

**CALIFORNIA DEPARTMENT OF FISH AND GAME  
STREAM INVENTORY REPORT**

Rocky Creek

*Report Revised April 14, 2006*

*Report Completed 2005*

*Assessment Completed 2001*

INTRODUCTION

A stream inventory was conducted during the summer of 2001 on Rocky Creek. 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 Rocky 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

Rocky Creek, located in Mendocino County, California, is a tributary of the Russian River (see Rocky Creek map, page 2). The legal description at the confluence with the Russian River is T17N, R12W, S20. Its location is 39.318282620976 N latitude and 123.222045017513 W longitude, LLID: 1232220393182. Year round vehicle access exists from Highway 101 near Redwood Valley by taking School Way to West Road to Tomki Road

Rocky Creek and its tributaries drain a basin of approximately 2.37 square miles. Rocky Creek is a third order stream and has approximately 3.03 miles of intermittent stream, according to the USGS Redwood Valley and Laughlin Range 7.5 minute quadrangles. There are no major tributaries to Rocky Creek. There are three small ponds in the watershed, with a total surface area of 0.7 acres. The creek was mostly dry and summer flow was not measured due to low-flow conditions. Elevations range from about 801 feet at the mouth of the creek to 3337 feet in the headwaters. Oak woodland dominates the watershed, with areas of grassland and shrubs. Vegetation in the riparian zone includes alder, bay, sedges, poison oak, live oak, black oak, and wild grape. The watershed is almost entirely privately owned, mostly in large parcels, and is managed for cattle grazing. The California Natural Diversity Data Database lists no occurrences of sensitive plants or animals in the Rocky watershed.

METHODS

The habitat inventory conducted in Rocky 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 Rocky 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.

### 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". Rocky 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 Rocky 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 Rocky 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 Rocky 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 Bedrock, Boulders, Cobble/Gravel, or Silt/Clay/Sand, and may be covered predominantly with Grass, Brush, Deciduous Trees, Coniferous Trees, or No Vegetation at all. These factors influence the ability of stream banks to withstand winter flows. For each fully measured habitat unit in Rocky 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 Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Rocky include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

## HISTORICAL STREAM SURVEYS:

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

## HABITAT INVENTORY RESULTS

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

The habitat inventory of Rocky Creek was conducted on 7/16/2001 by M.Shugars and J.Newell 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 Rocky Creek to the end of survey at a high-gradient stream section containing a 14 foot bedrock sheet. The total length of stream surveyed was 4719 feet, with zero additional feet of side channel noted.

Flows were not measured on Rocky Creek.

This section of Rocky Creek has two reaches with two distinct channel types: from the mouth to 2705 feet a B3 and 2014 feet a A2.

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.

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.

Water temperatures ranged from 63°F to 68°F. Air temperatures ranged from 70°F to 78°F.

Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs, Appendix A). A recorder in Reach 1 (500 feet upstream from the mouth) began logging temperatures every two hours from July 2 until the pool, in which the recorder was located, dried up on approximately September 24, 2001. The highest temperature recorded was 65°F on July 6 and the lowest was 53°F on September 24. The daily high had a mean of 63.2°F for the month of July, 62.4°F for August and 62.0°F for September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 51.7% Dry units, 27.6% Pool units and 20.7% Flatwater units (Graph 1). Based on total *length* there were 95.9% Dry units, 2.2% Pool units and 1.9% Flatwater units (Graph 2).

Twenty-nine habitat units were measured and 24% were completely sampled. Five Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent *occurrence* were Dry at 52%, Mid-Channel Pool at 21%, and Glide at 21% (Graph 3). Eight pools were identified (Table 3). Mid-Channel Pool pools were most often encountered at 75%, and comprised 86% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. None of the eight pools (0%) had a depth of two feet or greater (Graph 5).

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. Flatwater units rated 15 and Pools rated 14 (Table 1). Of the pool types, Mid-Channel Pool rated 15 and Lateral Scour Pool - Boulder Formed rated 10 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were Boulders at 52%, White Water at 16%, Aquatic Vegetation at 16%, and Small Wood at 12%. Graph 7 describes the pool shelter in Rocky Creek.

Table 6 summarizes the dominant substrate by habitat type.

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

The depth of cobble embeddedness was estimated at pool tail-outs. Of the eight pool tail-outs measured, one had a value of 2 (13%) and two had a value of 3 (25%). Five (63%) riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Boulders were the dominant substrate observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 76%. The mean percentages of deciduous and evergreen trees were 33.4% and 42.6%, respectively. Graph 9 describes the canopy for the entire survey and Graph 11 describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 35% and the mean percent left bank vegetated was 26%. For the habitat units measured, the dominant vegetation types for the stream banks were: 36% Evergreen Trees, 29% Deciduous Trees, 29% Brush and 7% Grass (Graph 11). The dominant substrate for the stream banks were: 64% Boulder, 21% Bedrock, 7% Silt, Clay & Sand and 7% Cobble & Gravel (Graph 10).

## BIOLOGICAL INVENTORY

### JUVENILE SURVEYS:

On September 27, 2001, a biological inventory was conducted in Rocky Creek to document the fish species composition and distribution. The creek was single-pass electro-fished using one Smith Root Model 12 electro-fisher. Air temperatures ranged from to 69° to 72°F and water temperatures ranged from 60° to 61°F. The surveyors walked the upstream, starting at the mouth and moved upstream for approximately 4400 feet (to habitat unit #18), electro-fishing every part of the creek that contained water. The entire stream was dry except for two small isolated pools, neither of which was deeper than 1.5 feet or covered a surface area greater than 25ft<sup>2</sup>. Two newts, one salamander, and two foothill yellow-legged frogs were observed. No salmonids were seen during the electrofishing survey. Two juvenile steelhead (young-of-the-year and one-year-old) were seen in a pool approximately 2000 feet from the mouth of the creek during the July habitat inventory survey, but this pool was completely dry during the September electro-fishing survey and the two steelhead probably perished.

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

Table 1. Species Observed in Historical and Recent Surveys			
YEARS	SPECIES	SOURCE	Native/Introduced
2001	Steelhead	DFG	N
2001	Pacific Giant Salamander	DFG	N
2001	California Newt	DFG	N
2001	Yellow-legged Frog	DFG	N

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

#### ADULT SURVEYS:

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

#### DISCUSSION

Rocky Creek has two reaches: 2705 feet of B3 and 2014 feet of A2.

According to the DFG Salmonid Stream Habitat Restoration Manual, B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.

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 7/16/2001 ranged from 63°F to 68°F. Air temperatures ranged from 70°F to 78°F. The warmest water temperatures were recorded in Reach 2 (the upper watershed). These temperatures, if sustained, are slightly above the threshold stress level (65°F) for salmonids.

Summer temperatures measured using remote temperature recorders placed in pools ranged from

53°F to 65°F for Reach 1. The Temperature Summary graph shows that for much of the summer (July through August) the lower watershed exhibited optimal temperatures for salmonids.

Pools comprised 2% 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 Rocky Creek, the pools are relatively shallow with 0% having a maximum depth of at least two feet. These pools comprised 0% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 14. 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 Boulders at 52%, White Water at 16%, Aquatic Vegetation at 16%, Small Wood at 12%, and Bedrock at 4. 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.

Because the stream was mostly dry, no wet low-gradient riffles could be measured to determine their dominant substrate. Gravel or small cobble is the best substrate for spawning salmonids.

Twenty-five 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.

The mean percent canopy for the survey was 76%. This is fair, since 80 percent is generally considered desirable. Slightly cooler water temperatures are desirable in Rocky Creek. Elevated water temperatures could be reduced by increasing stream canopy. The large trees required for adequate stream canopy would also eventually provide a long-term source of large woody debris needed for instream shelter and bank stability.

## GENERAL MANAGEMENT RECOMMENDATIONS

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

Winter storms often bring down 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. 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) In Rocky 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.
- 2) 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.
- 3) 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.
- 4) Increase the canopy on Rocky Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

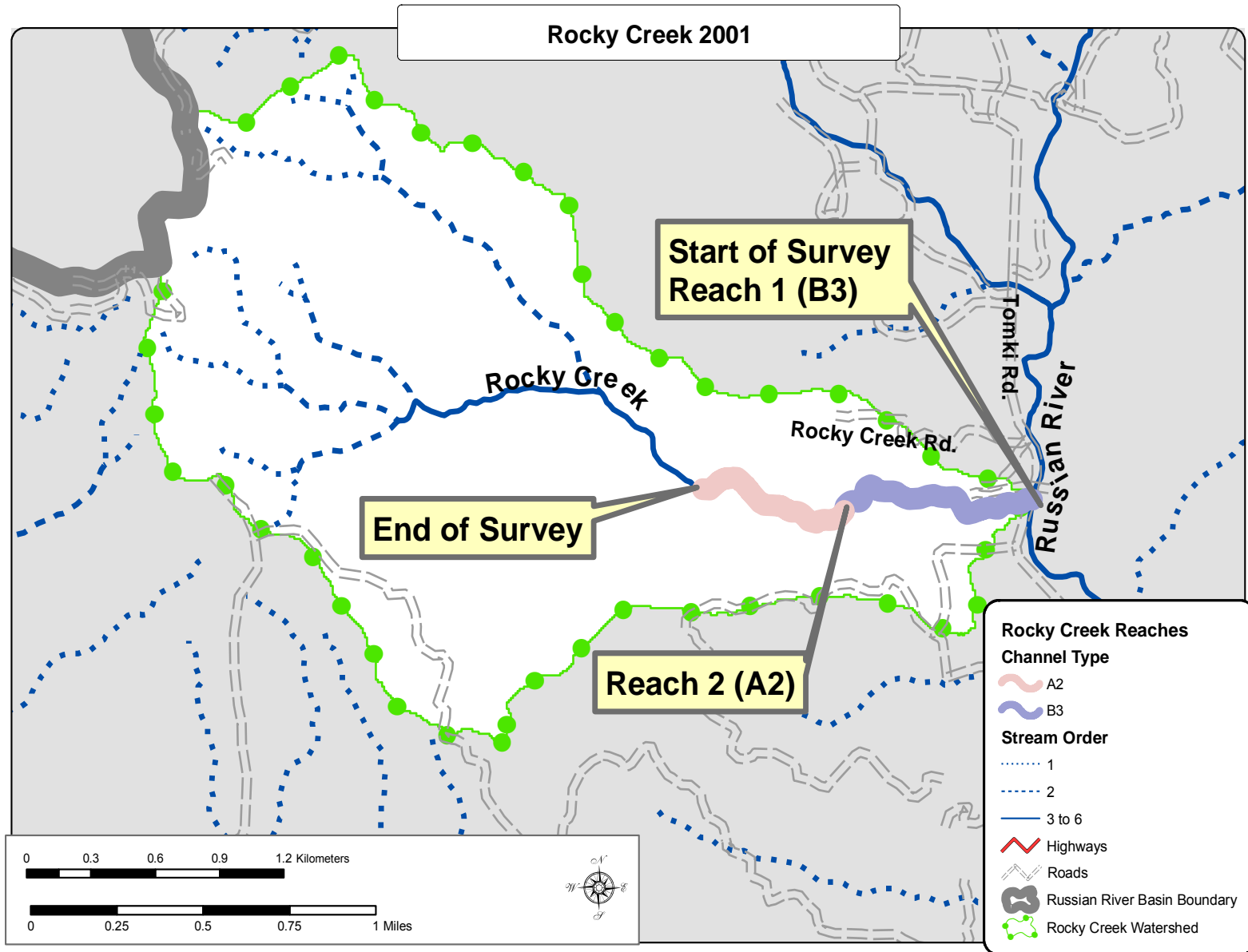
## COMMENTS AND LANDMARKS

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

### Rocky Creek

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	Large Pool in R.River 65 degrees F, ROACH, Pike minnows, Bluegill(?) WP#38(F1); Bridge-SEE FORM WP# 39(F1)
660	0002.00	HOBO TEMP
680	0003.00	Stagnant water; Dry on 9/12/01
887	0005.00	Soon will be dry; DRY on 9/12/01
900	0006.00	Small Dry Trib LB 928' up; Fence across creek 250' up unit begins

2089	0007.00	1+ & YOY rescued; DRY on 9/12/01
2105	0008.00	Small dry trib LB
2705	0009.00	Small pools soon to be dry; Channel change to A2
3480	0010.00	WP# 40(F1); N39° 19'1.5"/W123° 14'0.5"; Will probably dry up; DRY on 9/12/01; Bear Claw Marks on Alder
3584	0012.00	Rearing Pool?; DRY 9/12/01
4019	0014.00	Foul Smell; DRY 9/12/01
4041	0016.00	DRY on 9/12/01
4198	0020.00	WP# 41(F1); N39° 19'2.4"/W123° 14'8.4"
4271	0022.00	DRY 9/12/01
4366	0024.00	Flowing water into pool
4479	0029.00	WP# 42(F1)/N39° 19'3.4"/W123° 14'14";: 14' SHEER BEDROCK SHEET; END OF SURVEY-DRY



L:\mondo3\data\stream-maps\RockyCreek2001.mxd

Prepared by: Celeste Dodge and Colin Brooks, April 4, 2005

## APPENDIX B: TABLES

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

Stream Name: Rocky Creek      LLID: 1232220393182  
 Drainage: Russian River - Upper

Survey Dates: 7/16/2001 to 7/16/2001

Confluence Location: Quad: LAUGHLIN RANGE      Legal Description: T17NR12WS20      Latitude: 39:19:06.0N      Longitude: 123:13:19.0W

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
15	0	DRY	51.7	302	4526	95.9									
6	2	FLATWATER	20.7	15	88	1.9	3.5	0.4	0.7	31	188	12	69		15
8	8	POOL	27.6	13	105	2.2	5.3	0.8	1.5	67	532	59	472	59	14
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
29	10				4719					720			541		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: Rocky Creek

LLID:

1232220393182

Drainage: Russian River - Upper

Survey Dates: 7/16/2001 to 7/16/2001

Confluence Location:

Quad: LAUGHLIN RANGE

Legal Description: T17NR12WS20

Latitude: 39:19:06.0N

Longitude 123:13:19.0W

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 (%)
6	2	GLD	20.7	15	88	1.9	4	0.4	0.7	31	188	12	69		15	70
6	6	MCP	20.7	15	90	1.9	5	0.8	1.8	73	440	67	402	67	15	85
1	1	LSBk	3.4	7	7	0.1	4	0.9	1.4	28	28	25	25	25		65
1	1	LSBo	3.4	8	8	0.2	8	0.7	1.6	64	64	45	45	45	10	90
15	0	DRY	51.7	302	4526	95.9										73

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
29	10	4719	720	541

**Table 3 - Summary of Pool Types**

Stream Name: Rocky Creek

LLID:

1232220393182

Drainage:

Russian River - Upper

Survey Dates: 7/16/2001 to 7/16/2001

Confluence Location: Quad: LAUGHLIN RANGE

Legal Description: T17NR12WS20

Latitude: 39:19:06.0N

Longitude: 123:13:19.0W

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
6	6	MAIN	75	15	90	86	5.0	0.8	73	440	67	402	15
2	2	SCOUR	25	8	15	14	6.0	0.8	46	92	35	70	10
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>		<b>Total Volume (cu.ft.)</b>	
8	8				105					532		472	

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

Stream Name: Rocky Creek

LLID:

1232220393182

Drainage: Russian River - Upper

Survey Dates: 7/16/2001 to 7/16/2001

Confluence Location:

Quad: LAUGHLIN RANGE

Legal Description:

T17NR12WS20

Latitude:

39:19:06.0N

Longitude:

123:13:19.0W

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
6	MCP	75	0	0	6	100	0	0	0	0	0	0
1	LSBk	13	0	0	1	100	0	0	0	0	0	0
1	LSBo	13	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
8	0	0	8	100	0	0	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.5

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

Stream Name: Rocky Creek LLID: 1232220393182 Drainage: Russian River - Upper  
 Survey Dates: 7/16/2001 to 7/16/2001 Dry Units: 15  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS20 Latitude: 39:19:06.0N Longitude: 123:13:19.0W

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									
6	1	GLD	0	0	0	0	0	80	0	0	20
6	1	TOTAL FLAT	0	0	0	0	0	80	0	0	20
6	6	MCP	0	13	0	0	0	17	17	47	7
1	0	LSBk									
1	1	LSBo	0	0	0	0	0	0	0	100	0
8	7	TOTAL POOL	0	11	0	0	0	14	14	54	6
29	8	TOTAL	0	10	0	0	0	23	13	48	8



**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: Rocky Creek

LLID:

1232220393182

Drainage: Russian River - Upper

Survey Dates: 7/16/2001 to 7/16/2001

Dry Units: 15

Confluence Location: Quad:

LAUGHLIN RANGE

Legal Description: T17NR12WS20

Latitude: 39:19:06.0N

Longitude: 123:13:19.0W

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
6	2	GLD	0	0	0	0	50	0	50
6	3	MCP	0	33	0	0	0	67	0
1	1	LSBk	0	100	0	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0

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

Stream Name: Rocky Creek LLID: 1232220393182 Drainage: Russian River - Upper  
 Survey Dates: 7/16/2001 to 7/16/2001  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS20 Latitude: 39:19:06.0N Longitude: 123:13:19.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
76	56	44	0	35	26

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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: Rocky Creek  
 Survey Dates: 7/16/2001 to 7/16/2001  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS20  
 LLID: 1232220393182 Drainage: Russian River - Upper  
 Latitude: 39:19:06.0N Longitude: 123:13:19.0W

**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	1	2	21.4
Boulder	5	4	64.3
Cobble / Gravel	1	0	7.1
Sand / Silt / Clay	0	1	7.1

**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	1	0	7.1
Brush	2	2	28.6
Hardwood Trees	1	3	28.6
Coniferous Trees	3	2	35.7
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 4

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

StreamName: Rocky Creek LLID: 1232220393182 Drainage: Russian River - Upper  
 Survey Dates: 7/16/2001 to 7/16/2001  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS20 Latitude: 39:19:06.0N Longitude: 123:13:19.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)		0	0
SMALL WOODY DEBRIS (%)		0	11
LARGE WOODY DEBRIS (%)		0	0
ROOT MASS (%)		0	0
TERRESTRIAL VEGETATION (%)		0	0
AQUATIC VEGETATION (%)		80	14
WHITEWATER (%)		0	14
BOULDERS (%)		0	54
BEDROCK LEDGES (%)		20	6

## APPENDIX C

**Table 8 - Fish Habitat Inventory Data Summary**

Stream Name: Rocky Creek LLID: 1232220393182 Drainage: Russian River -  
 Survey Dates: 7/16/2001 to 7/16/2001 Survey Length (ft.): 4719 Main Channel (ft.): 4719 Side Channel (ft.): 0  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T17NR12WS20 Latitude: 39:19:06.0N Longitude: 123:13:19.0W

### Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 1**

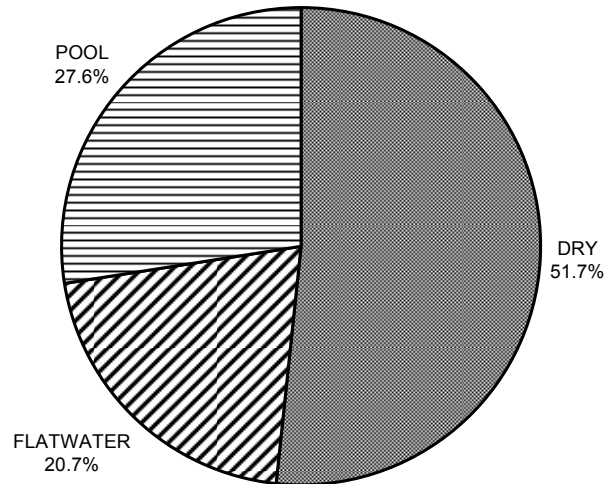
Channel Type: B3	Canopy Density (%): 72.0	Pools by Stream Length (%): 0.7
Reach Length (ft.): 2705	Coniferous Component (%): 66.0	Pool Frequency (%): 12.5
Riffle/Flatwater Mean Width (ft.): 3.0	Hardwood Component (%): 34.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 41.3	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Bedrock	>= 4 Feet Deep: 0.0
Base Flow (cfs):	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.): 1.8
Water (F): 0 - 0    Air (F): 72 - 72	LWD per 100 ft.:	Mean Pool Shelter Rating: 10
Dry Channel (ft.): 2641	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0    Sand: 0.0    Gravel: 100.0    Sm Cobble: 0.0    Lg Cobble: 0.0    Boulder: 0.0    Bedrock: 0.0		
Embeddedness Values (%): 1. 0.0    2. 100.0    3. 0.0    4. 0.0    5. 0.0		

**STREAM REACH: 2**

Channel Type: A2	Canopy Density (%): 78.0	Pools by Stream Length (%): 4.2
Reach Length (ft.): 2014	Coniferous Component (%): 51.0	Pool Frequency (%): 33.3
Riffle/Flatwater Mean Width (ft.): 4.0	Hardwood Component (%): 49.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 100.0
Range (ft.): to	Vegetative Cover (%): 26.5	2 to 2.9 Feet Deep: 0.0
Mean (ft.):	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Boulder	>= 4 Feet Deep: 0.0
Base Flow (cfs):	Occurrence of LWD (%): 0.0	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 0 - 0    Air (F): 72 - 72	LWD per 100 ft.:	Mean Pool Shelter Rating: 15
Dry Channel (ft.): 1885	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: 0.0    Sand: 0.0    Gravel: 0.0    Sm Cobble: 0.0    Lg Cobble: 28.6    Boulder: 42.9    Bedrock: 28.6		
Embeddedness Values (%): 1. 0.0    2. 0.0    3. 28.6    4. 0.0    5. 71.4		

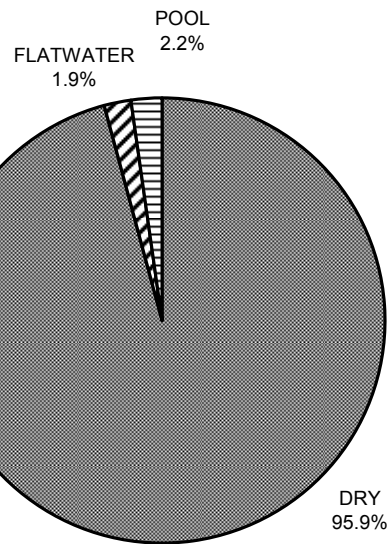
APPENDIX D: GRAPHS

**ROCKY CREEK 2001  
HABITAT TYPES BY PERCENT OCCURRENCE**



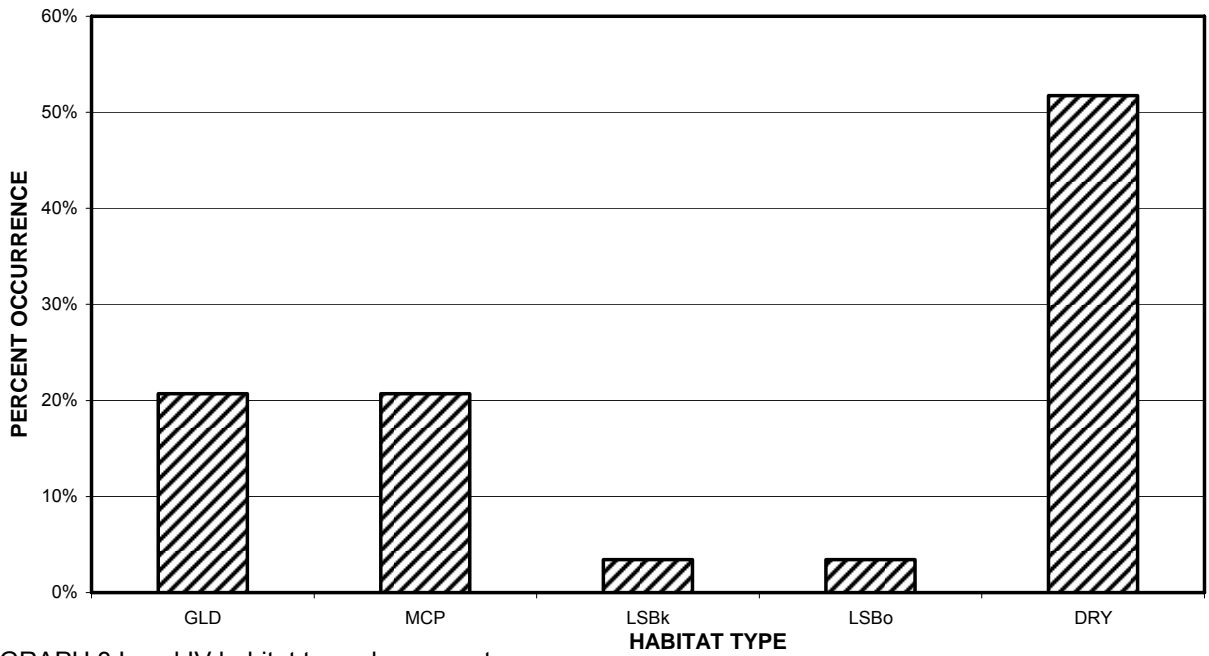
GRAPH 1 Level II habitat types by percent occurrence

**ROCKY CREEK 2001  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



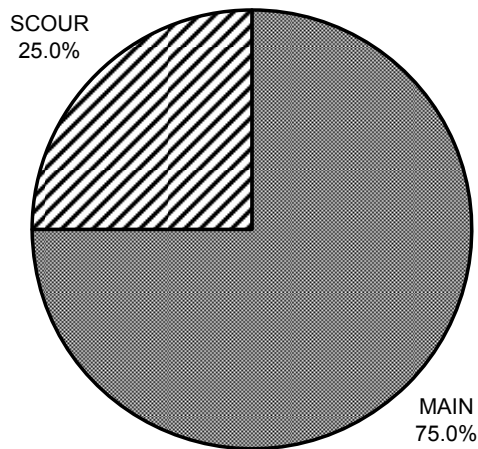
GRAPH 2 Level II habitat types by percent total length

**ROCKY CREEK 2001  
HABITAT TYPES BY PERCENT OCCURRENCE**



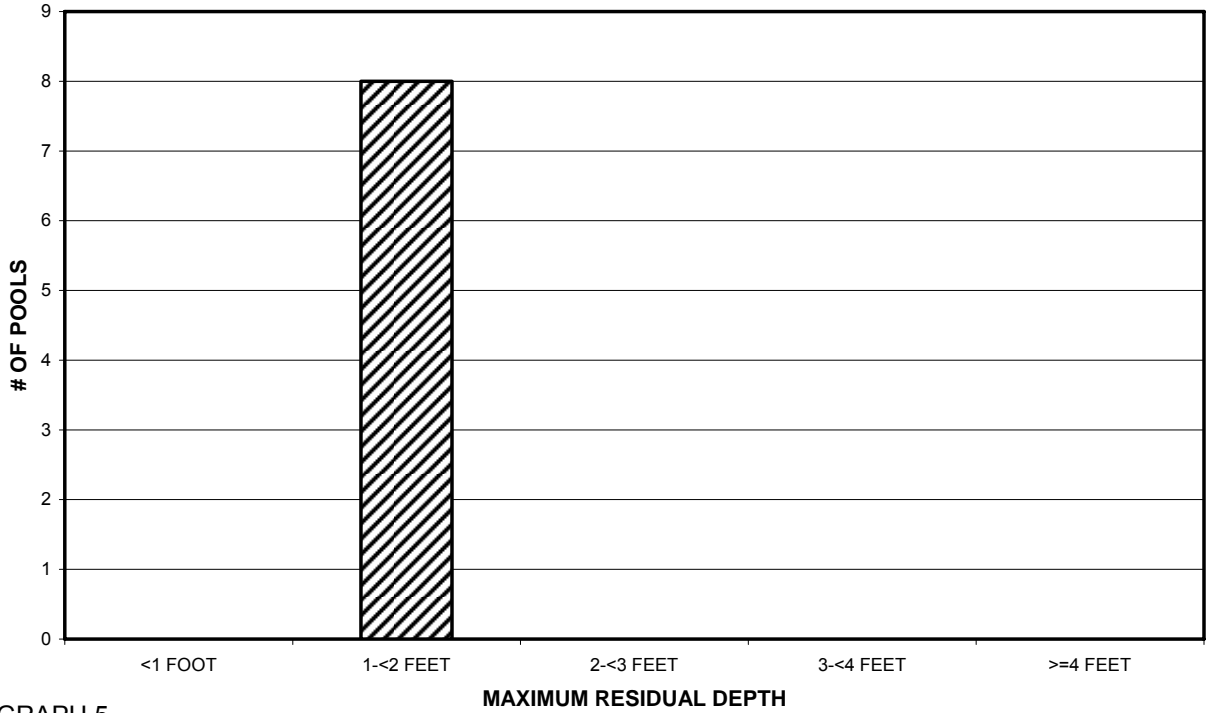
GRAPH 3 Level IV habitat types by percent occurrence

**ROCKY CREEK 2001  
POOL TYPES BY PERCENT OCCURRENCE**



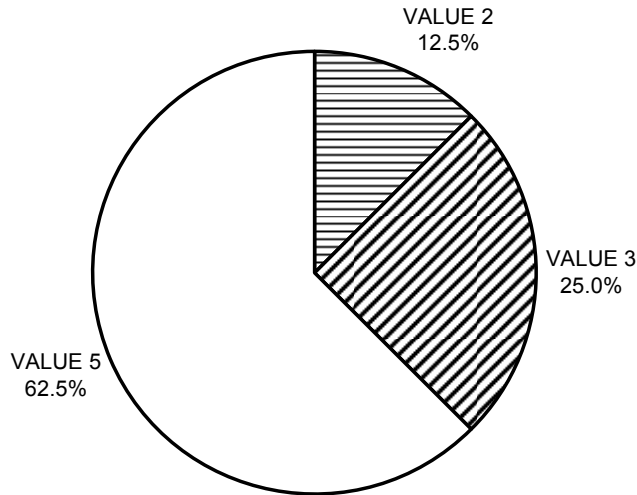
GRAPH 4 Level I pool types by percent occurrence

**ROCKY CREEK 2001  
MAXIMUM DEPTH IN POOLS**



GRAPH 5

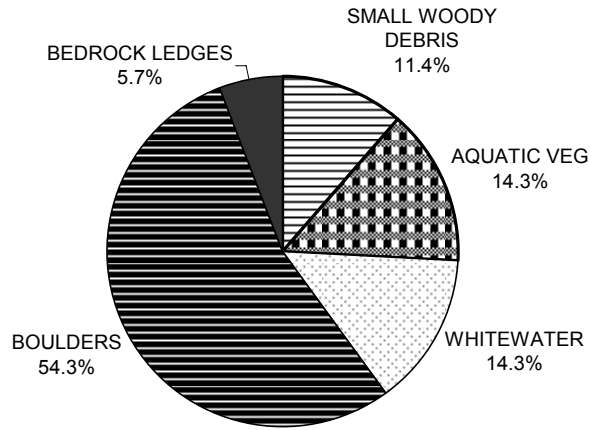
**ROCKY CREEK 2001  
PERCENT EMBEDDEDNESS**



GRAPH 6

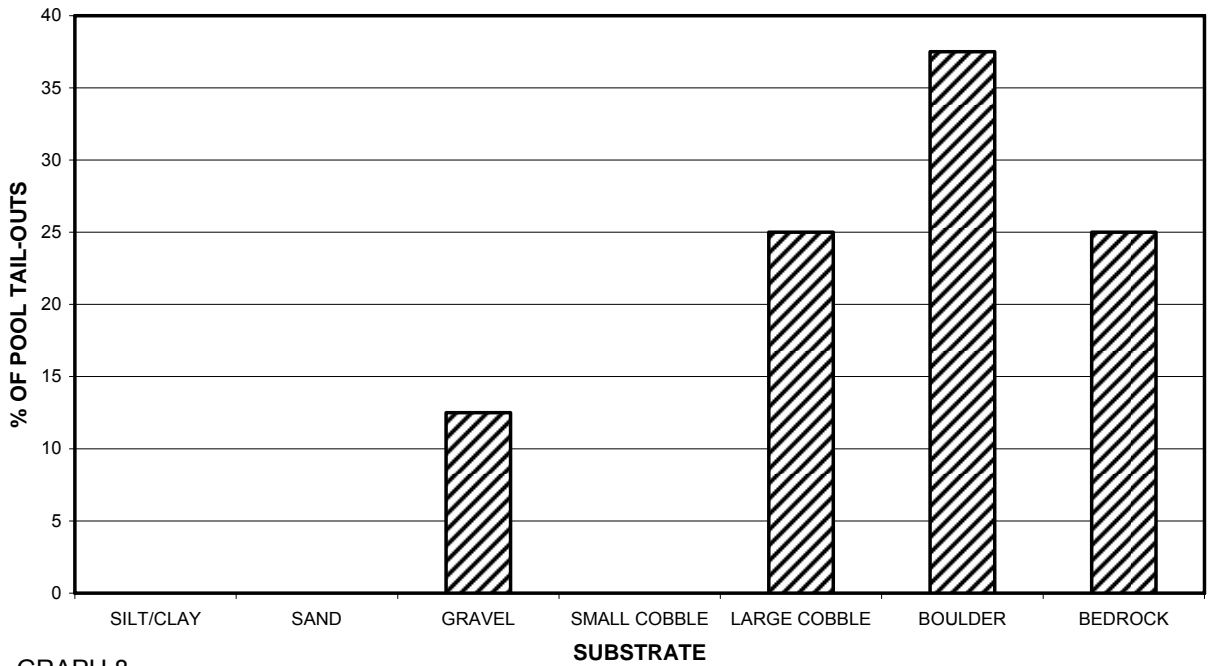


**ROCKY CREEK 2001  
MEAN PERCENT COVER TYPES IN POOLS**



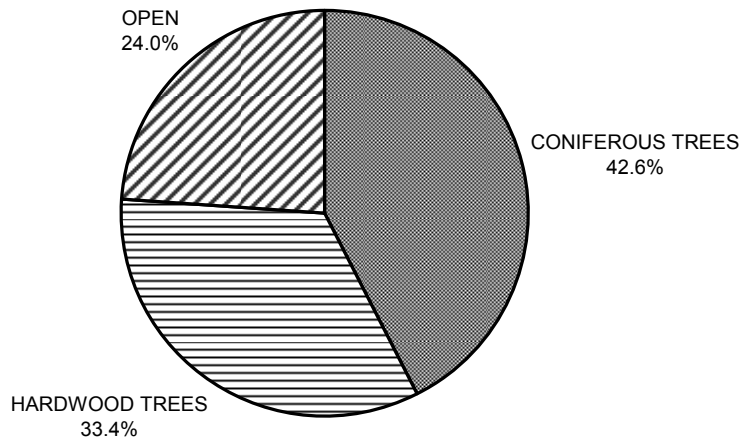
GRAPH 7

**ROCKY CREEK 2001  
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



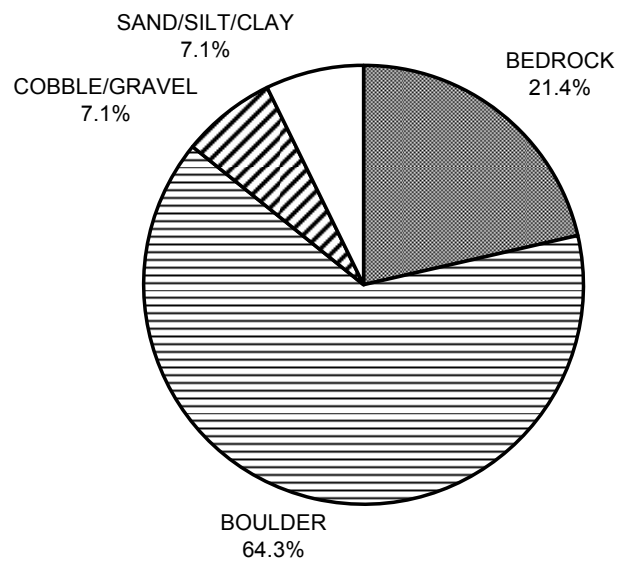
GRAPH 8

**ROCKY CREEK 2001  
MEAN PERCENT CANOPY**



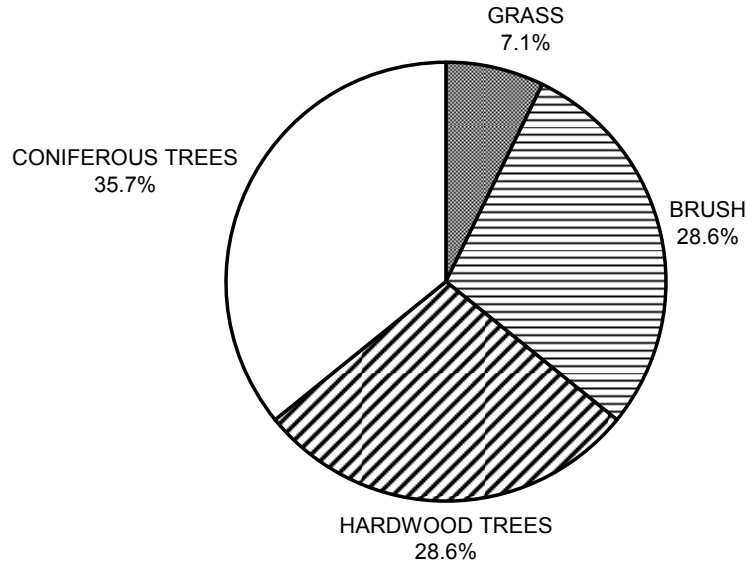
GRAPH 9

**ROCKY CREEK 2001  
DOMINANT BANK COMPOSITION**



GRAPH 10

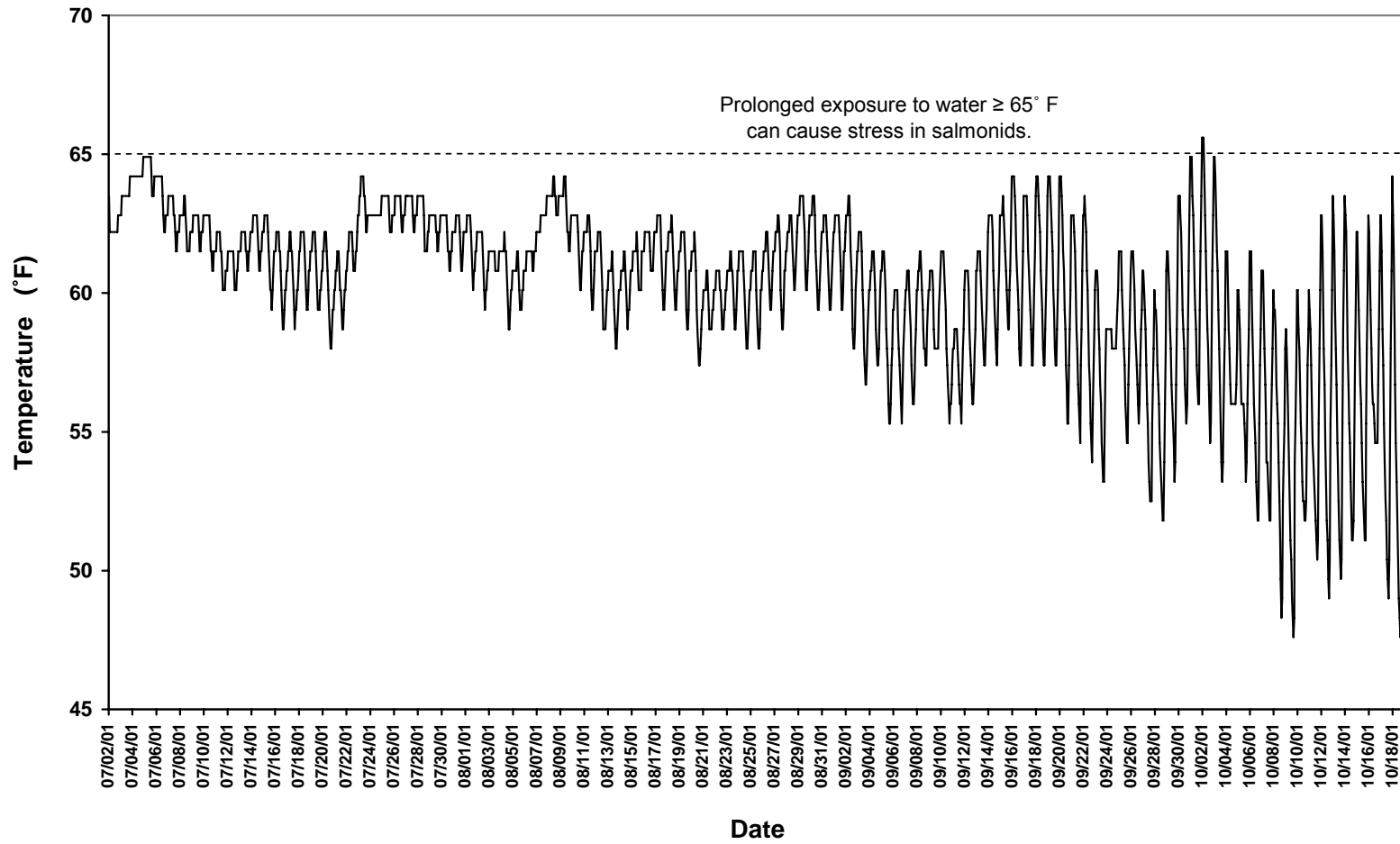
**ROCKY CREEK 2001  
DOMINANT BANK VEGETATION**



GRAPH 11

APPENDIX E

Rocky Creek Water Temperatures



Hydrologic Sub-Areas covered by the watershed:

Tributary to Russian River  
 Tributary to  
 Tributary to

**Name:** Rocky Creek      **LLId: (1:24k)** 1232220393182      **County:** Mendocino  
**Location:**    **T:** 17N    **R:** 12W    **S:** 20    **Latitude:** 39.318282620976    **Longitude** 123.222045017513

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.

<b>Stream Order:</b> 3	<b>Total Length:</b> 3.03 Miles	Note: Length is for the USGS blue-line 1:24,000 stream.
Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nhydro1" 1:24k streams layer.	4.88 Km	

<b>Drainage Area:</b>	614 Hectares
	1518 Acres
	2.37 sq. mi.

<b>Elevations:</b>	Mouth: 801 feet
	Headwaters: 3337 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:
0.0 acres	1.9	0.0	1515.6
0.00 %	0.12 %	0.00 %	99.88 %

Note: Source for ownership data is 2002 DFG-CCR "ccr\_public\_lands.shp" GIS layer.

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

<b>Mixed hardwood/conifer:</b>	<b>Hardwood:</b>	<b>Conifer:</b>	<b>Agriculture:</b>	<b>Urban:</b>
536.98 acres	666.56	6.48	2.93	0.00
35.4 %	43.9 %	0.4 %	0.2 %	0.0 %
<b>Shrub:</b>	<b>Herbaceous:</b>	<b>Barren/rock:</b>	<b>Water:</b>	
59.76	238.14	0.00	6.17	
3.9 %	15.7 %	0.0 %	0.4 %	

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

## 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	0.03
Forsythe Creek	111433	Upper Russian River	99.97