

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

Bakers Creek

*Report Revised April 14, 2006*

*Report Completed 2005*

*Assessment Completed 1999*

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on Bakers 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 Bakers Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

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

Bakers Creek is a tributary to Forsythe Creek, a tributary of the Russian River, located in Mendocino County, California. The legal description at the confluence with Forsythe Creek is T16N, R12W, S6. Its location is 039°15'55.4" N. latitude and 123°14'1.3" W. longitude. Year round vehicle access exists from Highway 101 near Calpella, via Uva Drive to Ranch Road.

Bakers Creek and its tributaries drain a basin of approximately 2.3 square miles. Bakers Creek is a second order stream and has approximately 4.05 miles of blue line stream, according to the USGS Redwood Valley and Laughlin Range 7.5 minute quadrangles. No flow was measured, as there was no water at the mouth of Bakers Creek. Elevations range from about 797 feet at the mouth of the creek to 2800 feet in the headwaters. Oak woodland dominates the watershed. The watershed is owned primarily by private landowners and some land within the watershed is managed for agricultural production.

Salmonid fish species currently present include steelhead trout (*Oncorhynchus mykiss*) which is listed as threatened on the federal and state endangered species lists.

METHODS

The habitat inventory conducted in Bakers 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. This form was used in Bakers 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 Forsythe Creek 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 were 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. 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. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

### 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 temperatures every 1.5 hours, 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. Bakers 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 measurements were in feet to the nearest tenth. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain and a stadia rod.

### 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 Bakers 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). Additionally, a rating of "not suitable" (value 5) was

assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, 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 Bakers 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:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully measured habitat units, dominant and sub-dominant substrate elements were visually estimated using a list of seven size classes which are defined in the California Salmonid Stream Habitat Restoration Manual.

#### 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual. Canopy density relates to the amount of stream shaded from the sun. In Bakers Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the top of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated visually into percentages of evergreen or deciduous trees.

#### 9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Bakers Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation, including downed trees, logs and rootwads, was estimated and recorded.

### BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species 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, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

### DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat for data storage and analysis. Habitat is a Visual Basic extension to Microsoft Access, developed by Zebulon Young, University of California, Berkeley. 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 Bakers Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

## HABITAT INVENTORY RESULTS

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

The habitat inventory of September 17-20, 1999 was conducted by AmeriCorps Interns Ethan Jankowski and Sean Higgins, with supervision and analysis by DFG. The survey began at the confluence with Forsythe Creek and extended up Bakers Creek to the end of surface flows. The total length of the stream surveyed was 10,482 feet.

Flows were not measured on Bakers Creek because there was no flow at the confluence with Forsythe Creek.

This section of Bakers Creek has one channel type, from the mouth to 10,482 feet an F3.

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

No water or air temperatures were recorded during the habitat inventory.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 45% pool units, 36% dry streambed units, 14% riffle units, and 2% flatwater units. Based on total *length* there were 82% dry streambed units, 7% pool units, 5% riffle units, and no flatwater units.

Sixty-four habitat units were measured and 33% 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 streambed at 36%, mid-channel pools at 34%, low gradient riffles at 14% and root wad scour pools at 11%. By percent total *length*, dry streambed made up 82%, mid-channel pools 5%, low gradient riffles 5%, and root wad scour pools 2%.

Twenty-nine pools were identified (Table 3). Main Channel pools were most often encountered at 76%, and comprised 78% 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. Four of the twenty-nine pools (14%) had a depth of two feet or greater. These deeper pools comprised 1% 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. Pool types had the highest shelter rating at 42 and riffles had the lowest rating with 0 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 50 and main channel pools rated 35 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were root masses at 35%, terrestrial vegetation at 32%, large woody debris at 11%, and undercut banks at 8%.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was dominant in both of the two low gradient riffles measured.

No mechanical gravel sampling was conducted in 1999 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 29 pool tail-outs measured, none had a value of 1 (0%); six had a value of 2 (21%); 13 had a value of 3 (45%); and 10 had a value of 4 (34%). On this scale, a value of one is best for fisheries. Gravel and small cobble were the dominant substrates observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 87%. The mean percentages of deciduous and evergreen trees were 60% and 27%, respectively.

For the entire stream reach surveyed, the mean percent right bank vegetated was 86% and the mean percent left bank vegetated was 73%. For the habitat units measured, the dominant vegetation types for the stream banks were: 33% deciduous trees, 25% grass, 25% evergreen trees, and 17% brush. The dominant substrate for the stream banks were: 83% cobble/gravel and 17% silt/clay/sand.

## BIOLOGICAL INVENTORY

## JUVENILE SURVEYS:

On September 21, 1999 a biological inventory was conducted by DFG in Bakers Creek at five sites in Reach 1 to document the fish species composition and distribution. Each site was single pass electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream. A random sample of fish were selected from each Reach and tissues were taken for genetic analysis. The air temperature was 85° and the water temperature was 67°. The observers were Sean Higgins and Ethan Jankowski (AmeriCorps), and Bryan Freele (DFG). At the time the biological sampling was conducted Bakers Creek had intermittent flow, with residual pools and glides separated by stretches of completely dry streambed with subterranean flow.

The inventory of the first site in Reach 1 started at habitat unit #6 and ended approximately 2,286 feet upstream. In glide habitat types (the only types encountered) four steelhead (45mm, 50mm, 95mm, and 100mm) were observed, along with a number of yellow-legged frogs.

The inventory of the second site in Reach 1 started at habitat unit #13 and ended approximately 338 feet upstream. In glide habitat types (the only type encountered) three steelhead (70mm-90mm) were observed, along with a number of yellow-legged frogs.

The inventory of the third site in Reach 1 started at habitat unit #17 and ended approximately 258 feet upstream. In glide habitat types (the only type encountered) eight steelhead (20mm-110mm) were observed, along with a number of yellow-legged frogs. One of these steelhead (110mm) had an adipose fin clip, indicating that it was a hatchery-raised fish.

The inventory of the fourth site in Reach 1 started at habitat unit #28 and ended approximately 61 feet upstream. In pool habitat types (the only type encountered), seven steelhead (40mm-80mm) were observed, along with one rough-skinned newt.

The inventory of the fifth site in Reach 1 started at habitat unit #40 and ended approximately 32 feet upstream. In glide habitat types (the only type encountered), three steelhead (55mm-180mm) were observed. One of these steelhead (180mm) had an adipose fin clip, indicating that it was a hatchery-raised fish.

During the habitat inventory, no salmonids were observed upstream of unit #64, 1650 feet above the confluence with Forsythe Creek, where the stream bed becomes dry for a long distance.

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
1999	Steelhead	DFG	N
1999	Rough-skinned Newt	DFG	N
1999	Yellow-legged Frog	DFG	N

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

#### ADULT SURVEYS:

No carcass surveys were conducted on Baker's Creek in 1999, due to inadequate staffing levels.

#### DISCUSSION

Bakers Creek has one channel type, an F3 (10,482 ft.).

According to the DFG Salmonid Stream Habitat Restoration Manual, F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

Temperatures need to be monitored on Bakers Creek.

Pools comprised 7% 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 Bakers Creek, the pools are relatively shallow with 14% having a maximum depth of at least two feet. These pools comprised 1% of the total length of stream habitat. In steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 42. 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 root masses (35%), terrestrial vegetation (31%), large woody debris (11%), and undercut banks (11%). 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.

Two of the low gradient riffles measured (100%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Seventy-nine 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 mean percent canopy for the survey was 87%. This is a good amount of canopy, since 80 percent is generally considered desirable.

#### GENERAL MANAGEMENT RECOMMENDATIONS

Bakers 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) Access for migrating salmonids is an ongoing potential problem in Reach 1, therefore, fish passage should be monitored, and improved where passable. Baffles should be installed in the culverts to facilitate easier fish access. Eventually this culvert will have to be replaced. Future design should include improved passage of gravel as a second priority and fish passage first.
- 2) 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, ultimately reducing embeddedness. 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.
- 3) In Bakers 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.
- 4) Where feasible, design and engineer pool enhancement structures to increase the depth of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 5) Where feasible, increase woody cover in the pool habitat units along the entire stream. Most of the existing shelter is from root masses and terrestrial vegetation. 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 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.



BAKERS 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.

<u>HABITAT</u> <u>UNIT #</u>	<u>STREAM</u> <u>LENGTH (FT)</u>	<u>COMMENTS</u>
1.00	211	STARTED SURVEY AT MOUTH WHERE IT EMPTIES INTO FORSYTHE CR. NO WATER!
2.00	557	WEIR @135' SIZE:2'H x 16'W x 1'L; @160' SIZE:2.5'h CEMENT CULVERTS (9 FT. HIGH) RUNNING UNDER UVA RD., 101. STANDING WATER 40' LENGTH IN MIDDLE OF CULVERT, THEN A 2.5' STEP UP IN CEMENT FLOOR. CULVERT SURVEYED IS OVERFLOW (3' CEMENT WALL AT END OF CULVERT DIVERTING FLOW TO MAIN CULVERT.
3.00	1003	FOOT BRIDGE; @157' - HUMAN MADE DAM: ROCKS & SOIL NOT SPANNING WHOLE CHANNEL; @ 347' - 4'L x 11'W x 3'H.
4.00	1022	BAGS IN POOL.
5.00	2359	BRIDGE @ 60' SIZE: 12'L x 30'W x 10'H. PILE OF SAWDUST & CLAY. PIECES ON LEFT BANK. BRIDGE @574' SIZE: 10'L x 25'W x 8"H. STANDING WATER @1233': 7'x3'x5"deep; POSSIBLE SH (YOY 1+). STANDING WATER @1305': 20'X1'X3"DEEP
8.00	4628	ROAD X @1034' B TRIB @ 1064' ROAD X @1454'.
11.00	5020	ROAD @428'
16.00	6173	ROAD X @295'
17.00	6186	POSSIBLE STEELHEAD IN POOL.
19.00	6439	SEVERAL STEELHEAD YOUNG-OF-THE-YEAR
23.00	6548	YOUNG-OF-THE-YEAR STEELHEAD
26.00	6769	YOUNG-OF-THE-YEAR STEELHEAD
34.00	7201	UNSTABLE LEFT BANK, DOWNED TREE.
35.00	7241	YOUNG-OF-THE-YEAR STEELHEAD
38.00	7327	SEVERAL YOUNG-OF-THE-YEAR STEELHEAD
41.00	7420	ROAD X & RIGHT BANK TRIB. AT BOTTOM OF UNIT- FLOWING TUBING.
43.00	7571	YOUNG-OF-THE-YEAR STEELHEAD
49.00	7907	YOUNG-OF-THE-YEAR STEELHEAD
62.00	8632	LEFT BANK TRIB. AT TOP OF UNIT-FLOWING.
63.00	8832	4' DIAMETER CULVERTS UNDER RR TRACKS. ONE CULVERT IS HALF CLOGGED WITH GRAVEL, THE OTHER IS CLEAN AND PASSABLE.
64.00	10482	END OF SURVEY: CULVERT IS LONG AND THEN A LONG DRY SECTION. SOME RESIDUAL WATER SPOTS NEAR TOP OF DRY UNIT. NO FISH SEEN.

## APPENDIX B: TABLES

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

Stream Name: Bakers Creek

LLID:

1232335392652

Drainage:

Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location: Quad: LAUGHLIN RANGE

Legal Description: T16NR12WS06

Latitude: 39:15:55.0N

Longitude: 123:14:01.0W

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
2	1	CULVERT	3.1	273	546	5.2	11.0			3806	7612				
23	0	DRY	35.9	374	8597	82.0									
1	1	FLATWATER	1.6	47	47	0.4	5.0	0.3	0.4	200	200	60	60		
29	29	POOL	45.3	26	768	7.3	7.4	0.6	1.2	221	6419	157	1416	129	42
9	2	RIFFLE	14.1	58	524	5.0	3.3	0.2	0.5	67	606	13	121		
<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>		
64	33				10482					14836			1597		

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

Stream Name: Bakers Creek

LLID:

1232335392652 Drainage: Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

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 (%)
9	2	LGR	14.1	58	524	5.0	3	0.2	0.5	67	606	13	121			96
1	1	RUN	1.6	47	47	0.4	5	0.3	0.4	200	200	60	60			93
22	22	MCP	34.4	27	597	5.7	8	0.6	2.1	244	5367	169	846	137	35	76
7	7	LSR	10.9	24	171	1.6	6	0.7	1.6	150	1051	143	571	120	50	93
23	0	DRY	35.9	374	8597	82.0										98
2	1	CUL	3.1	273	546	5.2	11			3806	7612					
<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>			
64	33				10482					14836			1597			

**Table 3 - Summary of Pool Types**

Stream Name: Bakers Creek

LLID:

1232335392652

Drainage: Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location: Quad: LAUGHLIN RANGE

Legal Description: T16NR12WS06

Latitude: 39:15:55.0N

Longitude: 123:14:01.0W

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
22	22	MAIN	76	27	597	78	7.9	0.6	244	5367	137	683	35
7	7	SCOUR	24	24	171	22	6.0	0.7	150	1051	120	479	50
<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	29				768					6419		1162	

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

Stream Name: Bakers Creek

LLID:

1232335392652

Drainage: Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location:

Quad: LAUGHLIN RANGE

Legal Description:

T16NR12WS06

Latitude: 39:15:55.0N

Longitude: 123:14:01.0W

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
5	MCP	56	2	40	2	40	1	20	0	0	0	0
4	LSR	44	1	25	3	75	0	0	0	0	0	0
<b>Total Units</b>												
			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
9			3	33	5	56	1	11	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.2

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

Stream Name: Bakers Creek LLID: 1232335392652 Drainage: Russian River - Upper  
 Survey Dates: 9/17/1999 to 9/20/1999 Dry Units: 23  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

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
9	0	LGR									
9	0	TOTAL RIFFLE									
1	0	RUN									
1	0	TOTAL FLAT									
22	9	MCP	8	0	14	20	42	8	0	8	0
7	7	LSR	14	3	6	54	19	0	0	4	0
29	16	TOTAL POOL	11	1	11	35	32	4	0	6	0
2	0	CUL									
64	16	TOTAL	11	1	11	35	32	4	0	6	0

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

Stream Name: Bakers Creek LLID: 1232335392652 Drainage: Russian River - Upper  
 Survey Dates: 9/17/1999 to 9/20/1999 Dry Units: 23  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

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
9	2	LGR	0	0	0	100	0	0	0
1	1	RUN	0	0	100	0	0	0	0
22	1	MCP	0	100	0	0	0	0	0
7	2	LSR	0	0	50	50	0	0	0

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

Stream Name: Bakers Creek  
 LLID: 1232335392652  
 Drainage: Russian River - Upper  
 Survey Dates: 9/17/1999 to 9/20/1999  
 Confluence Location: Quad: LAUGHLIN RANGE  
 Legal Description: T16NR12WS06  
 Latitude: 39:15:55.0N  
 Longitude: 123:14:01.0W

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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
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87	27	60	0	86	73
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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: Bakers Creek

LLID:

1232335392652 Drainage: Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

**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	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	5	5	83.3
Sand / Silt / Clay	1	1	16.7

**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	2	1	25.0
Brush	1	1	16.7
Hardwood Trees	2	2	33.3
Coniferous Trees	1	2	25.0
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 3

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

StreamName: Bakers Creek

LLID:

1232335392652 Drainage: Russian River - Upper

Survey Dates: 9/17/1999 to 9/20/1999

Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

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	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)			11
SMALL WOODY DEBRIS (%)			1
LARGE WOODY DEBRIS (%)			11
ROOT MASS (%)			35
TERRESTRIAL VEGETATION (%)			32
AQUATIC VEGETATION (%)			4
WHITEWATER (%)			0
BOULDERS (%)			6
BEDROCK LEDGES (%)			0

### Appendix C - Fish Habitat Inventory Data Summary

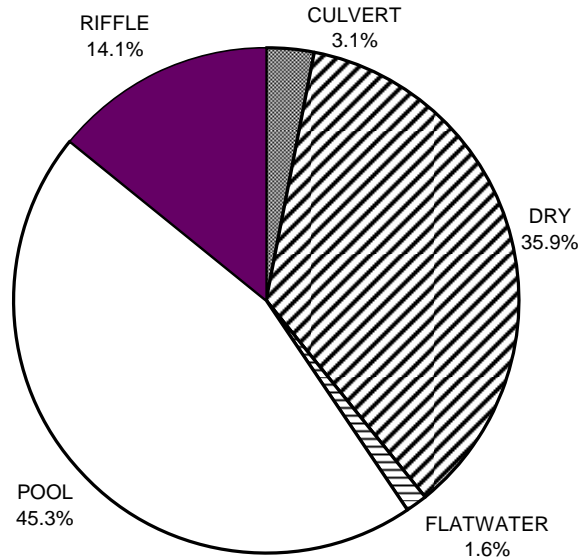
Stream Name: Bakers Creek LLID: 1232335392652 Drainage: Russian River -  
 Survey Dates: 9/17/1999 to 9/20/1999 Survey Length (ft.): 10482 Main Channel (ft.): 10482 Side Channel (ft.): 0  
 Confluence Location: Quad: LAUGHLIN RANGE Legal Description: T16NR12WS06 Latitude: 39:15:55.0N Longitude: 123:14:01.0W

#### Summary of Fish Habitat Elements By Stream Reach

##### STREAM REACH: 1

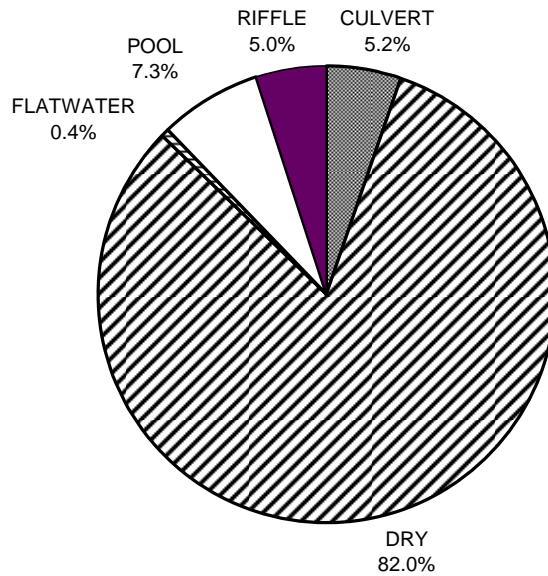
Channel Type: E3	Canopy Density (%): 86.6	Pools by Stream Length (%): 7.3
Reach Length (ft.): 10482	Coniferous Component (%): 31.0	Pool Frequency (%): 45.3
Riffle/Flatwater Mean Width (ft.): 3.8	Hardwood Component (%): 69.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 88.9
Range (ft.): to	Vegetative Cover (%): 79.2	2 to 2.9 Feet Deep: 11.1
Mean (ft.):	Dominant Shelter: Root masses	3 to 3.9 Feet Deep: 0.0
Std. Dev.:	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0.0
Base Flow (cfs):	Occurrence of LWD (%): 10.6	Mean Max Residual Pool Depth (ft.): 1.17
Water (F): 0 - 0 Air (F): 0 - 0	LWD per 100 ft.:	Mean Pool Shelter Rating: 42
Dry Channel (ft.): 8597	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:		
Embeddedness Values (%): 1. 0.0 2. 20.7 3. 44.8 4. 34.5 5. 0.0		

APPENDIX D: GRAPHS  
**BAKERS CREEK 1999**  
**HABITAT TYPES BY PERCENT OCCURRENCE**



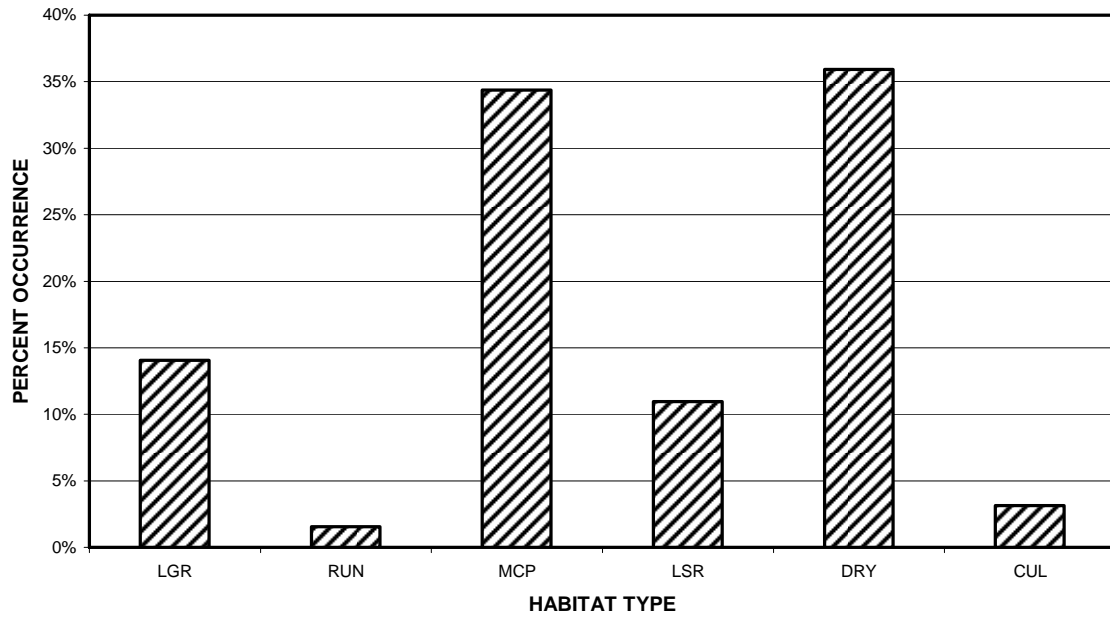
GRAPH 1: Level II habitat types by percent occurrence

**BAKERS CREEK 1999**  
**HABITAT TYPES BY PERCENT TOTAL LENGTH**



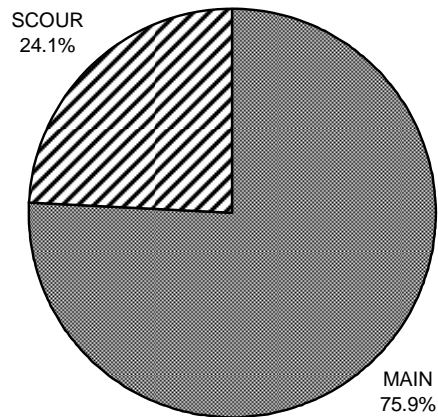
GRAPH 2: Level II habitat types by percent total length

**BAKERS CREEK 1999  
HABITAT TYPES BY PERCENT OCCURRENCE**



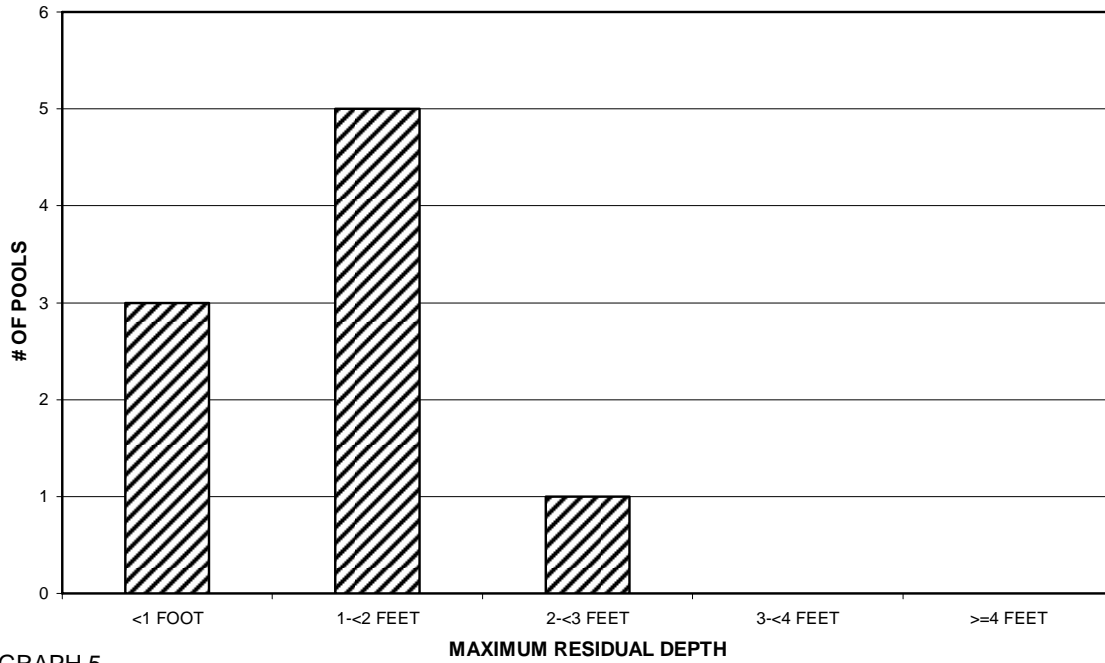
GRAPH 3: Level IV habitat types by percent occurrence

**BAKERS CREEK 1999  
LEVEL I POOL TYPES BY PERCENT OCCURRENCE**



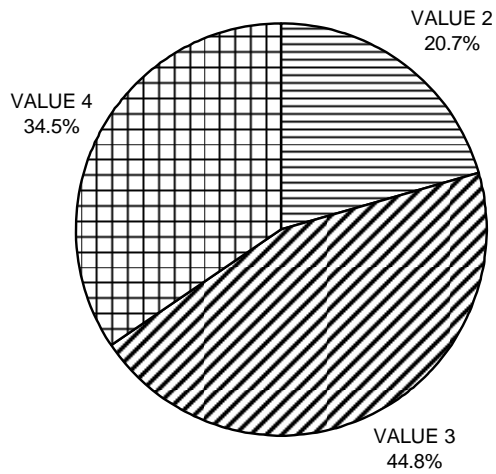
GRAPH 4

**BAKERS CREEK 1999  
MAXIMUM DEPTH IN POOLS**



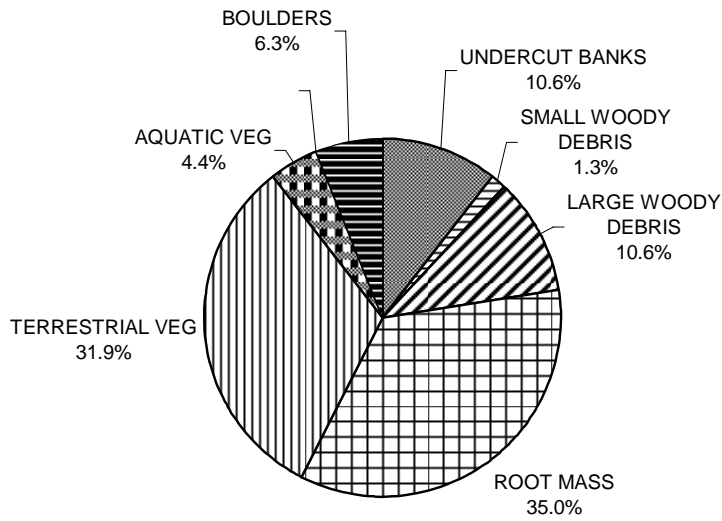
GRAPH 5

**BAKERS CREEK 1999  
PERCENT EMBEDDEDNESS**



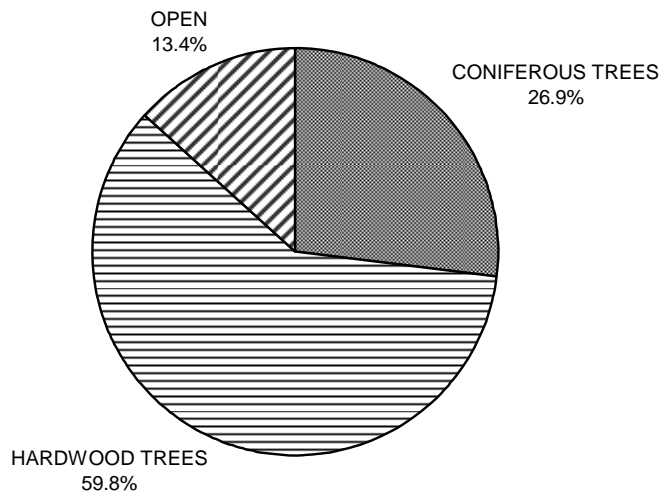
GRAPH 6

**BAKERS CREEK 1999  
MEAN PERCENT COVER TYPES IN POOLS**



GRAPH 7

**BAKERS CREEK 1999  
MEAN PERCENT CANOPY**



GRAPH 9

**BAKERS CREEK 1999**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11



Hydrologic Sub-Areas covered by the watershed:

**Tributary to** Forsythe Creek  
**Tributary to** Russian River  
**Tributary to**

**Name:** Bakers Creek      **LLId: (1:24k)** 1232335392652      **County:** Mendocino  
**Location:**      **T:** 16N      **R:** 12W      **S:** 6      **Latitude:** 39.2652099838325      **Longitude** 123.233590085538

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> <u>3</u>	<b>Total Length:</b> 4.19 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.	6.75 Km	

<b>Drainage Area:</b>	596 Hectares
	1473 Acres
	2.3 sq. mi.

<b>Elevations:</b>	Mouth: <u>719</u> feet
	Headwaters: <u>2966</u> 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:
0.0 acres	0.0	0.0	1473.0
0.00 %	0.00 %	0.00 %	100.00 %

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>
71.96 acres	781.93	22.70	40.92	10.50
1.2 %	10.6 %	0.3 %	0.5 %	0.1 %
<b>Shrub:</b>	<b>Herbaceous:</b>	<b>Barren/rock:</b>	<b>Water:</b>	
17.29	528.34	0.00	0.00	
0.2 %	7.1 %	0.0 %	0.0 %	

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
Forsythe Creek	111433	Upper Russian River	100