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Historically, Santa Rosa Creek supported one of the largest, self-sustaining populations of steelhead (*Oncorhynchus mykiss*) in San Luis Obispo County. However, in the past few decades, significant land development in the town of Cambria and adjacent areas and a concurrent increase in the demand for water resources have adversely impacted instream habitat and the steelhead population which resides there. Excessive sediment deposition, modified stream banks, and reduced or altered riparian areas have also degraded steelhead habitat. Stream habitat degradation is not unique to Santa Rosa Creek. What is unique is that most of the fifteen miles of creek are perennial; the bank altering development is confined to the lower 3 miles of the watershed, and only one impediment to migration exists on the mainstem. Most other watersheds in San Luis Obispo County either have greatly reduced perennial reaches, development throughout the entire watershed, and/or several barriers or impediments located throughout the migration corridor. Because of the relatively few issues on Santa Rosa Creek, the restoration or enhancement potential for steelhead is greater than in other areas.

In order to determine current habitat conditions and the population status of steelhead, habitat typing, outmigrant trapping and juvenile fish sampling was conducted in Santa Rosa Creek during the spring, summer, and fall of 2005. The habitat inventory documented the quantity and quality of spawning and rearing habitat available for steelhead rainbow trout and determined some of the limiting factors depressing the population. The juvenile steelhead population monitoring determined the distribution and relative abundance of fish throughout the creek while the outmigrant trapping for steelhead smolts in the spring determined run timing and gathered information on smolt morphological characteristics.

This report discusses the results of the survey and includes recommendations for habitat enhancement or further studies that are needed to thoroughly describe watershed processes.

Watershed Overview

Santa Rosa Creek is a small coastal stream located in north western San Luis Obispo County. It originates in the south western portion of the Santa Lucia Mountain Range at elevations ranging between 1,000 and 1,900 feet and flows in a northwesterly direction for approximately 15 miles before entering the Pacific Ocean at San Simeon State Beach (N35° 34' 07.0", W121° 06' 38.1")(Figures 1, 2, 3, and 4). Santa Rosa Creek is a third order stream with several springs and tributaries located throughout the watershed, the most significant of which are Perry Creek which enters Santa Rosa Creek at stream mile 3.0 on the eastern edge of the town Cambria, Curti Creek which enters at stream mile 8.1, and two unnamed perennial tributaries that enter Santa Rosa Creek at approximately stream miles 10.5 and 13. Total drainage area, including Perry Creek, is 47 square miles. The watershed area not including Perry Creek is 24 square miles (Chatham, 1993).

From the headwaters down to stream mile 7.8, the creek flows through a sinuous confined canyon where oaks, California bay and alder are the dominant tree species. Grasses, sedges and other herbaceous species comprised the understory. At stream mile 7.8, the creek abruptly discharges from the narrow canyon into a broad valley with a poorly defined creek channel, extensive gravel bars and flood plains, short, denuded stream banks and intermittent willow trees, mule fat and grasses. It is in this section of the channel that the creek will be seasonally dry or go sub-surface. From stream mile 6.5 downstream to stream mile 3, the valley floor is still broad, however the stream channel is incised. Riparian species include alder, willow, cottonwood, sycamore and a dense herbaceous understory. Downstream of this point the valley constricts somewhat and the town Cambria surrounds the creek. Much of channel in this area is lined with rip rap and the riparian has been encroached upon by development. The native vegetation along the creek includes willow, poison oak, stinging nettle and blackberry, however extensive stands of non-native trees, shrubs and ivy dominate the riparian zone to the exclusion of native vegetation. This is a very general description of the watershed. Specific information can be found in the Comments and Landmarks section at the end of the report.

Ninety percent of the watershed is privately owned with variable land use. Most of the

commercial and residential development is concentrated in the lower 3.5 miles of the watershed within the town of Cambria. Cattle grazing, rural residential, irrigated agriculture, vineyards, mining and private property without current land use activity comprises the remainder of the privately owned portion of the watershed. Ten percent of the watershed is publicly owned and is managed for preservation or limited recreation (Duff, 2007).

Habitat Evaluation Methods

In order to assess habitat conditions in Santa Rosa Creek, several parameters were evaluated including habitat features, channel form, stream flow, and stream temperatures.

Habitat Features

To evaluate instream habitat features several parameters were noted including habitat type, average length, width, and depth, maximum depth of the unit, abundance and type of instream shelter, substrate composition, embeddedness of the substrate at the pool tail crest, canopy, bank composition, vegetation coverage, and comments on landmarks or issues that may be impacting instream habitat.

Every habitat unit was classified according to habitat type and measured for average length. In all pool units, maximum depth, depth at the pool tail crest (measured in the thalweg), dominant substrate at the pool tail crest, and embeddedness of that substrate were also measured. However, only 10% of the habitat units are measured for all the parameters mentioned previously including those habitat types encountered for the first time and one randomly selected unit on each page. A detailed description of the habitat typing method can be found in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998).

1) Habitat Typing

To describe the stream, the method used the 24 habitat types defined by McCain et.al. (1990). Habitat units were numbered sequentially starting at 0001 and assigned a type identification number selected from the list of 24 habitat types (Appendix A). For a particular habitat unit to be classified as a discreet unit the minimum length of the unit must have been equal to or greater

than, the stream's mean wetted width.

2) Measuring dimensions

Once a unit was identified as a particular habitat type, the average length was measured. For those units that were measured for average width and depth, the number of measurements made to obtain an average depended upon the uniformity of the channel with more measurements being taken if the channel was irregular. All measurements were in feet to the nearest half foot and the dimensions were measured using a laser range finder and stadia rod.

3. Shelter Rating

Instream shelter components included wood (logs, roots, tree's, stumps), boulders, undercut banks, and other elements within a stream channel that could provide juvenile and adult salmonids protection from predation, reduce water velocities so fish could rest and conserve energy, and allow for the separation of territorial units to reduce density related competition. At each fully measured unit, the type of shelter present and the percentage of that type relative to other shelter components was recorded. In addition, percent cover was derived by estimating how much of the volume of a particular unit contained cover components.

4. Substrate Composition

Substrate composition ranged from silt/clay sized particles to boulders and bedrock. In all fully-described habitat units, dominant and sub-dominant substrate elements were estimated using a list of seven size classes and recorded as a one and two, respectively.

5. Substrate Composition and Embeddedness at Pool Tail Crests

The dominant or primary substrate composing the pool tail crest was recorded at each pool. In addition, the depth of fine sediment surrounding or burying the cobbles at the crest was estimated. This figure is expressed as a value and the following criteria were used: 0 - 25% buried (value 1), 26 - 50% (value 2), 51 - 75% (value 3), and 76 - 100% (value 4). A value of 5 was assigned to tail-outs deemed unsuitable for spawning because of an inappropriate substrate such as bedrock, log sills, or boulders.

6. Canopy

Canopy was considered to be anything hanging or situated over the creek (e.g. vegetation, bridges) that would provide shade on the water. It was measured by standing in the center of the unit and visually estimating how much of the unit is covered. Canopy does not take into account topographic shade or other upslope features which may be shading a stream. Estimates of canopy were made at every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample.

7. Bank Composition and Vegetation

For every fully described unit, the dominant bank composition type (e.g. bedrock, cobble, soil) and vegetation type (e.g. grass, brush, and trees) was recorded for both the right and left banks. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and root wads) was estimated and recorded.

8. Comments and Landmarks

In addition to collecting data on the specific habitat units, comments on adjacent land use, water quality, erosion sources, non-native vegetation, impediments, and other issues which may be impacting stream habitat were noted. Landmarks such as tributaries, road or bridge crossings, buildings, or other structures which are not likely to move were noted to facilitate locating certain areas of the stream for future sampling.

Habitat Typing Data Analysis

Data from the habitat inventory was entered into Stream Habitat 2.0.16, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game.

Channel Typing

Channel typing was conducted according to the classification system developed and revised by David Rosgen (1994) and is described in the *California Salmonid Stream Habitat Restoration*

Manual (Flosi et al, 1998). Channel typing was conducted simultaneously with habitat typing and followed a standard form to record measurements on: 1) water slope gradient, 2) sinuosity, 3) entrenchment, 4) width/depth ratio, and 5) substrate composition.

Stream Flow

Stream flow was measured weekly from April 20, 2005 through September 20, 2005 with additional measurements made on October 5, 2005, October 24, 2005, November 11, 2005 and December 6, 2005. All measurements were taken at a fixed transect site located approximately 3,000 feet downstream from Highway 1 (Figure 1).

Stream flow was measured by setting a transect line perpendicular to flow and recording velocity measurements at one foot increments (or at 0.5 foot increments if the stream was less than 20 feet wide). Because maximum depth never exceeded two feet, the six-tenths depth method was used. All velocity measurements were taken using a Model 2000 Marsh-McBirney Flow-Mate and stream flow was calculated using the Velocity Area method.

Temperatures

Water and air temperatures were measured and recorded during the habitat typing survey at the start of a new page or every tenth habitat unit. Water temperatures were taken within one foot of the surface of the water and air temperatures were taken in the shade.

In addition to collecting temperature data during habitat typing, three Hobo® temperature data loggers were deployed on June 6, 2005 and began taking measurements every half hour starting at 12:00 midnight on June 7, 2005 until they were retrieved on October 25, 2005. The data loggers were placed instream at stream miles 0.6, 8.0, and 14.5 (Figures 1, 2 and 3).

Fish Sampling Methods

Fish sampling included out-migrant trapping in the spring to determine steelhead smolt characteristics and timing of emigration and quantitative electrofishing in the fall to ascertain juvenile steelhead densities at ten locations in Santa Rosa Creek.

Out-migrant Trapping Methods

In order to determine the timing and general morphological characteristics of steelhead smolts moving downstream, an out-migrant trap and attached weir were placed in Santa Rosa Creek from April 18, 2005 through May 25, 2005 at stream mile 0.35. The trap was a twelve foot long seven hoop trap constructed of treated quarter inch mesh. The attached weir was also constructed of treated quarter inch mesh with floats along the top edge at one foot intervals. The weir extended slightly upstream to the stream banks to form a V-shape that would facilitate fish movement into the trap (Figure 5). The weir was secured by fastening it to fence posts at two to three foot intervals depending on water velocities. The bottom of the weir was lined with rock in order to prevent fish from swimming underneath.

The trap was operational from Monday afternoon through Friday afternoon (four nights) with one side of the weir folded back into the trap during the weekends to allow unimpeded fish movement.



Figure 5. Hoop trap and weir on Santa Rosa Creek, 2005.

On the days when the trap was operational, the trap and weir were cleared of debris and checked to assure that it remained secure and that it was fishing effectively. Trap and weir conditions, air temperature, water temperature, weather conditions, and sandbar condition were recorded daily.

Captured steelhead were measured for fork length and total length to the nearest millimeter and wet weight to the nearest 0.1 gram. A scale sample was taken from the left side beneath the dorsal fin and above the lateral line if the steelhead was longer than 100 millimeters. Steelhead were also categorized as parr (fish with rainbow trout coloration and conspicuous parr marks), pre-smolt (silver coloration with faded parr marks), smolt (fish exhibiting silver coloration, no parr marks, low condition factors and deciduous scales), rainbow trout morph (trout with olive-green coloration on the dorsal surface, a distinct pink stripe along the lateral line and no parr marks), or kelts (adults which have spawned). Additionally, captured steelhead were checked for black spot disease, *Salmonicola* and other parasites or abnormalities.

All other fish species, amphibians, reptiles, and crustaceans in the trap were identified and enumerated.

From the length and weight data, Fulton Condition Factors were calculated using the formula “Condition = (weight (g)/length (mm)³)*100,000” (Murphy and Willis, 1996).

Electrofishing Survey Methods

Using the habitat typing data collected during the summer of 2005 ten sample sites were chosen in order to obtain steelhead densities. Sites were chosen by how well they represented the habitat within a particular section of stream. Length of each site varied to ensure that whole habitat units were included in the sampling. To enclose the population, block nets were placed at the upper and lower ends of the sampling site. Once the nets were in place and the water cleared, sampling began at the lower net, working upstream until the upper net was reached. All fish and amphibians observed were captured using a Smith-Root Model 12 backpack electrofishing unit. Fish and amphibians were held in buckets or placed in flow-through live cars until the upper net was reached. Total time that the anode was functioning was recorded and effort was made to keep time consistent between each pass. Electrofishing settings were also fixed between passes

to assure that capture probabilities remained constant. Protocols designed to meet the assumptions of the multiple pass removal/depletion method as described by Zippin (1958) were used to analyze the population at each site.

At the end of each pass, steelhead were measured for fork length and/or total length to the nearest millimeter, weighed to the nearest 0.1 gram and checked for obvious signs of parasites and disease. Other fish species and amphibians captured were identified and enumerated. After each pass, fish were held in a live car upstream of the upper block net until the sampling was completed after which all fish were re-distributed back into the sample station.

With the paucity of information regarding age/length relationships of juvenile steelhead in the central coast region, age classes defined by Shapovalov and Taft (1954) were used for assigning the steelhead captured in Santa Rosa Creek to certain age classes. While conducting an extensive year round upmigrant and outmigrant trapping program for nine years on Waddell Creek in Santa Cruz County, Shapovalov and Taft analyzed scales from juvenile and adult steelhead captured in the traps in order to determine age, length of time spent in freshwater and saltwater, and spawning history. Juvenile fish captured in the trap during September and October that were less than 105 millimeters fork length were age 0+ or young-of-the-year. Steelhead measuring 105 to 165 millimeters were age 1+ and fish that were 165 to 220 millimeters were age 2+. Obviously, there will be variability in the length ranges for a given age class depending upon timing of emergence, food availability, stream flow, competition, temperature and other rearing conditions. However, until more discreet, stream specific information becomes available the age/length categories defined by Shapovalov and Taft will be used.

Population estimates for each site were calculated using the Microfish 3.0 program (VanDevanter and Platts, 1989). Fulton Condition Factors were calculated using the method described in the outmigrant trapping method section.

Channel Typing Results

In Santa Rosa Creek, channel types changed often primarily because of substrate composition

and the degree of entrenchment. To simplify the classification of reaches, the most prevalent channel type was used to designate reaches. For example, if there was a short reach of a “C” channel type in an otherwise “F” dominated channel, the “C” channel was not called out separately. Using this criterion, reach 1 within Santa Rosa Creek extended from the upper end of the lagoon upstream 26,399 feet and was primarily a F3/F4 channel type. Reach 2 was a C3/C4 channel for the next 16,411 feet before switching back to a F3 channel for 5,455 feet and reach 4 was a C2 channel type for the remaining 28,208 feet. The “F” type channels are entrenched, low gradient, meandering, with riffle/pool sequences and high width/depth ratios. The “C” channel type is a low gradient, meandering, alluvial channel with point-bars, riffle/pool sequences and broad, well defined floodplains. The 2, 3, and 4 refer to the dominant substrate with 2 referring to boulder, 3 referring to cobble, and 4 being gravel.

Habitat Typing Results

The mainstem Santa Rosa Creek was surveyed from the upper end of the lagoon up to stream mile 11.2 where the mainstem makes a 90° turn off to the south. The survey continued for another 3.2 miles in the unnamed tributary that runs adjacent to Santa Rosa Creek Road which at the time of the survey contained three quarters of the flow. Approximately 1,452 feet of stream were not surveyed because of access issues. Access was also denied on an additional 5,050 feet of stream, but habitat mapping was conducted from the road. Depth, width, instream shelter and pool tail crest information was not able to be obtained on those units, however.

A total of 894 discreet habitat units were identified in the 79,843 feet of channel surveyed; however 3,370 feet were side channel units so the actual length of stream surveyed was 76,473 feet. Based on frequency of occurrence, 44% of the units were pools, 37% were flatwater units, 15% were riffles, 3% consisted of side channel units, 0.1% of the units were dry, 0.1% was a culvert, 0.5% was not surveyed, and 0.1% was the lagoon (Table 1 and Figure 6).

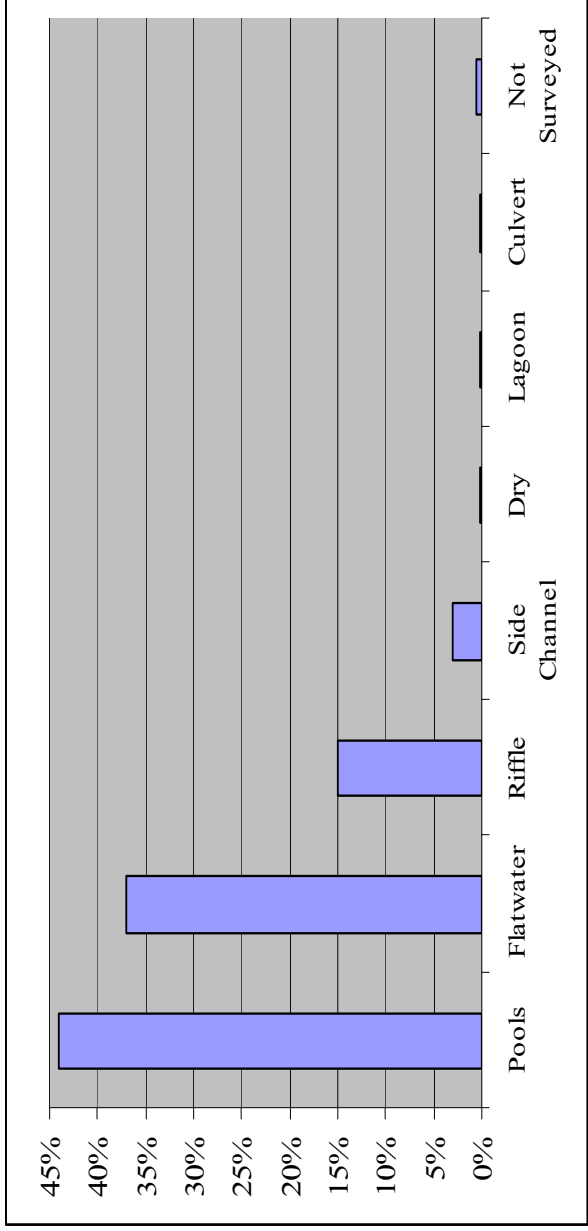


Figure 6. Percent frequency occurrence of habitat units in Santa Rosa Creek, 2005.

Based on total stream length, 34.1% (27,238 feet) was pool habitat, 46.2% (36,924 feet) was flatwater, 8.2% (6,546 feet) were riffles, 3.3% (2,625 feet) was dry, 1.8% (1,452 feet) was not surveyed, 1.9% (1,548 feet) was lagoon habitat, 0.06% (50 feet) of the creek went through a culvert and 4.3% (3,370 feet) were side channel units (Table 1 and Figure 7).

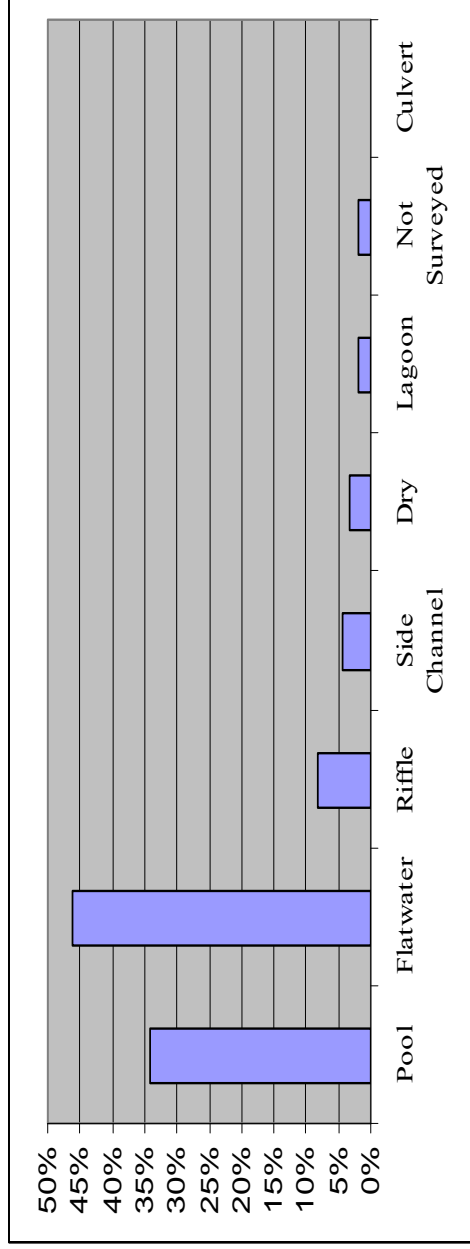


Figure 7. Percent total length of each category of habitat, Santa Rosa Creek, 2005.

Pool Results

Of the 894 units identified, 397 of these units were pools. Pool types found in Santa Rosa Creek include mid-channel pools (84 pools), lateral scour boulder pools (83 pools), lateral scour root pools (80 pools), lateral scour bedrock pools (74 pools), lateral scour log pools (58 pools), corner pools (11 pools), and step pools (7 pools). Fifty-eight percent or 231 pools were located upstream of the dry reach while the remaining 166 pools (42%) were dispersed downstream of the dry reach.

Average lengths, widths, and depths of each of these pools types can be found in Table 2. Maximum depths of all pool types measured ranged from less than one foot (61 pools) to over 4 feet (1 pool). An additional 212 pools ranged between 1 and 2 feet maximum depth, 71 pools ranged between 2 and 3 feet, and 13 pools ranged between 3 and 4 feet deep (Table 3 and Figure 8). Pools upstream of the dry reach had a slightly higher average maximum depth of 1.92 feet while downstream of the dry reach the average maximum depth of pools was 1.88 feet.

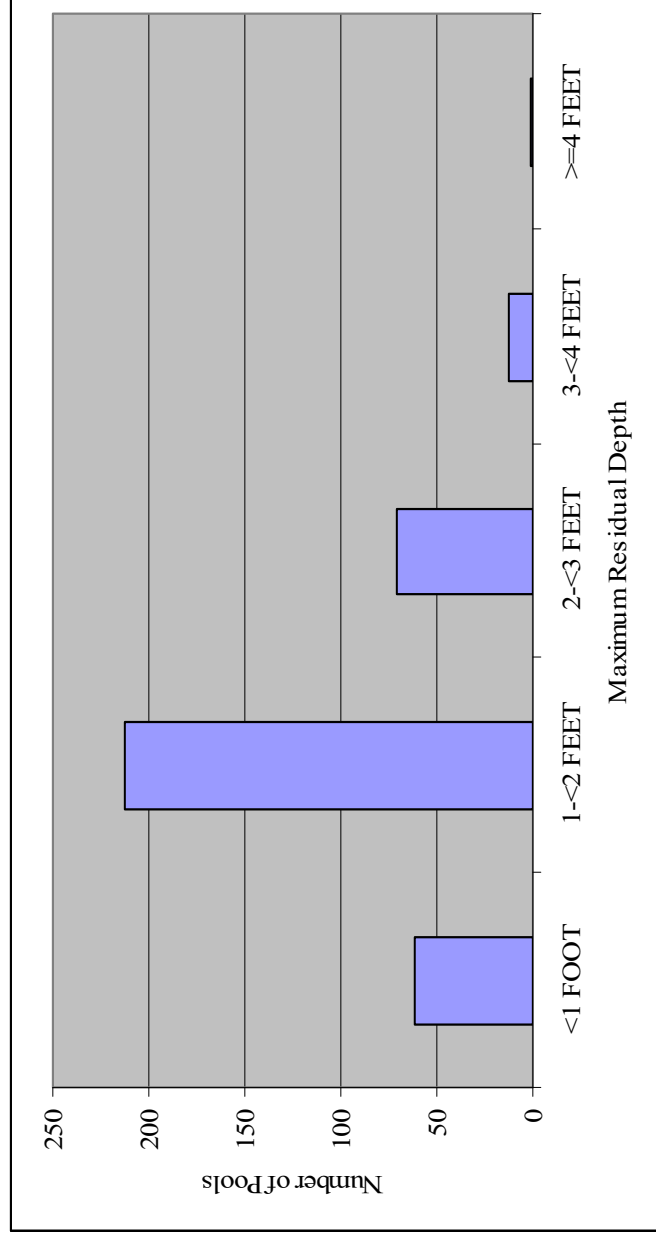


Figure 8. Distribution of maximum residual depths in measured pools, Santa Rosa Creek, 2005.

Instream cover or shelter was diverse and included root mass (26%), terrestrial vegetation (17%), small woody debris (13%), boulders (18%), undercut banks (10%), aquatic vegetation (12%), large woody debris (3%), and white water (1%) (Table 4 and Figure 9). The percentage of pool volume with instream shelter ranged from 5% and 90% in the 42 pools that were fully measured (Table 5).

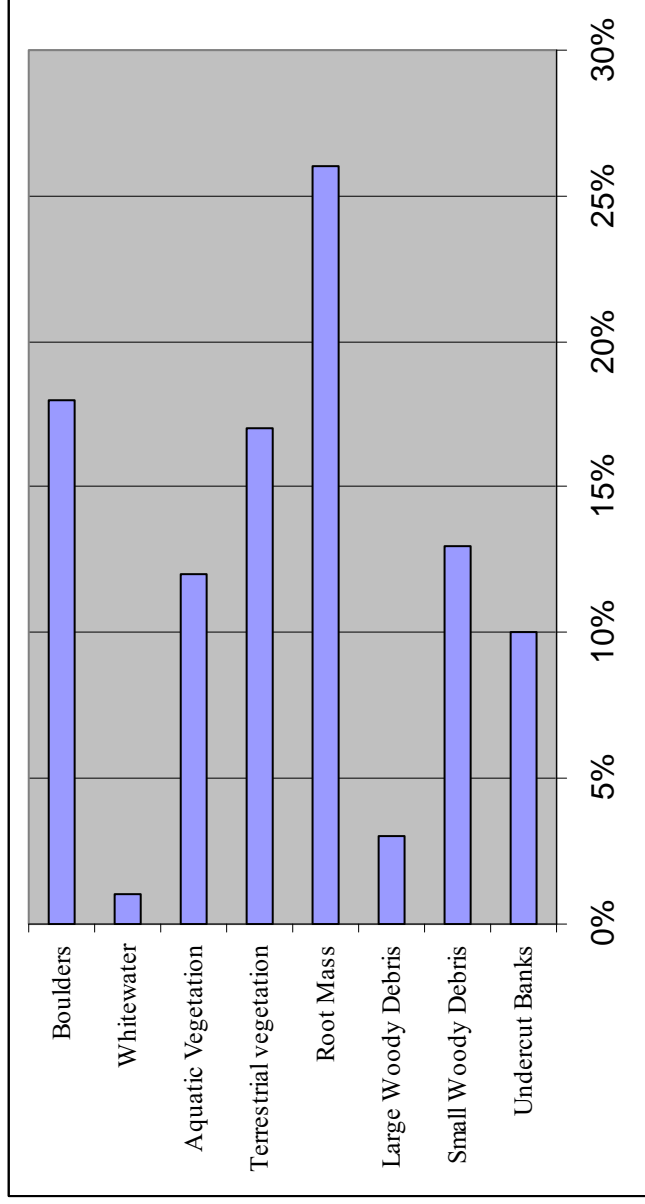


Figure 9. Percentage of each cover type in pool habitat, Santa Rosa Creek, 2005.

Percentage of Pool Volume with Cover	Percentage of Pools
0% – 10%	28 %
11% - 20%	49 %
21% - 30%	10%
31% - 40%	2.5%
41% - 50%	5%
51% - 60%	2.5%
61% - 70%	
71% - 80%	
81% - 90%	3%
91% - 100%	

Table 5. Percentage of pool volume with cover components, Santa Rosa Creek, 2005.

The pools in stream miles one, five, six, seven, and ten had the highest percentages of instream cover with 42% cover in stream mile one, 20% in stream mile five, 21% in stream mile six, 37% in stream mile seven and 30% in stream mile ten. Cover in stream mile one was provided primarily by emergent aquatic vegetation that covered the channel. Cover was more diverse in stream miles five, six, seven and ten. All remaining pools had cover in 5% and 15% of the volume. It is suspected that the pools that were identified but not surveyed throughout stream miles 12 and 13 would significantly increase the percentage of cover for those two stream miles.

Primary substrate within pools consisted of sand (34.5% of the pools), gravel (22%), silt (17.5%), boulder 16%, small cobble and large cobble (5% each) (Table 6).

Substrate Composition and Embeddedness at Pool Tail Crests

Of the 381 pool tail crests measured, 79 consisted of silt/clay, sand, or boulders and since these substrate types could not be used for spawning, they had a rating of 5. The remaining 302 pool tail crests consisted of gravel (164 pools), small cobble (107 pools), or large cobble (31 pools) (Figure10). Gravel (0.08 – 2.5 inches in diameter) and small cobble (2.5 – 5.0 inches in

diameter) can be used for spawning, however the large cobble (5 – 10 inches in diameter) would most likely need to be mixed with smaller sized substrate in order to be used for spawning.

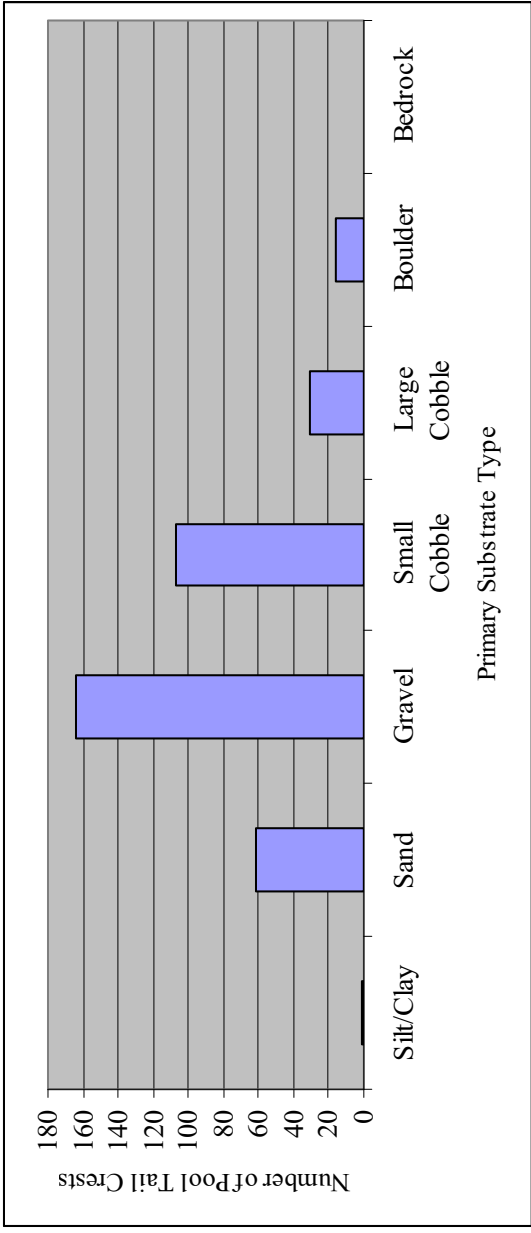


Figure 10. Distribution of the primary substrate at 381 of the pool tail crests, Santa Rosa Creek.

The pool tail crests that consisted of gravel, small cobble and large cobble were also measured for embeddedness. It was found that 61 of the pools tail crests were less than 25% embedded (Value 1), 138 were between 26 – 50% embedded (Value 2), 66 were embedded between 51 – 75% (Value 3), and 36 were embedded more than 75% (Value 4) (Table7).

Substrate at pool crests	Number of Pools	Value 1 (< 25%)	Value 2 (26 – 50%)	Value 3 (51 – 75%)	Value 4 (>75%)	Value 5 (Cannot use)
Silt/Clay	1					1
Sand	62					62
Gravel	164	57	69	22	18	
Small Cobble	107	3	53	32	15	
Large Cobble	31	1	16	12	3	
Boulder	16					16

Table 7. Embeddedness of substrate at pool tail crests

Of those pool tail crests consisting of either gravel or small cobble, 112 spawning sites were located downstream of the dry area and 139 sites were above the dry area. The number of spawning sites above the dry reach is most likely much higher since it does not include any spawning areas that may have been located in the 6,502 feet that were not surveyed. Using the criteria of appropriate substrate and low embeddedness (< 50%), 175 sites were available (81 below the dry reach and 94 above). Fifty-seven of those sites had the optimum combination of gravel/small cobble substrate and embeddedness less than 25% (25 below the dry reach and 31 above). Stream miles 5 through 7, 9, 10, 11 and 14 had the highest quality and quantity of spawning habitat. Stream miles 1 through 4 had three optimal sites.

There were 183 other potential spawning sites that are not located at the pool tail crests. Of these, 91 were above the dry area and 92 were below. Within the dry reach spawning substrate was available as well. The locations of these sites are identified in the Comments and Landmarks section.

Riffle Results

In Santa Rosa Creek, 128 low gradient riffles and three cascades were identified. Most of the riffles (99 units) were located above the dry reach. Detailed information of the average length, width, and depth of these units can be found in Tables 1 and 2. Average maximum depth in the riffles and cascades was 0.9 feet.

Instream shelter in riffles consisted primarily of white water (29.5%) and boulders (29%) however, aquatic vegetation (16%), small woody material (8%), terrestrial vegetation (7.5%), root mass (7.5%), bedrock ledge (2%) and large woody material (0.5%) were also present (Table 4). The volume of riffle habitat with instream shelter ranged from 0% to 90% with most of the riffles (81%) having shelter between 0% and 10% of the volume. An additional 12.5% of the riffles had shelter in 11% to 20%, 6% of the riffles had shelter in 31% to 40% of the volume, and the remaining 12.5% of the riffles had shelter in 81% to 90% of the volume.

Primary substrate within low gradient riffles included gravel (31%), small cobble (31%), large cobble (25%), and boulders (13%). The three cascades surveyed consisted of boulders (Table 6).

When looked at individually and cumulatively, the boulder cascades were not considered to be impediments or barriers to migration.

Flatwater Results

The flatwater habitat in Santa Rosa Creek included glides, runs, and step-runs. Within the approximate 14.5 miles of stream surveyed, 254 runs, 59 glides, and 16 step-runs were identified. Average length, width and depth of these units can be found in Table 2. Maximum depth was 2.2 feet in the runs, 1.3 feet in the glides, and 1.2 feet in the step-runs.

Instream shelter in all flatwater units combined included boulders (31%), root mass (22%), submerged terrestrial vegetation (16%), aquatic vegetation (10%), small woody material (8%), white water (8%), undercut banks (4%) and large woody material (1%) (Table 4). The volume of flatwater habitat with instream shelter ranged from 0% to 50% with 58% of the flatwater units having shelter in 0% to 10% of the volume, 31% of the units had shelter in 11% to 20%, 8% of the units had shelter in 21% to 30%, and 3% of the units had shelter between 41% to 50% of the volume. Generally, the runs and step-runs had diverse shelter and the shelter was distributed throughout the entire unit. Cover in the glides consisted primarily of submerged terrestrial vegetation and it was confined to the margins of the stream.

Primary substrate within glides consisted of gravel (66%), silt (17%), and small cobble (17%). Primary substrate within runs consisted of gravel (36%), small cobble (24%), sand (16%), boulder (12%), and large cobble (12%). Step-runs consisted of boulders (75%) and small cobble (25%)(Table 6). The locations of the glides which could be potential spawning sites are identified in the Landmarks and Comments section.

Side Channel Habitat

Side channel habitat were those units that flowed parallel to one or more main channel units, but at low flow are separated from the main channel by a cobble bar. In Santa Rosa Creek, the side channels that were identified had less flow than the main channel units, but were going to remain perennial. Twenty-nine side channel units were identified and included five backwater boulder

scour pools (546 feet), two bedrock scour pools (277 feet), seven riffles (948 feet), six glides (807 feet), eight runs (581 feet), and one step-run (211 feet).

Canopy

Canopy density was measured in approximately one-third of all the habitat units (Table 8). In addition, general native riparian vegetation communities and non-native species locations were noted, but an extensive vegetation survey was not conducted. For all of Santa Rosa Creek, canopy averaged 39% and was provided by willows, alder, California bay, sycamore, oaks, cottonwood, Monterey pine, and eucalyptus. From stream mile 7.9 downstream to the lagoon, canopy density was low with an average density of 35% (range: 17% in stream mile one to 46% in stream mile six). Canopy measurements were not taken over the dry area and if that area were included, the average for the reach would be much lower. From stream mile 8 to the end of the survey, canopy averaged 42% (range: 23% in stream mile 8 to 57% in stream mile 14).

Non-native plant species located in the riparian zone included eucalyptus, cape ivy, english ivy, pampas grass, arundo, nasturtiums, redwood, castor bean, French broom, walnut, palm tree's, cow parsnips, and Jimsonweed. Stream mile 2 had the most extensive coverage and species diversity including most of the non-native vegetation mentioned, in addition to vegetable gardens and succulents planted on the stream banks as well as on the top of the bank. Cape ivy was found from stream mile 10 downstream, but was most extensive in stream miles 5 and 6. With the exception of one private garden in stream mile 12 and one patch of arundo in stream mile 14 no other non-native plant species were observed from stream mile 11 to 14. Specific locations of non-native plant species can be found in the Comments and Landmarks section.

Stream Bank Composition

Of the habitat units fully surveyed, stream banks were composed of sand/silt/clay (42% of the units), cobble/gravel (39%), boulder (12%), and bedrock (7%). The stream bank area with vegetation was relatively high with 71% of the right bank and 64% of the left bank covered with vegetation. Vegetation types consisted of hardwood trees (88%), brush (6%), and grass (4%). An additional 1.1% of the stream banks had no vegetation (Table 8).

Although stream banks were relatively well vegetated in those units that were fully measured, vertical denuded banks were common in certain reaches of the stream (Figure 11). Downstream of stream 7.9, approximately 6,040 feet of the left bank and 7,770 feet of the right bank were denuded and actively eroding. Upstream of stream mile 7.9, approximately 8,353 feet of the left bank and 5,760 feet of the right bank were eroding. Only those sites greater than 50 feet in length were included in these measurements.

Descriptions and locations of stream bank erosion sites are in the Comments and Landmarks section.



Figure 11. One of several vertical denuded banks observed along Santa Rosa Creek, 2005.

Potential Impediments

During the summer and fall months, stream flow at approximately stream mile 6.7 (unit 363) goes subsurface leaving a portion of Santa Rosa Creek dry for a part of the year. The dry unit was 2,625 feet long at the time of the survey (Sept. 21, 2005) although that distance and the length of the dry period may vary from year to year depending on the amount of rainfall the previous winter. The flood plain width in this section ranges from 250 to 350 feet with the potential wetted channel being 70 to 100 feet wide. These channel characteristics extend 3,304 feet upstream of the current dry channel. The stream banks throughout the dry reach and extending to stream mile 7.9 are 15 to 20 feet high, vertical, denuded, and are actively eroding in many areas (Figure 12). This section of dry creek severs the upper watershed from the lower watershed and can delay or prevent upstream migration of adult steelhead and downstream migration of smolts during drier years.



Figure 12. A portion of the dry section in Santa Rosa Creek, 2005.

Another impediment and occasional barrier to upstream adult and juvenile migration is Ferrasci Road crossing located at stream mile 3.4 (N35° 24' 05.0" W121° 03' 55.3"). The crossing is a 10 foot high concrete ford that spans the 45 foot wide channel at an angle and has three culverts and a fish ladder through the center (Figure 13). The culverts are 4 feet in diameter and are perched approximately five feet above the pool at the base of the structure (Figures 14 and 15). The fish ladder is 4 feet in width and the flow is run-like through the ladder during the low flow season. During high flow events, water flows completely over the structure (Figure 16).



Figure 13. Ferrasci Road crossing at stream mile 3.4.



Figure 14. Looking upstream to Ferrasci Road crossing, Santa Rosa Creek.



Figure 15. Looking downstream to Ferrasci Road crossing, Santa Rosa Creek



Figure 16. Ferrasci Road crossing during high flows in the spring of 2005.

Stream Flow Results

The stream flow site on Santa Rosa Creek was located approximately 3,000 feet downstream from Highway 1 at N35° 33' 57.6" W121° 06' 05.8" (Figure 1.). Stream flow measurements were taken on a weekly basis from April 20, 2005 through September 20, 2005 with additional measurements taken on October 5, 2005, November 11, 2005 and December 6, 2005 (Table 9 and Figure 17).

Date	Stream Flow (cfs)
April 20, 2005	23.0
April 28, 2005	25.3
May 4, 2005	15.3
May 11, 2005	14.94
May 18, 2005	11.14
May 24, 2005	8.77
June 2, 2005	7.82
June 7, 2005	6.75
June 14, 2005	5.3
June 21, 2005	4.2
June 28, 2005	3.86
July 5, 2005	4.08
July 12, 2005	3.5
July 19, 2005	3.36
July 26, 2005	3.14
August 2, 2005	2.98
August 9, 2005	2.36
August 16, 2005	2.47
August 23, 2005	2.15
August 30, 2005	1.45
September 8, 2005	1.73
September 13, 2005	1.66
September 20, 2005	1.90
October 5, 2005	1.35
October 24, 2005	1.56
November 11, 2005	1.18
December 6, 2005	2.85

Table 9. Stream flow results from the spring, summer, and fall on Santa Rosa Creek. 2005.

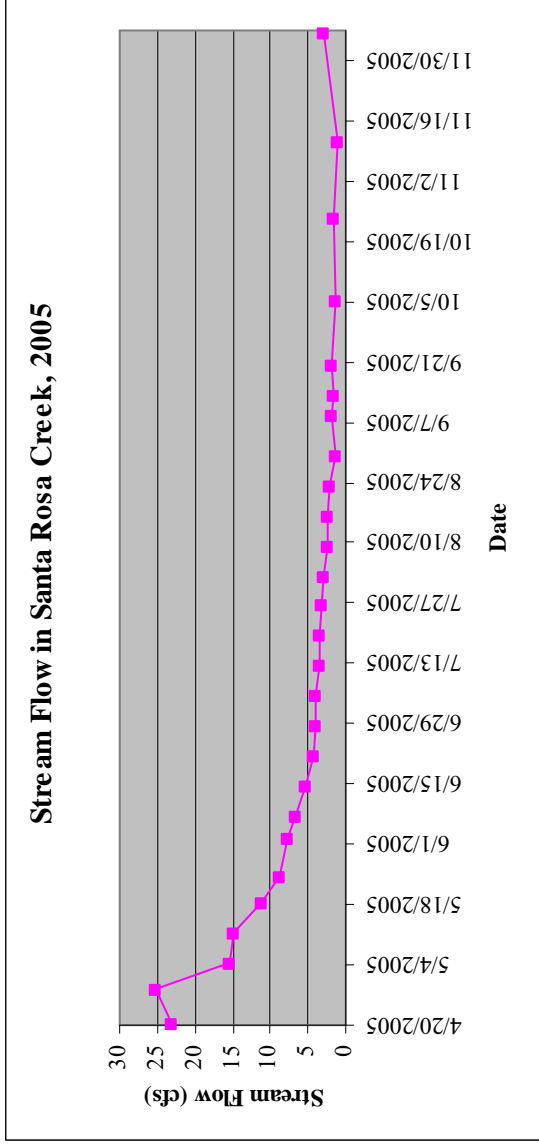


Figure 17. Stream flow results from Santa Rosa Creek, 2005.

A fairly significant rain event occurred overnight on April 27 which increased stream flow approximately 2 cubic feet per second (cfs) on April 28th and compromised the outmigrant trap. Rain events also occurred on May 5th and 9th, but the flow had receded somewhat by the time streamflow was measured on May 11th.

Temperatures Results

Air and water temperatures taken during the habitat survey ranged from 54°F to 87°F and 55°F to 70°F, respectively. Air temperatures were highest and water temperatures coolest in the inland areas compared to the coast where the marine influence cooled the air, but water temperatures were consistently higher than inland areas.

In addition to temperatures recorded during the habitat survey, data loggers were installed at three sites in Santa Rosa Creek in order to continuously monitor stream temperatures from June 2nd through October 25th 2005.

Site 1 was located at stream mile 0.6 and the data logger was placed in a pool approximately 1.5 feet beneath the surface of the water under the right stream bank (Figure 1). It was at this location that stream temperatures were highest and experienced the greatest diurnal fluctuations

(Figure 18). On thirteen occasions throughout August and early September stream temperatures rose above 75°F and on one occasion reached 79.4°F. On three of the days with higher temperatures (77.3° - 79.4°F), the data logger may have been dewatered for a brief period of time. The temperatures leading up to the highs on those three days were rising steadily with an increase of 1.5°F to 2.0°F from 10:00 in the morning until 2:30 in the afternoon when the temperature jumped 7° to 8.5°F at 3:00 and then decreased back down to the same temperature that was recorded at 2:30 by the next reading.

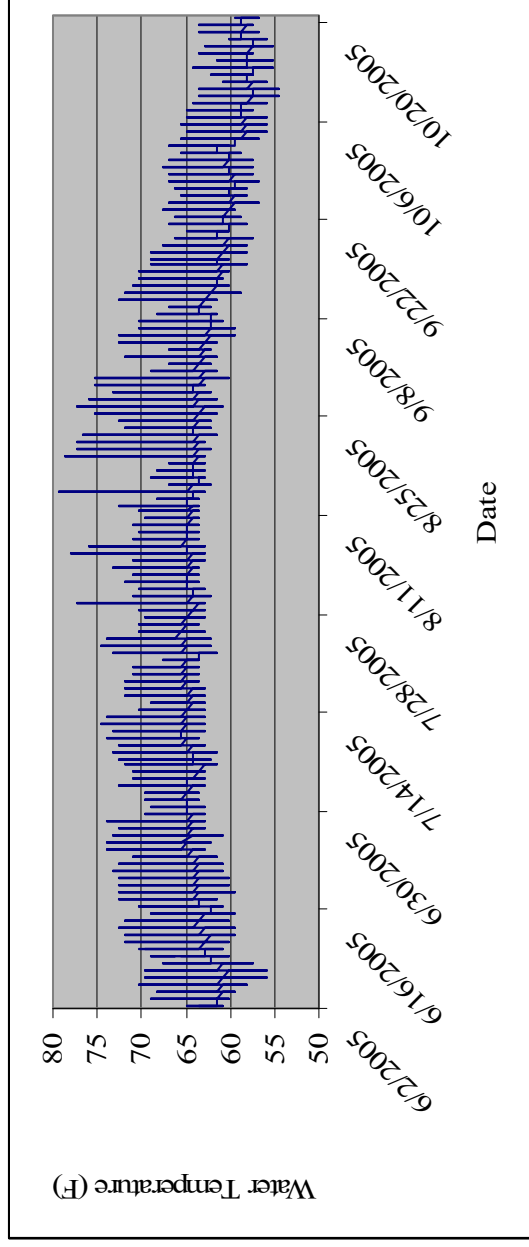


Figure 18. Recorded water temperatures at Site 1 from June 2 through October 20, 2005.

Excluding the three suspect high temperatures, 71 days from June through mid September exceeded 70°F. Without exception stream temperatures peaked at 3:00 p.m. and stayed elevated (above 70°F) for three to eight hours before eventually decreasing down to the lower 60's. In late September, stream temperatures remained elevated for 2.5 to 3 hours before rapidly decreasing to the lower 60's or high 50's.

Diurnal fluctuations ranged 5°F to 16°F with the warmer days from June through August having the greatest fluctuations.

Site 2 was located at stream mile 8.0 and the data logger was placed approximately one foot beneath the surface of the water under willow vegetation (Figure 2). Stream temperatures at this

location were cooler than at Site 1, but daily temperature fluctuations were still relatively broad (Figure 19). Temperatures reached or exceeded 70°F on fourteen days with the highest temperature of 71°F recorded on June 13 and July 13. Like at Site 1, stream temperatures peaked by 3:00 p.m., but unlike Site 1 temperatures began decreasing by the next reading one half hour later and after four hours temperatures were in the low 60's.

The greatest daily fluctuations occurred in early to mid June and ranged from 12° to 14°F.

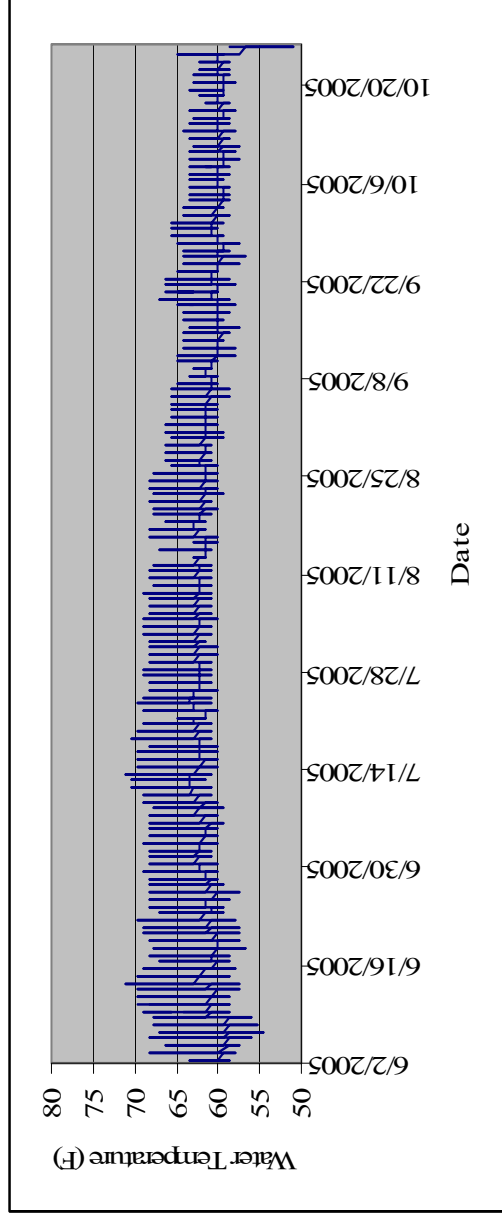


Figure 19. Recorded water temperatures at Site 2 from June 2 through August 25, 2005.

Site 3 was located at stream mile 14.5 and the data logger was placed 1.5 feet beneath the surface of the water under an alder root (Figure 3). Stream temperatures were coolest and daily fluctuations narrowest at this site (Figure 20). The highest temperature of 69.7°F was reached on July 23rd although there were four other occasions when temperatures reached 68°F. Peak temperatures were again reached by 3:00 p.m., but by the next reading one half hour later stream temperatures had begun to decrease. Daily fluctuations throughout the entire study period ranged from 2.5° to 6.5° F.

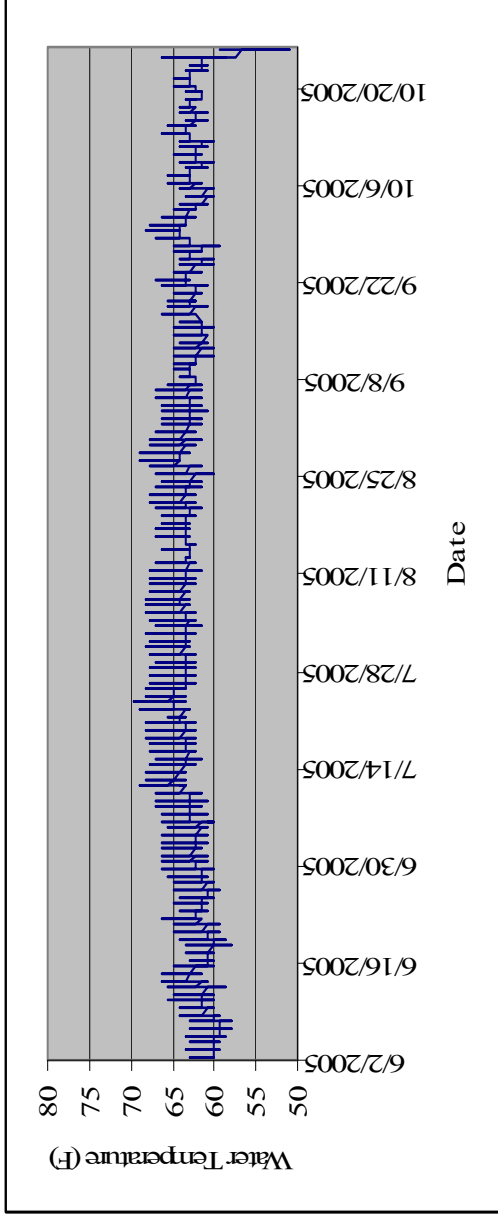


Figure 20. Recorded water temperatures at Site 3 from June 2 through October 25, 2005.

Outmigrant Trapping Results

The outmigrant trap and attached weir installed at stream mile 0.35 from April 18, 2005 to May 25, 2005 was operational on 21 days. Weekends and rain events which significantly increased streamflow precluded us from trapping the other 17 days. Over the approximate six weeks of trapping, 355 steelhead were captured including 79 parr, 11 rainbow trout morphs, 199 partial smolts, 65 smolts, and one kelt (Table 10). Over the course of trapping, peak emigration was during the weeks of April 18 and 25 where 100 fish were captured during the week April 18 and 140 were captured during the week of April 25. However, only 24% of the fish were smolts. Sixty-five percent of the fish captured over this time frame were partial smolts.

Week	Parr	Partial Smolt	Smolt	Rainbow trout coloration	Kelt
April 18	12	52	36		1
April 25	11	107	23	2	
May 2	9	11			
May 9	13	12	1	2	
May 16	29	8		1	
May 23	5	9	5	6	

Table 10. Number of parr, partial smolts, smolts, rainbow trout morphs and kelts captured in the outmigrant trap on Santa Rosa Creek, 2005.

The 79 parr that were captured averaged 92 millimeters fork length (range: 59 – 138 millimeters). The 199 partial smolts averaged 146 millimeters fork length (range: 109 – 207 millimeters) and the 65 smolts averaged 165 millimeters fork length (range: 130 - 247). The 11 fish with rainbow trout coloration averaged 175 millimeters fork length (range: 138 – 239 millimeters) (Figure 21). The kelt was only measured for total length and was 526 millimeters.

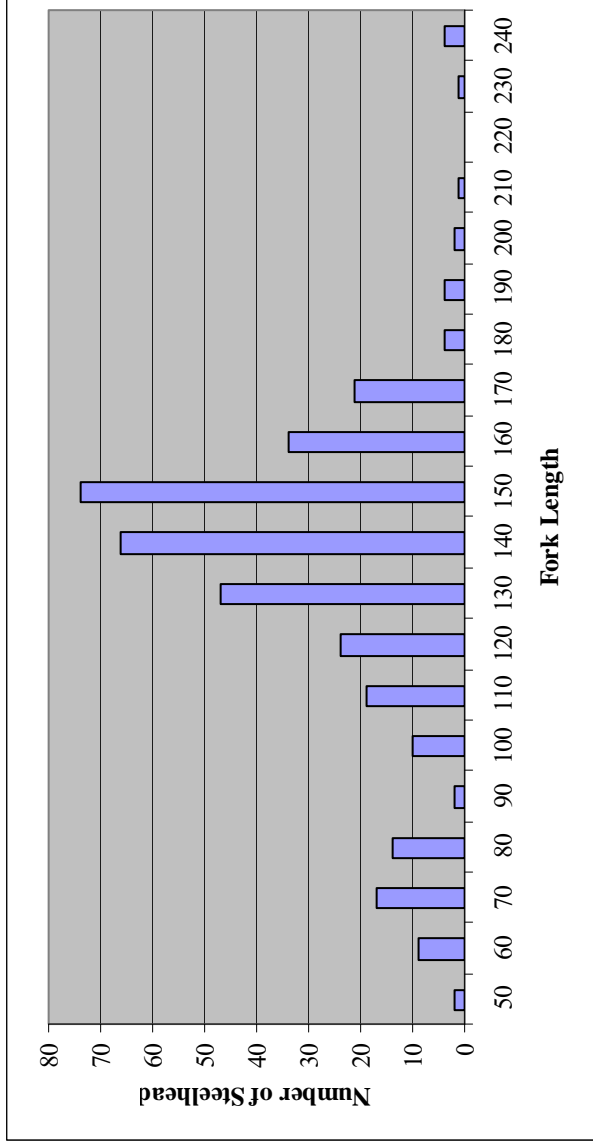


Figure 21. Length frequency distribution of the parr, partial smolts, smolts and rainbow trout captured in the outmigrant trap, Santa Rosa Creek, 2005.

Fulton condition factors (K) are a measure of “fitness” or how much mass a fish has relative to its length. Higher numbers indicate better fitness or greater plumpness. The Fulton condition factors for the parr, partial smolts, smolts, and rainbow trout morphs captured in the outmigrant trap are summarized in Tables 11, 12, 13, and 14. Generally, smolts and partial smolts had the lowest condition factors and the parr had the highest. Condition factors of the rainbow trout were more similar to the partial smolts and smolts.

Fork Length (mm)	Number of Fish	Weight Range (grams)	K-Factor Range	Average K-Factor
50 - 59	2	2.5	1.22	1.22
60 - 69	9	2.5 - 4.0	1.04 - 1.52	1.14
70 - 79	17	3.5 - 6.5	0.91 - 1.54	1.13
80 - 89	14	5.5 - 8.0	1.07 - 1.36	1.14
90 - 99	2	11.0 - 12.0	1.17 - 1.27	1.22
100 - 109	9	11.0 - 16.0	0.98 - 1.23	1.08
110 - 119	15	11.5 - 20.5	0.84 - 1.28	1.09
120 - 129	6	16.5 - 22.0	0.95 - 1.16	1.09
130 - 139	3	25.0 - 28.0	0.95 - 1.20	1.12

Table 11. Summary of condition factors for those steelhead exhibiting parr coloration, Santa Rosa Creek, 2005.

Fork Length (mm)	Number of Fish	Weight Range (grams)	K-Factor Range	Average K-Factor
100 - 109	1	13.5	1.04	1.04
110 - 119	4	15.5 - 18.0	1.03 - 1.18	1.04
120 - 129	18	17.0 - 25.5	0.94 - 1.44	1.09
130 - 139	40	10.0 - 30.5	0.82 - 1.31	1.00
140 - 149	56	20.0 - 35.0	0.75 - 1.24	0.96
150 - 159	54	27.0 - 46.0	0.74 - 1.28	0.97
160 - 169	17	29.5 - 49.0	0.67 - 1.13	0.98
170 - 179	8	37.0 - 57.0	0.75 - 1.12	0.91
180 - 189				
190 - 199				
200 - 209	1	93.5	1.05	1.05

Table 12. Summary of condition factors for those steelhead exhibiting partial smolt coloration, Santa Rosa Creek, 2005.

Fork Length (mm)	Number of Fish	Weight Range (grams)	K-Factor Range	Average K-Factor
130 - 139	3	21.0 - 24.0	0.87 - 1.00	0.94
140 - 149	9	26.5 - 33.0	0.87 - 1.06	0.94
150 - 159	18	21.0 - 48.5	0.61 - 1.21	0.92
160 - 169	16	34.5 - 54.5	0.82 - 1.15	0.94
170 - 179	11	42.5 - 63.5	0.84 - 1.11	0.96
180 - 189	3	53.5 - 59.0	0.90 - 1.01	0.94
190 - 199	3	58.5 - 79.0	0.85 - 1.00	.093
200 - 209	1	80.5	1.01	1.01
210 - 219				
220 - 229				
230 - 239				
240 - 249	1	94.5	0.63	0.63

Table 13. Summary of condition factors for those steelhead exhibiting smolt coloration, Santa Rosa Creek, 2005.

Fork Length (mm)	Number of Fish	Weight Range (grams)	K-Factor Range	Average K-Factor
130 - 139	1	28.0	1.06	1.06
140 - 149	1	27.0	0.96	0.96
150 - 159	2	43.0 - 44.0	1.11 - 1.16	1.13
160 - 169	1	50.0	1.11	1.11
170 - 179	2	49.5 - 57.5	1.00 - 1.07	1.035
180 - 189	1	73.5	1.20	1.20
190 - 199	1	78.5	1.14	1.14
200 - 209				
210 - 219	1	91	0.98	0.98
220 - 229				
230 - 239	1	162	1.19	1.19

Table 14. Summary of condition factors for those steelhead exhibiting rainbow trout coloration, Santa Rosa Creek, 2005.

One hundred seventy four of the steelhead captured in the trap were infected with black spot disease including 22 parr, 115 partial smolts, 31 smolts and 6 of the rainbow trout morphs. No other parasites or obvious signs of disease were observed.

In addition to steelhead, coast range sculpin (*Cottus aleuticus*), prickly sculpin (*Cottus asper*), stickleback (*Gasterosteus aculeatus*), red legged frogs (*Rana aurora*), crayfish (*Pacifastacus leniusculus*), western pond turtles (*Clemmys marmorata*), green sunfish (*Lepomis cyanellus*), and bullfrogs (*Rana catesbeiana*) were also captured.

Fish Sampling Results

Results for each electrofishing site will be presented separately.

Site 1

The first sample site was located at approximately stream mile 0.27 or 100 feet upstream from Windsor Road Bridge crossing (Figure 1). The total survey length was 150 feet and included an 85 foot long mid-channel pool and a 65 foot long glide. Maximum depths of the pool and glide were 1.5 feet and 0.5 feet, respectively. Aquatic vegetation (cattails and watercress) covered approximately 60% of the site. Air and water temperatures ranged from 62° to 65°F and 57°F, respectively.

At this site, three steelhead were captured with an average fork length of 206 millimeters (range: 201 - 214 mm). Biomass within Site 1 was 0.08 g/ft² and the number of steelhead per linear foot was 0.02 (Table 15). Using age/length criteria described previously, all three steelhead were considered to be age 2+ and all three were partial smolts. One steelhead was infected with black spot disease. Table 16 summarizes the Fulton condition factors for the three steelhead captured at Site 1.

Location (Stream Mile)	Total Number of Fish Captured	Fish Per Linear Foot	Total Weight of all Captured Fish (Grams)	Biomass (grams/foot ²)
Site 1 (0.27)	3	0.02	318.5	0.088
Site 2 (0.5)	12	0.07	974	0.72
Site 3 (2.3)	27	0.07	2,070	0.24
Site 4 (3.2)	50	0.12	2,761	0.82
Site 5 (4.3)	156	0.53	8,091	3.2
Site 6 (5.5)	44	0.13	1,304	0.3
Site 7 (8.8)	174	0.52	2,965	0.61
Site 8 (11.0)	341	1.16	4,180	2.19
Site 9 (12.7)	235	0.75	2,769.5	0.73
Site 10 (14.0)	231	0.77	1,832	0.93

Table 15. Biomass and the number of steelhead per linear foot at the 10 sample locations in Santa Rosa Creek, 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	Average K-Factor
200-209	2	96 – 101.5	1.16 – 1.25	1.20
210-219	1	121	1.23	1.23

Table 16. Condition factors (K) of the 3 steelhead captured at Site 1, Santa Rosa Creek, 2005.

In addition to steelhead, prickly sculpin and stickleback were captured and one red legged frog and one crayfish were observed.

Site 2

The second sample site was located at stream mile 0.5 and was 169 feet in length (Figure 1). The site included two log scour pools (104 feet), two glides (38 feet), and one low gradient riffle (27 feet). Maximum depths in the pools were 1.0 and 1.2 feet and instream shelter was provided by

willow roots, branches and watercress. The glides were both 0.5 feet in maximum depth and one glide had submerged willow branches for shelter and the other had no shelter. Maximum depth in the riffle was 0.4 feet and shelter was provided by watercress and cobble. Air and water temperatures ranged from 66° to 69°F and 58° to 59°, respectively.

At site 2, twelve steelhead were captured with a calculated abundance of 13 steelhead. Biomass within Site 2 was 0.72 g/ft² and the number of steelhead per linear foot was 0.07 (Table 15). Five of the steelhead captured were considered to be age 1+ with an average fork length of 150 millimeters (range: 120 – 164 mm); five were age 2+ with an average fork length of 180 millimeters (range: 169 – 209 mm); and two were age 3+ (225 and 252 millimeters in fork length)(Figure 22). The steelhead that was 225 millimeters in length was a silvery parr while all other fish were parr. All three steelhead that were greater than 200 millimeters in fork length had black spot disease. Table 17 summarizes the Fulton condition factors for the twelve steelhead captured at Site 2.

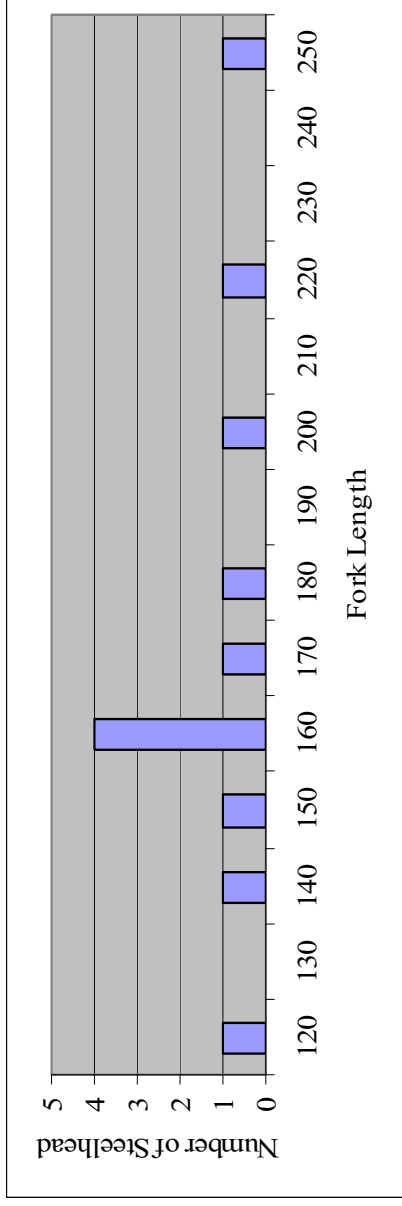


Figure 22. Length frequency distribution of steelhead captured at Site 2, Santa Rosa Creek, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
120 - 129	1	20.0	1.16	1.16
130 - 139				
140 - 149	1	35.5	1.12	1.12
150 - 159	1	51	1.34	1.34
160 - 169	4	56.5 - 66	1.28 – 1.37	1.33
170 - 179	1	73	1.46	1.46
180 - 189	1	68	1.18	1.18
190 - 199				
200 - 209	1	131	1.43	1.43
210 - 219				
220 - 229	1	160	1.40	1.40
230 - 239				
240 - 249				
250 - 259	1	191	1.19	1.19

Table 17. Condition factors of the 12 steelhead captured at Site 2, Santa Rosa Creek, October 2005.

Prickly sculpin were also captured in Site 2.

Site 3

The third sample site was located at approximately stream mile 2.3 (Figure 1). The total survey length was 379 feet and included two boulder scour pools (76 feet), one run (138 feet), one glide (121 feet) and two riffles (44 feet). Maximum depths in the pools were 1.7 and 2.0 feet and shelter included boulders (rip rap) and submerged willow branches. Maximum depths in the run and glide were 0.7 feet and 0.6 feet, respectively. Minimal shelter was provided by dislodged riprap. The riffles had a maximum depth of 0.3 feet and shelter was provided by cobble and undercut bank. During the sampling air temperatures ranged from 56° to 60°F and water temperature was 57°F.

At this site, 27 steelhead were captured and the calculated abundance was also 27. Biomass in Site 3 was 0.24 g/ft² and the number of steelhead per linear foot was 0.07 (Table 15). One steelhead measuring 105 millimeters was placed in the young-of-the-year category, but could very well have been age 1+. Ten additional steelhead placed in the age 1+ category averaged 139 millimeters fork length (range: 108 – 161 mm) and twelve were age 2+ with an average fork length of 193 millimeters (range: 172 – 216 mm). The remaining 4 steelhead were age 3+ with an average fork length of 234 millimeters (range: 224 - 255 mm)(Figure 23). Twelve steelhead ranging in length from 108 to 225 millimeters were silvery parr. Ten were infected with black spot disease. Fulton condition factors for the 27 steelhead captured in Site 3 are summarized in Table 18.

In addition to steelhead, prickly sculpin, coast range sculpin, and stickleback were also captured.

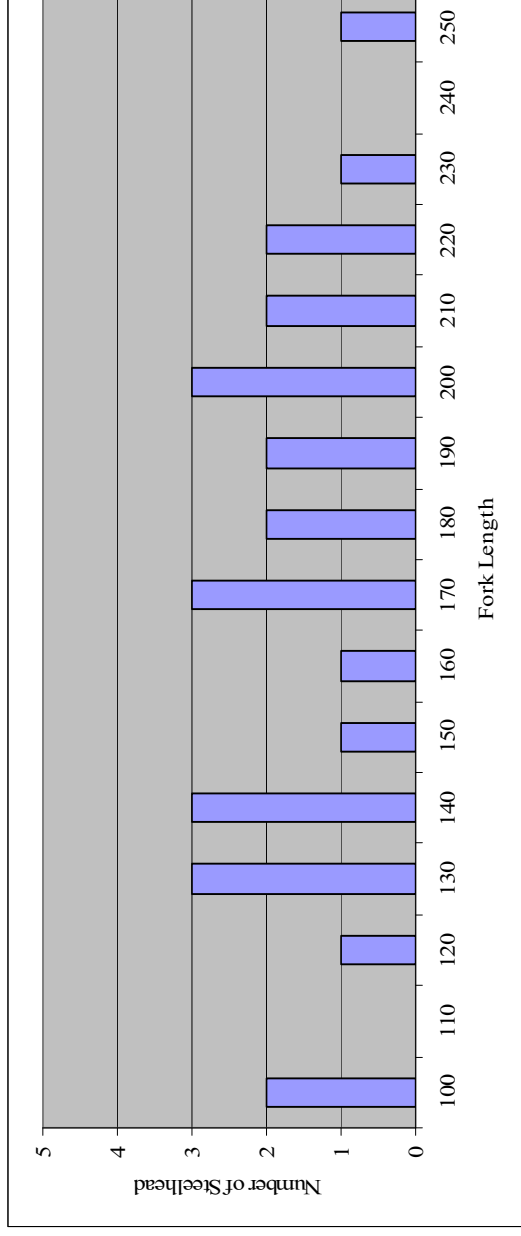


Figure 23. Length frequency distribution of steelhead captured at Site 3, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
100 - 109	2	15.5 - 16.5	1.31 - 1.34	1.33
110 - 119				
120 - 129	1	24.5	1.25	1.25
130 - 139	3	26 - 33.5	1.11 - 1.33	1.26
140 - 149	3	33.5 - 43	1.17 - 1.38	1.31
150 - 159	1	52.5	1.31	1.31
160 - 169	1	47.5	1.14	1.14
170 - 179	3	57.5 - 72	1.11 - 1.41	1.25
180 - 189	2	66 - 66.5	1.06 - 1.14	1.1
190 - 199	2	87 - 88.5	1.14 - 1.23	1.19
200 - 209	3	96 - 120.5	1.18 - 1.34	1.28
210 - 219	2	112 - 121	1.16 - 1.20	1.18
220 - 229	2	146.5 - 148	1.29 - 1.32	1.31
230 - 239	1	146.5	1.16	1.16
240 - 249				
250 - 259	1	197.5	1.19	1.19

Table 18. Condition factors of the 27 steelhead captured at Site 3, Santa Rosa Creek, October 2005.

Site 4

The fourth sample site on Santa Rosa Creek was located at stream mile 3.2 and was 398 feet in length (Figure 1). Habitat included two root scour pools (118 feet), one log scour pool (70 feet), and two runs (210 feet). Maximum depths in the log scour and two root pools were 1.1 feet, 1.7 feet and 1.5 feet, respectively. Instream cover was provided by a fallen pine tree and submerged willow branches. Maximum depths in the runs were 0.9 and 1.1 feet and cover was provided by cobble, willow branches, and small woody debris. Air and water temperatures ranged from 46° to 68°F and 52° to 61°F, respectively.

At Site 4, fifty steelhead were captured with a calculated abundance of 58 steelhead. Calculated biomass was 0.82 g/ft² and there were 0.12 steelhead per linear foot (Table 15). One steelhead

with a fork length of 103 millimeters was considered to be age 0+. Thirty-five steelhead averaging 144 millimeters fork length (range: 111 – 163 mm) were placed in the age 1+ category; twelve steelhead were age 2+ with an average fork length of 181 millimeters (range: 168 - 205 mm); and two were age 3+ (223 and 229 millimeters) (Figure 24). Seventeen of the steelhead were silvery parr (fork length range: 119 to 190 mm); six had distinct rainbow trout coloration (fork length range: 162 – 229 mm); and the remaining twenty-seven were parr (fork length range: 103 – 223 mm). Thirty seven steelhead captured at this location were infected with black spot disease. Table 19 summarizes the Fulton condition factors.

In addition to steelhead, prickly sculpin, coastrange sculpin, stickleback, and crayfish were captured.

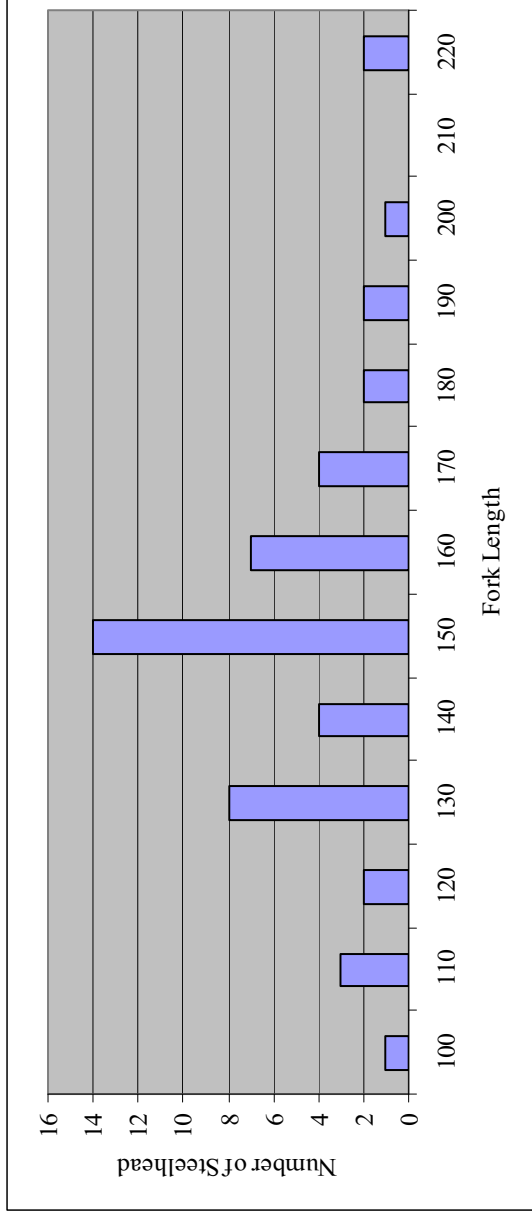


Figure 24. Length frequency distribution of steelhead captured at Site 4, Santa Rosa Creek, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
100 – 109	1	13.5	1.24	1.24
110 – 119	3	16 - 24	1.14 – 1.42	1.26
120 – 129	2	26	1.21 – 1.43	1.32
130 – 139	8	25.5 - 34	1.13 – 1.38	1.28
140 – 149	4	35.5 - 46	1.19 – 1.43	1.32
150 – 159	14	38 - 60	1.10 – 1.52	1.36
160 – 169	7	48.5 - 80.5	1.16 – 1.93	1.39
170 – 179	4	69 - 80	1.27 – 1.47	1.39
180 – 189	2	79.5 - 82.5	1.26 – 1.32	1.29
190 – 199	2	91.5 - 107	1.33 – 1.54	1.44
200 – 209	1	121	1.40	1.40
210 – 219				
220 - 229	2	154.5 – 164.5	1.29 – 1.48	1.39

Table 19. Condition factors of the 50 steelhead captured in Site 4, October 2005.

Site 5

The fifth site on Santa Rosa Creek was located at stream mile 4.3 and was 293 feet in length (Figure 2). This site included one mid-channel pool (43 feet), one log scour pool (29.5 feet), one bedrock scour pool (32.5 feet), and two runs (188 feet). Maximum depths in the mid-channel, log scour and bedrock scour pools were 2.0 feet, 1.5 feet and 2.5 feet, respectively. Instream shelter was provided by large woody debris, bedrock shelves and overhanging and submerged willow trees. Maximum depth in the runs was 1.1 feet and 0.8 feet and instream shelter consisted of cobble and overhanging riparian vegetation. Air temperatures during sampling ranged from 56°F to 61°F and the water temperature was 59°F.

Within this site, 156 steelhead were captured with a calculated abundance of 158 steelhead. Biomass was 3.2 g/ft² and there were 0.53 steelhead per linear foot (Table 15). Three steelhead measuring 98 millimeters in fork length were age 0+; 92 steelhead were age 1+ with an average fork length of 138 millimeters (range: 108 – 165 mm); 57 were age 2+ with an average fork

length of 187 millimeters (range: 169 – 218 mm); and four were age 3+ (average fork length: 242 mm, range: 224 – 260 mm) (Figure 25). Forty-seven of the steelhead ranging in fork length from 124 to 230 millimeters were silvery parr; eleven of the fish ranging in fork length between 113 and 175 millimeters had rainbow trout coloration; and the remaining 98 were parr. Fifty two of the steelhead captured were infected with black spot disease. Table 20 summarizes the Fulton condition factors for steelhead captured at Site 5.

In addition to steelhead, stickleback and one prickly sculpin were captured.

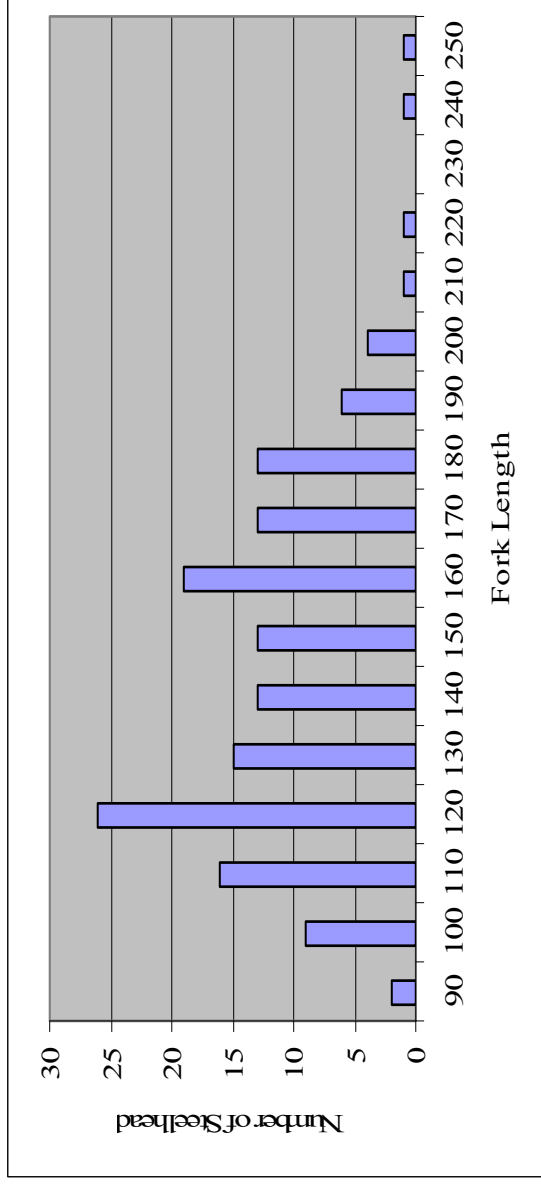


Figure 25. Length frequency distribution of steelhead captured at Site 5, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
90 – 99	3	11 - 13	1.17 – 1.38	1.26
100 – 109	2	15 – 15.5	1.19 – 1.2	1.20
110 – 119	9	15.5 - 20	1.07 – 1.32	1.20
120 – 129	16	21 - 31	1.05 – 1.61	1.27
130 – 139	25	20 - 35	0.85 – 1.33	1.18
140 – 149	15	29.5 - 44	1.03 – 1.54	1.21
150 – 159	13	37.5 - 54	1.09 – 1.40	1.23
160 – 169	13	45 – 60.5	1.01 – 1.34	1.18
170 – 179	19	50.5 - 71	1.01 – 1.37	1.18
180 – 189	13	59.5 - 87	1.02 – 1.29	1.17
190 – 199	13	75 - 97	1.04 – 1.33	1.18
200 – 209	6	92 – 121.5	1.10 – 1.33	1.19
210 – 219	4	114.5 - 124	1.15 – 1.25	1.21
220 – 229	1	123	1.09	1.09
230 – 239	1	133.5	1.10	1.10
240 – 249				
250 – 259	1	224.5	1.37	1.37
260 – 269	1	211	1.20	1.20

Table 20. Condition factors of 154 of the 156 steelhead captured at Site 5, Santa Rosa Creek, October 2005. (Note: Two additional fish were captured but not measured)

Site 6

The sixth sample site on Santa Rosa Creek was located at approximately stream mile 5.5 (Figure 2). This site was 347 feet long and included three log scour pools (215 feet) and two runs (132 feet). Maximum pool depths were 1.3 feet, 2.1 feet and 1.2 feet and instream shelter was provided by large and small wood debris, undercut bank and root mass. Maximum depth in the runs was 0.6 feet and 0.9 feet and instream shelter was provided by undercut bank and willow vegetation. Air and water temperatures ranged from 68°F to 77°F and 58°F to 63°F, respectively.

Within this site, 44 steelhead were captured with a calculated abundance of 45. Biomass was 0.3

g/ft² and there were 0.13 steelhead per linear foot (Table 15). Five steelhead captured were age 0+ with an average fork length of 99 millimeters (range: 88 – 104 mm); 33 were age 1+ with an average fork length of 128 millimeters (range: 108 – 155 mm); and six were age 2+ with an average fork length of 182 millimeters (range: 167 – 207 mm) (Figure 26). Five steelhead ranging in length from 128 to 173 millimeters were silvery parr and the remainder were parr. Sixteen steelhead were infected with black spot disease. Table 21 summarizes the Fulton condition factors for 43 of the 44 steelhead captured at Site 6.

Threespine stickleback were also captured.

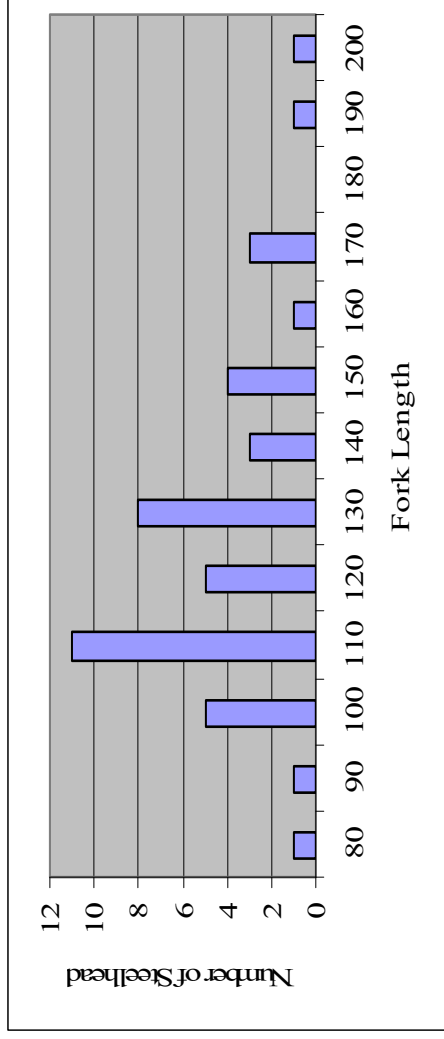


Figure 26. Length frequency distribution of steelhead captured at Site 6, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
80 – 89	1	7.5	1.10	1.10
90 – 99	1	11.5	1.19	1.19
100 – 109	5	12.5 – 15	1.11 – 1.21	1.17
110 – 119	11	14 – 19.5	1.05 – 1.22	1.13
120 – 129	5	23.5 – 25.5	1.12 – 1.22	1.17
130 – 139	7	26 – 31.5	1.07 – 1.20	1.14
140 – 149	3	29 – 42.5	1.01 – 1.42	1.20
150 – 159	4	41 – 51.5	1.12 – 1.38	1.21
160 – 169	1	57.5	1.23	1.23
170 – 179	3	60 – 64	1.12 – 1.21	1.16
180 – 189				
190 – 199	1	80.5	1.12	1.12
200 – 209	1	108	1.22	1.22

Table 21. Condition factors for 43 of the 44 steelhead captured at Site 6, October 2005.

Site 7

The seventh sampling site on Santa Rosa Creek was located at approximately stream mile 8.8 and was 334 feet in length (Figure 3). The site included one boulder scour pool (96 feet), one mid channel pool (36 feet), two riffles (60 feet), one run (106 feet), and one glide (36 feet). Maximum depths in the boulder scour pool and mid-channel pool were 2.7 feet and 1.8 feet, respectively. Instream shelter was provided by boulder rip rap, terrestrial vegetation and root mass. Riffles had maximum depths of 0.5 and 0.4 feet and shelter consisted of cobble and willow vegetation. The run and glide were 0.9 and 1.2 feet in maximum depth and shelter was provided by boulders and terrestrial vegetation in the run and undercut bank in the glide. Air and water temperatures ranged from 62°F to 66°F and 59°F to 64°F, respectively.

Within Site seven, 174 steelhead were captured with a calculated abundance of 188 steelhead. Biomass was 0.61 g/ft² and there were 0.52 steelhead per linear foot (Table 15). Ninety-two steelhead were age 0+ with an average fork length of 91 millimeters (range: 67 – 105 mm); 78

were age 1+ with an average fork length of 127 millimeters (range: 106 – 165 mm); and four were age 2+ with an average fork length of 174 millimeters (range: 167 – 180 mm) (Figure 27). Three steelhead were silvery parr (fork lengths: 128, 143, 143), one had rainbow trout coloration (165 millimeters) and the remainder of the fish were parr. One hundred fifteen steelhead captured at this location were infected with black spot disease. Table 22 summarizes the Fulton condition factors for the steelhead captured at Site 7.

In addition to steelhead, stickleback were also captured and two red legged frogs were observed (one adult and one juvenile).

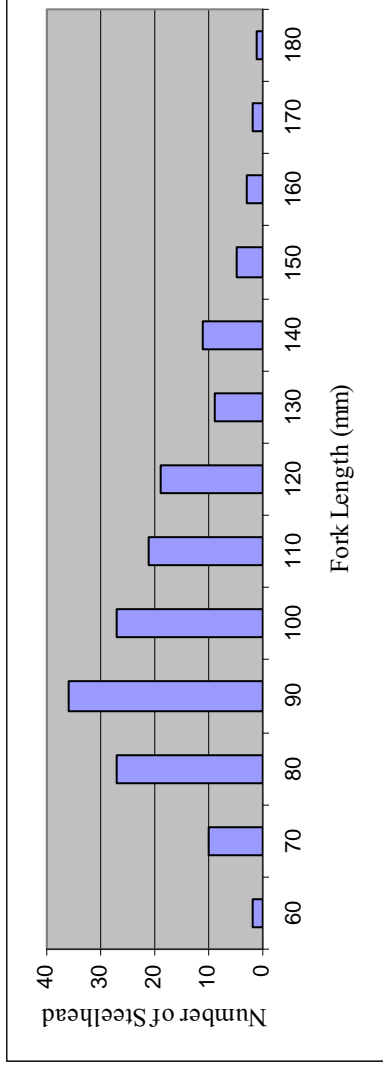


Figure 27. Length frequency distribution of steelhead captured at Site 7, October 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
60 – 69	2	3.5 - 4	1.11 – 1.33	1.22
70 – 79	10	4 - 6	1.16 – 1.31	1.23
80 – 89	27	5.5 – 9.5	1.06 – 1.44	1.20
90 – 99	36	7.5 – 13.5	0.93 – 1.53	1.19
100 – 109	27	10.5 - 16	0.99 – 1.36	1.17
110 – 119	21	13.5 – 20.5	1.00 – 1.31	1.17
120 – 129	19	18 – 27	0.91 – 1.26	1.13
130 – 139	9	26 – 32.5	1.01 – 1.26	1.12
140 – 149	11	30 - 38	1.03 – 1.25	1.12
150 – 159	5	36.5 – 45.5	1.04 – 1.18	1.11
160 – 169	3	50 – 54.5	1.07 – 1.21	1.14
170 – 179	2	60.5 – 67.5	1.13 – 1.26	1.20
180 - 189	1	68.5	1.17	1.17

Table 22. Condition factors of the 174 steelhead captured at Site 7, October 2005.

Site 8

The eighth sample site was located at approximately stream mile 11 and was 293 feet in length (Figure 3). The site included two root scour pools (188 feet) and one run (105 feet). Maximum depths in the pools were 2.6 feet and 2.1 feet and instream shelter was provided by undercut bank, root mass, boulders and bedrock ledge. Maximum depth in the run was 0.9 feet and shelter was provided by boulders and undercut bank. Air and water temperatures ranged from 73°F to 77°F and 59°F to 62°F, respectively.

A total of 341 steelhead were captured with a calculated abundance of 365 steelhead. Calculated biomass in Site 8 was 2.19 g/ft² and there were 1.16 steelhead per linear foot (Table 15). Of the 341 fish captured, 255 were age 0+ with an average fork length of 84 millimeters (range: 59 – 105 mm); 79 were age 1+ with an average fork length of 125 millimeters (range: 106 – 161 mm); and seven were 2+ with an average fork length of 188 millimeters (range: 175 – 210 mm) (Figure 28). All fish captured at this site had parr coloration. One hundred eleven steelhead were

infected with black spot disease. Table 23 summarizes the Fulton condition factors.

In addition to steelhead, stickleback were also captured and two newts (*Taricha torosa*) were observed.

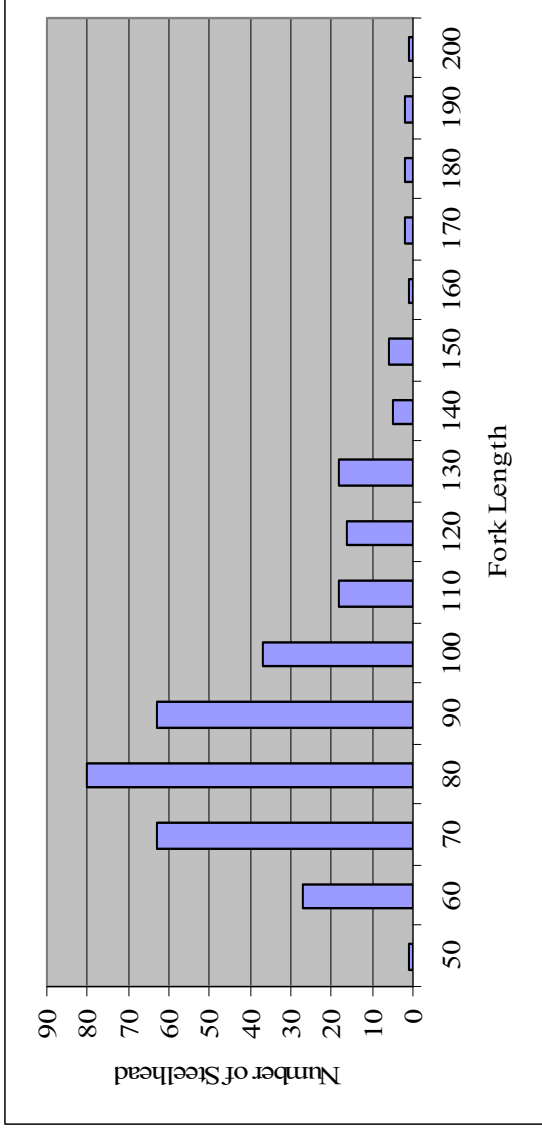


Figure 28. Length frequency distribution of steelhead captured at Site 8, November 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
50 – 59	1	2	0.97	0.97
60 – 69	26	2.5 - 4	1.07 – 1.46	1.17
70 – 79	64	3.5 – 6.5	1.02 – 1.34	1.17
80 – 89	78	4.5 – 9.5	0.81 – 1.55	1.12
90 – 99	62	7 - 12	0.90 – 1.33	1.12
100 – 109	37	10 - 16	0.86 – 1.33	1.16
110 – 119	18	14 - 21	0.97 – 1.25	1.13
120 – 129	16	17.5 – 26.5	0.98 – 1.53	1.14
130 – 139	18	22 – 33.5	0.94 – 1.25	1.11
140 – 149	5	32 - 35	1.01 – 1.15	1.09
150 – 159	6	36.5 – 44.4	1.06 – 1.23	1.14
160 – 169	1	53.5	1.28	1.28
170 - 179	2	59.5 – 62.5	1.11 – 1.17	1.14
180 – 189	2	66.5 – 70.5	1.11	1.11
190 – 199	2	85.5 - 90.5	1.10 - 1.15	1.13
200 - 209	1	90.5	1.11	1.11

Table 23. Condition factors of 339 of the 341 steelhead captured at Site 8, November 2005.

(Note: Two additional fish were caught but not measured)

Site 9

The ninth sample site was located at approximately stream mile 12.7 and was 314 feet in length. This site included a boulder scour pool (80 feet), a root scour pool (93 feet), and a run (141 feet). Maximum depth in the boulder scour pool and root scour pool were 1.9 feet and 3.2 feet, respectively and instream shelter consisted of boulders, root mass and undercut bank. The maximum depth in the run was 0.6 feet and instream shelter was provided by undercut bank and boulders. Air and water temperatures ranged from 57°F to 59°F and 56°F to 59°F, respectively.

Within this site, 235 steelhead were captured with a calculated abundance of 334 steelhead. Biomass was 0.73 g/ft² and there were 0.75 steelhead per linear foot (Table 15). Of the 235

steelhead captured, 175 were age 0+ with an average fork length of 79 millimeters (range: 54 – 105 mm); 53 were age 1+ with an average fork length of 125 millimeters (range: 106 – 164 mm); and seven were age 2+ with an average fork length of 194 millimeters (range: 171 – 215 mm) (Figure 29). One steelhead measuring 161 millimeters in fork length was a silvery parr, but all others had parr coloration. Forty steelhead were infected with black spot disease. Table 24 summarizes the Fulton condition factors for the steelhead captured at Site 9.

Because of the habitat complexity and difficulty capturing fish in the cover, the results drastically underestimate the number of steelhead at this location. In addition, only two passes were done at this site because it was thought that further sampling would cause unacceptable mortalities.

Stickleback were also captured at this location.

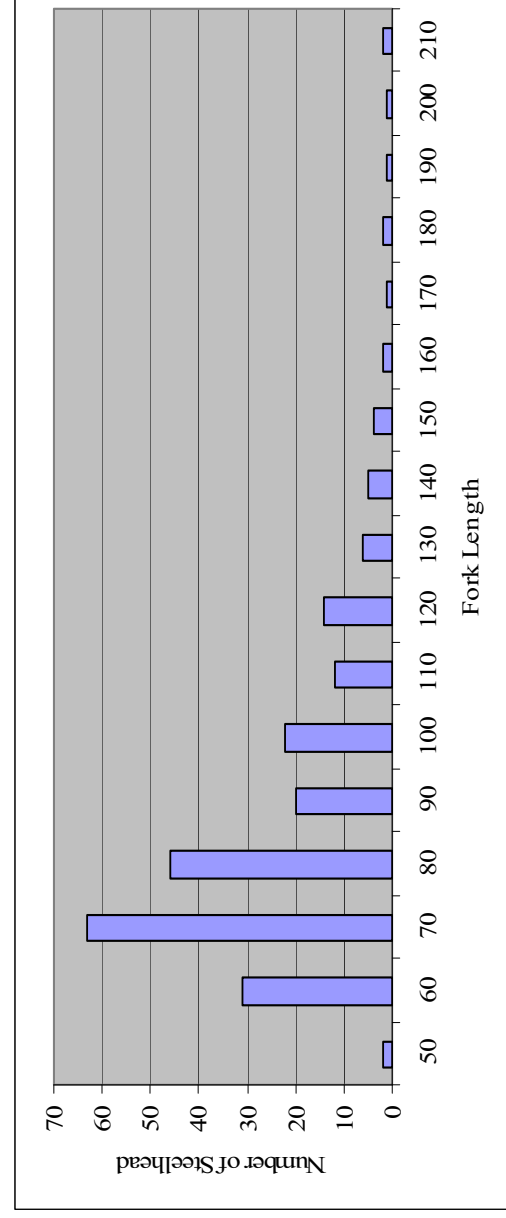


Figure 29. Length frequency distribution of steelhead captured at Site 9, November 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
50 – 59	2	2	1.03 – 1.27	1.15
60 – 69	31	2.5 - 4	0.91 – 1.39	1.14
70 – 79	63	3.5 - 6	0.90 – 1.40	1.16
80 – 89	46	5 – 8.5	0.91 – 1.43	1.11
90 – 99	20	7.5 – 10.5	0.99 – 1.19	1.10
100 – 109	22	10.5 – 15.5	1.04 – 1.27	1.13
110 – 119	12	13.5 – 19.5	0.93 – 1.19	1.08
120 – 129	14	17 - 26	0.98 – 1.27	1.08
130 – 139	6	23 – 28.5	0.97 – 1.11	1.04
140 – 149	5	27 - 35	0.97 – 1.10	1.02
150 – 159	4	32 - 45	0.93 – 1.26	1.09
160 – 169	2	42 – 45.5	0.95 – 1.09	1.02
170 – 179	1	50	1.00	1.00
180 – 189	2	59.6 – 75.5	0.96 – 1.21	1.09
190 – 199	1	72	1.02	1.02
200 – 209	1	87	1.07	1.07
210 - 219	2	103.5 - 116	1.06 – 1.17	1.11

Table 24. Condition factors of 234 of the 235 steelhead captured at Site 9, November 2005.

(Note: One additional fish was caught but not measured).

Site 10

The last sample site on Santa Rosa Creek was located at approximately stream mile 14 and was 297 feet in length. The site included a bedrock scour pool (36 feet), root scour pool (69 feet), a run (51 feet), step-run (96 feet), and a riffle (45 feet). Maximum depths in the bedrock and root scour pools were 1.6 feet and 2.7 feet, respectively, and shelter was provided by boulders, bedrock ledges, roots and undercut bank. The run and step-run had maximum depths of 1.2 feet and 1.0 foot, respectively, and shelter was provided by boulders, root mass, small woody debris, and bubble curtain. The riffle had a maximum depth of 0.7 feet and boulders, terrestrial vegetation, aquatic vegetation and bubble curtain provided shelter. Air and water temperatures ranged from 53°F to 62°F and 55°F to 59°F, respectively.

At site ten, 231 steelhead were captured with a calculated abundance of 244 steelhead. Biomass was 0.93 g/ft² and there were 0.77 steelhead per linear foot (Table 15). Of the steelhead captured, 193 were age 0+ with an average fork length of 77 millimeters (range: 53 – 105 mm); 31 were age 1+ with an average fork length of 126 millimeters (range: 107 – 159 mm); and seven were age 2+ with an average fork length of 187 millimeters (range: 168 – 210 mm) (Figure 30). Fifty-five of the steelhead (fork length range: 96 – 192 mm) at this site had rainbow trout coloration while the remaining 176 steelhead were parr. Nineteen steelhead captured at this location were infected with black spot disease. Table 25 summarizes the Fulton condition factors for the steelhead captured at Site10.

In addition to steelhead, one coastrange sculpin was captured and one newt was observed.

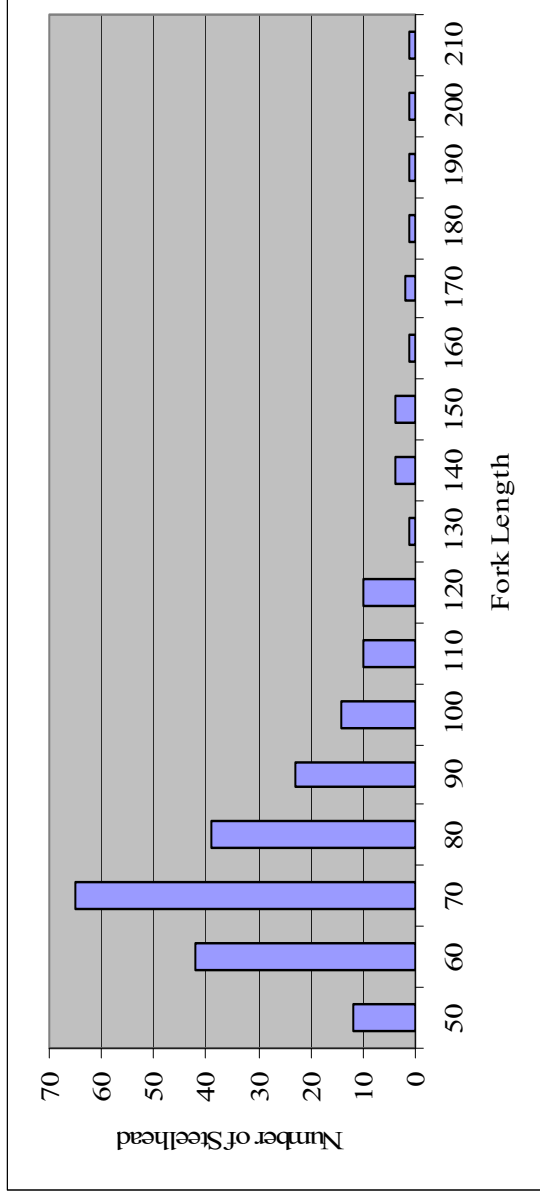


Figure30. Length frequency distribution of steelhead captured at Site 10, November 2005.

Fork Length (mm)	Number of Fish	Weight Range (g)	K-Factor Range	K-Factor Average
50 – 59	12	1.5 - 3	0.95 – 1.46	1.20
60 – 69	42	2 – 4.5	0.83 – 1.64	1.15
70 – 79	64	3 – 6.5	0.83 – 1.48	1.13
80 – 89	39	5 – 8.5	0.98 – 1.38	1.12
90 – 99	23	7.5 – 11.5	0.96 – 1.38	1.12
100 – 109	13	10.5 - 15	0.99 – 1.22	1.10
110 – 119	9	13.5 – 20.5	0.97 – 1.22	1.06
120 – 129	10	16 – 23.5	0.90 – 1.15	1.02
130 – 139	1	25.5	1.11	1.11
140 – 149	4	27.5 - 35	1.00 – 1.15	1.06
150 – 159	4	31 – 40.5	0.82 – 1.05	0.95
160 – 169	1	49	1.03	1.03
170 – 179	2	55.5 – 56.5	1.00 – 1.09	1.05
180 – 189	1	54	0.91	0.91
190 – 199	1	69.5	0.98	0.98
200 – 209	1	96	1.08	1.08
210 - 219	1	93.5	1.01	1.01

Table 25. Condition factors of 228 of the 231 steelhead captured at Site 10, November 2005.

(Note: Three additional fish were caught but not measured).

Discussion

The purpose of habitat mapping Santa Rosa Creek was to determine the quantity and quality of rearing and spawning habitat available for steelhead and to identify habitat deficiencies or limiting factors in order to make recommendations on remediation actions. In 2005, Santa Rosa Creek had perennial flow in the lower 6.7 miles and upstream of stream mile 7.2 with a seasonal dry reach extending for approximately one-half mile in between that disconnected the upper watershed from the lower watershed. During winters with average and above average precipitation, that reach will have surface flow after the groundwater has been recharged and adult and smolt steelhead migration through the area is most likely not an issue. But during drier winters, the increased groundwater recharge time in the dry reach may significantly delay,

abbreviate, or prevent adult steelhead from accessing the headwaters and smolts from emigrating from the headwaters. A prolonged drought may prevent adult steelhead access to the headwaters for several successive years. For this reason, it is imperative that high quality rearing and spawning habitat is abundant in the lower watershed as well as in the upper watershed.

Rearing habitat preference is variable depending on the size of the juvenile steelhead. Upon emergence from the gravel, steelhead fry will seek low velocity shallow areas along the stream margins in glides or pocket water habitat moving to riffles as they get bigger. As they grow and develop into fingerling size, fish will move into deeper, faster water taking refuge behind boulders, logs and other cover. Pre-smolt size steelhead will also utilize the faster water habitat, but ideal habitat for larger fish are deeper pools, with abundant instream cover and a riffle or run leading into the pool which provides drifting invertebrates for feeding. The larger the fish, the larger the territory it needs to survive and it is often the habitat for the larger individuals that is limiting.

In all of Santa Rosa Creek, 44% of the habitat units were pools and they comprised 34% (27,328 feet) of the total length. Approximately 39% more pool habitat (3,015 feet) was located upstream of the dry reach compared to downstream of dry reach providing significantly more habitat for larger fish upstream. Of those pool units that were able to be measured 76% were less than two feet maximum depth and although deeper pools were located throughout the entire stream, pools were consistently deeper in stream miles 1, 10 and 11. Pools that were shallow were so because of fine sediment deposition. Substrate within 52% of the pools was silt or sand. An additional 22% consisted of gravel and although gravel is a preferred substrate for spawning, its deposition in pool habitat reduces rearing space. In the remaining pools, the substrate consisted of boulders, small cobble, and large cobble and these units will only be scoured under very high flows.

Instream cover in most pools was diverse with many types of cover found in each unit. Only some pools in the lower watershed had only one or two types of cover present. Instream cover that would protect juveniles from displacement during high winter flows such as undercut banks, all woody material, larger boulders, and some terrestrial vegetation was more prevalent upstream of stream mile three. In addition to the types of cover present, the amount of cover within pools

was also evaluated. When the percentage of cover for all pools within a particular stream mile was averaged, it was found that the pools in stream miles 6, 7, and 10 had the greatest quantity of cover in the pools (21%, 37%, and 30%, respectively) while all remaining areas had cover in less than 16% of the volume.

While pools themselves are used for rearing, most spawning occurs at the pool tail crests or the glides at the downstream end of pools. In Santa Rosa Creek, more potential spawning sites were located upstream of the dry reach (139 upstream compared to 112 below) with the highest number of sites (20 to 25 sites) in stream miles 9 through 11 and 14. Stream miles 6 and 7 also had a relatively high number of sites.

Those pool tail crests that were considered to be potential spawning sites were located in an area of the stream channel where intra gravel velocities were thought to be sufficient to aerate and remove metabolic wastes from the eggs incubating in the redds. These areas can only be used for spawning if the substrate is relatively small (5.5 inches in diameter or less) and loose enough for an adult steelhead to move. The “looseness” quality is a direct effect of how much fine sediment (sand and silt) surrounds or covers the gravels and cobbles. The greater the quantity of fine sediment deposition the harder it is to dislodge or move the substrate. In addition to hampering substrate mobility, excessive fine sediment deposition decreases spawning success by filling interstitial spaces between the gravels preventing aeration of the eggs and waste removal from the redds, and in some cases impedes emergence of fry from the gravels. Several researchers have found that survival of fry to emergence was significantly reduced when fine sediment in the gravels exceeded 12 to 14% (Cederholm et.al., 1979). In laboratory experiments conducted by Reiser and White (1988), it was found that a 30 to 70 percent ratio of fine sediment to gravel was lethal to developing embryos. The percentage of fines within potential spawning gravels was not measured during this survey, however the high embeddedness of gravels by fine material indicates that excessive fine sediment deposition is occurring.

Although there were several spawning sites in stream miles 5 through 7, 9 through 11, and 14, that had the optimum combination of gravel or small cobble and a low percentage of fines, there were far more locations where excessive fine sediment deposition was degrading spawning

habitat.

The low velocity pool habitat that has been described is essential rearing habitat for juvenile steelhead, especially larger juveniles. But high velocity riffle and run habitat are critical rearing areas for fry and fingerlings and for benthic macro invertebrate production. The riffle habitat in Santa Rosa Creek was almost twice as abundant upstream of the dry reach (83 riffles upstream compared to 46 below) and comprised over twice the length upstream compared to downstream of the dry reach (5,019 feet upstream versus 2,063 below). Run habitat was more comparable with 144 units (13,350 feet) upstream of the dry reach and 110 units downstream (13,010). Stream mile 8, by far, had the greatest amount of riffle habitat (2,284 feet) and stream mile 6 had the greatest amount of run habitat (3,342 feet) although other areas of the stream had extensive run habitat as well.

Prime substrate conditions for optimum benthic macro invertebrate production include streambed particle sizes ranging from 1.25 inches to 12 inches in diameter (gravel, small cobble, and large cobble) with low embeddedness (Reiser, 1979). Most of the riffles (87%) and runs (72%) consisted of optimal particle sizes for invertebrate production and these sites were located throughout the watershed. Although high velocity areas are not typical sites for fine sediment deposition, 16% of the runs consisted of sand. These sites were primarily located in the lower three miles where the creek is lower gradient and fine sediment is more apt to settle out.

Canopy, non-native plant species, and bank erosion were other variables that are noted during the habitat typing survey. Canopy density over the first 6.7 miles of the watershed was considerably lower than upstream. This was primarily due to the greater channel width, relatively flatter topography adjacent to the stream, the numerous denuded bank erosion sites, and the willows and other riparian vegetation in the lower watershed was not always tall enough or expansive enough to extend over the channel. Those locations that had good canopy coverage had willows on the banks, but cottonwood, sycamore, and alders were further upslope creating a multi-level canopy that extended over the channel. The extensive non-native plant species in some locations also precluded native vegetation from growing. Stream mile 2 had the most extensive coverage of non-native species because the vegetation growing in the back yards of stream side residents

often extended down the banks. In some cases the stream banks were planted with palm trees, aloe vera and other plant species which not only don't provide shade, but make stream banks susceptible to erosion. In other areas of the stream, cape ivy was so extensive that it blanketed the banks and upslope areas preventing any other tree or plant species from rooting and because cape ivy is a vine it does not provide the extensive root system that holds the soil together which makes the banks beneath the ivy susceptible to erosion and failure.

Cumulatively, at least 2.6 miles of stream banks in the lower watershed were vertical, denuded, and actively eroding. Some erosion sites were associated with cape ivy and eucalyptus locations, cattle grazing activities, or across from or adjacent to riprap sites. However, it is suspected that many of the bank failures are either from past land use activities or a consequence of previous severe winter storm events and because the banks are vertical, it is difficult for vegetation to become re-established.

In 2005, the dry reach extended from stream miles 6.7 to 7.2 and although willows line portions of the (dry) low flow channel, no overhead canopy was present. Stream banks in this section were also vertical, denuded and actively eroding.

Starting at stream mile 7.9, the alluvial valley narrows into a canyon where the creek is incised between the surrounding steeper slopes. Obviously in this upper section the steeper slopes provide shade or prevent the stream from receiving direct sun exposure. However, the narrower canyon also allows trees to hang over the channel and the structure of the oaks, sycamore, and California bay laurel sprawl out instead of growing linearly; consequently the canopy over the creek is much greater than lower in the watershed. The topographic features, increased canopy, and numerous springs in the upper watershed also account for the significantly lower water temperatures even though air temperatures can be 20°F to 35°F warmer than the coast.

While canopy increased in the canyon reach, the diversity and abundance of non-native plant species in the riparian zone decreased substantially with one patch of arundo in stream mile 14, and scattered patches of nasturtiums adjacent to home sites. Eroding banks, however, were still prevalent with 2.7 miles of stream bank denuded and actively eroding. Cattle grazing is more extensive in the upper watershed which may account for more of the bank issues than the lower

watershed, but the same consequences of severe winter storm events apply here.

In addition to the habitat mapping, outmigrant trapping was conducted in the spring of 2005, to determine peak run timing and smolt characteristics. Unfortunately, the outmigrant trap was placed late in the spring and the true peak of smolt emigration may have been missed. Significant high flow events starting on March 19th and extending throughout the week of March 21st may have been the time when most of the smolts migrated to sea. However, for the time frame that was monitored the peak migration for smolts occurred during the week of April 18th; however the greatest quantity of steelhead were passed through the trap the week of April 25th. It is assumed that the partial smolts that were captured were either far enough along in the smoltification process that they could survive in the ocean or they were going to finish the process in the lagoon or lower watershed before migrating out before the sand bar closed on May 25th. The parr and rainbow trout morphs that were captured were most likely going to reside in the lower watershed until the spring of 2006 before migrating to the ocean; however rearing conditions in the stream below the trap and lagoon were poor, if not prohibitive.

Although steelhead, stickleback, and other native species were the most abundant species captured while trapping, non-native green sunfish, bullfrogs and crayfish were also captured. Crayfish can consume salmonid eggs, but the full impact of their presence is not understood. They are also ubiquitous in Santa Rosa Creek and across the region making their complete eradication difficult at best. Bullfrogs can also be common, especially in ponds or pond-like habitat, but they aren't so common in small coastal streams making their presence in Santa Rosa Creek disconcerting. The same is true for green sunfish. Given the warm water temperatures in the lower watershed both of these non-native species will thrive during the summer months. It is doubtful that the sunfish could withstand the higher winter flows, but the adult bullfrogs will move to higher ground during these flow events, re-occupying the creek when flows subside. Eradication of these species from their "seed source" may be more effective in the long run.

The other biological parameter evaluated during the 2005 field season was instream juvenile densities. The ten sites selected for sampling were chosen from the data sheets by how well they represented the prevalent habitat types in certain areas. Habitat quality was not a factor. If only

the higher quality habitat was sampled the fish densities would be skewed higher and not reflective of what the entire stream could support. For example, if only the deeper pools and run habitat were sampled yet that represents less than 10% of the habitat, unrealistic assumptions about the carrying capacity of the creek would prevail.

The results of the fish sampling mirrored what was observed during the habitat survey. Small numbers of primarily older (larger) fish were scattered throughout the lower 3.5 miles, but increasing densities of steelhead fry, fingerling, yearling and older fish were observed upstream. During the fish sampling, Site 5 (stream mile 4.3) had the highest biomass due to the large numbers of yearling and smolt sized fish; however Site 8 had the greatest number of fish per linear foot and the second highest biomass due to the large numbers of fry. Sites 9 and 10 (stream miles 12.7 and 14, respectively) also had high numbers of fry but when the number of fish per linear foot of stream was calculated, the numbers were much lower (0.75 and 0.77 fish/ft, respectively) than for Site 8 (1.16 fish/ft).

Based on the limited and widely spaced sampling, the most successful spawning occurred above the dry reach in 2005. The spring of 2005 had several late and significant storm events that provided sustained surface flow through the seasonal dry reach and allowed prolonged passage of adult steelhead to the headwaters. The late rain events also provided a longer time frame for adult steelhead to pass Ferrasci Road crossing. If flows are flashy during rain events, passage at the crossing could be significantly delayed or prevented making adult steelhead susceptible to poaching or forced to spawn below the crossing. Considering very few spawning sites and low quality rearing habitat exist downstream of the crossing, it is imperative that adult steelhead be able to pass this crossing.

In summary, much of the spawning and rearing habitat was impacted to some degree by excessive fine sediment deposition. Many sediment sources were observed and documented during the survey, however upslope and tributary sources also need to be identified. Habitat quality was higher in the upper watershed and was reflected by the greater numbers of juvenile steelhead captured during sampling. The lower watershed was more impacted by excessive sediment deposition, warmer water temperatures, non-native plant species, and a managed

riparian zone. Passage through Ferrasci Road crossing and the dry reach may be problematic or prohibitive during drought years which is why the lower watershed needs to be just as capable as the upper watershed of supporting spawning adults and rearing juveniles.

Recommendations

1) Remove Ferrasci Road (ford) crossing and replace with a bridge.

Ferrasci Road crossing is an impediment under high and low flows and if flows are flashy during winter rain events this crossing can greatly impede or prevent adult steelhead from migrating upstream. Santa Rosa Creek is unique in San Luis Obispo County in that there is only one anthropogenic impediment on the mainstem and because Santa Rosa Creek is still one of the most important steelhead streams in the county, removal of this structure should be the highest priority project.

2) Active and potential sources of sediment throughout the watershed should be identified, mapped and prioritized according to the volume of sediment that is, or could be delivered to Santa Rosa Creek.

Excessive fine sediment generated from throughout the watershed and deposited in Santa Rosa Creek is adversely impacting spawning habitat by filling interstitial spaces, embedding gravels and in some cases, burying the gravel completely. It is also reducing the rearing space by filling pools and burying instream cover.

Sources to be mapped include, but are not limited to landslides, bank failures, roads (county, private and state owned roads), and all land use activities on the floodplains and on slopes which have a potential for delivering sediment to a watercourse which enters Santa Rosa Creek.

3) Develop an action plan for dealing with the sediment sources.

Miles of Santa Rosa Creek's stream banks are covered in riprap. Most of the riprap was probably placed during or right after emergency events. However, the erosion continues and many of the sites have shifted upstream and downstream of the riprap or to the opposite bank. The portion of Santa Rosa Creek which flows through Cambria is entirely riprapped and that was most likely the only option since housing and commercial development is located at the top of the bank. However, most areas of Santa Rosa Creek could use biotech options that allow for some

semblance of a natural riparian corridor. Reducing the angle of repose of the steeper banks, planting with diverse native vegetation, and/or other innovative biotech options are preferred over hardscape.

To define a long term solution to chronic bank failures, a geomorphologist or geologist should be consulted in order to determine the most effective solution for maintaining stream bank integrity and fish habitat values.

4) Work with landowners to install exclusionary cattle fencing along Santa Rosa Creek.

Working with willing landowners to install exclusionary fencing for cattle should occur as soon as opportunities arise. Many seemingly “natural” bank erosion sites in Santa Rosa Creek need to be evaluated in a watershed context; however the cause of bank erosion in the areas where cattle are grazing does not need to be evaluated. Excluding cattle from the riparian corridor would not only decrease the quantity of sediment entering the creek, but would also decrease nutrient loading and potential water quality issues. Several grants are available to fund fencing, re-vegetating, and developing alternative water sources for cattle.

5) Protest future water right applications which could jeopardize adult and juvenile passage, summer-fall juvenile rearing, and spawning.

Reduced summer and fall stream flows have a direct impact on the quantity and quality of rearing space, food production and availability, and water quality. With cessation of continuous stream flow, pools and some flatwater habitat may remain, but the volume within these units would be greatly diminished, thereby decreasing rearing space and juvenile steelhead populations. Decreased stream flows also cause riffles to be dewatered which would preclude aquatic insect production and use by steelhead fry.

Water quality degradation also accelerates at decreased stream flows. A reduction in the volume of water allows water temperatures to increase at a faster rate which could be directly lethal to salmonids and indirectly affect survival by increasing their susceptibility to disease. Higher water temperatures decrease oxygen solubility and with lower D.O. levels the extraction of dissolved oxygen by salmonids becomes increasingly difficult causing growth, food conversion and swimming ability to become adversely affected (Bjornn and Reiser, 1979).

6) Remove non-native vegetation from the riparian zone and re-vegetate with a variety of native species which would create a multi-level canopy.

Several non-native plant species were noted during the habitat survey. Removal of the seed sources in the upper watershed should be a priority. This obviously does not mean digging up private gardens, but there are areas of non-natives that are not associated with development that might be targeted. Willow species are usually the preferred alternative to use for re-vegetating, but if other native tree species are available and appropriate for the area, that would be preferred.

7) Enhance riparian corridors wherever possible.

Enhancing or increasing the width of riparian corridors would buffer the stream and filter sediment derived from land use activity. There are many locations in Santa Rosa Creek watershed where this would be effective and beneficial. Developing easements or other landowner agreements would be essential.

8) Survey Perry Creek sub-watershed.

Perry Creek sub-watershed has not been surveyed to determine its fishery value or restoration potential. It absolutely needs to be included in a sediment assessment. It may also be the source of non-native fish species in Santa Rosa Creek, so the headwater impoundments would need to be assessed to determine species composition.

9) Determine lagoon quality for rearing and enhancement potential.

Santa Rosa Creek lagoon was not assessed during this survey. The rearing potential of the lagoon during the summer and fall months needs to be determined as does what, if anything, limits rearing. Elsewhere along the coast of California lagoons are proving to be essential rearing habitat for steelhead. So much so, that it is thought most adults that survive in the ocean and return to spawn reared in lagoons as opposed to streams. These studies have been conducted in northern California and may not be applicable to central California, but the role of the lagoon in the life history of steelhead needs to be ascertained.

Water quality, stream flow, depth, sand bar status, tides, and salt water influx throughout the spring, summer and fall are a few of the parameters that need to be analyzed to determine if the

lagoon is habitable. A multi year marking and trapping program would determine steelhead use and the lagoons relative importance.

10) Determine age length relationships for juvenile steelhead along the south central California coast.

Most reference material relating to steelhead life history is from northern populations of salmonids residing in streams in redwood forests and is not applicable to populations of steelhead residing in south central California. The age length relationship that was used to categorize steelhead during this study is one example of a reference that may not be valid. In order to properly manage and restore steelhead populations in the southern areas, it will be necessary to develop the information for local populations.

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Level III and Level IV Habitat Types

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }
CASCADE			
Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{ 24 }
FLATWATER			
Pocket Water	(POW)	[3.1]	{ 21 }
Glide	(GLD)	[3.2]	{ 14 }
Run	(RUN)	[3.3]	{ 15 }
Step Run	(SRN)	[3.4]	{ 16 }
Edgewater	(EDW)	[3.5]	{ 18 }
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{ 17 }
Channel Confluence Pool	(CCP)	[4.3]	{ 19 }
Step Pool	(STP)	[4.4]	{ 23 }
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{ 22 }
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{ 10 }
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{ 11 }
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{ 12 }
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{ 20 }
Plunge Pool	(PLP)	[5.6]	{ 9 }
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{ 13 }
<u>ADDITIONAL UNIT DESIGNATIONS</u>			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Comments and Landmarks

The following comments and landmarks were noted during the habitat mapping survey of Santa Rosa Creek. All distances are approximate and taken from the beginning of the survey reach.

Position (ft.)	Habitat Unit #	Comments:
		Lagoon length was 1,548 feet.
0	0001.00	Start of Survey: The survey began adjacent to Shamel County Park at 35°34'2.33"N, 121°6'22.57"W. At +750 ft., cape ivy covers the right bank. The upper end is pool like. Stickleback were observed in this unit. There is an access road that runs through or at edge of left bank riparian for units 000 to 010.
1005	0002.00	General Comment: Cape ivy covers the left bank. Entire unit consists of spawning gravel.
1030	0003.00	General Comment: The lower 30 feet consists of spawning gravel. Schools of stickleback observed.
1169	0004.00	General Comment: This unit is primarily a glide with small scoured pools along the right bank; however the lower 12 feet is a riffle. There is no spawning gravel in this unit. Windsor Road Bridge crosses this unit. First electrofishing location.
1447	0005.00	General Comment: The pool tail crest has a 40 ft x 25 ft patch of spawning gravel. The aquatic vegetation includes cattails and watercress, the latter of which covers the channel.
1704	0006.00	General Comment: This pool starts as a mid-channel which turns into a bedrock scour pool, and finally a log scour pool. Aquatic vegetation includes watercress and cattails, but willows are also growing in the channel. The out-migrant trap station was located 120 feet into the unit. Temperature recorder located in this unit as well.
1875	0007.00	General Comment: The channel is choked with cattails.
2006	0008.00	General Comment: The upper 82 feet is more run like with small pools scoured along the margins of the channel. The pool tail crest consists of sand and roots.

Position (ft.)	Habitat Unit #	Comments:
2179	0010.00	General Comment: At 309 feet into the unit, road drainage (Highway 1) enters off the right bank (a 5 ft. wide carved channel). This unit is a glide with some minor scour pools along the right bank margin. Steelhead fry, tree frogs, and schools of stickleback observed in this unit. Second electrofishing site.
2582	0012.00	General Comment: The lower 58 feet of this unit is a glide with very little spawning gravel. The left bank is half bedrock and half silt with willow and brush. Caster bean plants are growing on the left bank. The upper 25 feet contains spawning gravel, however the pool tail crest is sandy. One age 2+ steelhead observed along with schools of stickleback. Most of the channel is choked with aquatic plants.
2738	0013.00	General Comment: This unit has a braided channel, most of which is choked with aquatic vascular plants. Both the main channel and a larger side channel contain viable habitat, with a 20 foot riffle in the middle. There are a few other flowing channels under the aquatic vegetation. Cape ivy covers the right bank.
2949	0014.00	General Comment: The right bank is rip rap from 480 to 515 feet into the unit. The percentage of vegetation is less than 10 percent on the right bank. The left bank is denuded (100 ft. long x 4 ft. high). There are minor scour pools on the margins of both banks. Pine trees are on left bank and a few are on the right bank along with cape ivy. Green filamentous algae covers the streambed.
3587	0015.00	General Comment: The lower 52 feet is a glide without spawning gravel.
3625	0016.00	General Comment: Right bank vegetation consists of small sycamores, dogwood, lupine, and scotch broom. Pine trees are at the top of the left bank with willows below. Stickleback observed.
3764	0017.00	General Comment: The lower 31 feet is a transverse riffle. Spawning gravel patch 60 ft. long x 22 ft. wide. Young tree frogs observed.

Position (ft.)	Habitat Unit #	Comments:
3886	0018.00	General Comment: There is a fallen pine scouring out a small pool.
4185	0020.00	General Comment: Entire riffle consists of spawning gravel.
4454	0023.00	General Comment: The upper 25 feet is the beginning of a bank revetment project. It continues through the next unit. The project consists of boulders along the base of the bank with logs extending out into the channel. Jute netting with various planted vegetation are above the boulders. Green filamentous algae covers the streambed.
4686	0024.00	General Comment: The bank revetment on the left bank ends at 4,736 feet. There are two small log scour pools at the base.
4821	0025.00	General Comment: The lower 15 feet is a run.
4853	0026.00	General Comment: The pool is a mid-channel pool at the upper end and a lateral scour pool at the lower end. Both banks have gravel bars.
5023	0027.00	General Comment: The lower 19 feet is a run. There is spawning gravel throughout the unit.
5065	0028.00	General Comment: The right bank is 17 feet high and completely denuded for 304 feet starting at 5065 feet and extending through unit 30. Caster bean plants are on the right bank.
5092	0029.00	General Comment: Age 1+ steelhead observed here.
5143	0030.00	General Comment: At 226 feet into the unit, the denuded right bank ends.
5402	0031.00	General Comment: Tadpole and adult pacific tree frogs observed. Eucalyptus trees are on the left bank. There is a manmade rock crossing at the top of the unit. Stickleback have been observed in almost every unit since the beginning.

Position (ft.)	Habitat Unit #	Comments:
5526	0033.00	General Comment: The lower 80 feet of this pool is a glide with small cobble. Several steelhead fry observed. Eucalyptus on both banks provides minor shade over the creek.
5759	0034.00	General Comment: At 20 feet, there is a stream gauge. At 48 feet, Highway 1 crosses over the creek. Riprap is on the right and left banks upstream from the bridge and on the right bank downstream from the bridge. Eucalyptus trees are on the top of the left bank. At 106.5 feet, a small tributary and/or road drainage ditch enters from the left bank.
5865.5	0035.00	General Comment: There is scour at the base of the right bank riprap which is 20 ft long.
5934.5	0036.00	General Comment: Entire riffle consists of spawning gravel.
5958.5	0037.00	General Comment: Eucalyptus on the right bank with poison oak understory. Filamentous green algae covers the stream bed.
6081.5	0038.00	General Comment: The Cambria Community Service District (CCSD) stream flow site is 39 feet into the unit. Eucalyptus canopy shades the stream.
6120.5	0039.00	General Comment: Eucalyptus canopy.
6312.5	0041.00	General Comment: The riparian vegetation has been dense, but very little of it is tall enough to shade the creek. A trailer park is on the right bank from 201 feet into the unit upstream to 245 feet Rip rap begins on the right bank starting at 201 feet. At 426 feet into the unit, the left bank is denuded and continues like this until unit 0043.
6774.5	0043.00	General Comment: At 96 feet, the denuded left bank ends (132 ft. long x 12 ft. high). Nasturtiums cover the right bank. Eucalyptus and cape ivy are on the left bank. Tree frog tadpoles observed here. At 498 feet, a defunct concrete dam footing or pipe that is 1.5 feet high spans the channel. Pine trees are on the right bank at 620 feet.

Position (ft.)	Habitat Unit #	Comments:
7481	0045.00	General Comment: The lower 106 feet is a glide with gravel, but the substrate is very “cemented” or embedded. The right bank is bedrock and extends somewhat into the water. Several steelhead fry and stickleback observed. Pampas grass is on the right bank as well as pines.
7719.5	0047.00	General Comment: The lower 60 feet is a glide with spawning gravel. Cape ivy is on the left bank.
7811	0048.00	General Comment: Cape ivy covers the left bank.
7961	0049.00	General Comment: At 84 feet, pampas grass and cottonwood are on the right bank.
8442.5	0050.00	General Comment: Nasturtiums on the right bank as well as an enclosed garden at the top of the bank. Pines and a dense understory of cape ivy are on the left bank.
8508.5	0051.00	General Comment: The lower 4 feet and the upper 12 feet are riffles. There is an arundo patch on the right bank and cape ivy covers the left bank.
8564	0052.00	General Comment: Extensive canopy cover from this unit to unit 0054. Cape ivy covers the left bank. A pedestrian bridge crosses overhead in this unit. There is minor scour along the right bank margin.
8759.5	0053.00	General Comment: The boulder scour is due to concrete slabs.
8827	0054.00	General Comment: English ivy covers the left bank. A 2 foot diameter pipe extends from the right bank with a retaining wall above.
9016	0056.00	General Comment: Small scour pools are along the margins of the right bank. At 205 feet, a one foot diameter pipe extends from the left bank. Riprap lines the right bank (20 ft. long x 10 ft. high).
9220.5	0057.00	General Comment: Steelhead fry observed. There are some riffle sections in this unit.
9306	0058.00	General Comment: Riprap and nasturtiums are on the right

Position (ft.)	Habitat Unit #	Comments:
		bank from 25 feet to 107 feet. Stickleback present. Rip rap lines the left bank through the entire unit and continues to unit 070.
9438.5	0060.00	General Comment: The scour on the right bank is due to rip rap. The riprap continues on the left bank.
9506	0061.00	General Comment: The lower 60 feet is a glide without spawning gravel. Rip rap becomes more extensive on the left bank extending to the top of the bank. Some willows are growing through the rip rap. English ivy covers the right bank.
9691	0063.00	General Comment: A patch of arundo is on the right bank.
9852	0065.00	General Comment: The lower 45 feet is a glide with small cobble. The pool is formed by boulder riprap on the left bank. Age 1+ steelhead observed. Walnut trees and blackberry are on the right bank. Pine trees are on the left bank.
9955	0066.00	General Comment: There is a 5 inch diameter drainage pipe on the left bank.
10061.5	0068.00	General Comment: The pipe continues on left bank.
10199.5	0069.00	General Comment: The Burton Road Bridge crosses the creek at 126.5 feet into the unit.
10347.5	0070.00	General Comment: Canopy is due to the bridge. There is a small backwater section here and debris (wood and metal) are on the left bank.
10376.5	0072.00	General Comment: The Bridge ends at 10,390 feet.
10390	0073.00	General Comment: Riprap covers both banks. A parking lot is at the top of the right bank. Pampas grass is growing on the left bank.
10590	0074.00	General Comment: The scour is formed by riprap. The lower 81 feet is a spawning glide. Observed ten+ steelhead (5 to 8 inches long). Palm trees and cow parsnips are on the right bank along with planted aloe vera.

Position (ft.)	Habitat Unit #	Comments:
10707	0075.00	General Comment: Rip rap covers the left bank. Green filamentous algae covers the streambed in this unit and unit 0076.
10733	0076.00	General Comment: Riprap covers both banks and a redwood tree is growing on the top of the left bank.
10871	0076.01	General Comment: The side channel is scoured by riprap. Power lines are on the left bank, but they do not cross the creek. The riprap in this unit continues through unit 0080 on both banks.
10925	0078.00	General Comment: At 48 feet, a fallen tree has created a scour pool. Mesh debris covers the left bank.
11117	0079.00	General Comment: Riprap and roots provide the cover in this pool. A defunct culvert is along the left bank. Observed one, 5 inch long steelhead and 1 dead sculpin in this unit.
11224	0080.00	General Comment: Green filamentous algae covers the streambed and stickleback were observed.
11262.5	0081.00	General Comment: Starting in this unit and extending to unit 0090 rip rap covers the right bank. Riprap on the left bank starts here and extends through unit 0086. An old metal car frame and tire have been discarded in this unit. Start of third electrofishing site.
11287.5	0082.00	General Comment: The lower 10 feet is a riffle. Pieces of an old culvert are on the left bank. On the right bank, an old metal pipe has been discarded, nasturtiums cover the unit, and buildings are at the top of the bank.
11408.5	0083.00	General Comment: Unit consists of high quality spawning gravel.
11546.5	0084.00	General Comment: The scour in the pool is due to riprap. Observed one steelhead approximately 5 inches in length.
11597.5	0085.00	General Comment: At 40 feet, two discharge pipes are on the right bank. The newer of the two pipes has water trickling out. At 98 feet, there is a culvert for road runoff

Position (ft.)	Habitat Unit #	Comments:
		coming off the right bank. Cape ivy covers the left bank. On the right bank, the vegetation consists of English ivy, cape ivy, nasturtiums, and fuchsia. Green filamentous algae covers streambed from this unit through unit 90.
11810	0086.00	General Comment: Houses are at the top of the right bank and continue to unit 090. Nasturtiums cover the right bank.
11951	0087.00	General Comment: Nasturtiums continue on the right bank.
11981	0088.00	General Comment: There is a short riffle at 120 feet. Nasturtiums continue on the right bank.
12236	0089.00	General Comment: Trails are on the left bank.
12358	0091.00	General Comment: The lower 20 feet consists of spawning gravel. The scour in the pool is due to riprap. The riprap on the right bank ends in this unit. Cape ivy covers the left bank. Green filamentous algae covers the streambed. Observed approximately 10 steelhead ranging in length from 5 to 10 inches.
12457	0092.00	General Comment: The lower 15 feet is a riffle. Another transverse riffle is at the top of the unit. Cape ivy continues on the left bank.
12538	0093.00	General Comment: The lower 10 feet is a riffle. Entire unit consists of spawning gravel. Cape ivy continues on the left bank. Alder trees line the right bank.
12592	0094.00	General Comment: For just this unit, the canopy opens up and streamside vegetation consists of smaller trees on both banks. On the left bank, a gravel bar starts in this unit and continues through unit 101.
12772	0095.00	General Comment: Riprap covers the right bank.
12819.5	0096.00	General Comment: Observed 30+ steelhead that were 3 to 8 inches in length.
12990.5	0100.00	General Comment: A bedrock wall starts on the left bank. The gravel bar ends at this unit. The lower 26 feet is pool-like, but there is moving water through here. The entire unit

Position (ft.)	Habitat Unit #	Comments:
		consists of spawning gravel. Large pines are on the top of the left bank at the upstream end of the unit. There is a short (temporary) manmade rock dam at the upstream end of the unit.
13170.5	0102.00	General Comment: The bedrock wall ends on the left bank. A large gravel bar starts on the left bank in this unit and continues through unit 0105. Large pines continue on the top of the left bank. Seven 4 inch long steelhead were observed. Green filamentous algae covers the streambed from this unit through to unit 105.
13310.5	0103.00	General Comment: Denuded right bank (15 - 25 feet high) begins in this unit. There is a short (temporary) manmade rock dam at the upstream end of the unit. On the left bank there is a gravel bar that is approximately 150 – 200 feet wide.
13352.5	0104.00	General Comment: The eroded right bank ends at 65 feet into the unit. Castor bean plants are growing on the left bank.
13445.5	0105.00	General Comment: The gravel bar on the left bank ends in this unit. Pine trees are on the right bank.
13535.5	0107.00	General Comment: There is a side channel pool near the left bank.
13630.5	0108.00	General Comment: Riprap lines the left bank. This unit starts at the Main Street Bridge. There is scour at the base of the bridge abutments. English ivy covers the left bank.
13686.5	0109.00	General Comment: The stream channel is braided in this section. The lower 65 feet of the unit is the bridge with continued scour at the base of the bridge abutments and riprap.
13805.5	0110.00	General Comment: A stream gauge station is located here.
13986.5	0111.00	General Comment: Minor scour along the margins of the channel caused by willows. Observed one steelhead approximately 9 inches in length. Green filamentous algae covers the streambed from this point through unit 0113.

Position (ft.)	Habitat Unit #	Comments:
14088.5	0112.00	General Comment: The side channel is a pool.
14208.5	0113.00	General Comment: Cape ivy covers the left bank.
14323.5	0114.00	General Comment: At 113 feet, metal debris is deposited on the left bank.
14493.5	0115.00	General Comment: There is a large downed tree and a backwater pool on the left bank.
14588.5	0116.00	General Comment: Cape ivy covers the right bank.
14633.5	0117.00	General Comment: At 77 feet, there is a scoured out section in the bank with a pool below. Uncertain if it is due to a tributary, road runoff, or a gully wash (see drawing). Cape ivy covers the right bank. One 4-5 inch long steelhead observed.
14742.5	0118.00	General Comment: Channel is split in this area with multiple channels consisting of run or riffle habitat. Stickleback observed throughout the unit. Riprap lines the right bank in sections behind the Coast Union High School. Dogwood shrubs and old car debris are in this unit. At 530 feet, another 100 foot long section of riprap is on the right bank. At 691 feet, metal debris (cables) is on the left bank. At 769 feet, an old car is in the creek.
15592.5	0119.00	General Comment: Debris is deposited on the right bank and a gravel bar is on the left bank (refer to drawing). Riffle-like sections and a large pool (1.8 feet deep maximum depth) are also in this unit.
15653.5	0120.00	General Comment: The beginning of this unit starts a new channel type. Pines are at the top of the right and left banks and the channel is bedrock. The gravel bar broadens on the left bank and old car debris is scattered throughout the creek. Several steelhead observed.
15721.5	0121.00	General Comment: The bedrock continues to the end of the unit. The lower 10 feet is cascade-like.
15770.5	0122.00	General Comment: This unit is the start of a steep eroding left bank (40 feet by 150 feet) that continues through part

Position (ft.)	Habitat Unit #	Comments:
		of unit 124. Two 4 - 5 inch long steelhead observed.
15805.5	0123.00	General Comment: There is a side pool that flows across the gravel bar on the right bank. Metal car debris is also on the right bank.
15871.5	0124.00	General Comment: Scour in the pool is caused by willows. Old cars are on the left bank (revetment) and cape ivy covers the right bank.
15987.5	0125.00	General Comment: Pine trees are on both banks. The lower 13 feet is a riffle. At 72 feet, the right bank is eroding. At 130 feet there is a small pool (25 feet in length). This unit is the beginning of the fourth electrofishing site.
16157.5	0126.00	General Comment: Starting at 35 feet and extending to the end of the unit, there is a large fallen pine tree coming off the right bank (the right bank is eroded behind the tree). Pine trees are at the top of both banks.
16227.5	0127.00	General Comment: Side channel is a run. Right bank continues to erode.
16267.5	0128.00	General Comment: The upper 8 feet of the unit is a riffle. The roots from a fallen tree on the right bank are causing the scour. The right bank is eroding, but there is more vegetation than previous units.
16290.5	0129.00	General Comment: The right bank is continuing to erode 48 feet into the unit. At 80 feet, the left bank is eroding (20 foot high slump with no riparian at the top). The pool scour is caused by willows. Stickleback observed.
16385.5	0130.00	General Comment: The upper 27 feet is riffle-like. The left bank continues to erode. There are some pool-like spots. Waypoint: WP SR130: N 35° 33' 57.6" W121° 04' 07.9".
16452.5	0131.00	General Comment: Perry Creek enters from the left bank 29 feet into the unit. The eroding left bank ends at the end of the unit.
16497.5	0132.00	General Comment: A small portion of the left bank is eroded. The entire unit consists of spawning gravel.

Position (ft.)	Habitat Unit #	Comments:
		Cottonwood trees are on the right bank.
16548.5	0133.00	General Comment: The left bank is partially eroding and exposing roots. Cottonwood trees are on the right bank and sycamore are on the left bank.
16595.5	0134.00	General Comment: Cape ivy covers the right bank.
16639	0135.00	General Comment: Pine trees and rip rap are on the left bank. The scour in the pool is caused by willows.
16721.5	0136.00	General Comment: There are some short riffle sections in the unit.
16978.5	0137.00	General Comment: A juvenile red legged frog was observed on the right bank. Cottonwood trees are on the left and right banks.
17017.5	0138.00	General Comment: The upper half of the unit is run-like. Rip rap covers the right bank and cape ivy is on both banks.
17101.5	0139.00	General Comment: There is some willow scour in the pool. The upper 20 feet is glide-like (no spawning gravel). Rip rap and cape ivy continue.
17213.5	0140.00	General Comment: Cape ivy covers the right bank.
17257	0141.00	General Comment: The entire unit consists of spawning gravel. Rip rap covers the right bank.
17296	0142.00	General Comment: Several steelhead observed (4 to 6 inches in length). Glide consists of spawning gravel.
17370	0143.00	General Comment: The upper 20 feet is run-like. There is some erosion on the left bank exposing extensive roots. Cape ivy covers the left bank.
17422.5	0144.00	General Comment: Ten steelhead observed (4 to 6 inches in length). The left bank is eroding through the entire unit and continues into part of unit 146. The bank is 25-30 feet high.
17464.5	0145.00	General Comment: Entire unit consists of spawning gravel.

Position (ft.)	Habitat Unit #	Comments:
17495.5	0146.00	General Comment: Cape ivy covers the right bank.
17642	0147.00	General Comment: Rip rap covers the right bank starting at 132 feet and extends to the end of the unit. Scour is due to willow and rip rap. There is a small cascade at the top of the unit due to dislodged rip rap.
17817	0148.00	General Comment: There are large chunks of concrete rip rap in the creek throughout the unit, forming small cascades. Alder grove on the right bank.
17969	0150.00	General Comment: Rip rap covers the right bank.
18029	0151.00	General Comment: Rip rap covers both banks. The Ferrasci Road/concrete ford is at the top of the unit (20 feet into unit 151). The ford is comprised of a fish ladder and 3 culverts and measures 45 feet across. The water is flowing through the fish ladder. Waypoint: WP FRFL: N 35° 34' 05.0" W121° 03' 55.3".
18102	0153.00	General Comment: The lower 15 feet is a riffle. Cape ivy covers the left bank.
18285	0154.00	General Comment: Steelhead observed (4 inches in length).
18363	0155.00	General Comment: Right bank is bedrock and continues through unit 157. Entire unit consists of spawning gravel. Cape ivy covers the left bank.
18405	0156.00	General Comment: Cape ivy covers the left bank.
18471	0157.00	General Comment: A tributary enters on right bank through a culvert under the road. A 6 inch diameter diversion line runs through the culvert. Rip rap covers the right bank and cape ivy is on the left bank. WP SRTR157: N 35° 34' 10.8" W121° 03' 53.0".
18564	0158.00	General Comment: There is a split channel for the lower 112 feet.
18885	0159.00	General Comment: Cape ivy is on the left bank.
18995	0160.00	General Comment: Entire unit consists of spawning gravel.

Position (ft.)	Habitat Unit #	Comments:
		Cape ivy covers the right bank.
19041	0161.00	General Comment: The scour is caused by willow roots. Steelhead observed. Equisetum is on the left bank.
19150.5	0162.00	General Comment: The upper 10 feet is a riffle.
19183.5	0163.00	General Comment: There is a log jam on the left and right banks at 46.5 feet. The right bank is eroding.
19416	0166.00	General Comment: Several willows have fallen across the channel.
19548	0168.00	General Comment: There is debris and a backwater pool near the right bank 25 feet into the unit. A large log jam and root mass are on the left bank.
19656	0169.00	General Comment: This pool is the downstream end of a bank revetment project on the eroding left bank. The project continues through unit 173. 30+ steelhead 5-10 inches in length observed.
19774.5	0171.00	General Comment: Stickleback observed.
19854.5	0172.00	General Comment: The lower 12 feet is a run.
19883.5	0173.00	General Comment: There are some glide and riffle-like sections in the unit. End of the bank revetment project. Riparian vegetation: beginning in this unit: Willow, cottonwood, sycamore, alder, poison oak, cape ivy (both banks).
20052.5	0174.00	General Comment: Upstream from the project, there is newly deposited fine sediment on the creek bed.
20166	0176.00	General Comment: The lower 60 feet is glide-like. Cape ivy covers both banks.
20256	0177.00	General Comment: The lower half of the unit is a riffle. Cape ivy covers both banks.
20292	0178.00	General Comment: There is some willow root scour in the pool. Observed 30+ steelhead (4 - 10 inches in length).

Position (ft.)	Habitat Unit #	Comments:
20332	0179.00	General Comment: At 35 feet into the unit there is a riffle. The right bank is eroding in spots. Newly deposited fine sediment in the creek. Equisetum and cattails in unit.
20662.5	0180.00	General Comment: The scour is due to willow roots and branches. Newly deposited sediment in creek continues. Observed 10+ steelhead (5 - 10 inches in length).
20722.5	0181.00	General Comment: From 130 to 157 feet into the unit, there is a riffle.
20966.5	0183.00	General Comment: Cape ivy covers the right bank.
21153.5	0184.00	General Comment: A log jam forms the scour in the pool. Numerous steelhead observed (4 - 10 inches in length).
21182.5	0185.00	General Comment: At the beginning of the unit, there is a log jam on the left bank. Some spawning gravel in the short riffles. Cape ivy covers the left bank.
21427.5	0186.00	General Comment: There is cape ivy on both banks starting in this unit and extending though unit 190.
21508.5	0187.00	General Comment: The lower 8 feet is a transverse riffle and at 78 feet, there is a 10 foot long transverse riffle. California bay laurel trees are in this unit.
21744.5	0189.00	General Comment: The left bank is steep and denuded for the length of the unit. The lower 4 feet is a riffle. A 6 foot by 12 foot patch of spawning gravel is in this unit.
21806	0190.00	General Comment: Green filamentous algae covers the stream bed.
21875	0191.00	General Comment: Starting in this unit, there are young cottonwoods, alder, and walnut. Cape ivy covers both banks.
21953	0192.00	General Comment: The scour is due to willow roots and branches. At 110 feet, rip rap covers the right bank. There is also discarded metal debris in the unit.
22081.5	0193.00	General Comment: 25 feet into the unit, wires cross

Position (ft.)	Habitat Unit #	Comments:
		overhead 15 feet above the stream. On the right bank, PVC pipe debris has been discarded.
22120.5	0194.00	General Comment: Power lines cross over the creek
22164.5	0195.00	General Comment: Between 25 and 45 feet, a wet ford road crosses through the creek channel. There are cattails on the left bank at the upper end of the unit.
22295	0196.00	General Comment: Right bank is denuded.
22349	0197.00	General Comment: There are riffle sections that contain spawning gravel. Cape ivy covers the right bank.
22394	0198.00	General Comment: Pool scour is caused by both willow branches and roots. Stickleback observed.
22429	0199.00	General Comment: Between 120 feet and 152 feet into the unit, there is a transverse riffle. The riffle-like sections consist of spawning gravel. There is a gravel bar on the left bank. The upper left bank is denuded and eroding but is re-vegetating on the bottom (55 feet long by 10 feet high). Cape ivy covers both banks.
22587	0200.00	General Comment: There is a gravel bar on the right bank. Way point: WP SR200: N35° 34' 09.9" W121° 03' 11.0"
22678	0201.00	General Comment: At the beginning of the unit, wires cross above the creek. Both banks have gravel bars. At 80 feet, there is an old pump house on the right bank. The top 15 feet of the right bank is bedrock.
22778.5	0202.00	General Comment: The lower 15 feet of the right bank is bedrock. The scour in the pool is caused by willow branches and roots. On the left bank, there is a 10 ft by 10 ft section of bedrock. A minor log jam spans the channel. This unit is the lower end of electrofishing sample site 5.
22808	0203.00	General Comment: There is a gravel bar on the left bank. The left bank is denuded and eroding. Newly deposited fine sediment in the channel.
22940	0204.00	General Comment: Left bank is bedrock. Observed several

Position (ft.)	Habitat Unit #	Comments:
		juvenile steelhead (4 - 8 inches in length).
22972.5	0205.00	General Comment: A gravel bar runs along the left bank.
23028.5	0206.00	General Comment: Several steelhead (20+) ranging in length from 6 to 8 inches were observed.
23071.5	0207.00	General Comment: Small riffle sections are throughout the unit. The left bank is eroding at the upper 20 feet of the unit. A gravel bar is on the left bank.
23221.5	0208.00	General Comment: The left bank is denuded and eroding for the entire unit. The eroding left bank continues through unit 213.
23302.5	0209.00	General Comment: Green filamentous algae covers the stream channel. The possible cause of the newly deposited sediment downstream is the eroding left bank (serpentine "blue goo").
23373.5	0210.00	General Comment: Fence line above eroding left bank.
23451.5	0212.00	General Comment: At 70 feet, there is a small boulder scour pool.
23565.5	0213.00	General Comment: Observed one 5 inch long steelhead.
23583	0214.00	General Comment: There is both boulder and log scour in this unit.
23693	0215.00	General Comment: The scour is due to willow roots. The right bank is bedrock for the length of the unit.
23735.5	0216.00	General Comment: The bedrock on the right bank continues for the entire unit.
23770.5	0217.00	General Comment: There is a large bedrock scour pool with several (50+) steelhead ranging in length from 5 to 10 inches. A fallen tree is perched above the pool. A fence crosses the creek between bedrock walls (refer to drawing). The lower 30 feet on the right bank is bedrock. The entire left bank of the unit is bedrock. Cow tracks are upstream of the fence line. Heron prints are also present. WP SR217:

Position (ft.)	Habitat Unit #	Comments:
		N35° 34' 08.4" W121° 03' 0.9"
23845.5	0218.00	General Comment: Bedrock on the left bank continues through unit 221. Cattle activity begins in this unit and extends through unit 273.
23933.5	0220.00	General Comment: The lower 10 feet is a riffle consisting of spawning gravel.
24080.5	0221.00	General Comment: This pool could also be considered a mid-channel pool. Steelhead observed here. The lower 20 feet of the left bank is bedrock.
24123.5	0222.00	General Comment: The lower 10 feet is a riffle. Roots form a (natural) dam at the top of the pool.
24166.5	0223.00	General Comment: The upper 13 feet is a riffle. The right bank is denuded and eroding starting half way through the unit (34 feet) and extending to the end.
24234.5	0224.00	General Comment: There are cow trails/resting areas (sand) on the left bank. The right bank continues to erode through this unit and the next unit. The lower 41 feet is a sandy glide. A gravel bar runs along the left bank. The "bedrock" in the scour pool is actually mudstone.
24307.5	0225.00	General Comment: A gravel bar runs along the left bank. Green filamentous algae covers the streambed.
24351	0226.00	General Comment: The gravel bar continues on the left bank.
24426	0227.00	General Comment: The left bank is eroding, but is starting to re-vegetate. Cattle trails are on the right bank and the gravel bar continues on the left bank. A tree has fallen across the channel at 99 feet into the unit. The riffle consists of spawning gravel.
24582	0228.00	General Comment: A gravel bar runs along the right bank.
24619	0229.00	General Comment: Gravel bar continues on the right bank.
24704	0230.00	General Comment: Cattle trails on the right and left banks.

Position (ft.)	Habitat Unit #	Comments:
		Gravel bar continues along the right bank.
24723.5	0231.00	General Comment: The lower 15 feet is a riffle. The upper 79 feet of the unit has a gravel bar on the left bank.
24842.5	0232.00	General Comment: Gravel bar continues on the left bank. Cape ivy covers the right bank.
24986.5	0233.00	General Comment: The gravel bar continues on the left bank. Observed 5+ steelhead (6 inches in length).
25042	0234.00	General Comment: The lower 8 feet is a riffle. There is a patch of spawning gravel that is 10 feet by 8 feet. Gravel bar on the right bank with cattle trails and resting areas.
25081	0235.00	General Comment: Gravel bar on the left bank that continues through unit 237.
25173	0237.00	General Comment: Cape ivy covers the left bank.
25218	0238.00	General Comment: The left bank is bedrock through the entire unit.
25275	0239.00	General Comment: Bedrock continues on the left bank for 40 feet into the unit. Entire unit consists of spawning gravel. Cattle trails are on the right and left banks.
25319	0240.00	General Comment: Cattle trails continue. Cape ivy covers the left bank.
25456	0241.00	General Comment: At 90 feet into the unit cattle trails are on both banks. A gravel bar is on the left bank.
25576	0242.00	General Comment: The gravel bar on the left bank ends in this unit. Cape ivy covers the left bank.
25617	0243.00	General Comment: A gravel bar with cattle trails runs along the right bank.
25648	0244.00	General Comment: There is a side channel on the left bank that is pool-like and has a large fallen tree over it. The left bank is eroding through the entire unit. There are wide gravel bars on both banks.

Position (ft.)	Habitat Unit #	Comments:
26014.5	0245.00	General Comment: Gravel bar continues on the left bank (60 - 80 feet wide).
26036.5	0246.00	General Comment: Gravel bar continues on the left bank. Both banks are denuded and eroding through entire unit. At 65 feet, an old bridge piling is in the channel.
26137.5	0247.00	General Comment: Left bank is eroding. There is a small log jam on the left bank. Large gravel bar on the right bank. Upstream picture of this site.
26161.5	0248.00	General Comment: Large open floodplains and gravel bars on both banks. Both banks are denuded and eroding. Some spawning gravel is in this unit. See picture. WP SR248: N35° 34' 10.7" W120° 02' 35.6".
26497.5	0249.00	General Comment: Floodplains and gravel bars on both banks through this unit and unit 250.
26542.5	0250.00	General Comment: The lower three feet is a riffle. The right bank is denuded and eroding through the entire unit. Five 6 inch long steelhead observed. One adult red legged frog also in this unit.
26632.5	0251.00	General Comment: From unit 248 to unit 260, there are extensive floodplains, substantial point bars and severe left and right bank erosion. Canopy does not exist in this section. Some spawning gravel present.
26743.5	0252.00	General Comment: The right bank continues to erode.
26824.5	0253.00	General Comment: Picture of upstream and downstream habitat and Jimsonweed.
27001.5	0255.00	General Comment: The "bedrock" is actually mudstone. Stickleback observed.
27185	0258.00	General Comment: Substantial quantities of soft sediment deposited on the streambed (1-2 feet deep).
27216	0259.00	General Comment: Cape ivy covers the left bank. Gravel bar along the right bank.

Position (ft.)	Habitat Unit #	Comments:
27312	0260.00	General Comment: Gravel bar continues on the right bank.
27411.5	0261.00	General Comment: This unit marks the beginning of canopy over the creek since habitat unit 251. The bedrock is mudstone. Right bank is eroding and is covered with cape ivy.
27477.5	0262.00	General Comment: There is a split channel which is pool-like on the right bank side. There is an old pump and cattle trails on the right bank. Cape ivy covers both banks.
27781.5	0263.00	General Comment: Cape ivy and cattle trails are on the right bank. Lower end of sample Site 6.
27853.5	0264.00	General Comment: Cape ivy and cattle trails continue.
27928.5	0265.00	General Comment: There is black plastic debris and cape ivy on the right bank. Observed 5+ steelhead (4 – 6 inches in length).
27990	0266.00	General Comment: The lower 15 feet is a run. Cape ivy covers the right bank.
28128	0268.00	General Comment: A small log jam is in this unit. Cape ivy continues on the right bank.
28158	0269.00	General Comment: Cape ivy continues on the right bank and a gravel bar runs along the left bank. The entire unit consists of spawning gravel. Santa Rosa Creek road is at the top of the right bank.
28181	0270.00	General Comment: Cape ivy continues on the right bank and the gravel bar continues on the left bank. The lower 6 feet consists of spawning gravel.
28226	0271.00	General Comment: Picture of an unidentified frog (yellow legged?) in this unit. Cattle trails are on the right and left banks. Small riffle sections with spawning gravel are located throughout the unit. Cape ivy continues on the right bank.
28392	0272.00	General Comment: Two 3 inch long steelhead observed.

Position (ft.)	Habitat Unit #	Comments:
28485	0273.00	General Comment: Cattle trails are on the left and right banks starting at 66 feet. A fence crosses the creek at 111 feet. Spawning gravel is upstream of the fence line. Cattle activity ends at this fence line.
28669	0274.00	General Comment: Several 4 inch long steelhead observed. The left bank is denuded and eroding.
28711	0275.00	General Comment: Cape ivy covers the right bank. The entire unit consists of spawning gravel.
28863	0276.00	General Comment: Cape ivy continues on the right bank. One 4 inch long steelhead observed.
28970	0278.00	General Comment: The entire unit consists of spawning gravel.
29008	0279.00	General Comment: Cape ivy covers the left bank. The unit has some spawning gravel. At 287 feet, an old pump is on the right bank and a farm building is on the left bank.
29433	0280.00	General Comment: A large log jam is on the right bank. Some sulfur precipitate is on the creek bed and cape ivy covers the right bank. Waypoint: WP SR280 N34° 34' 24.2" W121° 02' 20.7"
29478	0281.00	General Comment: Cape ivy covers the left bank. The entire unit consists of spawning gravel. There is a riffle portion at 170 feet. A bridge crosses over the creek at 362 feet (private driveway).
29975	0282.00	General Comment: Cape ivy covers the right bank.
30053	0283.00	General Comment: Rip rap is on the left bank at the upper end of the unit.
30128	0284.00	General Comment: Rip rap continues on the left bank for the entire length of the unit and continues into unit 285. Some spawning gravel is in the unit.
30164	0285.00	General Comment: The mid channel pool also has some root and rip rap scour. Several steelhead (4 – 6 inches in length) observed.

Position (ft.)	Habitat Unit #	Comments:
30263	0286.00	General Comment: A gravel bar runs along the right bank. The upper left bank is eroding (3 feet by 20 feet).
30340.5	0288.00	General Comment: The lower 10 feet is a run.
30388.5	0289.00	General Comment: There is a backwater bedrock scour pool in the lower 35 feet of the unit on the right bank side. Cape ivy covers the left bank. A fence line crosses the creek at 39 feet and cattle activity begins on the upstream side. The cattle activity continues through unit 308.
30457.5	0290.00	General Comment: Left bank is bedrock. A gravel bar is on the right bank.
30487.5	0291.00	General Comment: There is cable debris on the right bank. Left bank bedrock continues. A gravel bar starts on the right bank and switches to the left bank. Entire unit is spawning gravel.
30797.5	0292.00	General Comment: On the left bank above bankfull there are some trees, but the area is mostly denuded. Left bank gravel bar continues and the right bank is eroding.
30823.5	0293.00	General Comment: A tributary enters from the right bank at 39 feet. WP SRTB293 N35° 34'29.9 W121° 02'07.6". Gravel bar with tire tracks is on the left bank.
30892.5	0294.00	General Comment: The right bank is denuded and eroding. Left bank gravel bar continues.
30976.5	0295.00	General Comment: Cattle trails on the left bank.
31048.5	0296.00	General Comment: Gravel bar and cattle trails on the right bank.
31105.5	0297.00	General Comment: There is a discarded metal pipe along the left bank. This unit is the start of dirt roads and trails on both banks. A fence crosses the creek at 170 feet.
31509.5	0299.00	General Comment: Cattle trails are on the right bank gravel bar.
31602.5	0300.00	General Comment: Discarded metal pipes in the creek. The

Position (ft.)	Habitat Unit #	Comments:
		right bank gravel bar continues and grass covers the banks.
31625.5	0301.00	General Comment: A PVC pipe crosses 15 feet above the creek at the beginning of the unit. The right bank gravel bar and grass covered banks continues.
31769.5	0302.00	General Comment: The right bank gravel bar continues. Cape ivy covers the denuded left bank.
31853.5	0303.00	General Comment: Cape ivy on the eroding left bank continues. There is a gravel bar at the base of the eroding right bank.
31875.5	0304.00	General Comment: A fence line crosses the creek at 48 feet. The right bank is bedrock with a gravel bar.
31931.5	0305.00	General Comment: The channel is split through the upper 21 feet of the unit.
31994.5	0306.00	General Comment: Both banks are vertical and bedrock. A gravel bar runs along the base of the left bank. A few 4 to 6 inch long steelhead were observed.
32041.5	0307.00	General Comment: The right bank is denuded.
32095.5	0308.00	General Comment: Left bank is bedrock. At 50 feet into the unit, cattle activity ends.
32191.5	0309.00	General Comment: A gravel bar is on the right bank. Entire unit consists of spawning gravel.
32270.5	0310.00	General Comment: Cape ivy covers the left bank.
32312.5	0311.00	General Comment: Cape ivy covers both banks. The scour in the pool is caused willow roots and branches. There are large walnut and California bay trees at the top of the left bank.
32429.5	0312.00	General Comment: A gravel bar runs along the right bank.
32483.5	0313.00	General Comment: Right bank gravel bar continues. Stickleback observed.

Position (ft.)	Habitat Unit #	Comments:
32546.5	0314.00	General Comment: There is an older log jam on the left bank with logs sticking up out of the creek bed. Right bank gravel bar continues. A few 5 inch long steelhead were observed. The lower 10 feet of the unit is a riffle.
32577.5	0315.00	General Comment: Right bank gravel bar continues. There is a 3 foot x 5 foot patch of spawning gravel in the unit.
32606.5	0316.00	General Comment: Gravel bar continues on the right bank.
32628.5	0317.00	General Comment: The lower 12 feet is a riffle. The scour in the pool is caused by roots and logs from a log jam on the left bank. Right bank gravel bar continues.
32692.5	0318.00	General Comment: The lower 12 feet is a riffle. A gravel bar is on the left bank.
<u>32782.5</u>	0319.00	General Comment: A wet ford road crosses the creek 38 feet into the unit. Planks of wood also cross the creek. Downstream of the road crossing, the entire area consists of spawning gravel.
32896	0320.00	General Comment: There is some log scour in the pool. Left bank is denuded and covered with cape ivy.
32958	0321.00	General Comment: The left bank is steep and eroding throughout the unit. The entire unit consists of spawning gravel.
33012	0322.00	General Comment: Metal car parts are discarded in the creek channel. Approximately 10 steelhead 4 to5 inches in length were observed. Car parts, willow branches and small woody debris cause the scour in the pool.
33039	0323.00	General Comment: Metal debris is discarded throughout the creek. The right bank is eroding starting 25 feet into the unit through to the end. Power lines cross above the creek in this unit. Unit consists of spawning gravel.
33174	0324.00	General Comment: Right bank erosion continues through the end of this unit and up to the end of unit 330 (height is 30-35 feet, serpentine blue goo).

Position (ft.)	Habitat Unit #	Comments:
33253.5	0326.00	General Comment: Right bank is bedrock. Refer to drawing of unit.
33358.5	0328.00	General Comment: Right bank is bedrock.
33451.5	0330.00	General Comment: The right bank is partially eroded.
33499.5	0331.00	General Comment: The entire right bank is rip-rapped.
33637	0332.00	General Comment: Right bank rip rap continues. A culvert for road runoff drains above the right bank at the upstream end of the unit.
33693	0334.00	General Comment: There is a dry side channel and a gravel bar on the left bank.
33806	0336.00	General Comment: Entire unit consists of spawning gravel. Cape ivy covers the left bank.
33986	0338.00	General Comment: Cattails on the right bank.
34036	0339.00	General Comment: Cape ivy covers the right bank. Two 4 inch steelhead observed.
34203	0341.00	General Comment: The lower 30 feet is a glide consisting of spawning gravel.
34314	0342.00	General Comment: The lower 5 feet is a riffle. Ten plus steelhead observed (4 - 7 inches in length). Stickleback were also present.
34371	0343.00	General Comment: A gravel bar runs along the left bank.
34422	0344.00	General Comment: The right bank is eroding for the entire unit. Pampas grass is growing on the right bank and the left bank gravel bar continues. Stickleback observed.
34466	0345.00	General Comment: The lower 8 feet is a riffle. The entire unit consists of spawning gravel.
34528.5	0346.00	General Comment: Cape ivy covers the eroded left bank. A tributary enters from the right bank 45 feet into the unit. WP: SRTB346: N35° 34' 32.7" W121°01' 37.8".

Position (ft.)	Habitat Unit #	Comments:
34702.5	0348.00	General Comment: Cape ivy continues over the eroded left bank.
34851	0349.00	General Comment: The lower 15 feet is a riffle.
34907	0350.00	General Comment: The lower 4 feet is a riffle.
34975	0351.00	General Comment: Willow, mulefat, and sycamore are the dominant vegetation types found in the next ten units.
35020	0352.00	General Comment: A gravel bar runs along the right bank.
35076	0353.00	General Comment: There is a side channel with some water.
35179	0355.00	General Comment: Gravel bars run along both banks. At 69 feet, there is a 5 foot long riffle.
35335	0356.00	General Comment: At 35 feet, the right bank is starting to slump and erode (36 feet high by 76 feet long). At 54 feet, there is a short riffle section. Castor bean plants are growing on the right bank.
35448	0358.00	General Comment: Rebar is embedded in the channel.
35466	0359.00	General Comment: A gravel bar is on the left bank.
35505	0360.00	General Comment: The gravel bar continues on the left bank. The unit is 1.5 feet wide.
35551	0361.00	General Comment: Gravel bar continues on the left bank. Cape ivy covers the right bank. A fallen sycamore is hanging over the pool.
35596	0362.00	General Comment: The gravel bar continues on the left bank. Adult tree frogs observed
35636	0363.00	General Comment: This unit is dry. The right bank is denuded (6 feet high by 120 feet long). There is a dry side channel on the right bank side behind a gravel bar. The left bank is denuded from the beginning of the unit up to 277 feet (25 feet high). At 407 feet, a dry tributary enters from

Position (ft.)	Habitat Unit #	Comments:
		the left bank. WP:SRTB3631 N35° 34' 29.8", W121° 01' 26.7". In general, the channel is 280 feet wide however, the wetted portion (when water is present) is only about 100 feet wide (the overflow channel is 180 feet wide). There is a line of willows between the eroded left bank and the wetted stream channel. At 833 feet, the right bank is denuded and continues for 75 feet (when flowing, the stream is at the base of this bank). At 1,300 feet, the eroded right bank is 36 feet high and 156 feet long. At 2,000 feet, the left bank is eroding (33 feet high by 110 feet), but is beginning to re-vegetate. A substantial gravel bar on the right bank (125 feet wide) has castor bean plants.
38261	0364.00	General Comment: This unit will most likely be dry by September.
38273	0365.00	General Comment: From the beginning of this unit through to the end of unit 368, the left bank is denuded and eroding.
38290	0366.00	General Comment: Denuded left bank continues. Along the right bank, there is a 125 foot wide gravel bar.
38349	0367.00	General Comment: Entire unit consists of spawning gravel.
38598	0370.00	General Comment: The right bank is denuded (12 feet high by 50 feet long) with willows in front.
38701	0372.00	General Comment: The lower 94 feet is a glide (sand). A gravel bar is at the base of the left bank.
38884	0374.00	General Comment: The lower 48 feet is a glide (silty gravel). Cape ivy covers the left bank. Willows and poison oak are also in this section of creek.
38980	0376.00	General Comment: The scour is caused by willow branches. Several steelhead (6 to 8 inches in length) observed.
39205	0378.00	General Comment: Cape ivy flows over the denuded left bank. Several steelhead (6 to 8 inches in length) observed.
39370	0380.00	General Comment: There is a gravel bar and castor bean plants on the left bank.

Position (ft.)	Habitat Unit #	Comments:
39493	0381.00	General Comment: There is a 120 foot wide gravel bar on the left bank. At 290 feet, a house is at the top of the right bank and a 2 inch diameter diversion line crosses over the creek.
39814	0382.00	General Comment: There is willow riparian in this section of creek.
39959	0383.00	General Comment: The wetted channel is 12 feet wide but, the entire channel is 125 feet wide with a narrow band of willows lining the wetted portion.
40049	0386.00	General Comment: Cape ivy covers the right bank and castor bean plants are on the left bank. A two foot diameter discarded culvert is on the right bank. The channel width is 350 feet.
40112	0387.00	General Comment: The right bank is 3 feet high, vertical, and denuded and extends to the end of unit 391. Willows are "choking" or clogging the wetted channel.
40287	0390.00	General Comment: A (dry) tributary enters from the right bank at 23 feet. Waypoint: N35° 34' 44.6" W121° 00' 48.5". Castor bean plants are on the right bank.
40320	0391.00	General Comment: At 110 feet, a power line crosses over the creek. The lower 230 feet consists of spawning gravel. The upper end of the denuded right bank is at 285 feet. The substrate in this unit is extremely embedded. Large schools of stickleback observed. Castor bean plants are on the right bank.
40613	0392.00	General Comment: The entire riffle consists of spawning gravel (110 feet long by 12 feet wide). Tire tracks cross the channel.
40722.5	0393.00	General Comment: At 20 feet, the left bank is eroding (30 feet high). Refer to pictures. Found 2 adult western pond turtle shells in this unit. From units 392 through 399, the channel width ranges from 250 to 350 feet.
40938.5	0395.00	General Comment: A transverse riffle is at the start of this unit. A corner pool is at the base of the eroding, slumping

Position (ft.)	Habitat Unit #	Comments:
		bank. Refer to picture.
41072	0396.00	General Comment: A small mid-channel pool is at the top of the unit (1.1 feet deep).
41231	0397.00	General Comment: There is embedded spawning gravel throughout this entire unit.
41349.5	0399.00	General Comment: The gravel is embedded in this unit.
41423	0400.00	General Comment: At 143 feet, the left bank erosion ends and the right bank erosion begins. There is no spawning gravel at the pool tail crest.
41565.5	0401.00	General Comment: Starting in this unit, the stream channel is 45 - 50 feet wide with willow, alder, California bay, and sycamore. Cape ivy and castor bean are on the left bank. The valley and the stream channel constrict substantially starting in this unit.
41605.5	0402.00	General Comment: The right bank erosion ends at 184 feet. A gravel bar runs along the left bank.
41789.5	0403.00	General Comment: Discarded metal irrigation pipes (20 feet in length) are in the channel. At 69 feet, erosion starts on the left bank (33 feet high). A 15 by 20 foot wide patch of embedded spawning gravel is in this unit.
42257.5	0405.00	General Comment: An 8 by 20 foot patch of severely embedded spawning gravel is in this unit. Several smolt sized steelhead observed. The left bank erosion ends at 42 feet.
42344.5	0407.00	General Comment: A red house is at the top of the right bank. Power lines cross over the creek at 4 feet into the unit. The entire unit consists of spawning gravel.
42583	0408.00	General Comment: Cape ivy covers the right bank. A (dry) tributary enters from the right bank. Waypoint: SRTBRH: N35° 34' 53.6" W121° 00' 35.2"
42662.5	0409.00	General Comment: Several smolt sized steelhead are in this unit. There is a glide with embedded spawning gravel at

Position (ft.)	Habitat Unit #	Comments:
		37 feet into the unit.
42805.5	0410.00	General Comment: Cape ivy covers the right bank.
42829.5	0411.00	General Comment: The right bank is rip rapped starting at 100 feet. Santa Rosa Creek road is on the top of the right bank. Young alder trees line the channel. Second temperature data logger in this unit.
43025.5	0412.00	General Comment: The boulder scour is due to the riprap on the right bank.
43083.5	0413.00	General Comment: Entire unit consists of clean spawning gravel (135 feet long by 12 feet wide). The riprap on the right bank ends.
43218.5	0414.00	General Comment: There is a small backwater scour pool on the right bank ten feet into the unit. Riprap starts on the right bank at 100 feet into the unit.
43408.5	0415.00	General Comment: Entire right bank consists of rip rap (approximately 20 feet high) and the left bank is bedrock.
43523.5	0416.00	General Comment: Left bank bedrock continues and the right bank consists of a dense thicket of young alder trees.
43685.5	0417.00	General Comment: The left bank bedrock continues and a gravel bar covered with young alder trees is on the right bank.
43771.5	0418.00	General Comment: Several 6 inch long steelhead observed in this pool.
43867.5	0420.00	General Comment: Start of new riprap on the right bank.
43934.5	0421.00	General Comment: California bay, willow, sycamore, and alder comprise the riparian zone.
43961.5	0422.00	General Comment: Continuation of right bank riprap. There is no vegetation on the right bank. .
44154.5	0423.00	General Comment: Several 6 inch long steelhead observed. Instream shelter is provided by boulders and watercress.

Position (ft.)	Habitat Unit #	Comments:
44247.5	0425.00	General Comment: A road drainage pipe (one foot in diameter) enters from the right bank.
44267.5	0426.00	General Comment: The riprap on the right bank ends 65 feet into the unit. Canopy increases here from California bay trees.
44349.5	0427.00	General Comment: Entire unit consists of spawning gravel.
44411.5	0429.00	General Comment: The entire unit consists of spawning gravel.
44455.5	0430.00	General Comment: The lower 50 feet is a bedrock scour pool. In the upper 53 feet of the unit, there is a concrete wall on the left bank that is 4 feet high. The creek makes a 90 degree turn at the end of the wall. Several steelhead fry observed here. At 103 feet, a bridge crosses the creek several feet overhead. The banks beneath the bridge consist of riprap covered in concrete.
44558.5	0431.00	General Comment: At 5 feet, a road drainage pipe enters on the right bank. The substrate in this section of creek is very "cemented" or embedded.
44695.5	0434.00	General Comment: The right bank is riprapped with some vegetation growing through. Cottonwood trees are on the left bank.
44764.5	0435.00	General Comment: Riprap continues on the right bank through unit 438.
44914.5	0437.00	General Comment: The entire unit consists of spawning gravel.
44934.5	0438.00	General Comment: Eight steelhead fry observed as well as stickleback.
45021.5	0439.00	General Comment: Algae covers the unit. Curti Creek enters from the right bank at 100 feet. Waypoint: WP N35° 34' 50.2", W121° 0' 13.2".
45160.5	0441.00	General Comment: The lower 3 feet is a riffle. Stickleback

Position (ft.)	Habitat Unit #	Comments:
		and four steelhead (5 inches in length) observed. Green filamentous algae covers the unit. Gravel bars run along both banks.
45226.5	0442.00	General Comment: Algae continues in this unit. There is a side channel (run/riffe) on the left bank. Gravel bars continue along both banks.
45277.5	0443.00	General Comment: Gravel bars run along both banks.
45316.5	0444.00	General Comment: The gravel in this unit is embedded. The lower 141 feet is a glide with spawning gravel. The left bank is bedrock starting at 141 feet. An orchard is located approximately 100 feet away from the left bank.
45358.5	0445.00	General Comment: Wires cross over the creek at the end of the unit.
45383.5	0446.00	General Comment: The orchard continues at the top of the left bank. The scour in the unit is due to rip rap on the right bank.
45428.5	0447.00	General Comment: A pipe crosses over the creek at 25 feet into the unit. A tributary enters through a culvert on the left bank at 130 feet. Metal bank stabilizers or dissipaters are below the tributary on the left bank. Waypoint: WP: N35° 34' 45.2, W121° 00' 11.2".
45581.5	0448.00	General Comment: The left bank is eroding. Cape ivy covers the right bank.
45609.5	0449.00	General Comment: The left bank continues eroding for the lower 25 feet of the unit. Riprap is on the left bank upstream of the eroding section.
45664.5	0450.00	General Comment: Several steelhead, 2 to 7 inches in length observed. Discarded metal debris is on the left bank. Cape ivy covers the right bank and gravel bars run along on both banks.
45790.5	0451.00	General Comment: Gravel bars continue on both banks.
45814.5	0452.00	General Comment: The upper 5 feet is a riffle.

Position (ft.)	Habitat Unit #	Comments:
45969.5	0453.00	General Comment: Denuded, eroding right bank starts in this unit. A short cascade is at the beginning of the unit.
46009	0454.00	General Comment: There is a gravel bar on the left bank. The right bank continues to erode in this unit and through unit 455. Five steelhead, 3 to 6 inches in length, observed.
46058.5	0455.00	General Comment: Left bank gravel bar continues.
46093.5	0456.00	General Comment: 20+ two to six inch long steelhead observed in this unit. Both banks are eroding.
46163.5	0457.00	General Comment: Left bank continues to erode and a gravel bar runs along the right bank.
46220.5	0458.00	General Comment: The channel here splits (the run on the left bank side was typed). The left bank is eroding and gravel bars run along both banks.
46256.5	0459.00	General Comment: Ten 3 to 5 inch long steelhead observed.
46404	0461.00	General Comment: Gravel bars run along both banks.
46415.5	0462.00	General Comment: Gravel bars continue along both banks.
46458	0463.00	General Comment: A side channel runs along the right bank. One 5 inch long steelhead observed.
46573	0465.00	General Comment: The right bank is rip rapped starting 40 feet which is scouring the pool. The upper 40 feet along the left bank is a gravel bar. Ten plus 3 to 6 inch long steelhead observed. Lower end of sample site 7.
46669	0466.00	General Comment: Right bank rip rap continues. Gravel bars run along both banks.
46705	0467.00	General Comment: A gravel bar continues along the right bank.
46833	0469.00	General Comment: A left bank gravel bar starts in this unit and continues through unit 471.

Position (ft.)	Habitat Unit #	Comments:
46907	0471.00	General Comment: Cape ivy covers the right bank.
46967	0472.00	General Comment: The lower 5 feet is a riffle. Boulders are on both banks and the boulders on the right bank are covered with cape ivy. A house is at the top of the right bank.
47066	0473.00	General Comment: A house and cape ivy are on the right bank. There is a manmade rock dam at the end of the unit.
47189	0474.00	General Comment: There is a house on the right bank which continues through unit 476. Five plus steelhead (3 to 5 inches in length) and one steelhead that was 10 inches long were observed.
47258	0475.00	General Comment: There is a gravel bar on the right bank.
47282	0476.00	General Comment: Cape ivy and blackberry cover the left bank and the gravel bar continues on the right bank.
47354	0477.00	General Comment: Blackberry and cape ivy continue on the left bank and a bridge crosses the creek at the top of the unit.
47457	0478.00	General Comment: The bridge crossing continues at the beginning of the unit. Wooden structures are on both banks. There is a pump and gauge by the bridge on the left bank where an un-named tributary enters. Waypoint: TB478 N 35° 34' 36.4" W 120° 59' 55.7". Blackberry bushes and a house are on the right bank. Left bank erosion starts at the upper end of the unit on the left bank.
47559	0479.00	General Comment: Blackberry and cape ivy cover the right bank and the left bank erosion continues.
47624	0480.00	General Comment: The lower 10 feet is a riffle. Left bank erosion continues. Scour is from willow branches and roots.
47672	0481.00	General Comment: The pool tail crest substrate is embedded. Erosion begins on the right bank.
47702	0482.00	General Comment: he left bank is bedrock. The right bank

Position (ft.)	Habitat Unit #	Comments:
		erosion continues. Several 8 to 10 inch long steelhead observed.
47786	0483.00	General Comment: The left bank is bedrock. The right bank is eroding throughout the unit (20 feet high and vertical).
47896	0486.00	General Comment: There is willow branch and root sour in the pool.
47971	0487.00	General Comment: A short boulder cascade is located 20 feet into the unit.
48038	0488.00	General Comment: This unit is the start of large boulder substrate. The right bank is eroding starting at 30 feet and extending to the end of the unit. Two steelhead, 3 to 5 inches in length, observed.
48095.5	0489.00	General Comment: There are riffle sections at 0-11 feet, 50-68 feet, and 123-135 feet. The right bank is eroding throughout the unit and a gravel bar is along the left bank.
48230.5	0490.00	General Comment: The right bank is bedrock and a gravel bar runs along the left bank.
48278.5	0492.00	General Comment: The pool contains both boulder and root scour. The left bank gravel bar continues through to the end of the unit.
48370.5	0493.00	General Comment: Gravel bars are on both banks throughout the unit.
48389	0494.00	General Comment: There are both bedrock and eroding areas on the left bank. Observed 5+ steelhead, 3 to 5 inches in length.
48470	0495.00	General Comment: Waypoint: N35° 34' 31.2" W120° 59' 52.9". This tributary is located 25 feet into the unit on the left bank and has water trickling out of it. The left bank is bedrock. A gravel bar runs along the right bank.
48540	0497.00	General Comment: A tributary enters at the top of the unit from the left bank. Waypoint: TB497: N35° 34' 30.8"

Position (ft.)	Habitat Unit #	Comments:
		W120° 59' 52.1".
48602	0498.00	General Comment: This unit is a split channel (the left bank was typed). At 70 feet, there is a backwater section. The right bank is eroding.
48693	0499.00	General Comment: Eroding right bank continues.
48790	0501.00	General Comment: The upper 15 feet of the left bank is eroding (upstream of bedrock). Roots are extending from the eroding bank. Right bank continues to erode.
48944	0503.00	General Comment: Right bank erosion continues. Ten plus steelhead observed (3 to 5 inches in length).
48998	0504.00	General Comment: Left bank is eroding.
49046	0505.00	General Comment: Left bank continues to erode. Right bank is bedrock (erosion stops here on the right bank). A log jam at the end of the unit does not impede passage.
49127	0506.00	General Comment: There is a 3 foot long riffle at the start of the unit. Left bank erosion ends at 21 feet.
49166	0507.00	General Comment: The lower 10 feet is a riffle. A gravel bar is on the left bank throughout the unit.
49337	0508.00	General Comment: There is some root scour in the pool. The right bank is eroding. A gravel bar is at the base of the left bank. Twenty plus steelhead were observed (3 to 5 inches in length).
49427	0509.00	General Comment: Start of cattle trails and resting areas on banks and in riparian zone. The gravel bar on the left bank continues.
49472	0510.00	General Comment: The left bank is bedrock. A gravel bar runs along the right bank
49499	0511.00	General Comment: Cattle activity continues in this unit and extends to the end of unit 628. The left bank is eroding.
49597.5	0513.00	General Comment: A gravel bar runs along the right bank.

Position (ft.)	Habitat Unit #	Comments:
		Left bank erosion continues. Observed ten plus steelhead (3 to 5 inches in length).
49723.5	0514.00	General Comment: Right bank gravel bar continues. Left bank erosion continues. Cattle trails are also on the left bank.
49862.5	0515.00	General Comment: Left bank erosion continues.
49927.5	0517.00	General Comment: At 79 feet, a culvert drains under the road on the right bank. Left bank erosion ends.
50031.5	0518.00	General Comment: The right bank is rip rapped and Santa Rosa Creek road is at the top of the bank.
50236.5	0519.00	General Comment: The left bank is eroding and a small side channel runs along the base of the left bank. Riprap and the road continue on the right bank.
50371.5	0521.00	General Comment: Right bank is eroding with riprap under the road.
50424.5	0522.00	General Comment: At 36 feet, there is a short cascade.
50467.5	0523.00	General Comment: Both banks are eroding.
50500.5	0524.00	General Comment: Both banks continue eroding throughout the unit.
50532.5	0525.00	General Comment: Both banks continue eroding throughout the unit. There is some bedrock on the left bank.
50576.5	0526.00	General Comment: There is an orchard above the right bank. A metal pipe extends out the right bank.
50649.5	0527.00	General Comment: There is a house above the right bank.
50697.5	0528.00	General Comment: There is a 45 foot long backwater pool (rootwad) at the end of the unit. House on the right bank.
50800.5	0529.00	General Comment: House on the right bank.

Position (ft.)	Habitat Unit #	Comments:
50827.5	0530.00	General Comment: Cattle trail are on both banks. A house is on the right bank. Two unidentified frogs in this unit.
50909.5	0531.00	General Comment: There are houses and trails on the right bank. Eucalyptus trees are on the right bank through unit 535.
50951.5	0532.00	General Comment: A house and trails are on the right bank.
51017.5	0533.00	General Comment: Cattle trails are on the left bank. There are buildings on the right bank.
51104.5	0534.00	General Comment: A road and trail are on the left bank. Buildings are on the right bank.
51143.5	0535.00	General Comment: Trails are on both banks. The left bank is eroding.
51284.5	0537.00	General Comment: The lower 50 feet on the right bank is a backwater boulder scour pool. Both banks are eroding. At 60 feet, there is a trail on the left bank. The riparian zone is dense up to 200 feet, after which there are no trees. This is also the start of an eroding left bank (12-15 feet high) and a wide gravel bar on the right bank. At 215 feet, there is a small transverse riffle. Refer to picture taken here of the eroding left bank and floodplain.
51544.5	0538.00	General Comment: Left bank erosion continues. Right bank gravel bar continues.
51586.5	0539.00	General Comment: Left bank erosion continues. Right bank gravel bar continues. Observed 50+ steelhead (3 to 6 inches in length) and stickleback.
51652.5	0540.00	General Comment: A tributary enters from the left bank (coming off of the eroding bank). Waypoint: N35° 34' 25.1", W120° 59' 27.3". Left bank erosion and right bank gravel bar continue.
51709.5	0541.00	General Comment: Left bank erosion continues. Cape ivy covers the right bank.
51781.5	0542.00	General Comment: The lower 30 feet is a glide (small

Position (ft.)	Habitat Unit #	Comments:
		cobble). A gravel bar is on the right bank. This unit marks the end of significant erosion on the left bank (some minor erosion continues). Twenty plus steelhead observed (3 to 5 inches long).
51871.5	0543.00	General Comment: There are trails on the left bank and the right bank is bedrock. Gravel bars are on both banks.
51918	0544.00	General Comment: A 15 foot by 10 foot spawning gravel patch is at the beginning of the unit. Gravel bar continues along the left bank. Twenty plus steelhead observed (3 to 5 inches in length).
52008	0545.00	General Comment: Gravel bar continues on the left bank and there are trails on the right bank.
52031	0546.00	General Comment: Cattle trails are on both banks.
52073	0547.00	General Comment: Cattle trails are on both banks.
52171	0548.00	General Comment: Ten plus steelhead observed (3 to 5 inches in length).
52386	0550.00	General Comment: The lower 40 feet of the left bank is bedrock. Very little riparian vegetation is on the right bank.
52474.5	0551.00	General Comment: The lower 4 feet is a riffle. A gravel bar runs along the right bank.
52561.5	0552.00	General Comment: The gravel bar continues on the right bank. Riparian vegetation increases.
52671.5	0553.00	General Comment: Cattle trails are on both banks.
52716.5	0554.00	General Comment: There is some bedrock on the right bank.
52781.5	0555.00	General Comment: Right bank bedrock continues.
52872.5	0556.00	General Comment: The lower 10 feet is a riffle. There are twenty plus steelhead (3 to 6 inches in length) in this unit.

Position (ft.)	Habitat Unit #	Comments:
52933.5	0557.00	General Comment: There is a gravel bar on the left bank.
52996.5	0558.00	General Comment: Left bank gravel bar continues. A few steelhead observed (3 to 5 inches in length).
53030.5	0559.00	General Comment: The left bank is eroding starting at three feet.
53127.5	0560.00	General Comment: Continuation of left bank erosion. A gravel bar is along the right bank.
53157.5	0561.00	General Comment: The lower 8.5 feet is a transverse riffle. Left bank erosion ends at the top of the unit.
53250.5	0562.00	General Comment: The upper 10 feet is a riffle. The left bank is bedrock.
53316.5	0563.00	General Comment: Left bank is bedrock. There is a 20 foot long backwater section. Five steelhead observed (3 to 5 inches in length).
53385	0564.00	General Comment: A gravel bar and trails are on the left bank.
53452	0565.00	General Comment: The gravel bar continues on the left bank. Thirty plus steelhead observed (2 to 6 inches in length).
53509	0566.00	General Comment: There is a gravel bar on the right bank. The left bank is eroding for the length of the unit (6 to 8 feet high).
53610	0567.00	General Comment: Left bank erosion continues (exposing roots). Right bank gravel bar continues. One western pond turtle observed.
53651	0568.00	General Comment: At 65 feet into the unit there is a narrow riffle side channel. Some short riffle sections throughout the unit.
53829.5	0569.00	General Comment: This pool is approximately 5 feet deep with 50+ steelhead (2 to 10 inches in length) observed. The right bank is eroding and a tributary also enters on the right

Position (ft.)	Habitat Unit #	Comments:
		bank. Waypoint: TB569: N 35° 34' 19.8" W 120° 59' 09.6".
53901.5	0570.00	General Comment: Right bank erosion continues. A gravel bar runs along the left bank and there is no canopy. Twenty plus steelhead (3 to 6 inches in length) observed.
53977.5	0571.00	General Comment: Right bank erosion continues. The lower 9 feet is a riffle. The left bank gravel bar continues.
54061.5	0572.00	General Comment: Right bank erosion continues. Gravel bars and cattle trails runs along both banks.
54097.5	0573.00	General Comment: The right bank continues to erode (past the gravel bar). The left bank is bedrock. Ten plus steelhead (2 to 4 inches in length) observed.
54199	0574.00	General Comment: A gravel bar runs along the right bank and the erosion continues. The left bank is eroding throughout the unit. At 33 feet into the unit, a tributary enters from the left bank. Waypoint: TB574 N35° 34' 17.7" W120° 59' 08.1".
54268	0575.00	General Comment: There are 40+ steelhead (2-7 inches in length) in this deep pool. Right bank gravel bar continues and right bank erosion ends 12 feet into the unit. The left bank is bedrock.
54391	0576.00	General Comment: Right bank gravel bar continues and the left bank is bedrock.
54421	0577.00	General Comment: Metal debris is discarded on the left bank and in the creek. The left bank consists of bedrock.
54455	0578.00	General Comment: At 30 feet into the unit, the bedrock ends and erosion begins on the left bank.
54549	0579.00	General Comment: Twenty plus steelhead (3-4 inches in length) observed in this unit. Left bank erosion continues.
54607	0580.00	General Comment: Both banks are eroding. Cattle trails are on the left bank.

Position (ft.)	Habitat Unit #	Comments:
54629	0581.00	General Comment: Left bank erosion continues. A gravel bar runs along the right bank. Thirty plus steelhead observed (2 to 5 inches in length).
54734	0582.00	General Comment: A gravel bar runs along the left bank and the right bank is eroding.
54771.5	0583.00	General Comment: There is some bedrock and erosion on the right bank and a gravel bar runs along the left bank. Observed 50+ steelhead (2 to 8 inches in length). Green filamentous algae covers unit.
54861.5	0584.00	General Comment: At 89 feet, a 32 foot long backwater pool is on the left bank. Cattle trails are on both banks.
54970.5	0585.00	General Comment: Very little vegetation exists on the banks.
55012.5	0586.00	General Comment: The left bank is eroding.
55045.5	0587.00	General Comment: Left bank erosion continues. One 5 inch steelhead observed. The unit is covered with green filamentous algae.
55183.5	0588.00	General Comment: A gravel bar runs along the right bank. Green filamentous algae covers the unit.
55219.5	0589.00	General Comment: Sycamores are on both banks starting at 20 feet. A gravel bar runs along the right bank.
55246.5	0590.00	General Comment: Gravel bars runs along the right and left banks. The right bank is eroding.
55360.5	0591.00	General Comment: Cattle trails are on both banks.
55407	0592.00	General Comment: A short riffle is at the beginning of the unit. A gravel bar runs along the left bank and the right bank is bedrock. Observed 10+ steelhead (2 to 3 inches in length). Green filamentous algae covers the unit.
55458	0593.00	General Comment: At 8 feet, there is a short cascade. A gravel bar runs along the left bank and the right bank is bedrock.

Position (ft.)	Habitat Unit #	Comments:
55494	0594.00	General Comment: At 30 feet, a tributary with a small trickle of water enters from the right bank. The right bank is boulder and bedrock. Waypoint TB594: N35° 34' 26.6" W120° 59' 05.0".
55561.5	0595.00	General Comment: Boulders are on both banks and a gravel bar runs along the left bank. Some filamentous green algae is in the unit.
55606.5	0596.00	General Comment: The gravel bar continues on the left bank through unit 599. Observed 5+ steelhead 3 to 8 inches in length.
5661.5	0597.00	General Comment: A spring is on the right bank wall along with the start of some erosion.
55708	0598.00	General Comment: Cattle trails are on the right bank.
55783	0599.00	General Comment: Metal pipe debris has been discarded in the creek on the right bank side. Observed 10+ steelhead (2 to 6 inches in length).
55846	0600.00	General Comment: The pool contains large woody debris and root scour. The left bank is eroding.
55936	0601.00	General Comment: Cattle trails and erosion on the right bank.
56035	0602.00	General Comment: Cattle trails and erosion on the left bank. Right bank erosion continues. Observed 50+ steelhead (3 to 7 inches in length).
56155	0603.00	General Comment: Left bank erosion continues. There is a gravel bar along the right bank that continues through to unit 606. Observed 10+ steelhead (approximately 3 inches in length).
56216.5	0604.00	General Comment: Left bank erosion continues.
56261.5	0605.00	General Comment: Left bank erosion continues.
56313.5	0606.00	General Comment: The lower 10 feet is a riffle. Left bank erosion continues. Green filamentous algae covers the unit.

Position (ft.)	Habitat Unit #	Comments:
56418.5	0607.00	General Comment: Cattle trails are on the right bank. Left bank erosion continues.
56484.5	0608.00	General Comment: Left bank erosion ends at 63 feet. Cattle trails are on both banks. Green filamentous algae covers the unit. Observed 10+ steelhead (4 to 7 inches in length)
56631.5	0610.00	General Comment: Left bank erosion starts at 35 feet.
56757.5	0611.00	General Comment: Scour and instream cover provided by a fallen sycamore. Left bank erosion continues. Observed 30+ steelhead (3 to 6 inches in length)
56825	0612.00	General Comment: There is a short cascade at 11 feet.
56983	0615.00	General Comment: Observed 20+ steelhead (2 to 5 inches in length). Green filamentous algae covers the unit.
57064	0617.00	General Comment: At seven feet, riprap begins on the right bank. The left bank is bedrock. Observed 50+ steelhead (2 to 6 inches in length).
57160	0618.00	General Comment: Cattle trails are on the left bank. A road is at the top of the right bank. Green filamentous algae covers the unit.
57245	0619.00	General Comment: The right bank is riprapped and the road is above for the length of the unit. A gravel bar runs along the left bank. Observed 20+ steelhead (2 to 5 inches in length).
57353	0620.00	General Comment: Right bank riprap continues. Left bank gravel bar continues.
57446	0621.00	General Comment: Left bank gravel bar continues. Observed 20+ steelhead (2 to 4 inches in length).
57585	0622.00	General Comment: There is a road and gate at the top of the right bank. Left bank gravel bar continues. A culvert drains road runoff from the right bank.
57642	0623.00	General Comment: Observed 5+ steelhead (2 to 3 inches in length). End of left bank gravel bar.

Position (ft.)	Habitat Unit #	Comments:
57684	0624.00	General Comment: At the beginning of the unit, there is a short cascade. The left bank is bedrock. Metal debris is discarded on the right bank. Green filamentous algae covers the unit.
57750	0625.00	General Comment: The left bank is bedrock. A log, a concrete wall and a rock wall are being used to stabilize the right bank (refer to drawing). Lower end of Site 8.
57822	0626.00	General Comment: The lower one third of the unit has short cascades that make the area a little steeper than the upper two thirds. A gravel bar runs along the left bank.
57927	0627.00	General Comment: Observed 10+ steelhead (4 inches in length). Green filamentous algae covers the unit.
58043	0628.00	General Comment: At 99 feet, a fence line crosses the creek. We do not have access to the next property. The fence line ends the cattle activity that began in unit 509 (a distance of 8,616 feet). Habitat typing from this point was conducted from the road.
58352	0629.00	General Comment: The left bank is bedrock.
58448	0630.00	General Comment: This unit marks the beginning of a deeper entrenched channel.
58729	0634.00	General Comment: At the top of the unit, a ditch relief culvert goes under the road and enters onto the right bank.
58906	0636.00	General Comment: At 78 feet, a tributary enters on the right bank (culvert goes under the road). At 195 feet, another tributary enters from the right bank. A strong sulfur smell is in this area.
59270.5	0638.00	General Comment: From the start of the unit to 138 feet, the right bank is denuded and actively eroding. At 174 feet, mainstem Santa Rosa Creek splits off to the south and the property is inaccessible. We continue to type that the unnamed tributary which runs adjacent to Santa Rosa Creek Road. The unnamed tributary has approximately two-thirds the volume of flow.

Position (ft.)	Habitat Unit #	Comments:
59470.5	0639.00	General Comment: The main channel of Santa Rosa creek is no longer visible from the road. The right bank (unnamed) tributary channel is close to the road and has 2 tributaries entering from the right bank. The first tributary enters at 76 feet into this unit from a culvert under the road on the right bank. It is currently dry, but appears to have high flows during storm events. The second tributary enters at 202 feet. This is a major (un-named) tributary coming from the right bank which has approximately one-half the flow as the channel we are typing. This tributary passes under the road through two culverts (4 foot in diameter) A 6 foot deep pool is at the base of the culverts with several steelhead 2 to 5 inches in length observed. Waypoint: TB639 N35° 34' 19.0" W120° 58' 28.8". Refer to pictures taken.
59915.5	0642.00	General Comment: On the right bank, there is a large eroding section where the road has started to break away down the right bank. A gravel bar is on the right bank.
60067.5	0645.00	General Comment: This is the start of a garden on the right bank. The creek has gone away from the road and is on the far side of the garden. Measurements might not be actual creek length. At 273 feet, a large water pump is near the road. At 378 feet, a PVC pipe runs along the right bank. At 483 feet, a tributary enters off the right bank (culvert goes under the road). Waypoint: TB646 N35° 34' 11.6" W120° 58' 27.4". At 966 feet, a dry tributary enters on the right bank. A wooden downspout carry's flow from the tributary to the channel (refer to drawing). Waypoint: TB6462: N35° 34' 07.8" W120° 58' 23.8". At 1,257 feet, a (dry) tributary enters from the right bank through a culvert under the road. Waypoint: N35° 34' 05.0", W120° 58' 21.8".
61372.5	0647.00	General Comment: A gravel bar runs along the right bank.
61492.5	0649.00	General Comment: The left bank is eroding. Right bank gravel bar continues.
61579.5	0650.00	General Comment: Right bank gravel bar continues.
61618.5	0651.00	General Comment: The left bank is bedrock. Right bank

Position (ft.)	Habitat Unit #	Comments:
		gravel bar continues.
61828.5	0654.00	General Comment: Right bank gravel bar continues.
61850.5	0655.00	General Comment: Right bank gravel bar continues.
61916.5	0656.00	General Comment: The lower 5 feet is a run.
62027.5	0659.00	General Comment: The right bank is bedrock.
62357.5	0666.00	General Comment: The creek cannot be seen from the road. The fence line/ property line ends the survey from the road. Waypoint: FL666: N35° 33' 58.5", W120° 58' 10.5".
62477.5	0667.00	General Comment: The fence line starts at the beginning of the unit. Observed 3 steelhead (5 inches in length).
62510.5	0668.00	General Comment: At 154 feet, a discarded culvert is on the left bank. Beginning of the right bank erosion with the road immediately above the right bank.
62692.5	0669.00	General Comment: A gravel bar runs along the left bank.
62786	0671.00	General Comment: The left bank is bedrock.
62840	0672.00	General Comment: A tributary enters on the right bank through a culvert. Left bank erosion begins. Waypoint: TB635: N35° 33' 65.5" W120° 58' 06.7".
62903	0673.00	General Comment: Left bank erosion continues.
62957	0674.00	General Comment: At 108 feet, two tributaries are entering from the left bank. Refer to the drawing. Left bank erosion continues.
63170	0675.00	General Comment: Left bank erosion continues up to the bedrock. A gravel bar runs along the right bank.
63203	0676.00	General Comment: At 46 feet, a transverse riffle continues to the end of the unit. There is a split channel with the transverse riffle separating the run from a riffle (see drawing).

Position (ft.)	Habitat Unit #	Comments:
63297	0677.00	General Comment: The left bank is eroding for the entire unit.
63345	0678.00	General Comment: The right bank consists of bedrock and boulders. Left bank erosion continues to the end of the unit where it turns to bedrock.
63390	0679.00	General Comment: At 50 feet into the unit, there is a small cascade over logs (not a fish passage issue). The road is at the top of the eroding right bank.
63479	0680.00	General Comment: Observed 10+ steelhead (2 to 3 inches in length).
63594.5	0682.00	General Comment: At 61.5 feet, a tributary enters on the left bank. On the right bank, the "bedrock" is actually cemented riprap. Waypoint: N 35° 33' 52.5", W 120° 57' 59.8".
63656	0683.00	General Comment: Both banks are partially bedrock.
63771.5	0686.00	General Comment: Gravel bars are along both banks.
63797.5	0687.00	General Comment: The upper left bank is eroding.
63892.5	0688.00	General Comment: There is a gravel bar along the right bank and the left bank erosion continues.
63925.5	0689.00	General Comment: There is a 4 foot riffle at the start of the unit. Left bank erosion continues. Observed three steelhead (3 to 5 inches in length).
63990.5	0690.00	General Comment: Observed one 3 inch long steelhead. Left bank erosion continues.
64180.5	0693.00	General Comment: Left bank erosion continues. At 27 feet, a dry tributary enters on the left bank. Waypoint: TB656: N35° 33' 49.4" W120° 57' 55.4".
64259	0695.00	General Comment: Left bank erosion continues.
64369.5	0699.00	General Comment: At 26 feet, a tributary with minor flow enters on the left bank. A gravel bar runs along the right

Position (ft.)	Habitat Unit #	Comments:
		bank. Observed three steelhead (3 to 4 inches in length). Left bank erosion ends. Waypoint: TB662 N° 35 33' 49.1" W120° 57' 55.0".
64423.5	0700.00	General Comment: A gravel bar is on the right bank.
64435.5	0701.00	General Comment: Right bank gravel bar continues.
64523	0703.00	General Comment: The right bank is bedrock. Observed 5+ steelhead (3 to 6 inches in length).
64590	0704.00	General Comment: The lower 5 feet is a transverse riffle. At 40 feet, a dry tributary enters on the right bank from a culvert under the road. Green filamentous algae covers the unit. Waypoint: N35° 33' 50.1", W120° 57' 51.7".
64632	0705.00	General Comment: Observed 5+ steelhead (3 to 4 inches in length). Green filamentous algae covers the unit.
64698	0706.00	General Comment: A gravel bar runs along the left bank. The right bank is eroding. Green filamentous algae covers the unit.
64755.5	0707.00	General Comment: Green filamentous algae covers the unit. One 4 inch long steelhead observed.
64792.5	0708.00	General Comment: At 45 feet, a dry tributary enters on the right bank. Waypoint: N35° 33' 49.1" W120° 57' 50.4".
64903.5	0709.00	General Comment: One 5 inch steelhead observed.
64989	0711.00	General Comment: Access to the property denied. Habitat typing continues from the road up to unit 725. The right bank is eroding up to the road. WP: N35° 33' 49.0" W120° 57' 43.5".
65078	0712.00	General Comment: At 68 feet, a dry tributary enters from the right bank through a culvert under the road. Waypoint: TB712: N35° 33' 48.0" W120° 57' 41.9".
65277.5	0715.00	General Comment: There is a short cascade at the top of the unit. Left bank is eroded.

Position (ft.)	Habitat Unit #	Comments:
65316.5	0716.00	General Comment: At 81 feet, a dry tributary enters on the right bank from a culvert under the road. Waypoint: TB716: N35° 33' 46.1" W120° 57' 40.1".
65528	0718.00	General Comment: At 96 feet, the (vertical) right bank is eroded up to the road.
65813	0721.00	General Comment: A gravel bar is along the left bank.
65906	0723.00	General Comment: The left bank is eroding.
65946	0725.00	General Comment: At 48 feet, there is a fence marking a property line and a tributary on the left bank. This unit ends the survey from the road. Waypoint: TB726 N35° 33' 42.0" W120° 57' 37.2".
66006	0726.00	General Comment: This unit is the beginning of cattle activity through unit 743.
66096	0727.00	General Comment: At 21 feet, a small dry tributary enters from the left bank. A gravel bar is on the right bank. Observed 30+ steelhead (2 to 5 inches long).
66216	0728.00	General Comment: The road is at the top of the right bank.
66277.5	0729.00	General Comment: A gravel bar runs along the left bank. Observed 40+ steelhead (2 to 5 inches in length).
66361.5	0730.00	General Comment: At 50 feet, a tributary enters on the right bank from a culvert under the road. A gravel bar is on the left bank and the right bank is eroding. Discarded pipe debris on the left bank Waypoint: TB730 N35° 33' 42.2" W120° 57' 33.3".
66424.5	0731.00	General Comment: Large bedrock outcrops are on the left bank. Observed 5+ steelhead (2 to 4 inches in length).
66517.5	0732.00	General Comment: At 60 feet, a dry tributary enters on the right bank through a culvert under the road. The lower 4 feet is a riffle and the bedrock outcrops continue on the left bank. Waypoint: TB732 N35° 33' 41.8" W120° 57' 31.1".
66589.5	0733.00	General Comment: The channel here is split and the survey

Position (ft.)	Habitat Unit #	Comments:
		follows the left side of the channel. The right bank is eroding.
66634.5	0734.00	General Comment: The unit is a split channel with a wide cobble bar in the middle. The left bank is eroding. The road is lower and is at the top of the right bank.
66766.5	0735.00	General Comment: Left bank erosion continues up to the bedrock. The road continues to be low and next to the creek. Observed 40+ steelhead (2 to 7 inches in length).
66898.5	0736.00	General Comment: A discarded culvert and other debris are on the right bank.
67043.5	0738.00	General Comment: At 10 feet into the unit, a large dry tributary enters on the left bank. Observed 20+ steelhead (3 to 5 inches in length). Waypoint: N35° 33' 39.8" W120° 57' 27.2". Lower end of Site 9.
67264	0740.00	General Comment: A gravel bar runs along the left bank and the road continues to be above the right bank. Observed 40+ steelhead (2 to 5 inches in length).
67357	0741.00	General Comment: Cattle activity continues up to unit 743. Rip rap lines the right bank under the road for the entire unit.
67417	0742.00	General Comment: Rip rap continues on the right bank.
67471	0743.00	General Comment: A dry tributary enters through a culvert on the right bank at the start of the unit. The lower 30 feet of the right bank is rip rap. End of cattle activity. Waypoint: N35° 33' 40.5" W120° 57' 22.5".
67576	0744.00	General Comment: There is a house above the right bank that continues through unit 747.
67910.5	0748.00	General Comment: At 135 feet, a tributary enters from the right bank. Waypoint: N35° 33' 37.2" W120° 57' 19.2".
68065.5	0749.00	General Comment: The right bank is eroding.
68098.5	0750.00	General Comment: Both banks are eroding.

Position (ft.)	Habitat Unit #	Comments:
68145	0751.00	General Comment: Cattle activity begins. The road is at the top of the right bank and continues through to unit 757. The right bank is eroding.
68158.5	0752.00	General Comment: The right bank is covered with rip rap (not very effective) but is still eroding at margins. Observed 30+ steelhead (2 to 5 inches in length).
68204.5	0753.00	General Comment: The right bank is riprapped.
68286.5	0754.00	General Comment: A small eroded tributary enters on the right bank.
68349.5	0756.00	General Comment: Observed 5+ steelhead (4 to 6 inches in length).
68399.5	0757.00	General Comment: The left bank is bedrock. A gravel bar runs along the right bank (the gravel bar continues through to unit 760). End of cattle activity.
68489.5	0759.00	General Comment: At the start of the unit there is a dry tributary on the left bank. Waypoint: N35° 33' 34.6" W120° 57' 17.2".
68534.5	0761.00	General Comment: The left bank is eroding. Cattle activity begins and continues through to unit 784.
68708.5	0762.00	General Comment: The right bank is eroding (road above) and continues through to unit 765.
68833.5	0764.00	General Comment: At 50 feet, a dry tributary enters on the right bank from a culvert under the road. Rip rap is under the culvert on the bank. Waypoint: N35° 33' 35.0" W120° 57' 13.1".
68893.5	0765.00	General Comment: A gravel bar runs along the left bank and riprapp is on the right bank.
68941.5	0766.00	General Comment: There are cattle trails on both banks. Observed 20+ steelhead (3 to 6 inches in length).
69001.5	0767.00	General Comment: Blackberry (native) covers the right bank.

Position (ft.)	Habitat Unit #	Comments:
69073.5	0768.00	General Comment: A gravel bar runs along the left bank and the right bank is eroding.
69194.5	0770.00	General Comment: At the end of the unit, a dry tributary enters on the left bank. A gravel bar runs along the right bank. Observed 20+ steelhead (2 to 6 inches in length). Waypoint: N35° 33' 32.5"W120° 57' 09.8".
69241	0771.00	General Comment: Right bank gravel bar continues. The left bank is eroding.
69269	0772.00	General Comment: Left bank erosion continues. Cattle trails are on the right bank.
69341	0773.00	General Comment: Cattle trails are on both banks. Left bank erosion continues.
69386	0774.00	General Comment: At 30 feet, a dry tributary enters from the left bank. Cattle trails are on both banks. A fence crosses at the end of the unit. Waypoint: N35° 33' 33.3"W120° 57' 8.7".
69426	0775.00	General Comment: The road comes closer above the right bank again and continues through unit 798.
69564	0776.00	General Comment: The right bank is eroding.
69584	0777.00	General Comment: A gravel bar is on the left bank. Metal cord debris is discarded on the left bank. Observed 20+ steelhead (3 to 6 inches in length).
69775	0779.00	General Comment: There is a barn on the left bank.
69850	0780.00	General Comment: At 20 feet, a fence line crosses the creek.
70067	0783.00	General Comment: At the start of the unit, a dry tributary enters on the right bank. Observed a few fry in this unit.
70147	0784.00	General Comment: At 120 feet, a bridge (driveway) crosses over the creek and there is a fence line under the bridge. A house on the left bank continues through unit 788.

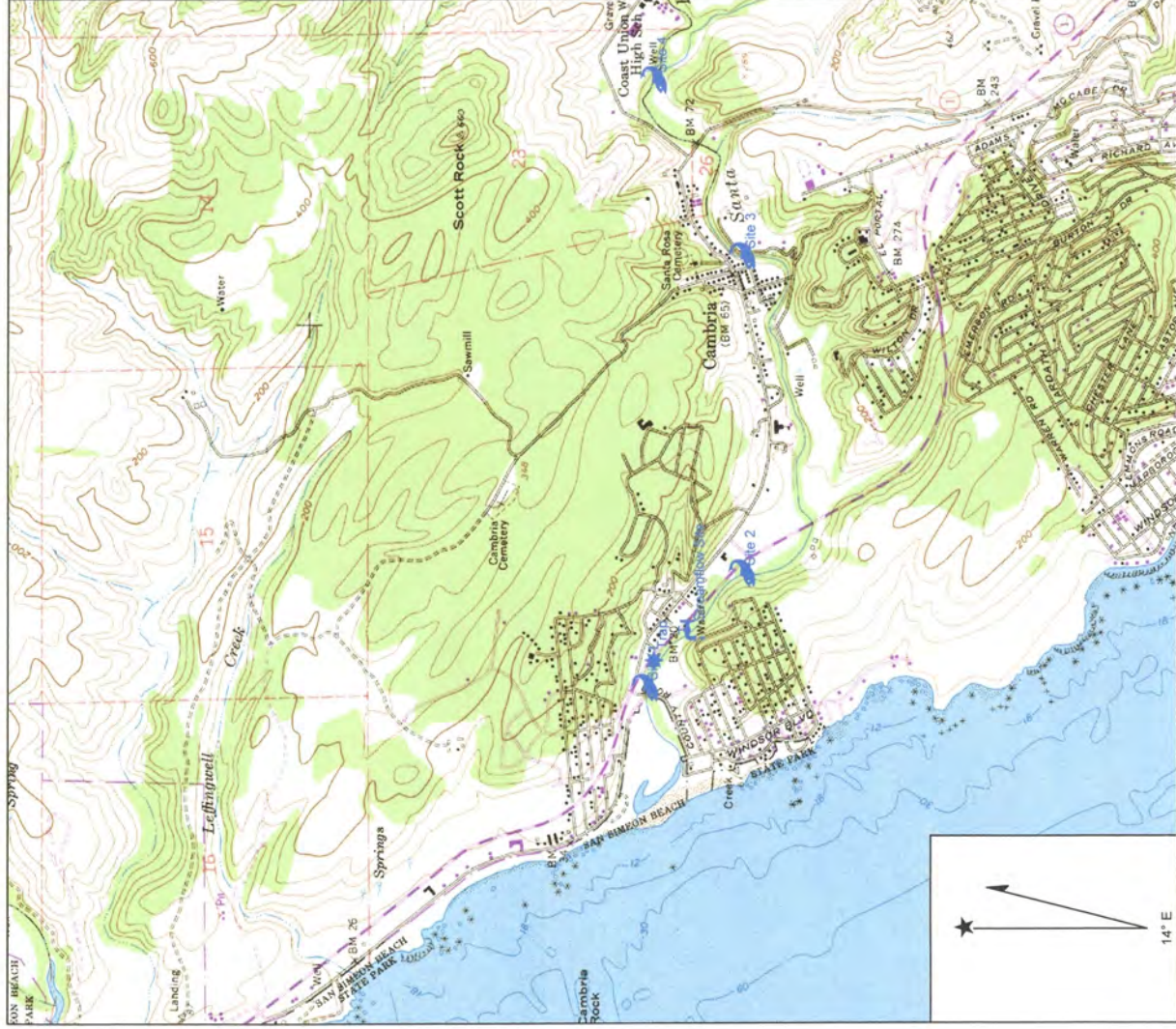
Position (ft.)	Habitat Unit #	Comments:
70550	0788.00	General Comment: At 160 feet, a dry tributary enters on the left bank near the house. Metal debris is discarded on the left bank. Waypoint: N35° 33' 39.6" W120°56' 55.5".
70746	0789.00	General Comment: The left bank is eroding.
70794	0790.00	General Comment: Left bank erosion continues.
70884	0791.00	General Comment: At 25 feet, a spring is on the left bank. Green filamentous algae covers the unit.
70927.5	0792.00	General Comment: A short cascade is between units 791 and 792. The right bank is bedrock.
70975.5	0793.00	General Comment: The right bank is eroding.
71053.5	0794.00	General Comment: Right bank erosion continues.
71291.5	0798.00	General Comment: Left bank is denuded and eroding.
71383.5	0800.00	General Comment: Left bank continues to erode. Observed 10+ steelhead (3 to 5 inches in length).
71413.5	0801.00	General Comment: A gravel bar is on the right bank.
71508.5	0803.00	General Comment: The road is directly above the right bank and continues this way to unit 806.
71688.5	0804.00	General Comment: Starting at 20 feet, rip rap covers the right bank to the end of the unit.
71754.5	0805.00	General Comment: There are some short riffle sections in the unit.
71919.5	0806.00	General Comment: The left bank is eroding.
71963	0807.00	General Comment: At 84 feet a fence line crosses the creek. Left bank erosion continues.
72164	0809.00	General Comment: Left bank erosion continues. Observed 5+ steelhead (3 to 5 inches in length).
72224	0810.00	General Comment: The bedrock on the right bank refers to

Position (ft.)	Habitat Unit #	Comments:
		a cobble/gravel cemented wall (natural). Left bank erosion continues. Lower end of Site 10.
72275	0811.00	General Comment: The road is directly above the right bank and the left bank erosion continues.
72407	0813.00	General Comment: Observed two steelhead that were 4 inches in length.
72476	0814.00	General Comment: Left bank erosion continues.
72557	0816.00	General Comment: At 129 feet, a large tributary enters from the left bank (contributes about one quarter of the flow). The larger of the two channels and the one with more flow continues under a bridge at 149 feet where the road switches to the left bank side of the creek. At 169 feet, a fence line crosses the creek. Waypoint: N35° 33' 45.5" W120° 56' 38.0".
72762	0817.00	General Comment: The unit starts at the upper end of the bridge. A gate is on the right bank and the road is now directly above the left bank which continues to the end of the survey.
72804	0818.00	General Comment: Springs are all along the left bank which is also eroding. The left bank consists of dirt with some cobble and gravel. Dried green filamentous algae observed.
72828.5	0819.00	General Comment: Dried filamentous algae continues. Springs and ferns are on the left bank wall.
72858.5	0820.00	General Comment: A water storage tank is on the right bank approximately 100 feet from the creek. Both banks are eroding.
73080.5	0822.00	General Comment: Both banks are eroding.
73265.5	0824.00	General Comment: Both banks are eroding. A gravel bar runs along the right bank.
73288.5	0825.00	General Comment: Right bank gravel bar continues.

Position (ft.)	Habitat Unit #	Comments:
73311	0826.00	General Comment: There are some backwater pool sections in this unit. Gravel bar continues on the right bank.
73340	0827.00	General Comment: There are springs seeping from the left bank.
73386	0828.00	General Comment: The left bank is eroding.
73557	0832.00	General Comment: Both banks are eroding.
73581	0833.00	General Comment: The right bank is eroding.
73641	0834.00	General Comment: At the top of the unit, there is a two foot high cascade.
73675.5	0835.00	General Comment: A gravel bar is along the left bank. The right bank is eroding. Sulfur springs are along the creek bed.
73815	0836.00	General Comment: At 62 feet, discarded metal debris is on the left bank.
73913.5	0837.00	General Comment: There is a sulfur precipitate (white) on the creek bed. Both banks are eroding.
73945.5	0838.00	General Comment: At 90 feet into the unit, there is a three foot high step. At 100 feet, the right bank erosion begins.
74114.5	0839.00	General Comment: A gravel bar is along the left bank and the right bank erosion continues.
74159	0841.00	General Comment: There are springs flowing out of the left bank. Observed 10+ steelhead (2 to 5 inches in length).
74185	0842.00	General Comment: There are springs, rip rap, and moss on the left bank. At 83 feet, a steady flow of runoff from springs is coming from the road on the left bank. The terrestrial vegetation refers to leaf litter in the creek.
74402	0843.00	General Comment: The unit has sulfur deposits on the bed and banks.
74447	0844.00	General Comment: Sulfur deposits continue. The right bank is eroding.

Position (ft.)	Habitat Unit #	Comments:
74616	0845.00	General Comment: White precipitate and right bank erosion continues.
74688	0846.00	General Comment: White precipitate and right bank erosion continues.
74788	0847.00	General Comment: White precipitate and right bank erosion continues.
74809	0848.00	General Comment: Iron precipitate is on the bed and banks. At the end of the unit on the left bank, there is a large section of riprap (65 feet long and 25 feet high).
74989	0849.00	General Comment: The left bank is eroding.
75019	0850.00	General Comment: Sulfur precipitate in the creek.
75041	0851.00	General Comment: A patch of arundo is on the left bank and the left bank is also eroding. Sulfur precipitate continues.
75086	0852.00	General Comment: At 69 feet, there is a one foot jump. The right bank is bedrock. Iron precipitate covers the Substrate.
75311	0853.00	General Comment: Sulfur precipitate is in the creek.
75371	0854.00	General Comment: At the start of the unit, a dry tributary enters on the right bank. Sulfur precipitate in the creek.
75649	0856.00	General Comment: A temperature data logger is located in this unit. The left bank is riprap. Waypoint: N35° 34' 04.1" W120° 56' 21.7".
75724	0857.00	General Comment: At 36 feet, a bubbling spring is on the left bank (there are multiple springs on the left bank). Sulfur precipitate in the creek.
75827	0858.00	General Comment: Several steelhead fry observed.
75857	0859.00	General Comment: Observed 30+ steelhead (2 to 5 inches in length).

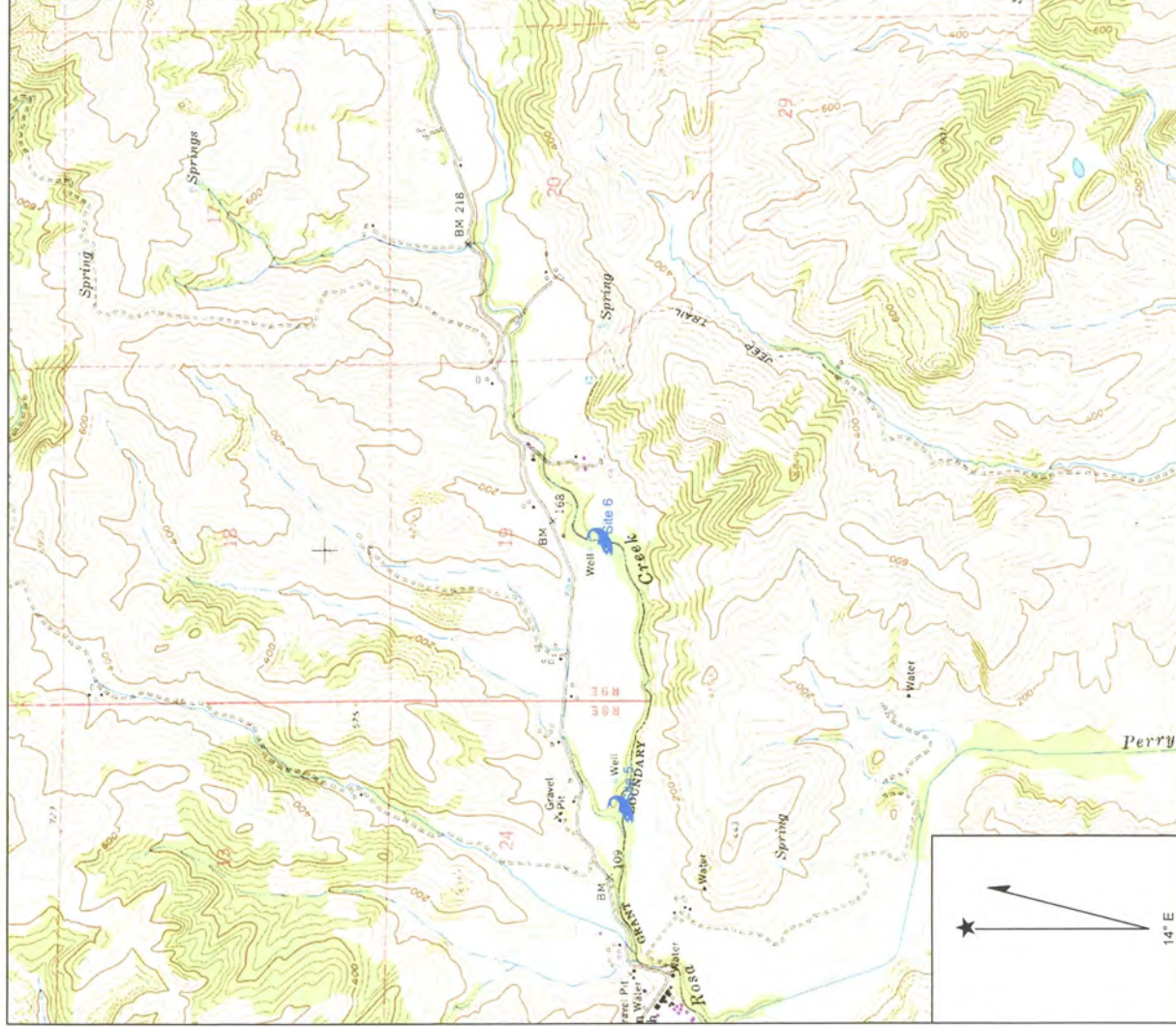
Position (ft.)	Habitat Unit #	Comments:
76058	0861.00	General Comment: At the end of the unit, the creek forks. One third of the flow is in the channel adjacent to Santa Rosa Creek Road and the other two thirds of the flow splits off towards the right bank side onto another inaccessible property. Ten steelhead, 2 to 6 inches in length were observed in a pool above the split in the right bank tributary. There is rip rap, erosion, and a defunct culvert on the left bank and a gravel bar on the right bank. Over twenty steelhead, 2 to 6 inches in length were observed in the unit. Waypoint: N35° 34' 6.1" W120° 56' 16.9" .
76138	0862.00	General Comment: There is erosion and riprap on the left bank. A gravel bar and discarded barbed wire are on the right bank.
76246	0864.00	General Comment: The pool is 5 feet long and 19.5 feet wide. Upstream of the pool there is a 0.8 foot jump up onto a concrete apron that is under the bridge. The apron under the bridge is approximately 15 feet long with sheet flow. This is the end of the survey, but not the end of anadromy.



Name: CAMBRIA
 Date: 4/7/2009
 Scale: 1 inch equals 2000 feet

Location: 035° 34' 13.9" N 121° 05' 39.5" W
 Caption: Figure 1. Trap, streamflow, and four electrofishing sample sites
 on Santa Rosa Creek, 2005.

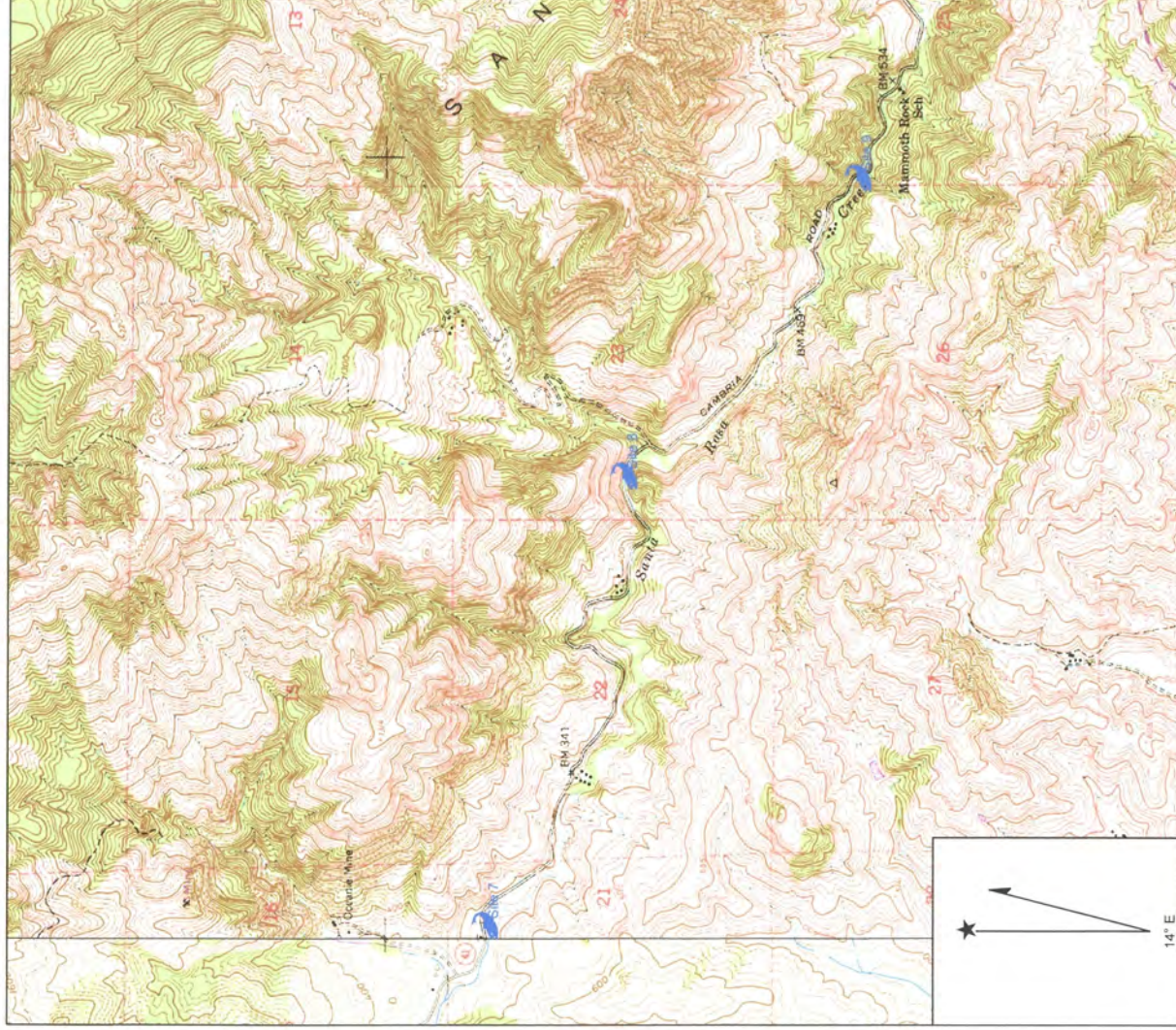
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Name: CAMBRIA
 Date: 4/7/2009
 Scale: 1 inch equals 2000 feet

Location: 035° 34' 16.3" N 121° 02' 26.0" W
 Caption: Figure 2. Electrofishing sample sites 5 and 6, Santa Rosa Creek, 2005.

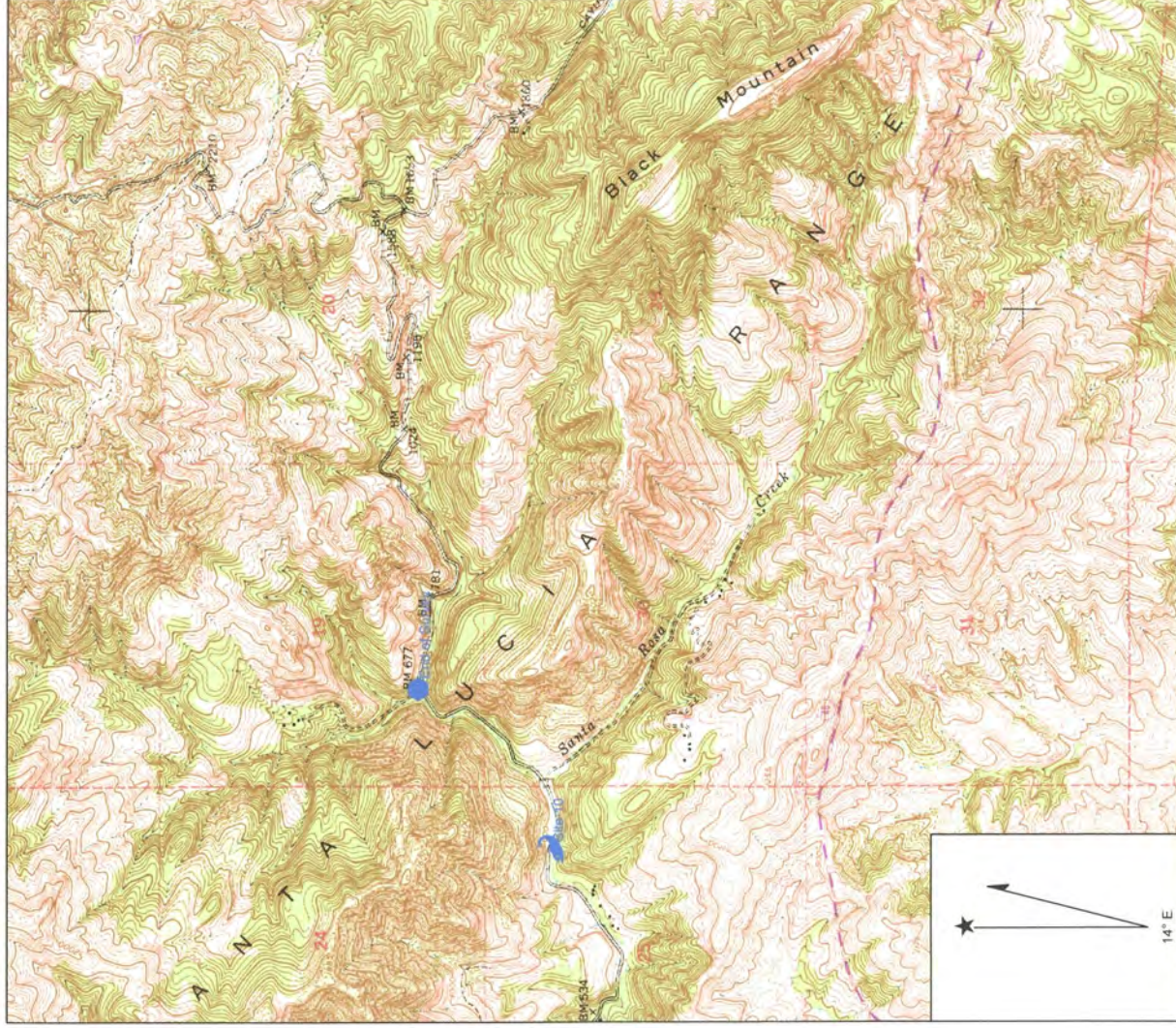
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Name: CYPRESS MT
Date: 4/7/2009
Scale: 1 inch equals 2000 feet

Location: 035° 34' 26.2" N 120° 58' 41.4" W
Caption: Figure 3. Electrofishing sample sites 7, 8, and 9, Santa Rosa
Creek, 2005

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Name: CYPRESS MT
 Date: 4/7/2009
 Scale: 1 inch equals 2000 feet

Location: 035° 33' 38.7" N 120° 55' 41.8" W
 Caption: Figure 4. Electrofishing site 10 and the end of the habitat mapping survey, Santa Rosa Creek, 2005.

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Summary of Riffle, Flatwater, and Pool Habitat Types

Santa Rosa Creek

County: San Luis Obispo

7/2005 to 10/3/2005

Quad: Cambria

07.ON

Longitude: 121:06:38.0

Confluence Legal Description: T27SR10ES30

Habitat Units	Units Fully Measured	% Habitat Occurrence	Total Length (ft)	% Total Length	Mean Length (ft)	Mean Width (ft)	Mean Depth (ft)	Mean Max Depth (ft)	Total Area (sq. ft)
397	42	44%	27,328	34.0%	69	15.5	0.7	1.6	586,09
329	33	37%	36,924	46.0%	112	10.3	0.6	1.0	355,25
131	18	15%	6,546	8.2%	50	13.2	0.4	0.6	82,28
29	0	3%	3,370	4.2%	116				
1	0	0.10%	1,548	2.0%	1,548				
1	0	0.10%	2,625	3.3%	2,625				
1	0	0.10%	50	0.06%	50				
5	0	0.52%	1,452	2.0%	290				
Total Units 894	Total Units 93		Total Length (ft) 79,843						Total Area (sq.ft.) 1,024,6

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Santa Rosa Creek

County: San Luis Obispo

Survey Dates: 9/7/2005 to 10/3/2005

Quad: Cambria

Latitude: 35:34:07.ON

Longitude: 121:06:38.0

Confluence Legal Description: T27SR10ES30

Habitat Type	Habitat Units	Units Fully Measured	% Habitat Occurrence	Total Length (ft)	% Total Length	Mean Length (ft)	Mean Width (ft)	Mean Depth (ft)	Mean Max Depth (ft)	Total Area (sq. ft.)	Total Volume (cu. Ft.)
Pools	397	42	44%	27,328	34.0%	69	15.5	0.7	1.6	586,093	603,572
Flatwater	329	33	37%	36,924	46.0%	112	10.3	0.6	1.0	355,256	182,588
Riffles	131	18	15%	6,546	8.2%	50	13.2	0.4	0.6	82,284	27,931
Side Channel	29	0	3%	3,370	4.2%	116					
Lagoon	1	0	0.10%	1,548	2.0%	1,548					
Dry	1	0	0.10%	2,625	3.3%	2,625					
Culvert	1	0	0.10%	50	0.06%	50					
Not Surveyed	5	0	0.52%	1,452	2.0%	290					

Total Units	Total Units	Total Length (ft)	Total Area (sq.ft.)	Total Vol. (cu.ft.)
894	93	79,843	1,024,633	814,092

Table 3 - Summary of Maximum Residual Pool Depths By Pool Habitat Type

Stream Name: Santa Rosa Creek

County: San Luis Obispo

Survey Dates: 9/7/2005 to 10/3/2005

Quad: Cambria

Latitude: 35:34:07.ON

Longitude: 121:06:38.0

Confluence Legal Description: T27SR10ES30

Habitat Type	Habitat Units	Units Measured For Depth	< 1 Foot Maximum Residual Depth	1 < 2 Feet Maximum Residual Depth	2 < 3 Feet Maximum Residual Depth	3 < 4 Feet Maximum Residual Depth	4 < 5 Feet Maximum Residual Depth
MCP	84	79	20	44	10	5	0
STP	7	2	0	2	0	0	0
CRP	11	11	0	7	3	1	0
LSL	58	55	18	28	8	1	0
LSR	80	75	12	46	14	2	1
LSBk	74	69	3	43	19	4	0
LSBo	83	67	8	42	17	0	0
	Total Pools 397	Total Measured 358	Total < 1 Foot 61	Total 1 < 2 Feet 212	Total 2 < 3 Feet 71	Total 3 < 4 Feet 13	Total 4 < 5 Feet 1

Note: The discrepancy between the total number of pools and those measured is due to the habitat mapping that was done from the road due to lack of access to the property.

Table 4 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Santa Rosa Creek

County: San Luis Obispo

Survey Dates: 9/7/2005 to 10/3/2005

Quad: Cambria

Latitude: 35:34:07.ON

Longitude: 121:06:38.0

Confluence Legal Description: T27SR10ES30

Habitat Type	Habitat Units	Units Fully Measured	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terrestrial Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
LGR	128	16	0	11	1	10	15	25	9	25	4
CAS	3	2	0	5	0	5	0	7	50	33	0
Total Riffle	131	18	0	8%	0.50%	7.50%	7.50%	16%	29.50%	29%	2%
GLD	59	6	2	13	0	38	28	13	0	6	0
RUN	254	27	1	12	5	27	19	17	3	16	0
SRN	16	1	10	0	0	0	0	0	20	70	0
Total Flatwater	329	34	4%	8%	1%	22%	16%	10%	8%	31%	0
MCP	84	8	13	11	0	18	16	14	0	28	0
STP	7	1	0	0	0	30	0	20	0	50	0
CRP	11	3	3	20	8	15	26	28	0	0	0
LSL	58	9	2	31	13	14	39	1	0	0	0
LSR	80	9	4	13	0	65	13	3	0	2	0
LSBk	74	6	43	11	0	12	13	15	0	5	1
LSBo	83	6	3	3	4	29	8	5	4	44	0
Total Pools	397	42	9.7%	12.7%	6%	26%	16%	11.5%	0.6%	18%	0%