CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Mariposa Creek
Report Completed April 14, 2006
Assesement Completed 2001

INTRODUCTION

A stream inventory was conducted during the summer of 2001 on Mariposa Creek and of its unnamed tributaries. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish and other aquatic species with an emphasis on anadromous salmonids in Mariposa Creek. The objective of the biological inventory was to document the presence and distribution of salmonids and other aquatic species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Mariposa Creek, located in Mendocino County, California, is a tributary to the west branch of the Russian River (see Mariposa Creek map, page 2). The legal description at the confluence with the Russian River is T17N, R12W, S17. Its location is 39°19 '33.6" N. latitude and 123°13'16.9" W. longitude. Year round vehicle access exists from Highway 101 near Redwood Valley by taking School Way to West Road to Tomki Road.

Mariposa Creek and its tributaries drains a basin of approximately 3.36 square miles. Mariposa Creek is a first order stream and has approximately 3.43 miles of intermittent stream, according to the USGS Redwood Valley and Laughlin Range 7.5 minute quadrangles. Major tributaries include an un-named tributary which is included in this report in italics. There are three ponds in the watershed which have a total surface area of 2.5 acres, including a 2.2 acre on-stream reservoir 0.26 miles upstream from the mouth of the creek. On September 10, summer flow was measured as approximately 0.02 cfs at habitat unit #039 (approximately 4900 feet upstream from the mouth of Mariposa). Elevations range from about 820 feet at the mouth of the creek to 3,166 feet in the headwaters. The watershed contains a mix of oak woodland and coniferous forest, with some zones of grassland and vineyards in the lower watershed. Vegetation in the watershed includes black oak, live oak, tan oak, manzanita, pines, douglas fir, madrone, bay, coyote brush, redwood, Oregon ash, and ferns. The watershed is primarily privately owned and is managed for timber production, rural/residential development and vineyard development. In addition, some of the ranches have small numbers of goats and chickens. Mariposa Creek has historical and current records of Steelhead Trout (*O. mykiss*) in its waters. The California Natural Diversity Data Database lists no occurrences of other sensitive plants or animals in the Mariposa watershed.

METHODS

The habitat inventory conducted in Mariposa Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The AmeriCorps Volunteers that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team and was supervised by Bob Coey, Russian River Basin Planner (DFG).

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the California Salmonid Stream Habitat Restoration Manual (1998). This form was used in Mariposa Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition. See parent stream report for discussion of specific methods used.

1. Flow:
Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows are also measured or estimated at major tributary confluences.

2. Channel Type:
Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the California Salmonid Stream Habitat Restoration Manual (1998). Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) Water Slope Gradient, 2) Entrenchment, 3) Width/Depth Ratio, 4) Substrate Composition, and 5) Sinuosity.

3. Temperatures:
Water and air temperatures, and time, are measured by crew members with hand-held thermometers and recorded at each tenth unit typed. Temperatures are measured in Fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures are also recorded using remote temperature recorders which log temperature at set intervals, 24 hours/day.

4. Habitat Type:
Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "DRY". Mariposa Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All unit

lengths were measured. The first occurrence of each unit type and a randomly selected 10% subset of all units were completely sampled (Length, Mean Width, Mean Depth, Maximum Depth and Pool Tail Crest Depth). All measurements are in feet to the nearest tenth.

5. Embeddedness:
The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Mariposa Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). "Not suitable" (value 5) is assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, absence of particulate substrate (e.g. bedrock), or other considerations.

6. Shelter Rating:
Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Mariposa Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. Thus, shelter ratings can range from 0-300, and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:
In all fully measured habitat units, dominant and sub-dominant substrate elements are visually estimated using a list of seven size classes: Silt/Clay, Sand, Gravel, Small Cobble, Large Cobble, Boulder, and Bedrock.

8. Canopy:
Stream canopy density is estimated using modified handheld spherical densiometers as described in the California Salmonid Stream Habitat Restoration Manual (1998). Canopy density relates to the amount of stream shaded from the sun. In Mariposa Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. Finally, the total canopy over each habitat unit is visually divided into evergreen and deciduous, and the estimated percentages are recorded.

9. Bank Composition and Vegetation:
Banks may be composed primarily of (1) Bedrock, (2) Boulders, (3) Cobble/Gravel, or (4) Silt/Clay/Sand, and may be covered predominantly with (5) Grass, (6) Brush, (7) Deciduous Trees, (8) Coniferous Trees, or (9) No Vegetation at all. These factors influence the ability of stream banks to withstand winter flows. For each fully measured habitat unit in Mariposa Creek, the dominant Bank Composition Type and Vegetation Type of both the right and left banks were chosen from the options above. Additionally, the percentage of vegetal coverage was estimated and recorded for each

bank.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species present and their distribution in the stream. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, and 3) electro-fishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual (1998).

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE IV data entry program developed by CDFG. This program processes and summarizes the data, and produces the following tables and appendices:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Shelter by habitat types
- Dominant substrates by habitat types
- Vegetative cover and dominant bank composition
- Fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel developed for Mariposa Creek include:

- Level II Habitat Types by % Occurrence and % Total Length
- Level IV Habitat Types by % Occurrence
- Pool Habitat Types by % Occurrence
- Maximum Depth in Pools
- Pool Shelter Types by % Area
- Substrate Composition in Low Gradient Riffles
- Percent Cobble Embeddedness by Reach
- Mean Percent Canopy
- Mean Percent Canopy by Reach
- Percent Bank Composition and Bank Vegetation

HISTORICAL STREAM SURVEYS:

There is no record of stream surveys conducted by the Department of Fish and Game on Mariposa Creek prior to this year.

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of Mariposa Creek, 9/5/2001 - 9/10/2001, was conducted by C. Sangiacomo (DFG), J. Newell (DFG), Jewels Willing (AmeriCorps) with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with the Russian River and extended up Mariposa Creek to the a steep section containing multiple 6 to 8 foot rock falls that were assumed to be impassible to salmonids. The total length of stream surveyed was 7511 feet, with an additional 61 feet of side channel.

On September 10, summer flow was measured as approximately 0.02 cfs at habitat unit #039 (approximately 4900 feet upstream from the mouth of Mariposa) with a Marsh-McBirney Model 2000 flowmeter.

This section of Mariposa Creek has 4 reaches with 3 distinct channel types: from the mouth to 1545 feet a B3, 3815 feet a F3, 1036 feet a B3 and 1115 feet a A2.

B3 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly cobble substrate.

F3 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly cobble substrate.

A2 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly boulder substrate.

Water temperatures ranged from 60ºF to 65ºF. Air temperatures ranged from 62ºF to 78ºF.

Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder in Reach 1 (in the pool just downstream of the Tomki Road bridge) logged temperatures every 2 hours from July 24 – October 19 , 2001. The highest temperature recorded was 68ºF on July 28 and the lowest was 53ºF on October 28. The mean of the daily highs was 67.1ºF for the month of July, 64.6ºF for August, 59.5ºF for September, and 54.7ºF for October.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 42.6% Flatwater units, 39.7% Pool units, 14.7% Dry units and 2.9% Riffle units (Graph 1). Based on total *length* there were 55.2% Dry units, 31.1% Flatwater units, 12.8% Pool units and 0.9% Riffle units (Graph 2).

There were 68 habitat units measured and 46% of these were completely sampled. Sixteen Level IV

habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent *occurrence* were Mid-Channel Pool at 22%, Run at 19%, Step Run at 16%, Dry at 15% (Graph 3). By percent total *length*, Dry at 55%, Run at 15%, Step Run at 13%, Mid-Channel Pool at 6%.

Twenty seven pools were identified (Table 3). Mid-Channel Pool pools were most often encountered at 22% of total percent of habitat (Graph 3). Mid channel pools comprised 57% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth.

Eleven of the 27 pools (40.1%) had a depth of two feet or greater (Graph 5). These deeper pools comprised 8.6% of the total length of stream habitat.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Pools rated 9 and Flatwater units rated 6 (Table 1). Of the pool types, Lateral Scour Pool - Log Enhanced rated 30, Lateral Scour Pool - Root Wad Enhanced rated 15, Step Pool rated 10, Lateral Scour Pool - Bedrock Formed rated 10, Mid-Channel Pool rated 8, Trench Pool rated 5, Secondary Channel Pool rated 5, Plunge Pool rated 5 and Corner Pool rated 5 (Table 2).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were Bedrock at 40%, Boulders at 29%, Small Wood at 21%, Terrestrial Vegetation at 4%. Graph 7 describes the pool shelter in Mariposa Creek.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 summarizes the dominant substrate in pool tail-outs. Gravel and bedrock were the dominant substrates at 25.9% each.

No mechanical gravel sampling was conducted in 2001 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. On this scale, a value of one is best for fisheries. Of the twenty seven pool tail-outs measured, eleven had a value of 2 (41%) and seven had a value of 3 (26%). Nine riffles (33%) rated a 5 (unsuitable substrate type for spawning). Gravel and bedrock were the dominant substrates observed at pool tail-outs. Graph 6 describes percent embeddedness by reach.

The mean percent canopy density for the stream reach surveyed was 80.3%. The mean percentages of deciduous and evergreen trees were 52% and 48%, respectively. Graph 9 describes the canopy for the entire survey.

For the entire stream reach surveyed, the mean percent right bank vegetated was 37% and the mean percent left bank vegetated was 35%. For the habitat units measured, the dominant vegetation types for the stream banks were: 44% Deciduous Trees, 34% Evergreen Trees, 10% Brush, and 6% Grass

(Graph 11). The dominant substrate for the stream banks were: 53% Bedrock, 18% Cobble & Gravel, 16% Silt, Clay & Sand and 11% Boulder (Graph 10).

HABITAT INVENTORY RESULTS FOR MARIPOSA CREEK, TRIB 1

The habitat inventory of the Mariposa Creek un-named tributary was conducted on September 10, 2001 by J. Newell (DFG) and J. Willing (AmeriCorps), with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence with Mariposa Creek and extended up the un-named tributary until is became to narrow to provide quality habitat for anadromous salmonids. The total length of stream surveyed was 296 feet, with no additional feet of side channel.

Flows were not measured on Mariposa Creek, Trib 1.

This section of the Mariposa Creek un-named tributary has one reach with one distinct channel type, A2, from the mouth to 296 feet.

A2 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly boulder substrate.

Water temperatures were 62ºF. Air temperatures were 70ºF.

*Based on frequency of **occurrence** there were 38.9% Flatwater units, 27.8% Pool units, 27.8% Dry units and 5.6% Culvert units. Based on total **length** there were 51.5% Flatwater units, 41.4% Dry units, 4.5% Pool units and 2.7% Culvert units.*

*Eighteen habitat units were measured and 39% were completely sampled. Seven Level IV habitat types were identified. The most frequent habitat types by percent **occurrence** were Step Run at 33.3%, Dry at 27.8%, Mid Channel Pool at 16.7%, Run, Plunge Pool, Corner Pool and culvert at 5.6% each. By percent total **length**, Step Run at 48.1%, Dry at 41.4%, Run at 3.4%, Mid Channel Pool at 2.8%, and Culvert at 2.7%.*

Five pools were identified. Mid-Channel Pool pools were most often encountered at 60%, and comprised 62% of the total length of pools.

Pool quality for salmonids increases with depth. One of the Five pools (20%) had a depth of two feet or greater. These deeper pools comprised 0.8 % of the total length of stream habitat.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Pools rated 26. Of the pool types, Scour rated 45 and Mid-Channel Pool rated 13.

By percent area, the dominant pool shelter types were Small Wood at 36%, Boulders at 26%,

and Large Wood at 10%.

Small cobble was the dominant substrate in this tributary. The depth of cobble embeddedness was estimated at pool tail-outs. Of the five pool tail-outs measured, two had a value of 2 (40%) 2 had a value of 3 (40%) and one had a value of 5 (20%). On this scale, a rating of 5 is unsuitable substrate type for spawning. One is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 90.4%. The mean percentages of deciduous and evergreen trees were 38.8% and 50.7%, respectively.

For the habitat units measured, the dominant vegetation types for the stream banks were: 35.7% Deciduous Trees, 21.4% Evergreen Trees, 14.3% Bare Soil and Brush, and 7.1% Grass. The dominant substrate for the stream banks were: 85.7% Bedrock and 14.3% Boulder.

BIOLOGICAL INVENTORY

Steelhead are known to inhabit Mariposa Creek.

JUVENILE SURVEYS:

On September 26, 2001, a biological inventory was conducted in Mariposa Creek to document the fish species composition and distribution at two locations. Each site was single-pass electro-fished using one Smith Root Model 12 electro-fisher. Fish from each site were counted by species and returned to the stream. A random sample of salmonids was selected from each reach and tissues were taken for genetic analysis. Air temperatures ranged from to 58° to 64° degrees F and water temperatures ranged from 62° to 81° F.

The inventory of Site 1 started at habitat unit #002 (the county swimming hole on the downstream side of the Tomki Road) and ended approximately 1100 feet upstream at habitat unit #004 (a pool below the dam spillway). The entire section of the creek below the dam was dry except for two pools. The water in both these stagnant pools resembled a black tannic tea, and visibility was less than one foot. Due to the extremely poor visibility, it was difficult to electro-fish. The lower pool was also 8-feet deep, so only the perimeter of the pool could be e-fished. An unidentified fish was observed (not captured), as was one unidentified frog (most likely a foothill yellow-legged frog or a bullfrog).

The inventory of Site 2 started at habitat unit #008 (where a dirt road crosses the creek, 4000 feet upstream from the mouth) and ended approximately 600 feet upstream. Three resident rainbow trout (ranging from young-of-year to 190 mm) were observed along with 75 California roach and 58 sculpin. The salmonids were considered resident *Oncorhynchus mykiss* as they were observed upstream of the dam that was assumed to be complete barrier to adult steelhead.

The inventory of Site 3 started at approximately habitat unit #049 (300 feet downstream of a right-bank unnamed, unmapped tributary) and ended approximately 1300 feet upstream. Twenty-seven resident rainbow trout (ranging from young-of-year to198 mm) were observed along with 20 pacific giant salamanders, and four sculpin.

A summary of historical and recent data collected appears in the table below.

Species Observed in Historical and Recent Surveys			
YEARS	**SPECIES**	**SOURCE**	**Native/Introduced**
2001	Resident rainbow trout	DFG	N
2001	Sculpin	DFG	N
2001	Roach	DFG	N
2001	Pacific Giant Salamander	DFG	N
2001	unidentified frog	DFG	?
2001	unidentified turtle	DFG	?

There is no record of hatchery stocking or fish rescue/transfer operations in Mariposa Creek.

ADULT SURVEYS:

Due to inadequate staffing levels, no spawner/carcass surveys have been conducted on Rocky Creek.

DISCUSSION

Mariposa Creek is a B3 channel type for 1,545 feet of the stream surveyed (Reach 1), a F3 channel type for 3,815 feet of the stream surveyed (Reach 2), a B3 channel type for 1,036 feet of the stream surveyed (Reach 3), and an A2 channel type for 1,115 feet of the stream surveyed (Reach 4).

The suitability of B3 channel types for fish habitat improvement structures is as follows: Excellent for Plunge weirs; Boulder Clusters and bank placed boulders; single and opposing wing deflectors, and log cover.

The suitability of F3 channel types for fish habitat improvement structures is as follows: Good for bank-place boulders, and single and opposing wing deflectors. Fair for plunge weirs; boulder clusters; channel constrictors and log cover.

The suitability of A2 channel types for fish habitat improvement structures is as follows: generally not suitable. High energy streams with stable stream banks and poor gravel retention capabilities.

The water temperatures recorded on the survey days 9/5/2001 to 9/10/2001 ranged from 60 to 65 degrees Fahrenheit. Temperatures at or below 65 degrees Fahrenheit are suitable for salmonids. Air temperatures ranged from 62 to 78 degrees Fahrenheit.

Flatwater habitat types comprised 31% of the total length of this survey, riffles 1%, and pools 13%. The pools are relatively shallow, with only eleven of the twenty seven (41%) pools having a maximum residual depth greater than 2 feet. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Pools comprised 8.6% of the total length of the stream surveyed. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Eleven of the twenty seven pool tail-outs measured had embeddedness ratings of 2. Seven of the pool tail-outs had embeddedness ratings of 3. Nine of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. None of the pool tail-outs rated a 1. Sediment sources in Mariposa Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fourteen of the twenty seven pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 9. The shelter rating in the flatwater habitats was 6. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Bedrock Ledges in Mariposa Creek. Bedrock Ledges are the dominant cover type in pools followed by boulders. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 80.3%. Reach 1 had a canopy density of 71.7%, Reach 2 had a canopy density of 74.2%, Reach 3 had a canopy density of 88.6%, Reach 4 had a canopy density of 80.8%. In general, revegetation projects are considered when canopy

density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 93.6% and 100%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

DISCUSSION of MARIPOSA CREEK, TRIB 1

Mariposa Creek, Tributary 1 has one reach at 296 feet in length.

There are 296 feet of A2 channel type in this reach. According to the DFG Salmonid Stream Habitat Restoration Manual, the high energy, steep gradient A2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for instream enhancement structures.

The water temperatures recorded on the survey day 9/10/01 were 62ºF. Air temperature was 70ºF. This temperature regime is favorable to salmonids.

Pools comprised 4.5% of the total length of this survey. In first and second order streams a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In Mariposa Creek, Tributary 1, the pools are relatively shallow with 1 (20%) having a maximum depth of at least two feet.

The mean shelter rating for pools was 26. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by Small Wood and Boulders. Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Eighty percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. None had a rating of 1. Cobble embeddedness measured to be 25% or less (a rating of 1) is considered best for the needs of salmon and steelhead.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Mariposa Creek, Tributary 1 sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 90.4%. This is very good, since 80 percent is generally considered desirable.

GENERAL MANAGEMENT RECOMMENDATIONS

Mariposa Creek should be managed as an anadromous, natural production stream.

Winter storms bring down many large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Efforts to increase flood protection or improve fish access in the short run, have led to long term problems in the system. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

1. Access for migrating salmonids is an ongoing problem, therefore, fish passage should be monitored, and improved where possible.

2. In Mariposa Creek, active and potential sediment sources related to the road system need to be mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

3. Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.

4. Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing >shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

5. Where feasible, design and engineer pool enhancement structures to increase the number of pools in the upper reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

MARIPOSA CREEK SURVEY COMMENTS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	Dry at mouth. River also dry. WP#19 (F1)
620	0002.00	Photo. Bullfrog, turtle.
685	0003.00	Box culvert. WP #20
1545	0006.00	Channel type changes to F3. Green heron, great blue heron, ducks. Reservoir being pumped
1745	0007.00	Two road crossings
4245	0008.00	170 ft upstream of 2nd road crossing. Several roach. 65 degrees F.
4269	0010.00	WP# 24 (F1): N39`19' 53", W123`13' 49.5"
4579	0017.00	Two alders in creek, layer of dust? on water
4644	0019.00	Old dam out of service
4813	0020.00	Orange color bubbling spring, WP#26 (F1), N39`19'56.3" W123`13'53.5"
4853	0021.00	Bedrock substrate. Several bubbling springs
5137	0023.00	Footbridge. *Vinca* on RB
5172	0024.00	2" water pipe in pool. Bedrock and mineral deposits on LB. Photo
5360	0027.00	Channel change to B3

5484	0030.00	WP#29 (F1)N39`19'56.9" W123`13"59.6"
5566	0032.00	RB: LWD/RipRap & planted redwoods bank stabilization. Photo
5703	0034.00	Begin bedrock
5820	0036.00	Spring LB
5986	0040.00	WP#30 (F1). N139`19'59.5" W123`14'3.8"
6160	0043.00	RB 1.5" pipe coming into creek. No GPS available.
6396	0049.00	Channel change to A2. Sword fern RB. No GPS reading
6484	0051.00	1+ rainbow trout
6721	0051.01	No GPS reading. Wet trib RB water temp 60 deg. Possibly survey. 1" piping RB.
6721	0052.00	3 foot plunge
7030	0058.00	Good potential spawning
7050	0059.00	Becoming intermittent. WP#31: N39`20'9.5" W123`14'9.5"
7297	0062.00	Possible spawning site
7313	0063.00	No GPS reading
7391	0065.00	Intermittent
7489	0066.00	WP#32 (F1): N39`20'9.7” W123`14'10.3"

MARIPOSA CREEK, TRIBUTARY SURVEY COMMENTS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft.)	Habitat Unit #	Comments:
128	0004.00	Pacific giant salamander
135	0005.00	Series of debris accumulations.
180	0006.00	Pacific giant salamander.
187	0007.00	Dry culvert.
279	0010.00	WP #35: N 39* 20' 0.6", W 123* 14' 11.8"
303	0012.00	Debris accumulation. Dry trib RB.
462	0013.00	Debris accumulation.
582	0014.00	Debris accumulation.
627	0015.00	Debris accumulation.
741	0018.00	Old road crossing no longer in use. END OF SURVEY, WP #36: N 39* 20' 3.4", W 123* 14'17.6"

Mariposa Creek
Assessment Completed 2001
Tables Graphs Maps;
1 of 41

APPENDIX B: TABLES

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

Stream Name: Mariposa Creek

LLID: 1232213393259

Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
10	0	DRY	14.7	418	4180	55.2									
29	8	FLATWATER	42.6	81	2353	31.1	8.0	0.4	1.0	446	12927	187	5430		6
27	27	POOL	39.7	36	972	12.8	19.7	1.6	2.7	2193	59217	15688	423563	15658	9
2	2	RIFFLE	2.9	34	67	0.9	6.0	0.3	0.5	63	126	15	31		

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
68	37	7572	72271	429024

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
1	1	LGR	1.5	36	36	0.5	5	0.2	0.3	72	72	14	14			90
1	1	HGR	1.5	31	31	0.4	7	0.3	0.6	54	54	16	16			90
5	2	GLD	7.4	44	219	2.9	7	0.5	0.9	261	1305	118	588		8	87
13	4	RUN	19.1	88	1145	15.1	5	0.3	1.6	461	5998	210	2730		5	82
11	2	SRN	16.2	90	989	13.1	16	0.4	1	599	6593	211	2325		5	84
1	1	TRP	1.5	43	43	0.6	4	1.9	2.9	151	151	301	301	286	5	75
15	15	MCP	22.1	32	480	6.3	13	1.6	8	467	7009	1387	20800	1358	8	84
1	1	STP	1.5	27	27	0.4	13	1.4	2.1	316	316	505	505	442	10	90
1	1	CRP	1.5	28	28	0.4	3	0.5	0.9	84	84	42	42	42	5	75
1	1	LSL	1.5	20	20	0.3	8	0.8	1.6	144	144	144	144	115	30	80

Table 2 - Summary of Habitat Types and Measured Parameters (continued)

Stream Name: Mariposa Creek

LLID: 1232213393259

Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
3	3	LSR	4.4	31	94	1.2	10	0.9	2.2	275	825	280	841	247	15	90
2	2	LSBk	2.9	28	56	0.7	10	1.2	2.05	270	540	346	691	308	10	85
1	1	PLP	1.5	13	13	0.2	5	1.1	1.5	65	65	72	72	72	5	75
1	1	SCP	1.5	11	11	0.1	8	1.0	1.4	84	84	167	167	84	5	70
1	1	DPL	1.5	200	200	2.6	250	8.0	15	50000	50000	400000	400000	400000		10
10	0	DRY	14.7	418	4180	55.2										74

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
68	37	7572	73239	429237

Table 3 - Summary of Pool Types

Stream Name: Mariposa Creek

LLID: 1232213393259

Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
17	17	MAIN	63	32	550	57	12.3	1.6	440	7475	1241	21105	8
8	8	SCOUR	30	26	211	22	8.3	0.9	207	1658	198	1586	13
2	2	BACKWATER	7	106	211	22	129.0	4.5	25042	50084	200042	400084	5

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
27	27	972	59217	422775

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Mariposa Creek

LLID: 1232213393259

Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
1	TRP	4	0	0	0	0	1	100	0	0	0	0
15	MCP	56	0	0	9	60	3	20	0	0	3	20
1	STP	4	0	0	0	0	1	100	0	0	0	0
1	CRP	4	1	100	0	0	0	0	0	0	0	0
1	LSL	4	0	0	1	100	0	0	0	0	0	0
3	LSR	11	0	0	2	67	1	33	0	0	0	0
2	LSBk	7	0	0	1	50	1	50	0	0	0	0
1	PLP	4	0	0	1	100	0	0	0	0	0	0
1	SCP	4	0	0	1	100	0	0	0	0	0	0
1	DPL	4	0	0	0	0	0	0	0	0	1	100

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
27	1	4	15	56	7	26	0	0	4	15

Mean Maximum Residual Pool Depth (ft.): 2.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001 Dry Units: 10

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
1	0	LGR									
1	0	HGR									
2	0	TOTAL RIFFLE									
5	2	GLD	0	75	3	0	23	0	0	0	0
13	2	RUN	0	15	0	0	25	0	0	35	25
11	2	SRN	0	5	5	0	0	0	0	65	25
29	6	TOTAL FLAT	0	32	3	0	16	0	0	33	17
1	1	TRP	0	0	0	0	0	0	0	0	100
15	13	MCP	0	12	2	0	8	0	0	40	37
1	1	STP	0	0	0	0	0	0	0	60	40
1	1	CRP	0	100	0	0	0	0	0	0	0

1	1	LSL	0	5	85	0	0	0	0	10	0
3	2	LSR	18	28	0	38	3	0	0	5	10
2	2	LSBk	0	35	0	0	3	0	0	5	58
1	1	PLP	0	100	0	0	0	0	0	0	0
1	1	SCP	0	80	0	0	0	0	0	0	20
1	0	DPL									
27	23	TOTAL POOL	2	25	5	3	5	0	0	27	33
68	29	TOTAL	1	26	4	3	7	0	0	28	30

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001 Dry Units: 10

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
1	1	LGR	0	0	0	0	100	0	0
1	1	HGR	0	0	0	0	0	100	0
5	2	GLD	0	0	50	50	0	0	0
13	4	RUN	0	0	25	25	25	0	25
11	2	SRN	0	0	0	0	0	50	50
1	1	TRP	0	0	100	0	0	0	0
15	7	MCP	0	14	14	29	0	14	29
1	1	STP	0	0	0	0	0	0	100
1	1	CRP	0	0	100	0	0	0	0
1	1	LSL	100	0	0	0	0	0	0
3	2	LSR	0	0	0	50	0	0	50
2	2	LSBk	0	0	100	0	0	0	0
1	1	PLP	0	100	0	0	0	0	0
1	1	SCP	0	0	0	100	0	0	0
1	1	DPL	100	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
81	56	44	0	29	29

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	18	15	53.2
Boulder	4	3	11.3
Cobble / Gravel	5	6	17.7
Sand / Silt / Clay	4	6	16.1

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	4	6.5
Brush	2	4	9.7
Hardwood Trees	16	11	43.5
Coniferous Trees	10	11	33.9
No Vegetation	2	0	3.2

Total Stream Cobble Embeddedness Values: 3

Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Mariposa Creek LLID: 1232213393259 Drainage: Russian River - Upper

Survey Dates: 9/5/2001 to 9/10/2001

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)		0	2
SMALL WOODY DEBRIS (%)		32	25
LARGE WOODY DEBRIS (%)		3	5
ROOT MASS (%)		0	3
TERRESTRIAL VEGETATION (%)		16	5
AQUATIC VEGETATION (%)		0	0
WHITEWATER (%)		0	0
BOULDERS (%)		33	27
BEDROCK LEDGES (%)		17	33

APPENDIX 2B: TABLES

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

Stream Name: *Mariposa Creek, Trib 1*

LLID: *1232355393336*

Drainage: *Russian River - Upper*

Survey Dates: *9/10/2001 to 9/10/2001*

Confluence Location: *Quad: REDWOOD VALLEY* *Legal Description: T17NR12WS18* *Latitude: 39:20:01.0N* *Longitude: 123:14:08.0W*

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
1	0	CULVERT	5.6	22	22	2.7									
5	0	DRY	27.8	68	342	41.4									
7	2	FLATWATER	38.9	61	425	51.5	5.5	0.3	0.8	219	1531	66	459		
5	5	POOL	27.8	7	37	4.5	5.8	0.8	1.5	43	213	37	183	36	26

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
18	7	826	1744	643

Table 2b - Summary of Habitat Types and Measured Parameters

Stream Name: Mariposa Creek, Trib 1 *LLID:* 1232355393336 *Drainage:* Russian River - Upper

Survey Dates: 9/10/2001 to 9/10/2001

Confluence Location: *Quad:* REDWOOD VALLEY *Legal Description:* T17NR12WS18 *Latitude:* 39:20:01.0N *Longitude:* 123:14:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
1	0	RUN	5.6	28	28	3.4										
6	2	SRN	33.3	66	397	48.1	6	0.3	0.8	219	1312	66	394			88
3	3	MCP	16.7	8	23	2.8	6	0.9	1.55	48	143	42	127	42	13	90
1	1	CRP	5.6	7	7	0.8	5	1.0	2.25	35	35	35	35	33	70	90
1	1	PLP	5.6	7	7	0.8	5	0.6	1.2	35	35	21	21	21	20	80
5	0	DRY	27.8	68	342	41.4										90
1	0	CUL	5.6	22	22	2.7										100

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
18	7	826	1525	577

Table 3b - Summary of Pool Types

Stream Name: *Mariposa Creek, Trib 1* *LLID:* *1232355393336* *Drainage:* *Russian River - Upper*

Survey Dates: *9/10/2001 to 9/10/2001*

Confluence Location: *Quad:* *REDWOOD VALLEY* *Legal Description:* *T17NR12WS18* *Latitude:* *39:20:01.0N* *Longitude:* *123:14:08.0W*

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
3	3	MAIN	60	8	23	62	6.3	0.9	48	143	42	125	13
2	2	SCOUR	40	7	14	38	5.0	0.8	35	70	27	54	45

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
5	5	37	213	179

Table 4b - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Mariposa Creek, Trib 1 *LLID:* 1232355393336 *Drainage:* Russian River - Upper

Survey Dates: 9/10/2001 to 9/10/2001

Confluence Location: *Quad:* REDWOOD VALLEY *Legal Description:* T17NR12WS18 *Latitude:* 39:20:01.0N *Longitude:* 123:14:08.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
3	MCP	60	0	0	3	100	0	0	0	0	0	0
1	CRP	20	0	0	0	0	1	100	0	0	0	0
1	PLP	20	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
5	0	0	4	80	1	20	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.5

Table 5b - Summary of Mean Percent Cover By Habitat Type

Stream Name: Mariposa Creek, Trib 1 *LLID:* 1232355393336 *Drainage:* Russian River - Upper

Survey Dates: 9/10/2001 to 9/10/2001 *Dry Units:* 5

Confluence Location: *Quad:* REDWOOD VALLEY *Legal Description:* T17NR12WS18 *Latitude:* 39:20:01.0N *Longitude:* 123:14:08.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
0	0	TOTAL RIFFLE									
1	0	RUN									
6	0	SRN									
7	0	TOTAL FLAT									
3	3	MCP	0	33	0	7	0	0	0	43	17
1	1	CRP	60	20	0	0	0	0	0	0	20
1	1	PLP	0	50	50	0	0	0	0	0	0
5	5	TOTAL POOL	12	34	10	4	0	0	0	26	14
1	0	CUL									
18	5	TOTAL	12	34	10	4	0	0	0	26	14

Table 6b - Summary of Dominant Substrates By Habitat Type

Stream Name: *Mariposa Creek, Trib 1* *LLID:* *1232355393336* *Drainage:* *Russian River - Upper*

Survey Dates: *9/10/2001 to 9/10/2001* *Dry Units:* *5*

Confluence Location: *Quad:* *REDWOOD VALLEY* *Legal Description:* *T17NR12WS18* *Latitude:* *39:20:01.0N* *Longitude:* *123:14:08.0W*

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
1	0	RUN	0	0	0	0	0	0	0
6	2	SRN	0	0	0	0	50	0	50
3	1	MCP	0	0	0	100	0	0	0
1	1	CRP	0	100	0	0	0	0	0
1	1	PLP	0	0	0	100	0	0	0

Table 7b - Summary of Mean Percent Canopy for Entire Stream

Stream Name: *Mariposa Creek, Trib 1* *LLID:* *1232355393336* *Drainage:* *Russian River - Upper*

Survey Dates: *9/10/2001 to 9/10/2001*

Confluence Location: *Quad:* *REDWOOD VALLEY* *Legal Description:* *T17NR12WS18* *Latitude:* *39:20:01.0N* *Longitude:* *123:14:08.0W*

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
89	57	43	0	11	14

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 9b - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Mariposa Creek, Trib 1 *LLID:* 1232355393336 *Drainage:* Russian River - Upper

Survey Dates: 9/10/2001 to 9/10/2001

Confluence Location: *Quad:* REDWOOD VALLEY *Legal Description:* T17NR12WS18 *Latitude:* 39:20:01.0N *Longitude:* 123:14:08.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	6	6	85.7
Boulder	1	1	14.3
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	0	0	0.0

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	1	7.1
Brush	2	0	14.3
Hardwood Trees	3	2	35.7
Coniferous Trees	1	2	21.4
No Vegetation	1	1	14.3

Total Stream Cobble Embeddedness Values: 3

Table 10b - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Mariposa Creek, Trib 1 *LLID: 1232355393336* *Drainage: Russian River - Upper*

Survey Dates: 9/10/2001 to 9/10/2001

Confluence Location: Quad: REDWOOD VALLEY Legal Description: T17NR12WS18 Latitude: 39:20:01.0N Longitude: 123:14:08.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)			12
SMALL WOODY DEBRIS (%)			34
LARGE WOODY DEBRIS (%)			10
ROOT MASS (%)			4
TERRESTRIAL VEGETATION (%)			0
AQUATIC VEGETATION (%)			0
WHITEWATER (%)			0
BOULDERS (%)			26
BEDROCK LEDGES (%)			14

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Mariposa Creek LLID: 1232213393259 Drainage: Russian River -
Survey Dates: 9/5/2001 to 9/10/2001 Survey Length (ft.): 7572 Main Channel (ft.): 7511 Side Channel (ft.): 61
Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS17 Latitude: 39:19:33.0N Longitude: 123:13:17.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B3
Reach Length (ft.): 1545
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 64 - 64 Air (F): 77 - 77
Dry Channel (ft.): 1440

Canopy Density (%): 71.7
Coniferous Component (%): 35.0
Hardwood Component (%): 65.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 34.2
Dominant Shelter: Boulders
Dominant Bank Substrate Type:
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 6.8
Pool Frequency (%): 40.0
Residual Pool Depth (%):
< 2 Feet Deep: 0.0
2 to 2.9 Feet Deep: 0.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 100.0
Mean Max Residual Pool Depth (ft.): 6
Mean Pool Shelter Rating: 10

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 50.0	3. 0.0	4. 0.0	5. 50.0		

STREAM REACH: 2

Channel Type: F3
Reach Length (ft.): 3815
Riffle/Flatwater Mean Width (ft.): 5.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 62 - 64 Air (F): 73 - 78
Dry Channel (ft.): 2592

Canopy Density (%): 74.2
Coniferous Component (%): 35.8
Hardwood Component (%): 64.2
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 44.0
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type:
Occurrence of LWD (%): 1.5
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 11.7
Pool Frequency (%): 42.9
Residual Pool Depth (%):
< 2 Feet Deep: 77.8
2 to 2.9 Feet Deep: 11.1
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 11.1
Mean Max Residual Pool Depth (ft.): 3.10
Mean Pool Shelter Rating: 11

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 44.4	3. 33.3	4. 0.0	5. 22.2		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B3
Reach Length (ft.): 1036
Riffle/Flatwater Mean Width (ft.): 10.3
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 60 - 65 Air (F): 64 - 78
Dry Channel (ft.): 0

Canopy Density (%): 88.6
Coniferous Component (%): 48.6
Hardwood Component (%): 51.4
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 27.2
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Bedrock
Occurrence of LWD (%): 7.1
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 26.1
Pool Frequency (%): 36.4
Residual Pool Depth (%):
< 2 Feet Deep: 62.5
2 to 2.9 Feet Deep: 37.5
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.91
Mean Pool Shelter Rating: 10

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 37.5	3. 37.5	4. 0.0	5. 25.0		

STREAM REACH: 4

Channel Type: A2
Reach Length (ft.): 1115
Riffle/Flatwater Mean Width (ft.): 6.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 60 - 62 Air (F): 62 - 68
Dry Channel (ft.): 148

Canopy Density (%): 80.8
Coniferous Component (%): 85.8
Hardwood Component (%): 14.2
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 10.3
Dominant Shelter: Boulders
Dominant Bank Substrate Type:
Occurrence of LWD (%): 3.6
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 12.5
Pool Frequency (%): 38.9
Residual Pool Depth (%):
< 2 Feet Deep: 42.9
2 to 2.9 Feet Deep: 42.9
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 14.3
Mean Max Residual Pool Depth (ft.): 2.26
Mean Pool Shelter Rating: 8

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 42.9	3. 14.3	4. 0.0	5. 42.9		

Appendix 2C - Fish Habitat Inventory Data Summary

Stream Name: Mariposa Creek, Trib 1 *LLID: 1232355393336* *Drainage: Russian River -*
Survey Dates: 9/10/2001 to 9/10/2001 *Survey Length (ft.): 826* *Main Channel (ft.): 826* *Side Channel (ft.): 0*
Confluence Location: Quad: REDWOOD *Legal Description: T17NR12WS18* *Latitude: 39:20:01.0N* *Longitude: 123:14:08.0W*

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: A2
Reach Length (ft.): 826
Riffle/Flatwater Mean Width (ft.): 5.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 62 - 62 Air (F): 70 - 70
Dry Channel (ft.): 342

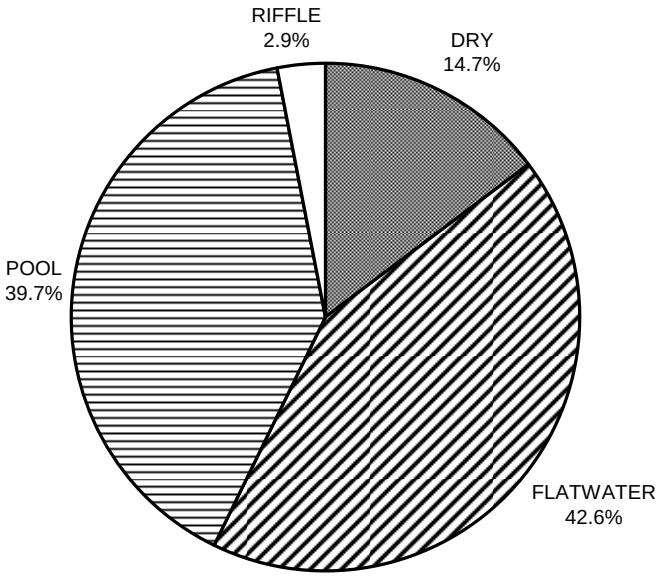
Canopy Density (%): 89.4
Coniferous Component (%): 56.7
Hardwood Component (%): 43.3
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 12.5
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Bedrock
Occurrence of LWD (%): 5.6
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 4.5
Pool Frequency (%): 27.8
Residual Pool Depth (%):
< 2 Feet Deep: 80.0
2 to 2.9 Feet Deep: 20.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.46
Mean Pool Shelter Rating: 26

Pool Tail Substrate (%):	*Silt/Clay:*	*Sand:*	*Gravel:*	*Sm Cobble:*	*Lg Cobble:*	*Boulder:*	*Bedrock:*
Embeddedness Values (%):	*1. 0.0*	*2. 40.0*	*3. 40.0*	*4. 0.0*	*5. 20.0*		

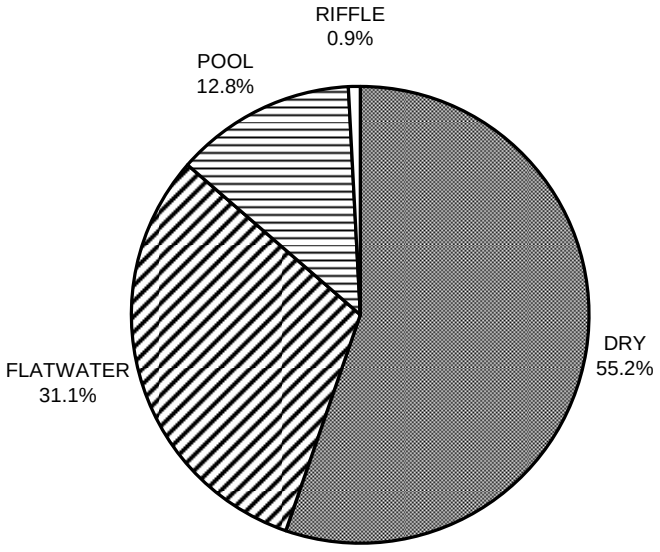
APPENDIX D: GRAPHS

MARIPOSA CREEK 2001
HABITAT TYPES BY PERCENT OCCURRENCE



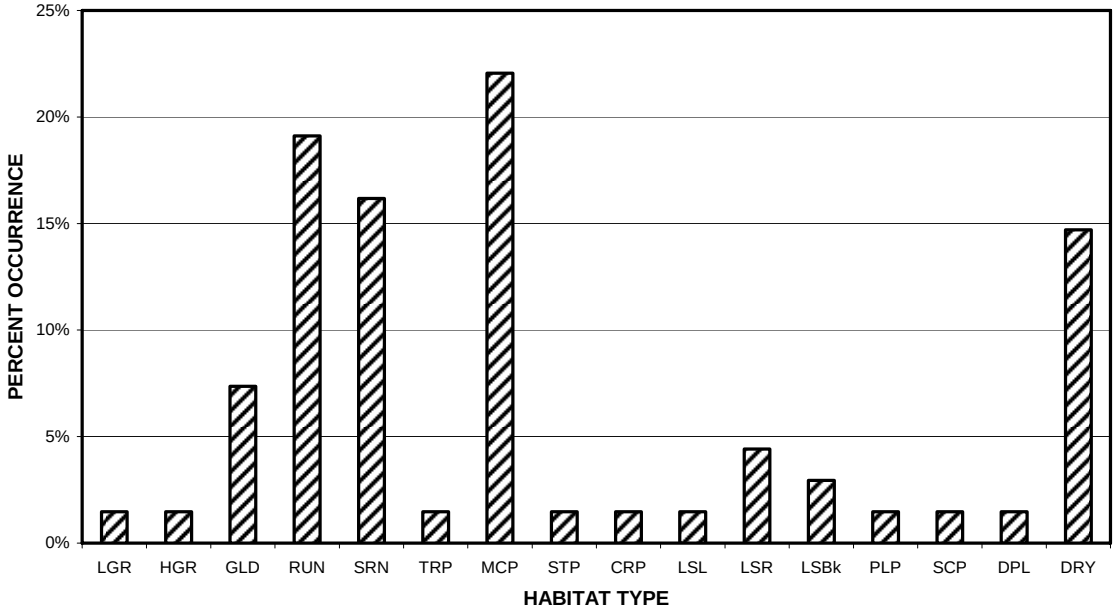
GRAPH 1: Level II habitat types by percent occurrence

MARIPOSA CREEK 2001
HABITAT TYPES BY PERCENT TOTAL LENGTH



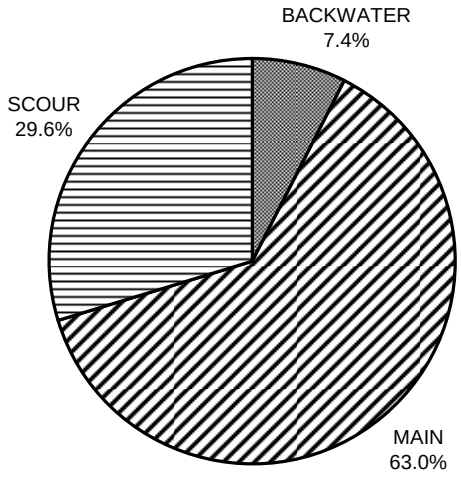
GRAPH 2: Level II habitat types by percent total length

MARIPOSA CREEK 2001
HABITAT TYPES BY PERCENT OCCURRENCE



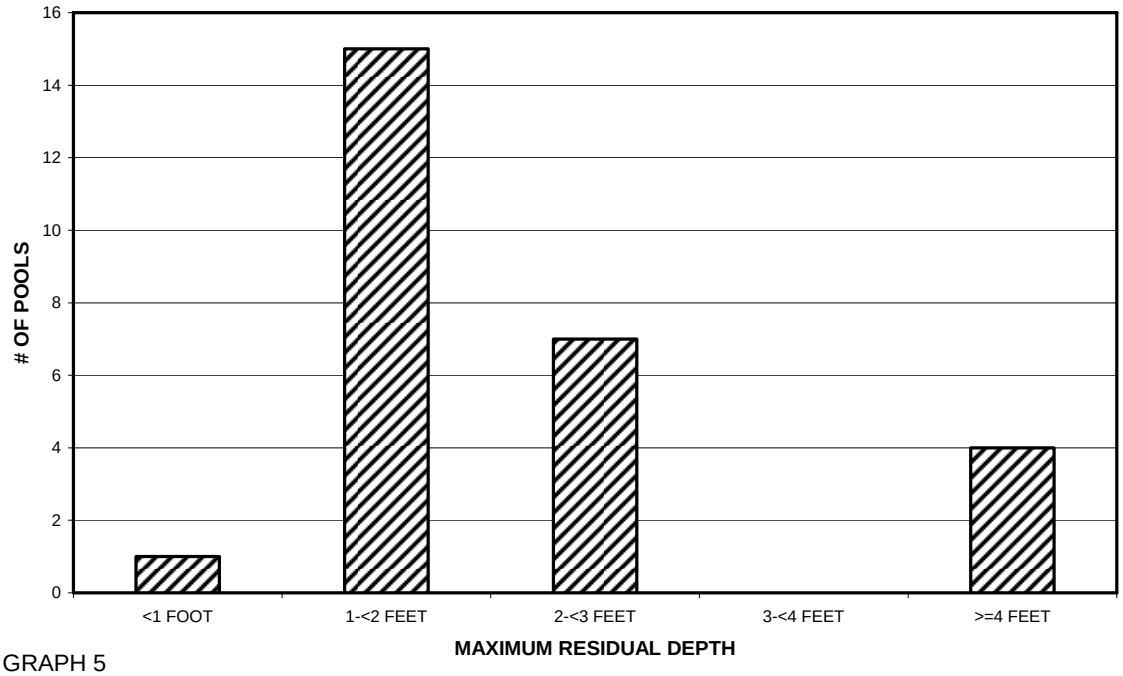
GRAPH 3: Level IV habitat types by percent occurrence

MARIPOSA CREEK 2001
POOL TYPES BY PERCENT OCCURRENCE



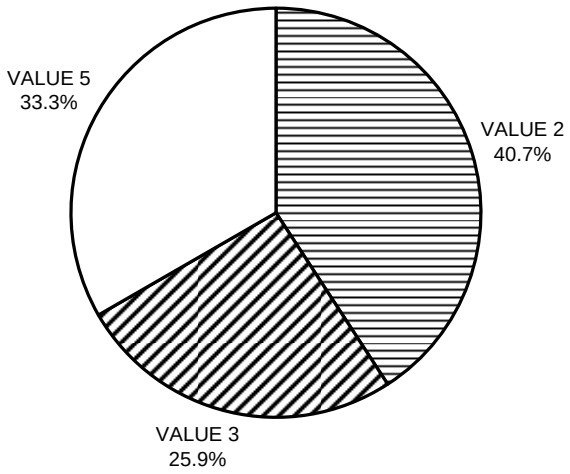
GRAPH 4: Level I pool types by percent occurrence

MARIPOSA CREEK 2001
MAXIMUM DEPTH IN POOLS



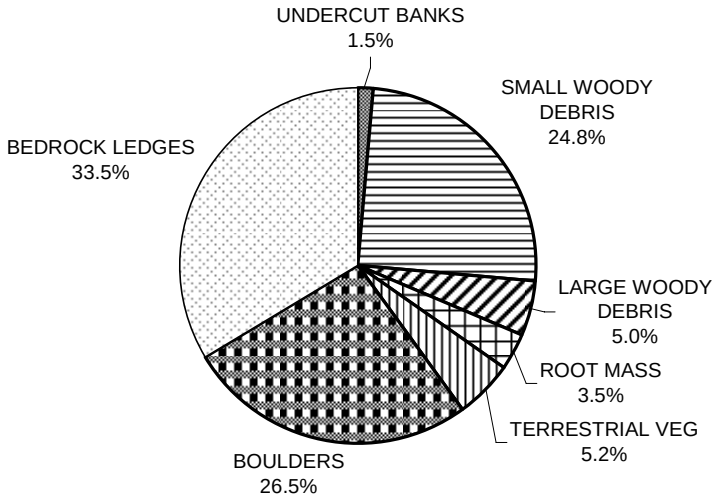
GRAPH 5

MARIPOSA CREEK 2001
PERCENT EMBEDDEDNESS



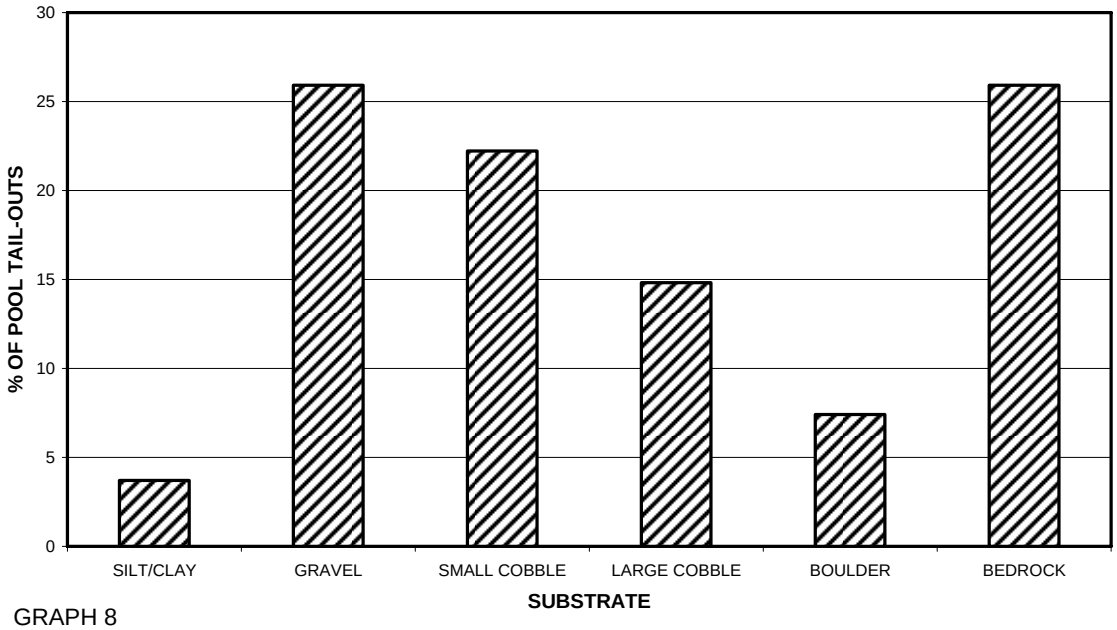
GRAPH 6

MARIPOSA CREEK 2001
MEAN PERCENT COVER TYPES IN POOLS



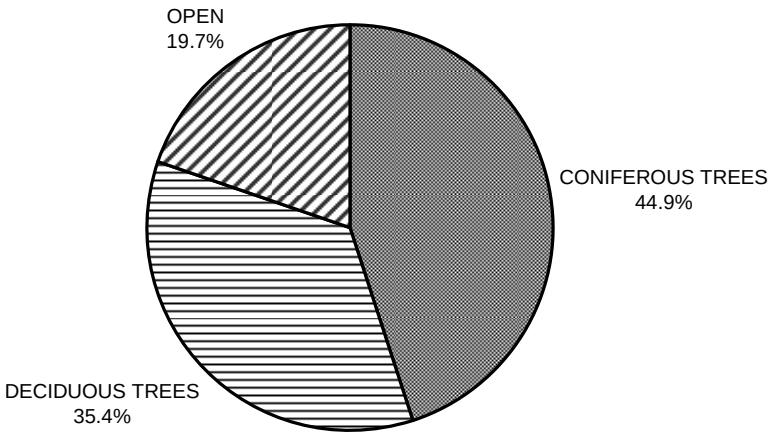
GRAPH 7

MARIPOSA CREEK 2001
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



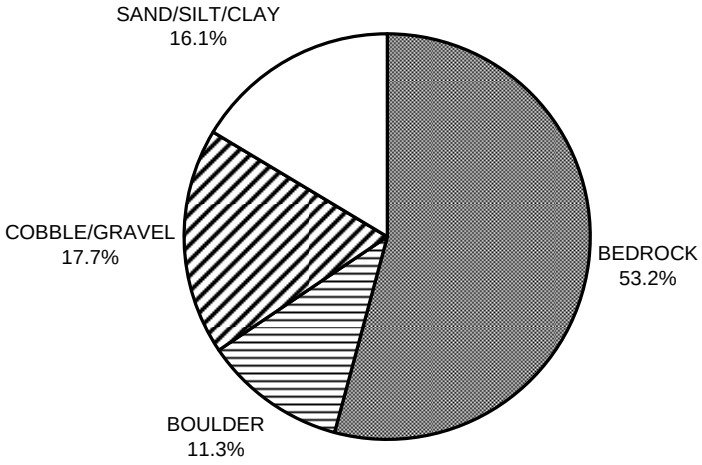
GRAPH 8

MARIPOSA CREEK 2001
MEAN PERCENT CANOPY



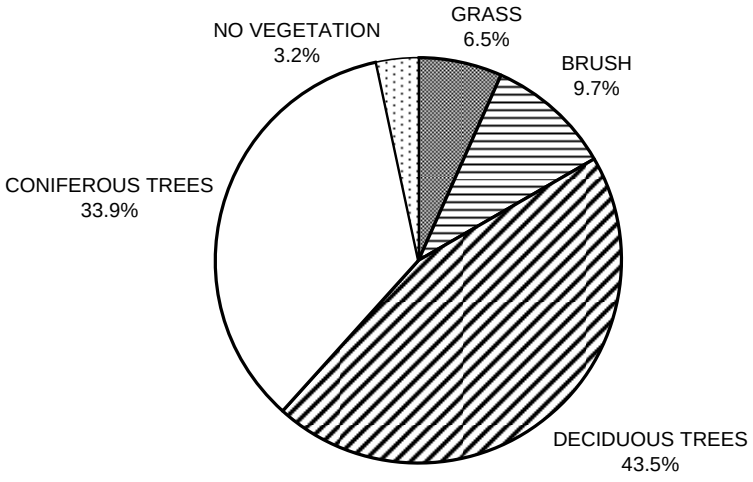
GRAPH 9

MARIPOSA CREEK 2001
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

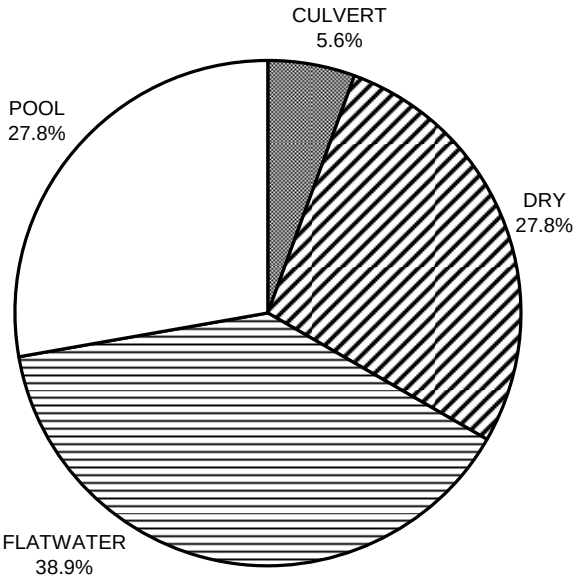
MARIPOSA CREEK 2001
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

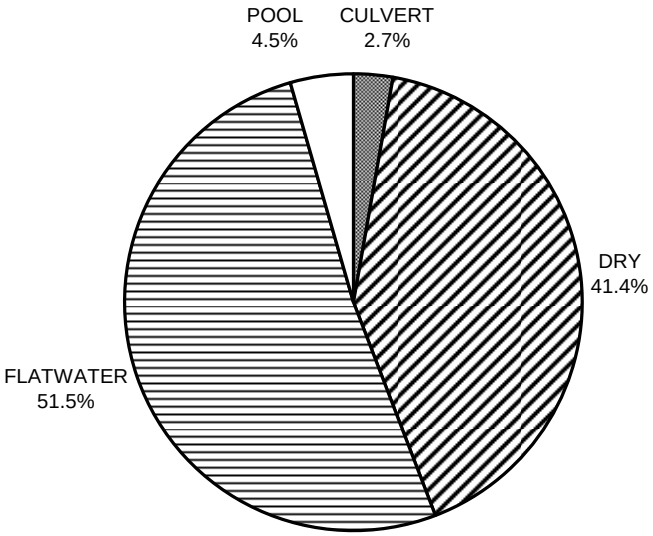
APPENDIX 2D: GRAPHS

MARIPOSA CREEK, TRIB 1 2001
HABITAT TYPES BY PERCENT OCCURRENCE



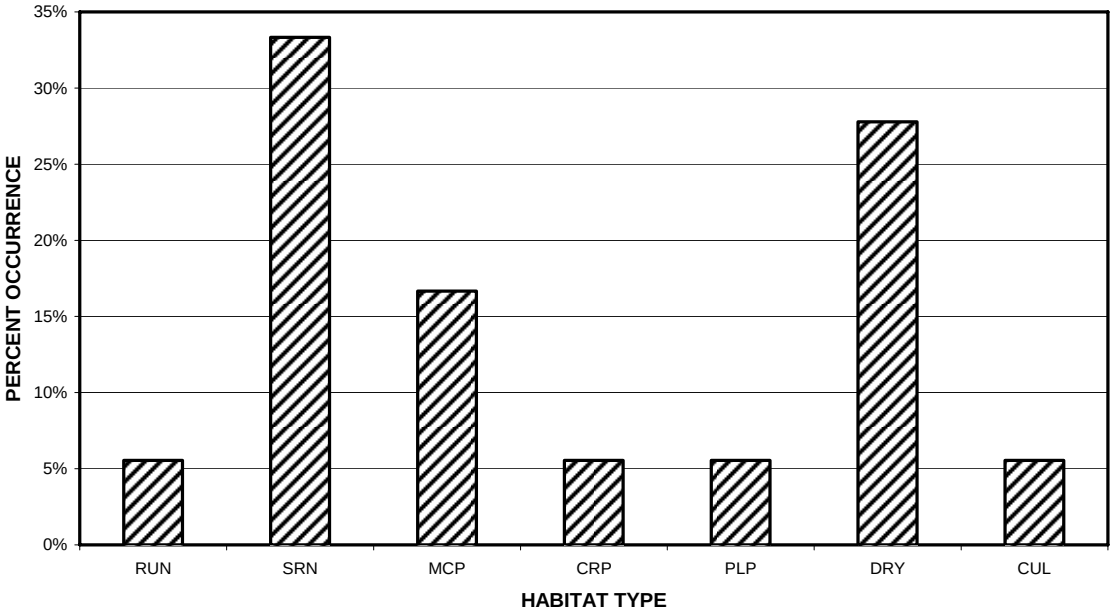
GRAPH 1b: Level II habitat types by percent occurrence

MARIPOSA CREEK, TRIB 1 2001
HABITAT TYPES BY PERCENT TOTAL LENGTH



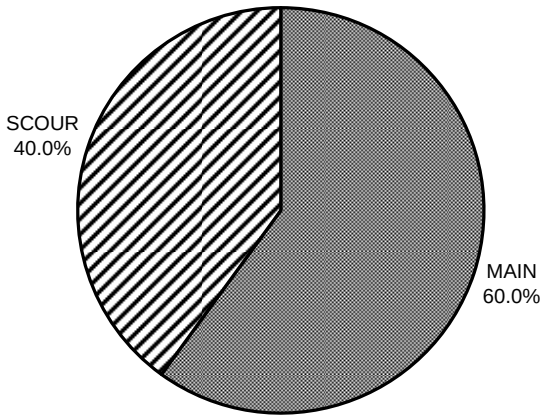
GRAPH 2b: Level II habitat types by percent total length

MARIPOSA CREEK, TRIB 1 2001
HABITAT TYPES BY PERCENT OCCURRENCE



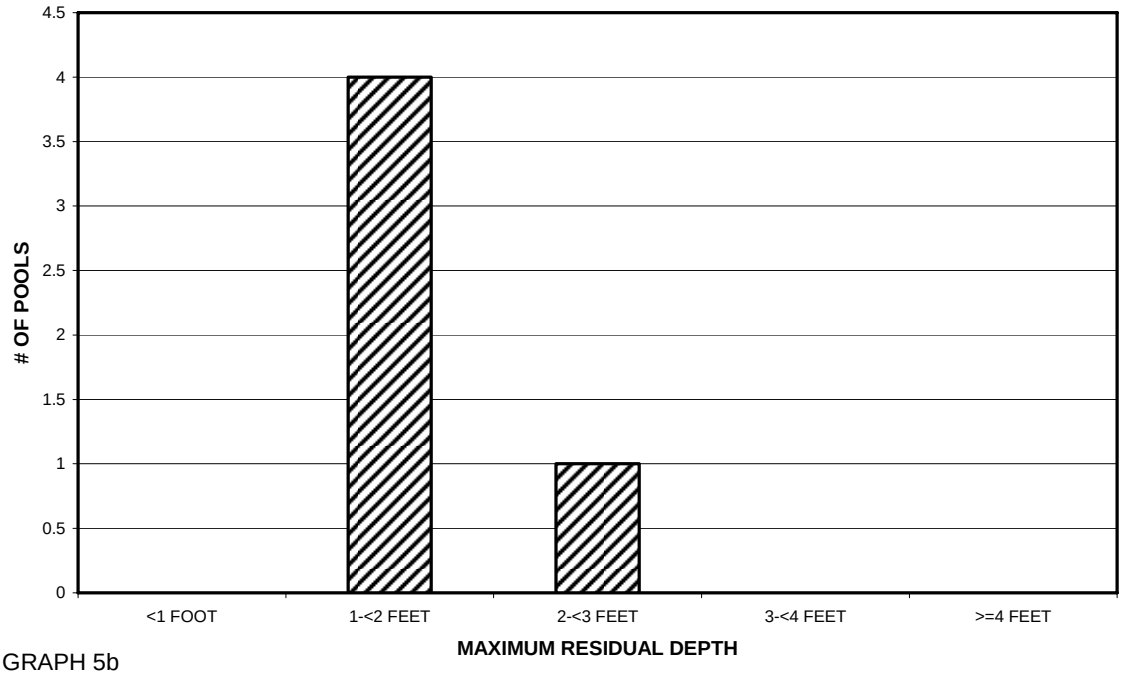
GRAPH 3b: Level IV habitat types by percent occurrence

MARIPOSA CREEK, TRIB 1 2001
POOL TYPES BY PERCENT OCCURRENCE



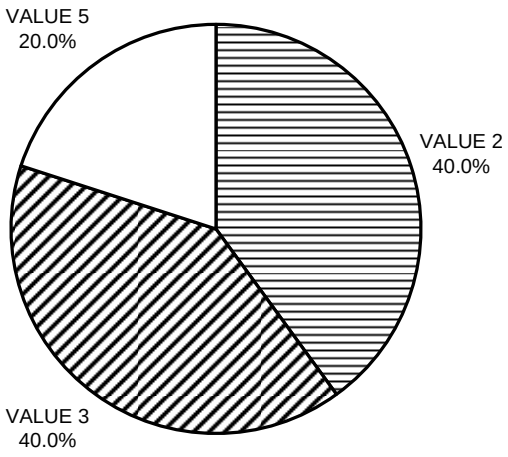
GRAPH 4b: Level I pool types by percent occurrence

MARIPOSA CREEK, TRIB 1 2001
MAXIMUM DEPTH IN POOLS



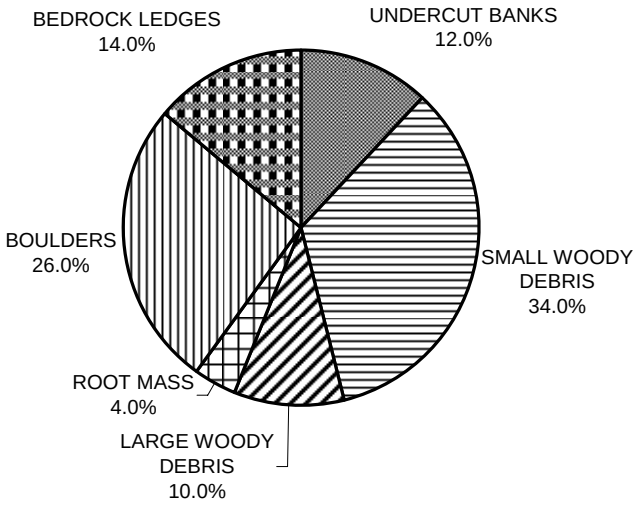
GRAPH 5b

MARIPOSA CREEK, TRIB 1 2001
PERCENT EMBEDDEDNESS



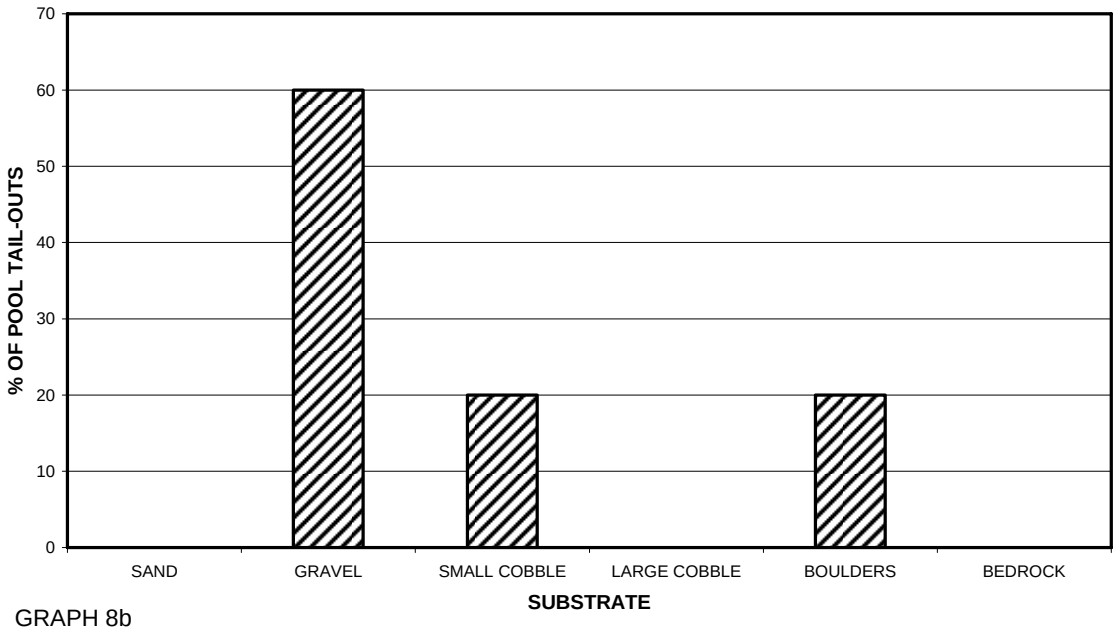
GRAPH 6b

MARIPOSA CREEK, TRIB 1 2001
MEAN PERCENT COVER TYPES IN POOLS



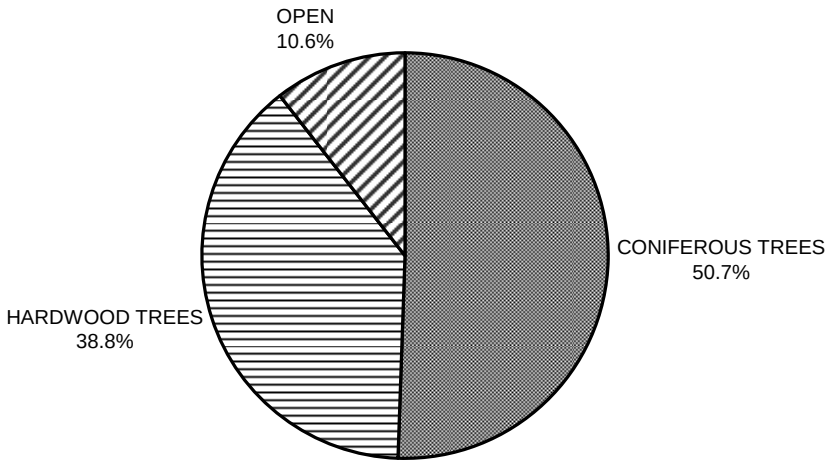
GRAPH 7b

MARIPOSA CREEK, TRIB 1 2001
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



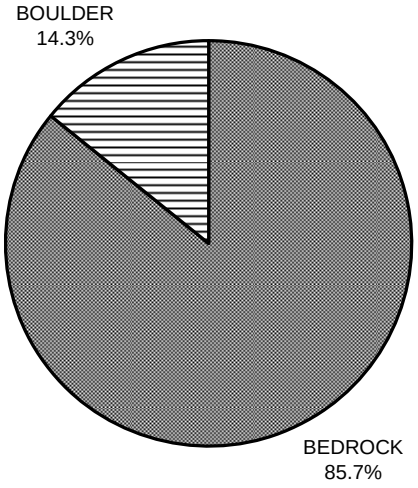
GRAPH 8b

MARIPOSA CREEK, TRIB 1 2001
MEAN PERCENT CANOPY



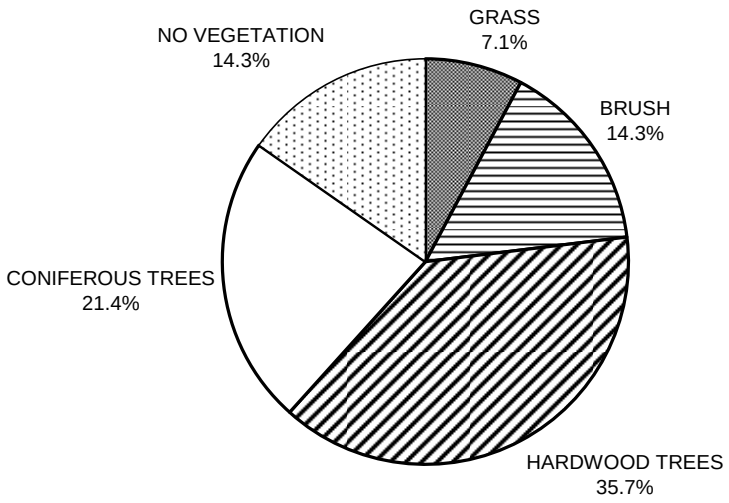
GRAPH 9b

MARIPOSA CREEK, TRIB 1 2001
DOMINANT BANK COMPOSITION IN SURVEY REACH

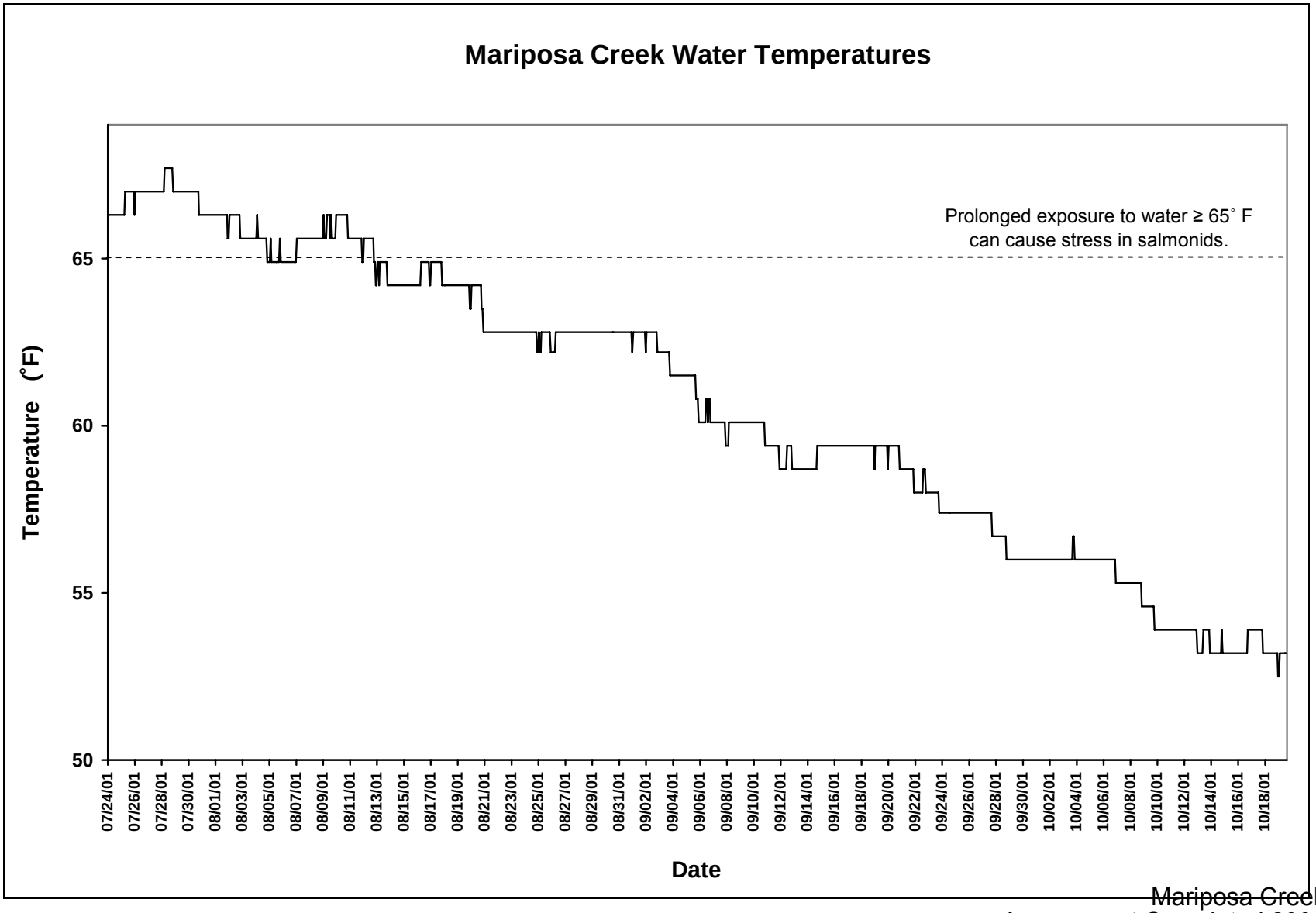


GRAPH 10b

MARIPOSA CREEK, TRIB 1 2001
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11b


Mariposa Creek Water Temperatures
Prolonged exposure to water ≥ 65˚ F
can cause stress in salmonids.
Temperature (˚F)
65
60
55
50
07/24/01
07/26/01
07/28/01
07/30/01
08/01/01
08/03/01
08/05/01
08/07/01
08/09/01
08/11/01
08/13/01
08/15/01
08/17/01
08/19/01
08/21/01
08/23/01
08/25/01
08/27/01
08/29/01
08/31/01
09/02/01
09/04/01
09/06/01
09/08/01
09/10/01
09/12/01
09/14/01
09/16/01
09/18/01
09/20/01
09/22/01
09/24/01
09/26/01
09/28/01
09/30/01
10/02/01
10/04/01
10/06/01
10/08/01
10/10/01
10/12/01
10/14/01
10/16/01
10/18/01
Date

Watershed Hydroid **430** Mariposa Creek

Hydrologic Sub-Areas covered by the watershed:

Name:	**LLId: (1:24k)**	**County:**
Mariposa Creek	1232213393259	Mendocino

Tributary to Russian River
Tributary to
Tributary to

Location: **T:** 17N **R:** 12W **S:** 17 **Latitude:** 39.3259946230334 **Longitude** 123.221349124374

Hydrologic Boundary Delineation: Watershed boundaries were delineated using the Watershed Point tool in ArcHydro, running under ArcMap 8.3 (ArcInfo version). A 1:24k stream network was "burned" into the underlying DEM to enforce hydrologic routing.

Aerial Photos (Source): For Mendocino County watersheds, 1993 USGS DOQQs are available in the Teale Albers, NAD27 projection. For Sonoma County watersheds, 2000 County-created orthophotos in the State Plane, NAD83 projection are also available.

Stream Order: 4 **Total Length:** 3.43 Miles 5.53 Km

Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nchydro1" 1:24k streams layer.

Note: Length is for the USGS blue-line 1:24,000 stream.

Drainage Area: 873 Hectares; 2156 Acres; 3.36 sq. mi.

Elevations: Mouth: 820 feet; Headwaters: 3166 feet

Note: Headwaters elevation is the highest elevation found in the watershed.

Lakes in Watershed: Number: 0 Surface area: 0 sq. mi.

Note: Source for lakes data is the USGS-DFG 1:100k lakes layer "lakes.shp"

Fish Species (as indicated by historical salmonid streams layer created by Bob Coey): Steelhead

Ownership, for the watershed, in acres (and % of total watershed):

Federal:	State:	Local:	Private:
46.3 acres	0.0	42.8	2066.9
2.14 %	0.00 %	1.98 %	95.88 %

Note: Source for owneship data is 2002 DFG-CCR "ccr_public_lands.shp" GIS layer.

Major Land Uses in the Watershed, in acres (and % of total watershed)

Mixed hardwood/conifer:	**Hardwood:**	**Conifer:**	**Agriculture:**	**Urban:**
1119.38 acres	766.17	5.55	36.13	7.25
51.9 %	35.4 %	0.3 %	1.7 %	0.3 %

Shrub:	**Herbaceous:**	**Barren/rock:**	**Water:**
124.94	88.33	0.00	6.94
5.8 %	4.1 %	0.0 %	0.3 %

Note: Land use areas were calculated using the 1994 CDF-USFS "Calveg" GIS layer.

Watershed HydroId **430** Mariposa Creek

USGS 7.5' Topographic Quads completely or partially in the watershed:

Quad Name	USGS Code
REDWOOD VALLEY	39123C2
LAUGHLIN RANGE	39123C3

Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, May 5, 2003 version)

Hydrologic Sub-Areas covered by the watershed

Hydrologic Sub-Area Name:	ID code (RBUAS)	Hydrologic Area Name	% of watershed in this HSA
Outlet Creek	111161	Upper Main Eel River	0.12
Forsythe Creek	111433	Upper Russian River	99.88

Watershed Hydroid **431** Mariposa Creek, Trib

Hydrologic Sub-Areas covered by the watershed:

Name:	LLId: (1:24k)	County:
Mariposa Creek, Trib	1232246393268	Mendocino

Tributary to Mariposa Creek
Tributary to Russian River
Tributary to

Location: **T:** 17N **R:** 12W **S:** 18 **Latitude:** 39.3268598429618 **Longitude** 123.224675351932

Hydrologic Boundary Delineation: Watershed boundaries were delineated using the Watershed Point tool in ArcHydro, running under ArcMap 8.3 (ArcInfo version). A 1:24k stream network was "burned" into the underlying DEM to enforce hydrologic routing.

Aerial Photos (Source): For Mendocino County watersheds, 1993 USGS DOQQs are available in the Teale Albers, NAD27 projection. For Sonoma County watersheds, 2000 County-created orthophotos in the State Plane, NAD83 projection are also available.

Stream Order: 1 **Total Length:** 0.61 Miles 1.00 Km

Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nchydro1" 1:24k streams layer.

Note: Length is for the USGS blue-line 1:24,000 stream.

Drainage Area: 873 Hectares; 2156 Acres; 3.36 sq. mi.

Elevations: Mouth: 820 feet; Headwaters: 3166 feet

Note: Headwaters elevation is the highest elevation found in the watershed.

Lakes in Watershed: Number: 0 Surface area: 0 sq. mi.

Note: Source for lakes data is the USGS-DFG 1:100k lakes layer "lakes.shp"

Fish Species (as indicated by historical salmonid streams layer created by Bob Coey): None

Ownership, for the watershed, in acres (and % of total watershed):

Federal:	State:	Local:	Private:
46.3 acres	0.0	42.8	2066.9
2.14 %	0.00 %	1.98 %	95.88 %

Note: Source for owneship data is 2002 DFG-CCR "ccr_public_lands.shp" GIS layer.

Major Land Uses in the Watershed, in acres (and % of total watershed)

Mixed hardwood/conifer:	Hardwood:	Conifer:	Agriculture:	Urban:
1119.38 acres	766.17	5.55	36.13	7.25
51.9 %	35.5 %	0.3 %	1.7 %	0.3 %

Shrub:	Herbaceous:	Barren/rock:	Water:
124.94	88.33	0.00	6.94
5.8 %	4.1 %	0.0 %	0.3 %

Note: Land use areas were calculated using the 1994 CDF-USFS "Calveg" GIS layer.

Watershed HydroId **431** Mariposa Creek, Trib

USGS 7.5' Topographic Quads completely or partially in the watershed:

Quad Name	USGS Code
REDWOOD VALLEY	39123C2
LAUGHLIN RANGE	39123C3

Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, May 5, 2003 version)

Hydrologic Sub-Areas covered by the watershed

Hydrologic Sub-Area Name:	ID code (RBUAS)	Hydrologic Area Name	% of watershed in this HSA
Outlet Creek	111161	Upper Main Eel River	0.12
Forsythe Creek	111433	Upper Russian River	99.88