

# **STREAM INVENTORY REPORT**

## **South Fork Gualala River**

### INTRODUCTION

A stream inventory was conducted beginning August 12 and ending August 20, 2003 on South Fork Gualala River. The survey began at the confluence with the Gualala River and extended upstream 48,682 feet. Stream inventories and reports were also completed for five tributaries to South Fork Gualala River.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in South Fork Gualala River.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for 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

South Fork Gualala River is a tributary to the Gualala River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). South Fork Gualala River's legal description at the confluence with the Gualala River is T11N R15W S26. Its location is 38°46'41" north latitude and 123°29'52" west longitude. South Fork Gualala River is a fourth order stream and has approximately 190,080 feet of blue line stream according to the USGS McGuire Ridge 7.5 minute quadrangle. South Fork Gualala River drains a watershed of approximately 247.8 square miles. Elevations range from about 5 feet at the mouth of the creek to 2,547 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production, rangeland, recreation, and residency. Vehicle access exists at the confluence of North Fork Gualala River and South Fork Gualala. The Gualala Redwood, Inc., main haul road was used to access the stream.

### METHODS

The habitat inventory conducted in South Fork Gualala River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members 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.

## South Fork Gualala River

### SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

### 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 South Fork Gualala River to record measurements and observations. There are nine components to the inventory form.

#### 1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

#### 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:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

#### 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". South Fork Gualala River 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

## South Fork Gualala River

wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

### 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In South Fork Gualala River, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate particle size, 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In South Fork Gualala River, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. 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-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

### 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 South Fork Gualala River, 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. In addition, the area of canopy was estimated ocularly 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 South Fork Gualala River, the dominant composition type and the

## **South Fork Gualala River**

dominant vegetation type of both the right and left banks for each fully-described 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.

### DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 1.0.37, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types
- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for South Fork Gualala River 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 August 12 to 20, 2003, was conducted by S. Thompson, H. Kleeb, L. Selvaggio, C. Hines and J. Brenton (WSP/Americorps). The total length of the stream surveyed was 48,682 feet with an additional 511 feet of side channel.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 13.835 cfs on November 11, 2003.

## South Fork Gualala River

South Fork Gualala River is a C3 channel type for the entire 48,682 feet of the stream surveyed. C3 channels are low gradient, meandering, point-bar, riffle/pool alluvial channels with broad, well defined floodplains and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 64° to 78° Fahrenheit. Air temperatures ranged from 62° to 78° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 19% riffle units, 59% flatwater units, and 21% pool units, with 1% dry (Graph 1). Based on total length of Level II habitat types there were 10% riffle units, 72% flatwater units, and 17% pool units, with 1% dry (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were glides, 34%; runs, 25%; and low-gradient riffles, 19% (Graph 3). Based on percent total length, glides made up 48%, runs 23%, and mid-channel pools 10%.

A total of 43 pools were identified (Table 3). Main-channel pools were the most frequently encountered, at 65%, and comprised 71% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-two of the 40 measured pools (80%) had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 42 pool tail-outs measured, 10 had a value of 1 (23%); 26 had a value of 2 (62%); 5 had a value of 3 (12%); 1 had a value of 4 (2%); and 0 had a value of 5 (0%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Riffle habitat types had a mean shelter rating of 23, flatwater habitat types had a mean shelter rating of 21, and pool habitats had a mean shelter rating of 78 (Table 1). Of the pool types, the main-channel pools had the highest mean shelter rating at 80. Scour pools had a mean shelter rating of 76 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation is the dominant cover type in South Fork Gualala River. Graph 7 describes the pool cover in South Fork Gualala River. Terrestrial vegetation is the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 98% of pool tail-outs while silt/clay was the next most frequently observed substrate type, at 2%.

The mean percent canopy density for the surveyed length of South Fork Gualala River was 29%. The mean percentages of evergreen and deciduous trees were 12% and 17%, respectively with 71% of the canopy open. Graph 9 describes the mean percent canopy in South Fork Gualala River.

## South Fork Gualala River

For the stream reach surveyed, the mean percent right bank vegetated was 50%. The mean percent left bank vegetated was 51%. The dominant elements composing the structure of the stream banks consisted of 72% cobble/gravel, and 28% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 82% of the units surveyed. Additionally, 12% of the units surveyed had coniferous trees as the dominant vegetation type, 5% had grass as the dominant vegetation type, and 1% had brush as the dominant vegetation type, with 1% having no vegetation (Graph 11).

## DISCUSSION

South Fork Gualala River is a C3 channel type for the entire 48,982 feet of stream surveyed. The suitability of C3 channel types for fish habitat improvement structures is as follows: C3 channel types are excellent for bank-placed boulders and good for plunge weirs, boulder clusters, single and opposing wing deflectors and log cover.

The water temperatures recorded on the survey days ranged from 64° to 78° Fahrenheit. Air temperatures ranged from 62° to 78° Fahrenheit. These water temperatures are unsuitable for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 72% of the total length of this survey, pools 17%, and riffles 10%. The pools are relatively deep, with 32 of the 40 (80%) measured pools having a maximum depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat.

Thirty-six of the 42 pool tail-outs measured had embeddedness ratings of 1 or 2. Six of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered not suitable 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.

Forty-one of the 42 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter for flatwater was 21. The mean shelter rating for pools was 78. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by terrestrial vegetation in all habitat types. Additionally, small woody debris contributes a small amount. 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 29%. In general, revegetation projects are considered when canopy density is less than 80%.

## South Fork Gualala River

The percentage of right and left bank covered with vegetation was moderate at 50% and 51%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

### RECOMMENDATIONS

- 1) South Fork Gualala River should be managed as an anadromous, natural production stream.
- 2) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from terrestrial vegetation. Adding high quality complexity with log and root wad cover is desirable.
- 4) Active and potential sediment sources need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 5) Inventory and map sources of stream bank 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.
- 6) The limited water temperature data available suggest that maximum temperatures are above the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.
- 7) Increase the canopy on South Fork Gualala River by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

## South Fork Gualala River

### COMMENTS AND LANDMARKS

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

Position (ft.)	Habitat Unit #	Comments:
0	0001.00	Start of survey at confluence of Little North Fork low water crossing.
300	0002.00	Sand/gravel substrate.
809	0004.00	Out of area of influence.
1486	0007.00	Dry right bank tributary.
2328	0010.00	Within unit is a small root wad formed scour pool (<10% of channel wetted width).
5270	0020.00	Road off of right bank.
8324	0032.00	Right bank tributary.
13402	0057.00	Rockpile Creek enters on the right bank.
17974	0072.00	Spring enters on left bank.
18718	0075.00	Fish observed.
19382	0079.00	Tire tracks in creek.
20242	0080.00	Fully blocked off backwater pool; no significant habitat.
20455	0083.00	Right bank erosion site measures 50' long x 15' high x 2' wide. Long narrow backwater pool blocked off from main channel.
20802	0084.00	Fish observed.
20959	0085.00	Left bank tributary.
21459	0086.00	Fish observed.
23090	0089.00	100 feet of scour along right bank terrestrial vegetation . Small backwater pool, filled with algae, with one 3" fish in it.

## South Fork Gualala River

27874	0101.00	Right bank tributary.
29930	0113.00	Fish observed.
34604	0121.01	Fish observed.
34604	0122.00	Fish observed.
37215	0143.00	Wheatfield Fork of Gualala River enters on the right bank.
38013	0150.00	Subsurface flow.
38189	0152.00	Salmonids observed. 10 foot long dry area.
38645	0154.00	Salmonids observed.
39570	0160.00	Dry right bank tributary.
40123	0162.00	Dry right bank tributary.
40461	0165.00	Large amounts of algae. Salmonids observed.
40644	0166.00	Right bank erosion. Stream gauge on left bank.
41269	0170.00	Stream gauge on right bank on boulder. 2' diameter culvert under road on right bank.
41757	0173.00	Dry left bank tributary with high gradient. It is not accessible to fish when flowing.
42233	0175.00	Dry left bank tributary with high gradient. It is not accessible to fish when flowing.
42965	0178.00	Dry right bank tributary with 2' diameter culvert.
43585	0179.00	Dry left bank tributary. Alders slumping on right bank.
43835	0180.00	Small, steep right bank tributary. It is not accessible to salmonids.
44565	0182.00	Left bank erosion site measures 50' long x 15' high x 2' deep.
44760	0183.00	Dry right bank tributary.
46118	0191.00	Dry, non-accessible right bank tributary.
47153	0195.00	Dry left bank tributary with high gradient.

## South Fork Gualala River

47523	0197.00	High gradient left bank tributary.
48202	0200.00	Salmonids observed.

## South Fork Gualala River

### LEVEL III and LEVEL IV HABITAT TYPES

#### RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

#### CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

#### FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

#### MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

#### SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

#### BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

#### ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

# South Fork Gualala River

## TABLES AND GRAPHS

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

Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Percent 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	0	DRY	1.0	170	340	0.7									
119	16	FLATWATER	58.6	299	35580	72.3	47.6	0.8	1.6	13777	1639458	11323	1347470		21
43	41	POOL	21.2	194	8338	16.9	38.9	2.2	4.1	7661	329412	21131	886450	19339	78
39	7	RIFFLE	19.2	127	4935	10.0	38.9	0.3	0.8	3727	145339	1578	61544		23
<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>		
203	64				49193						2114208		2295464		

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

Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

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 (%)
39	7	LGR	19.2	127	4935	10.0	39	0.3	1.8	3727	145339	1578	61544		23	23
68	7	GLD	33.5	349	23715	48.2	54	0.8	2.6	17445	1186270	13090	890095		14	30
50	8	RUN	24.6	230	11518	23.4	42	0.8	3	10338	516877	10412	520619		28	21
1	1	SRN	0.5	347	347	0.7	50	0.4	1.9	15615	15615	6246	6246		20	12
23	22	MCP	11.3	220	5061	10.3	35	2.4	7.7	7933	182470	21767	500652	19855	88	33
5	4	CCP	2.5	176	881	1.8	40	2.0	4	6861	34304	17201	86005	16675	13	30
10	10	LSL	4.9	175	1747	3.6	43	1.8	7.6	8418	84180	25593	230337	23075	81	50
4	4	LSR	2.0	140	560	1.1	48	2.4	6.3	5968	23872	15074	60295	13250	64	31
1	1	LSBo	0.5	89	89	0.2	48	1.6	3.9	4058	4058	6899	6899	6493	75	30
2	0	DRY	1.0	170	340	0.7										23
<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>			
203	64				49193						2192985		2362693			

# South Fork Gualala River

**Table 3 - Summary of Pool Types**

Stream Name: South Fork Gualala River

Drainage: Gualala River

Survey Dates: 8/12/2003 to 8/20/2003

Confluence Location: Quad: ANNAPOLIS

Legal Description: T11NR15WS26

Latitude: 38.46.42.0N

Longitude: 123.29.52.0W

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
28	26	MAIN	65	212	5942	71	35.4	2.3	7768	217517	19482	524524	80
15	15	SCOUR	35	160	2396	29	44.9	2.0	7474	112110	19083	267166	76

Total Units	Total Units Fully Measured
43	41

Total Length (ft.)
8338

Total Area (sq.ft.)
329627

Total Volume (cu.ft.)
791690

# South Fork Gualala River

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

Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

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
22	MCP	55	0	0	0	0	3	14	7	32	12	55
4	CCP	10	0	0	1	25	1	25	1	25	1	25
9	LSL	23	1	11	1	11	1	11	2	22	4	44
4	LSR	10	0	0	0	0	0	0	2	50	2	50
1	LSBo	3	0	0	0	0	0	0	1	100	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
40	1	2	2	5	5	12	13	32	19	48

Mean Maximum Residual Pool Depth (ft.): 4.1

# South Fork Gualala River

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

Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003      Dry Units: 2  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

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
39	6	LGR	3	18	0	0	60	13	0	5	0
39	6	TOTAL RIFFLE	3	18	0	0	60	13	0	5	0
68	7	GLD	0	11	0	0	81	7	0	0	0
50	8	RUN	0	12	10	1	62	2	1	12	0
1	1	SRN	0	20	0	0	80	0	0	0	0
119	16	TOTAL FLAT	0	12	5	1	72	4	1	6	0
23	23	MCP	4	11	20	3	38	22	0	2	0
5	3	CCP	0	10	0	0	45	40	2	3	0
10	10	LSL	6	12	25	6	39	13	0	1	0
4	4	LSR	3	24	40	0	29	5	0	0	0
1	1	LSBo	0	20	50	0	10	0	0	20	0
43	41	TOTAL POOL	4	13	22	3	37	19	0	2	0
203	63	TOTAL	3	13	16	2	48	14	0	3	0

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

Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003      Dry Units: 2  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

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
39	7	LGR	0	0	100	0	0	0	0
68	7	GLD	29	0	71	0	0	0	0
50	8	RUN	0	13	88	0	0	0	0
1	1	SRN	0	0	100	0	0	0	0
23	23	MCP	13	26	61	0	0	0	0
5	4	CCP	25	0	75	0	0	0	0
10	10	LSL	0	40	60	0	0	0	0
4	4	LSR	0	25	75	0	0	0	0
1	1	LSBo	0	100	0	0	0	0	0

# South Fork Gualala River

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

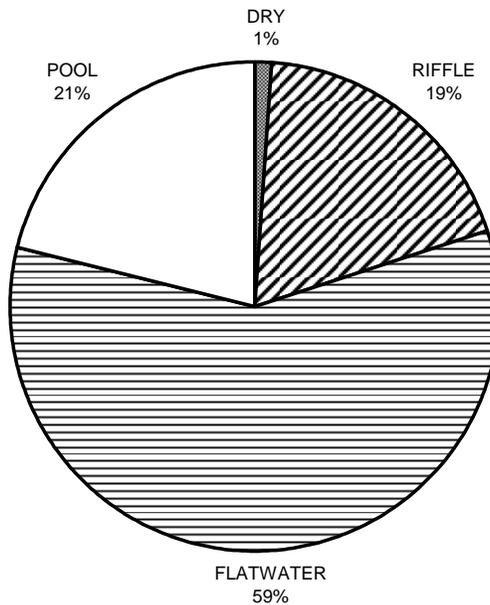
Stream Name: South Fork Gualala River      Drainage: Gualala River  
 Survey Dates: 8/12/2003 to 8/20/2003      Survey Length (ft.): 49193      Main Channel (ft.): 48682      Side Channel (ft.): 511  
 Confluence Location: Quad: ANNAPOLIS      Legal Description: T11NR15WS26      Latitude: 38:46:42.0N      Longitude: 123:29:52.0W

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

**STREAM REACH: 1**

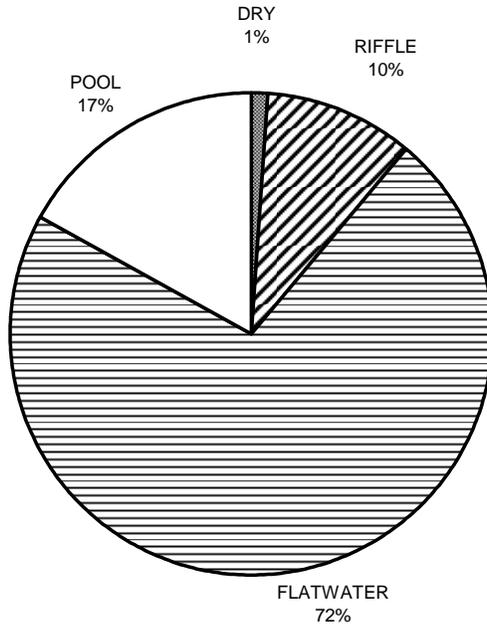
Channel Type: C3	Canopy Density (%): 29	Pools by Stream Length (%): 17
Reach Length (ft.): 48682	Coniferous Component (%): 42	Pool Frequency (%): 21
Riffle/Flatwater Mean Width (ft.): 49.1	Deciduous Component (%): 58	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Deciduous Trees	< 2 Feet Deep: 8
Range (ft.): 0 to 250	Vegetative Cover (%): 82	2 to 2.9 Feet Deep: 12
Mean (ft.): 149	Dominant Shelter: Terrestrial Veg.	3 to 3.9 Feet Deep: 32
Std. Dev.: 55	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 48
Base Flow (cfs.): 13.5	Occurrence of LWD (%): 15	Mean Max Residual Pool Depth (ft.): 4.1
Water (F): 64 - 78    Air (F): 62 - 78	LWD per 100 ft.:	Mean Pool Shelter Rating: 78
Dry Channel (ft.): 340	Riffles: 0	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0    Sand: 2    Gravel: 98    Sm Cobble: 0    Lg Cobble: 0    Boulder: 0    Bedrock: 0		
Embeddedness Values (%): 1. 24    2. 62    3. 12    4. 2    5. 0		

## SOUTH FORK GUALALA RIVER HABITAT TYPES BY PERCENT OCCURRENCE



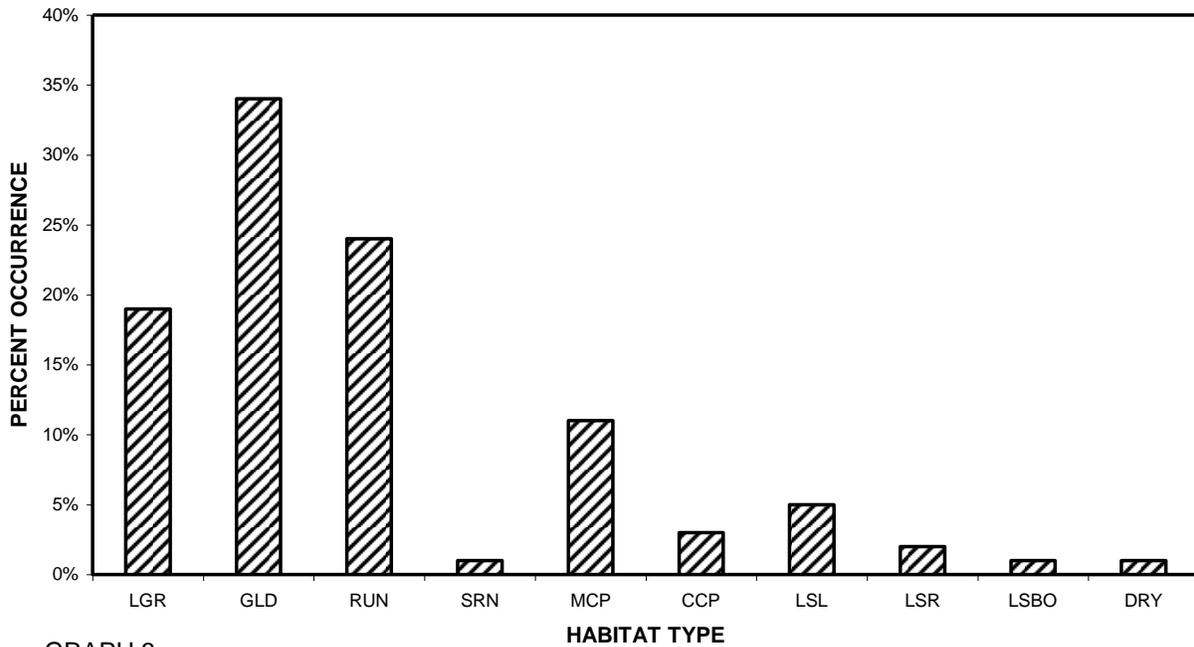
GRAPH 1

### SOUTH FORK GUALALA RIVER HABITAT TYPES BY PERCENT TOTAL LENGTH



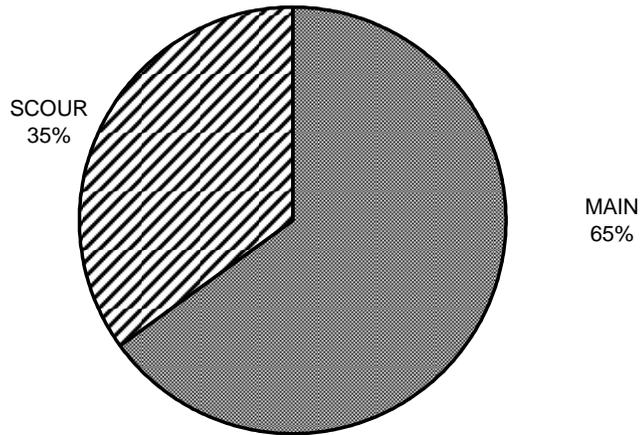
GRAPH 2

### SOUTH FORK GUALALA RIVER HABITAT UNIT TYPES BY PERCENT OCCURRENCE



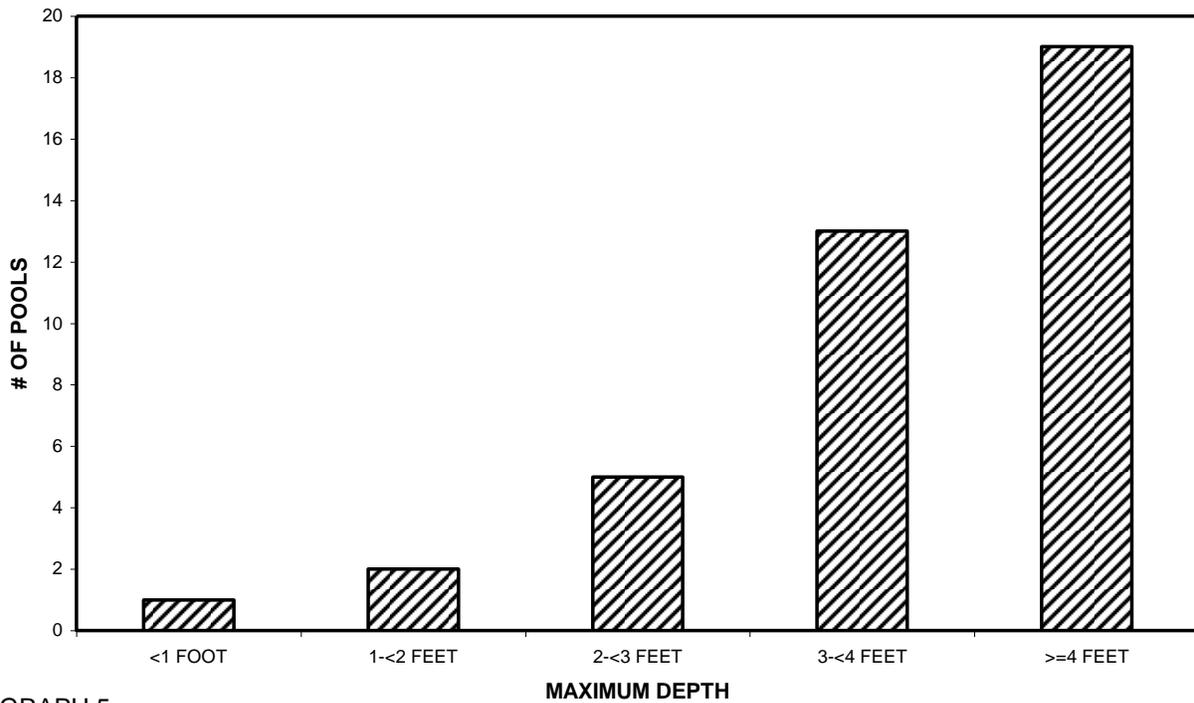
GRAPH 3

### SOUTH FORK GUALALA RIVER POOL HABITAT TYPES BY PERCENT OCCURRENCE



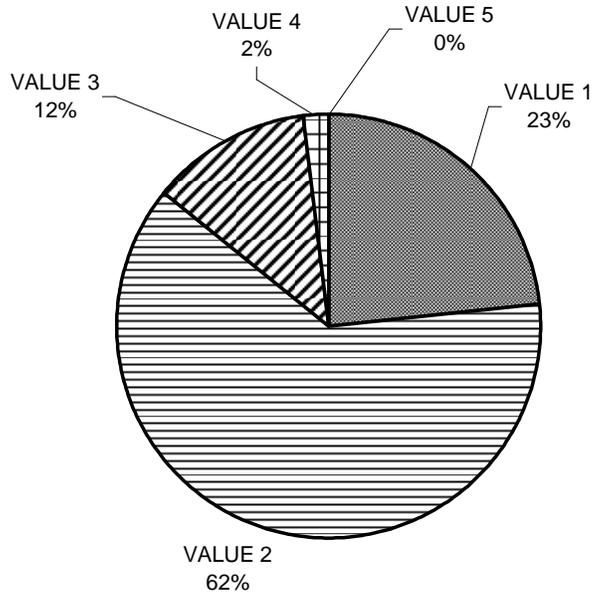
GRAPH 4

### SOUTH FORK GUALALA RIVER MAXIMUM DEPTH IN POOLS



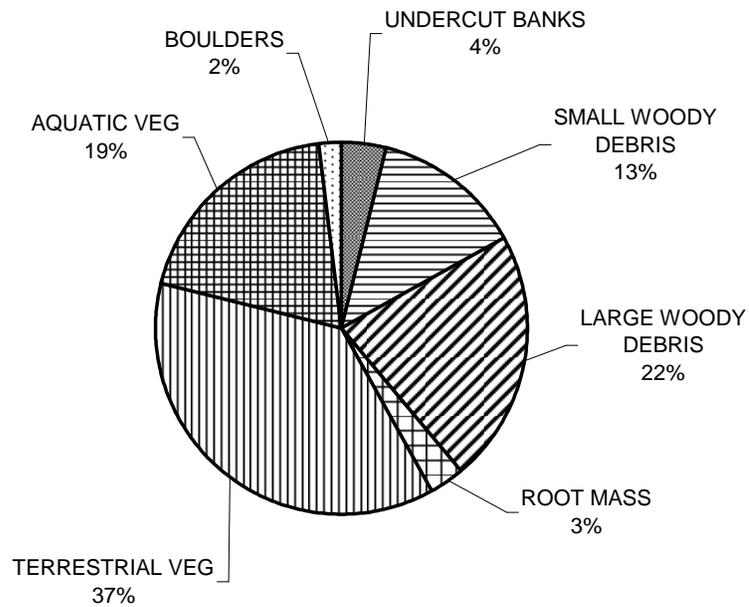
GRAPH 5

### SOUTH FORK GUALALA RIVER PERCENT EMBEDDEDNESS



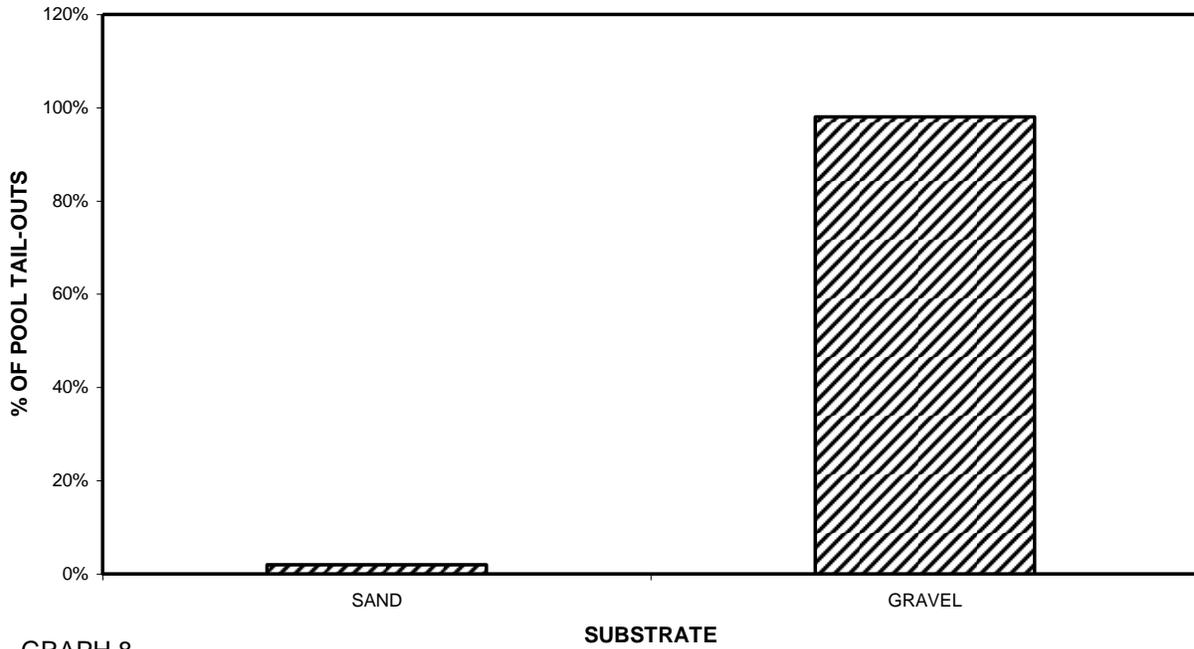
GRAPH 6

### SOUTH FORK GUALALA RIVER MEAN PERCENT COVER TYPES IN POOLS



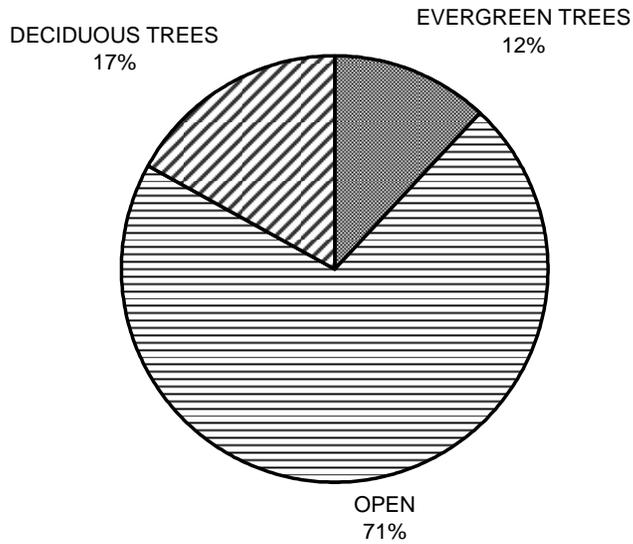
GRAPH 7

### SOUTH FORK GUALALA RIVER SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



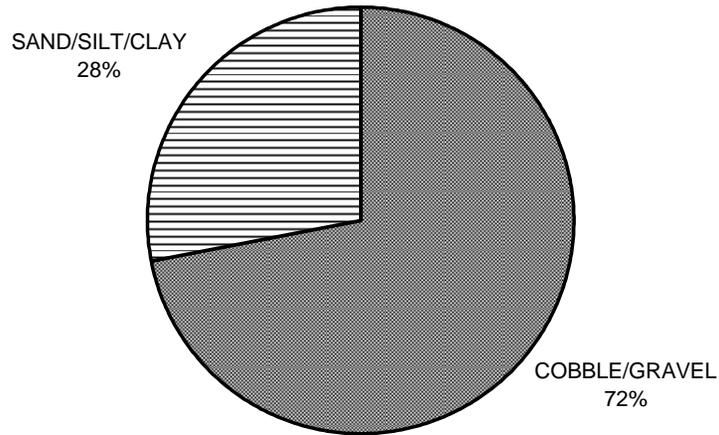
GRAPH 8

### SOUTH FORK GUALALA RIVER MEAN PERCENT CANOPY



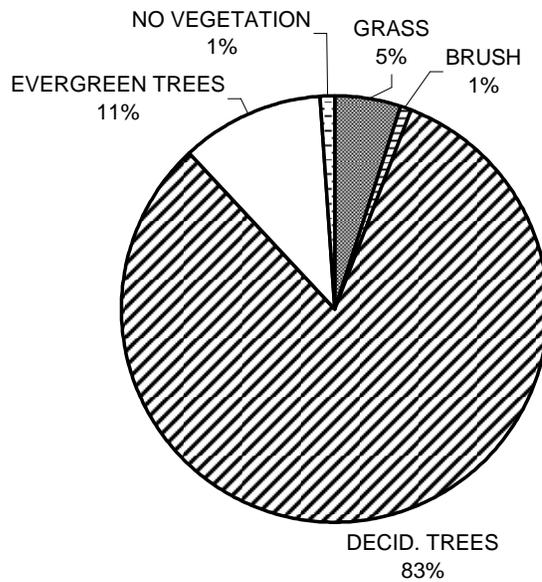
GRAPH 9

### SOUTH FORK GUALALA RIVER DOMINANT BANK COMPOSITION IN SURVEY REACH



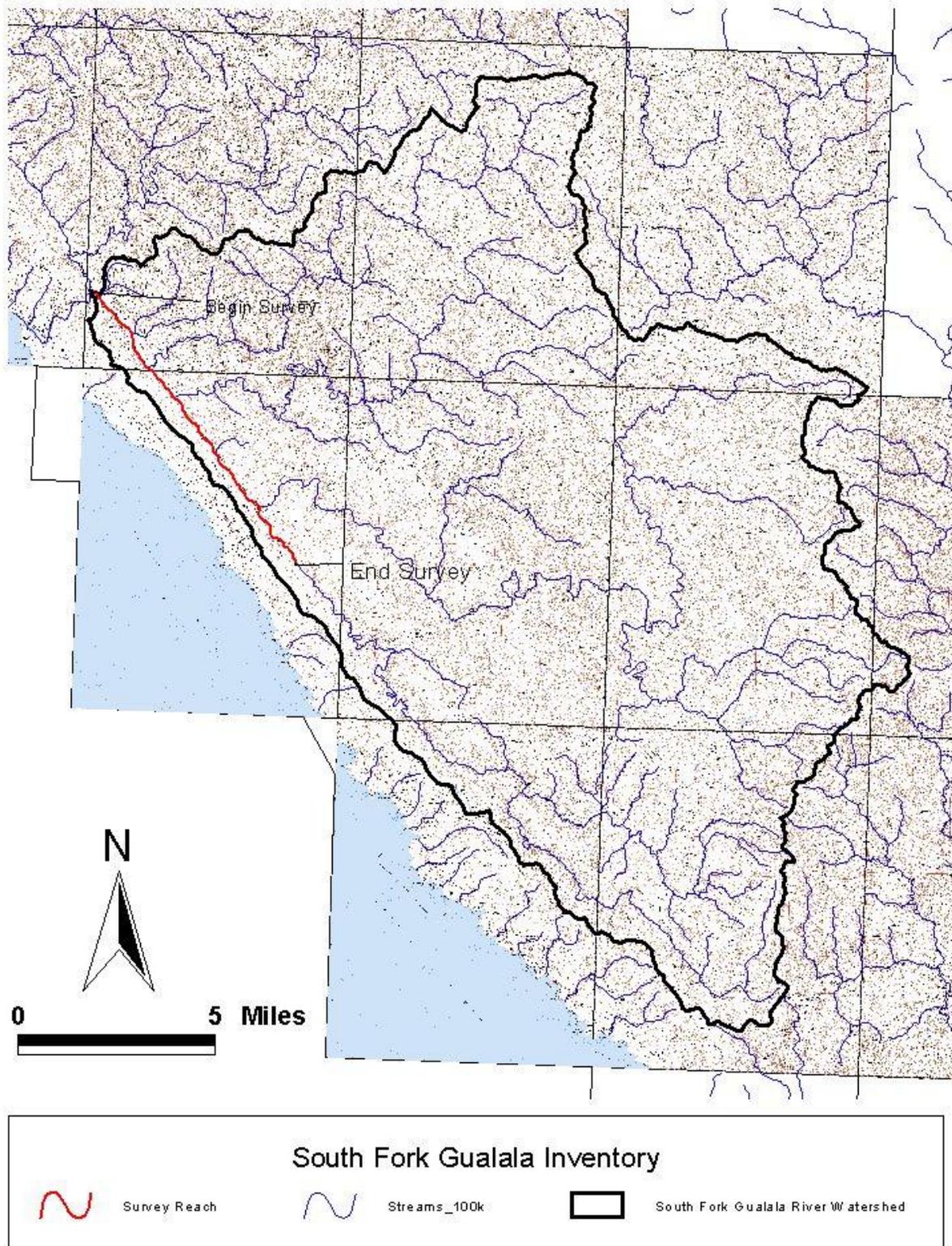
GRAPH 10

### SOUTH FORK GUALALA RIVER DOMINANT BANK VEGETATION IN SURVEY REACH



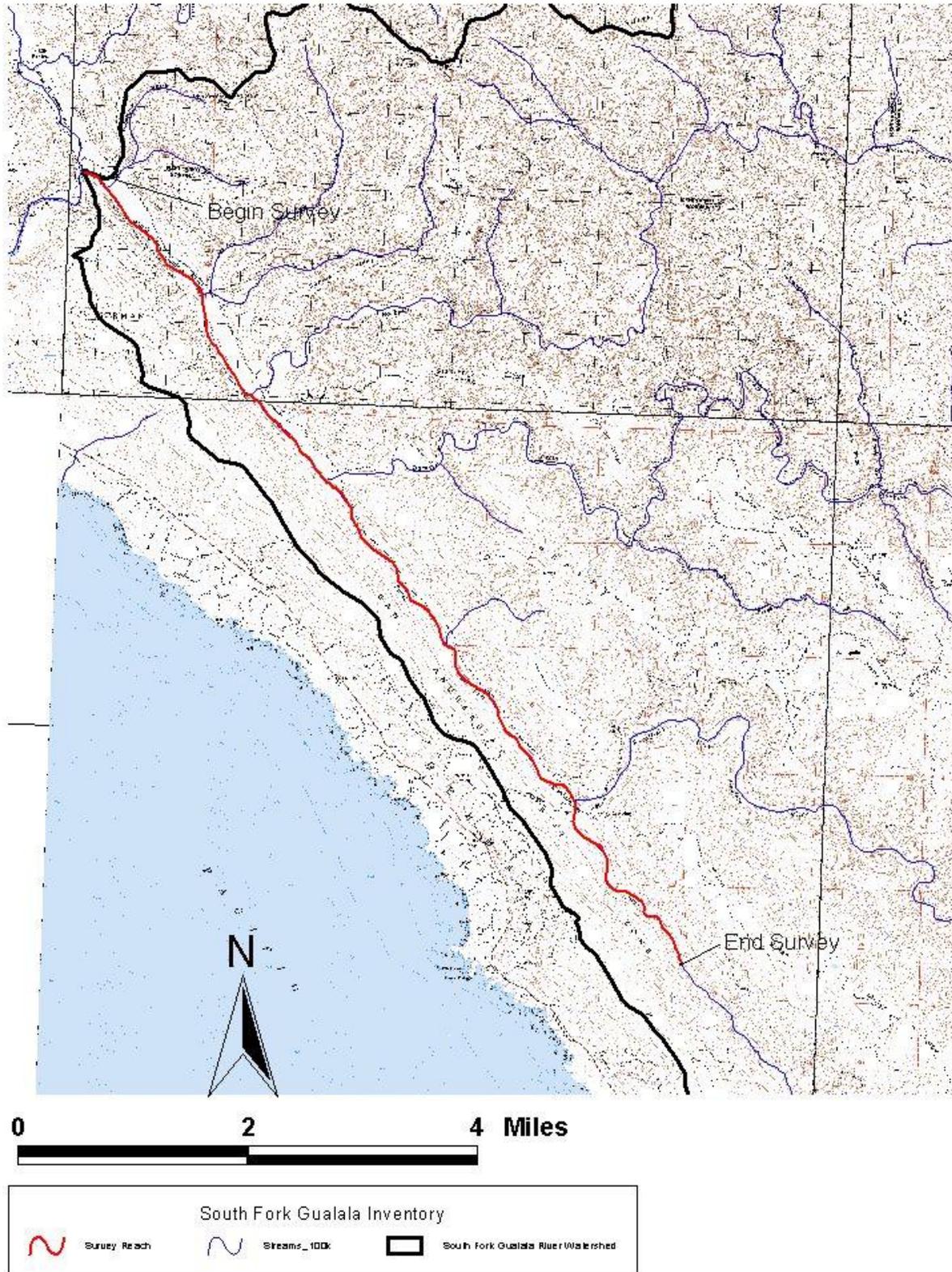
GRAPH 11

# South Fork Gualala River



MAP 1. Map of South Fork Gualala River showing the stream habitat inventory reach and watershed boundary.

# South Fork Gualala River



MAP 2. Map of South Fork Gualala River showing the stream habitat inventory reach.

## **South Fork Gualala River**

### REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

McCain, M., D. Fuller, L. Decker and K. Overton. 1990. Stream habitat classification and inventory procedures for northern California. FHC Currents. No.1. U.S. Department of Agriculture. Forest Service, Pacific Southwest Region.

Rosgen, D.L., 1994. A Classification of Natural Rivers. *Catena*, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.