

STREAM INVENTORY REPORT

South Fork Eel River Headwaters

INTRODUCTION

A stream inventory was conducted during August 8, 2007 to August 14, 2007 on the South Fork Eel River. The survey began at the confluence with Kenny Creek and extended upstream 5.4 miles.

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

A biological inventory of South Fork Eel River was last conducted in 1996 to document the presence and distribution of juvenile salmonid species. Data from that survey will also be included in this report.

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

The South Fork Eel River is a tributary to the Eel River, which drains to the Pacific Ocean, located in Mendocino and Humboldt Counties, California (Map 1). South Fork Eel River's legal description at the confluence with Kenny Creek is T21N R16W S22. Its location is 39.6591 north latitude and 123.6418 west longitude, LLID number 1239184403560. The South Fork Eel River is a third order stream from its headwaters to the point where it meets with Kenny Creek and has approximately 26.07 miles of blue line stream according to the USGS Lincoln Ridge 7.5 minute quadrangle. The South Fork Eel River headwaters drain a watershed of approximately 26.8 square miles. Elevations range from about 1,510 feet at the confluence with Kenny Creek to 2,400 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production, rangeland, dispersed recreation and rural residences. Vehicle access exists via U.S. Highway 101 to Laytonville. From Laytonville, travel west on Branscomb Road towards the town of Branscomb. When you get close to Branscomb, the South Fork Eel is on the left side of the road.

METHODS

The habitat inventory conducted in South Fork Eel River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians 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.

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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 Eel River to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near 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 (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 (1990). 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 Eel 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

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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 Eel 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 unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile 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 for prey. 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 Eel 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 densiometers 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 Eel 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 coniferous or hardwood 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 Eel River, the dominant composition type and the

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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.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks during habitat typing in the South Fork Eel River Headwaters. Detailed biological sampling (electrofishing and/or underwater observation) was not conducted on the South Fork Eel River Headwaters during the 2007 survey season. Data from a September 9, 1996 backpack electrofishing survey is listed in the Biological Inventory Results section of this report. Electrofishing sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, 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:

- 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

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- 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 South Fork Eel River 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

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 8, 2007 to August 14, 2007, was conducted by C. Hines (DFG) and M. Reneski (PSMFC). The total length of the stream surveyed was 28,385 feet with an additional 171 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.4 cfs on August 16, 2007.

South Fork Eel River is an F4 channel type for 28,385 of the stream surveyed (Reach 1).

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 61 degrees Fahrenheit. Air temperatures ranged from 53 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 34% flatwater units, and 27% riffle units (Graph 1). Based on total length of Level II habitat types there were 42% flatwater units, 41% pool units and 17% riffle units (Graph 2).

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Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 33% mid-channel pool units, 27% low gradient riffle units and 19% run units (Graph 3). Based on percent total length, mid-channel pool units made up 37%, run units 22%, and step run units 20%.

A total of 85 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 85% (Graph 4), and comprised 91% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Forty-nine of the 85 pools (58%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 85 pool tail-outs measured, 9 had a value of 1 (10.6%); 35 had a value of 2 (41.2%); 40 had a value of 3 (47.1%); 1 had a value of 5 (1.2%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

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. Riffle habitat types had a mean shelter rating of 19, flatwater habitat types had a mean shelter rating of 40, and pool habitats had a mean shelter rating of 47 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 88, main channel pools had a mean shelter rating of 41, and backwater pools had a mean shelter rating of 15 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation is the dominant cover types in South Fork Eel River. Graph 7 describes the pool cover in South Fork Eel River. Bedrock ledges are the dominant pool cover type followed by terrestrial vegetation.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 73% of pool tail-outs and small cobble observed in 26% of pool tail-outs.

The mean percent canopy density for the surveyed length of South Fork Eel River was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 81% and 19%, respectively. Graph 9 describes the mean percent canopy in South Fork Eel River.

For the stream reach surveyed, the mean percent right bank vegetated was 95%. The mean percent left bank vegetated was 95%. The dominant elements composing the structure of the stream banks consisted of 62% sand/silt/clay, 21% cobble/gravel, and 17% bedrock (Graph 10). Hardwood trees were the dominant vegetation type observed in 88.6% of the units surveyed. Additionally, 10.9% of the units surveyed had coniferous trees as the dominant vegetation type, and 0.5% had brush as the dominant vegetation (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

One site was surveyed with a backpack electrofisher on September 9, 1996, in the upper South Fork Eel River. The site was sampled by R. Goodfield (DFG) and T. Kraemer (WSP) for fish presence and identification. The site sampled was located approximately 30,418 feet from the confluence with Mud Creek. The site yielded 15 young-of-the-year (YOY) steelhead/rainbow trout, three 1+ steelhead/rainbow trout and eight YOY coho salmon.

DISCUSSION

South Fork Eel River is an F4 channel type for the entire 28,385 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channels are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover.

The water temperatures recorded on the survey days August 8, 2007 to August 14, 2007 ranged from 53 to 61 degrees Fahrenheit. Air temperatures ranged from 53 to 70 degrees Fahrenheit. 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 42% of the total length of this survey, riffles 17%, and pools 41%. The pools are relatively deep, with 49 of the 85 (58%) pools having a maximum residual 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. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width.

Forty-four of the 85 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Eighty-four of the 85 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 47. The shelter rating in the flatwater habitats was 40. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by terrestrial vegetation in South Fork Eel River. Bedrock ledges are the dominant cover type in pools followed by terrestrial vegetation. 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.

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The mean percent canopy density for the stream was 95%. In general, revegetation projects are considered when canopy density is less than eighty percent.

The percentage of right and left bank covered with vegetation was 95% and 95%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

- 1) South Fork Eel River should be managed as an anadromous, natural production stream.
- 2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from bedrock ledges. Adding high quality complexity with woody cover in the pools is desirable.
- 3) The limited water temperature data available suggest that maximum temperatures are within 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.

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.

Position (ft.):	Habitat Units #:	Comments:
0	0001.00	Begin survey at the confluence with Kenny Creek. Tributary (trib#01), Kenny Creek, enters right bank with an estimated discharge of 0.1 cubic feet per second (cfs), contributing approximately 10% to downstream flow. The temperature of the tributary and of the South Fork Eel River is fifty-eight degrees Fahrenheit. At least the first hundred feet of the tributary are accessible to fish. Slope is estimated at 6% with a clinometer. Juvenile salmonids were observed.
76	0002.00	Footbridge observed one hundred thirty-five feet into unit.
1361	0009.00	Juvenile salmonids were observed.
1941	0012.00	Bridge #01 is 105 feet into the habitat unit on a logging road and is made of steel. It is 18' wide x 15' high x 65' long.
2095	0013.00	Juvenile salmonids were observed.

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3107	0018.00	There were remnants of an old log stringer bridge 290 feet into the habitat unit.
3996	0023.00	There was a cobblestone dam forming a pool with water uptake pump for mill.
11903	0081.00	Mud Creek (trib#02) entered from the right bank 58' into unit. The flow was estimated to be 0.2cfs. The temperature of tributary was 61 degrees Fahrenheit, while the temperature of South Fork Eel River downstream and upstream was 58 degrees Fahrenheit. Mud Creek is accessible to fish. The slope is 3% at mouth. Juvenile salmonids were observed in the tributary.
12058	0082.00	The water was much less turbid upstream of Mud Creek.
13080	0091.00	A tributary (trib#03) enters left bank at top of unit flowing at an estimated 0.1 cfs, contributing an estimated 2% to downstream flow. The temperature of the South Fork Eel River and tributary is 53 degrees Fahrenheit. No fish were observed even though it was accessible for the first 100 feet. The slope was measured to be 10%.
16868	0122.00	Taylor Creek (trib#04) enters from the right bank at top of the habitat unit. The flow was estimated to be less than 0.1 cfs, contributing an estimated 5% to the downstream flow of South Fork Eel. The temperature upstream of the Taylor Creek confluence was 54 degrees Fahrenheit while Taylor Creek and downstream of the confluence were 55 degrees Fahrenheit. Slope of Taylor Creek was measured to be 8% by clinometer. It was accessible to fish, juvenile salmonids were observed.
19042	0139.00	A tributary (trib#05) entered from the left bank 83' into unit. The flow was estimated to be less than 0.1 cfs, contributing an estimated 5% to downstream flow. The temperature of the tributary was 54 degrees Fahrenheit, while the South Fork Eel upstream and downstream of the confluence was 55 degrees Fahrenheit. Using a clinometer the slope of tributary was measured to be 8% and it is was accessible to fish for at least 100 feet. Juvenile salmonids were observed.
20308	0151.00	Eight foot culvert 100' upstream on tributary. Juvenile salmonids observed above culvert.
20308	0151.00	Bear Creek (trib#06) enters from the right bank 80' into unit. The flow was estimated to be less than 0.1 cfs, contributing an estimated 15% to the downstream flow. The temperature of the tributary was 58 degrees Fahrenheit, while the temperature of the SF Eel downstream and

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upstream of the confluence was 57 degrees Fahrenheit. Juvenile salmonids were observed in Bear Creek. The slope was measured by clinometer to be 6%.

20670	0154.00	There was an old log stringer bridge at top of habitat unit.
21624	0162.00	Juvenile salmonids and 2+ steelhead have been consistently observed throughout the entire survey.
22498	0169.00	Junked car in channel.
23137	0174.00	A perched culvert on right bank is causing erosion. It is contributing sediment 70' into habitat unit.
23691	0179.00	A tributary (trib#07) enters from the left bank. It had an estimated flow of less than 0.1 cfs, contributing and estimated 20% to the downstream flow. The temperature of the tributary was 55 degrees Fahrenheit, while upstream of the confluence the temperature was 56 degrees Fahrenheit and downstream of the confluence the temperature was 57 degrees Fahrenheit. The slope was measured by clinometer to be 7%. While no fish were observed the tributary was accessible for at least the first 120' where a log debris accumulation (LDA) was located.
24931	0191.00	A ford wet crossing was located at the bottom of habitat unit.
25889	0198.00	A tributary (trib#08) enters the top of the unit and is not flowing at the confluence. The temperature of the tributary was 53 degrees Fahrenheit while the temperature of the South Fork Eel River was 55 degrees Fahrenheit both upstream as well as downstream of the confluence. The slope was measured to be 9% by clinometer. While the tributary appeared to be accessible to fish, none were observed.
27826	0215.00	A wet ford crossing at bottom of unit.
27964	0216.00	Wise Gulch entered from the right bank. It was dry at the time of survey.
28385	0218.00	End of survey.

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.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

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

CASCADE

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

FLATWATER

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

MAIN CHANNEL POOLS

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

SCOUR POOLS

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

BACKWATER POOLS

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

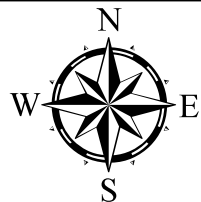
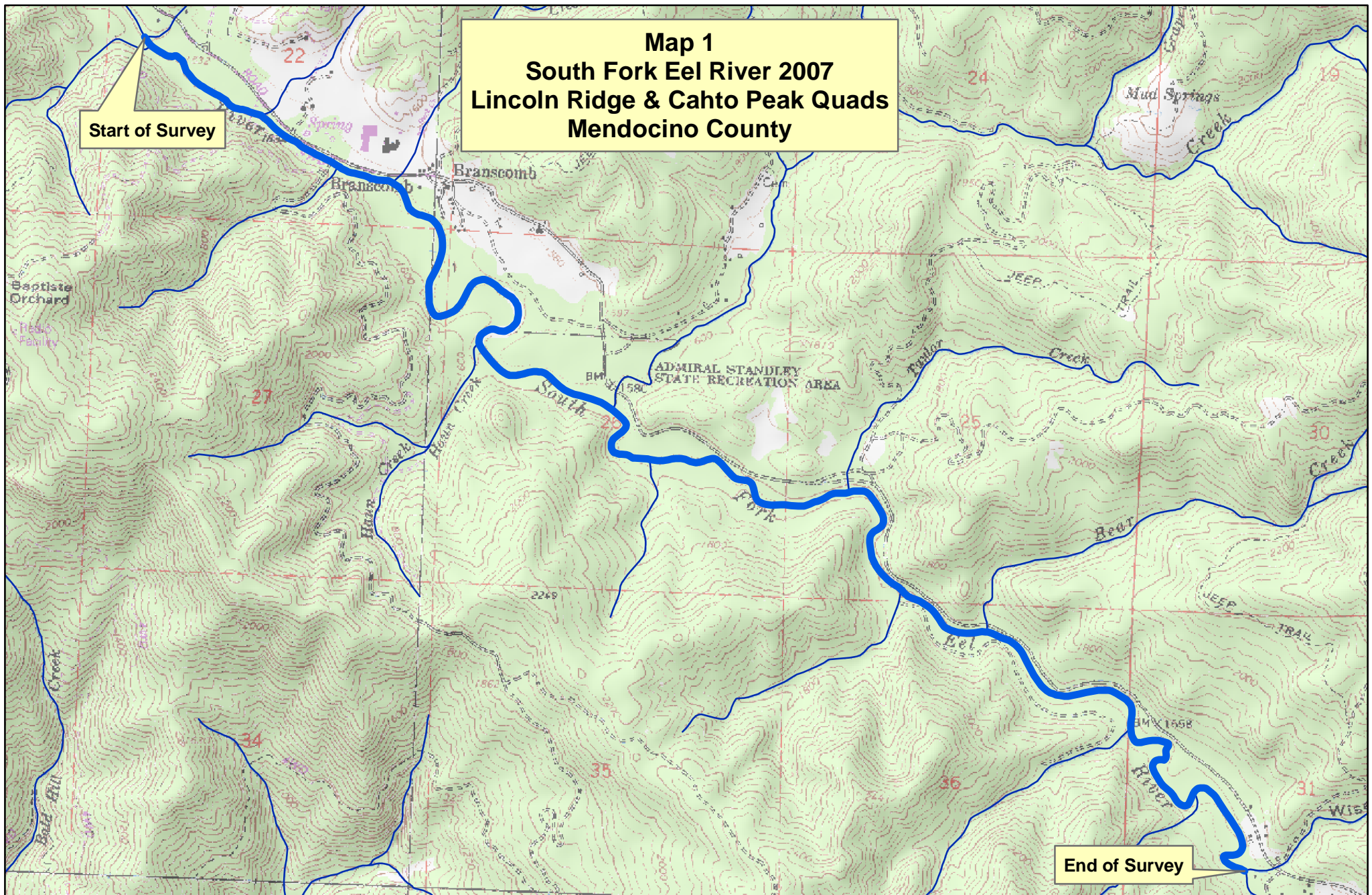
ADDITIONAL UNIT DESIGNATIONS

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

Map 1
South Fork Eel River 2007
Lincoln Ridge & Cahto Peak Quads
Mendocino County

Start of Survey

End of Survey



Legend

 Reach 1, F4 Channel Type

0 1,500 3,000 6,000 Feet



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

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0

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
75	14	FLATWATER	34.1	159	11893	41.6	17.9	0.8	1.6	2651	198837	2304	172821		40
85	85	POOL	38.6	139	11803	41.3	23.6	1.9	3.5	3422	290909	8350	709714	6906	47
60	11	RIFFLE	27.3	81	4860	17.0	11.5	0.4	0.7	783	47002	374	22444		19
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
220	110				28556					536748			904980		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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 (%)
60	11	LGR	27.3	81	4860	17.0	12	0.4	1.1	783	47002	374	22444		19	94
41	8	RUN	18.6	153	6279	22.0	18	0.8	2.2	2637	108128	2253	92390		32	92
34	6	SRN	15.5	165	5614	19.7	18	0.8	3	2670	90769	2372	80651		51	93
72	72	MCP	32.7	148	10689	37.4	25	1.9	8	3746	269685	9239	665202	7660	41	96
1	1	CRP	0.5	47	47	0.2	22	2.4	3.1	1034	1034	2999	2999	2482	180	95
2	2	LSL	0.9	84	167	0.6	18	1.9	4.4	1518	3035	3806	7612	3245	150	94
2	2	LSR	0.9	64	129	0.5	14	1.2	2.1	938	1875	1383	2766	1055	143	99
5	5	LSBk	2.3	103	516	1.8	20	1.4	5.5	2134	10670	4460	22302	3572	35	97
2	2	LSBo	0.9	78	155	0.5	16	1.5	2.8	1304	2609	2417	4833	1440	60	100
1	1	DPL	0.5	100	100	0.4	20	1.8	3.1	2000	2000	4000	4000	3600	15	98

Total Units
220

Total Units Fully Measured
110

Total Length (ft.)
28556

Total Area (sq.ft.)
536808

Total Volume (cu.ft.)
905200

Table 3 - Summary of Pool Types

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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
72	72	MAIN	85	148	10689	91	24.6	1.9	3746	269685	7660	551554	41
12	12	SCOUR	14	85	1014	9	18.1	1.5	1602	19224	2652	31821	88
1	1	BACKWATER	1	100	100	1	20.0	1.8	2000	2000	3600	3600	15

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
85	85	11803	290909	586975

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

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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
72	MCP	85	0	0	9	13	18	25	18	25	27	38
1	CRP	1	0	0	0	0	0	0	1	100	0	0
2	LSL	2	0	0	0	0	1	50	0	0	1	50
2	LSR	2	0	0	0	0	2	100	0	0	0	0
5	LSBk	6	0	0	0	0	4	80	0	0	1	20
2	LSBo	2	0	0	1	50	1	50	0	0	0	0
1	DPL	1	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
85			0	0	10	12	26	31	20	24	29	34

Mean Maximum Residual Pool Depth (ft.): 3.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Dry Units: 0

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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
60	11	LGR	0	13	6	0	46	0	1	34	0
60	11	TOTAL RIFFLE	0	13	6	0	46	0	1	34	0
41	8	RUN	27	27	3	0	25	0	0	13	5
34	6	SRN	5	17	8	0	28	0	0	38	3
75	14	TOTAL FLAT	16	22	6	0	27	0	0	26	4
72	71	MCP	13	18	10	8	20	0	0	10	21
1	1	CRP	30	40	30	0	0	0	0	0	0
2	2	LSL	0	15	55	15	15	0	0	0	0
2	2	LSR	0	20	0	60	20	0	0	0	0
5	5	LSBk	4	14	0	0	24	0	0	10	48
2	2	LSBo	0	30	0	0	20	0	0	50	0
1	1	DPL	0	0	0	0	30	0	0	0	70
85	84	TOTAL POOL	12	18	10	9	20	0	0	10	22
220	109	TOTAL	11	18	9	7	23	0	0	14	18

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Dry Units: 0

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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
60	11	LGR	0	0	36	55	9	0	0
41	8	RUN	0	0	63	25	0	0	13
34	6	SRN	0	0	50	50	0	0	0
72	72	MCP	0	3	74	18	4	0	1
1	1	CRP	0	0	100	0	0	0	0
2	2	LSL	0	0	50	50	0	0	0
2	2	LSR	0	0	100	0	0	0	0
5	5	LSBk	0	0	60	40	0	0	0
2	2	LSBo	0	0	0	50	50	0	0
1	1	DPL	0	0	0	100	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	19	81	0	95	95

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.

Stream Name:	South Fork Eel River	LLID:	1239184403560	Drainage:	Eel River - South Fork		
Survey Dates:	8/8/2007 to 8/14/2007	Survey Length (ft.):	28556	Main Channel (ft.):	28385	Side Channel (ft.):	171
Confluence Location:	Quad: GARBERVILLE	Legal Description:	T01SR02ES26	Latitude:	40:21:22.0N	Longitude:	123:55:06.0W

STREAM REACH: 1									
Channel Type: F4			Canopy Density (%): 94.6				Pools by Stream Length (%): 41.3		
Reach Length (ft.): 28385			Coniferous Component (%): 18.6				Pool Frequency (%): 38.6		
Riffle/Flatwater Mean Width (ft.): 15.1			Hardwood Component (%): 81.4				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Hardwood Trees				< 2 Feet Deep: 12		
Range (ft.): 17 to 59			Vegetative Cover (%): 95.2				2 to 2.9 Feet Deep: 31		
Mean (ft.): 31			Dominant Shelter: Terrestrial Veg.				3 to 3.9 Feet Deep: 24		
Std. Dev.: 9			Dominant Bank Substrate Type: Sand/Silt/Clay				>= 4 Feet Deep: 34		
Base Flow (cfs.): 0.4			Occurrence of LWD (%): 9				Mean Max Residual Pool Depth (ft.): 3.5		
Water (F): 53 - 61			Air (F): 53 - 70				Mean Pool Shelter Rating: 47		
Dry Channel (ft): 0			LWD per 100 ft.:						
			Riffles: 0						
			Pools: 0						
			Flat: 0						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 73 Sm Cobble: 26 Lg Cobble: 0 Boulder: 0 Bedrock: 1									
Embeddedness Values (%): 1. 10.6 2. 41.2 3. 47.1 4. 0.0 5. 1.2									

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

Legal Description: T01SR02ES26

Latitude: 40:21:22.0N

Longitude: 123:55:06.0W

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	12	25	16.8
Boulder	0	0	0.0
Cobble / Gravel	24	22	20.9
Sand / Silt / Clay	74	63	62.3

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	1	0	0.5
Hardwood Trees	99	96	88.6
Coniferous Trees	10	14	10.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

2

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

StreamName: South Fork Eel River

LLID: 1239184403560

Drainage: Eel River - South Fork

Survey Dates: 8/8/2007 to 8/14/2007

Confluence Location: Quad: GARBERVILLE

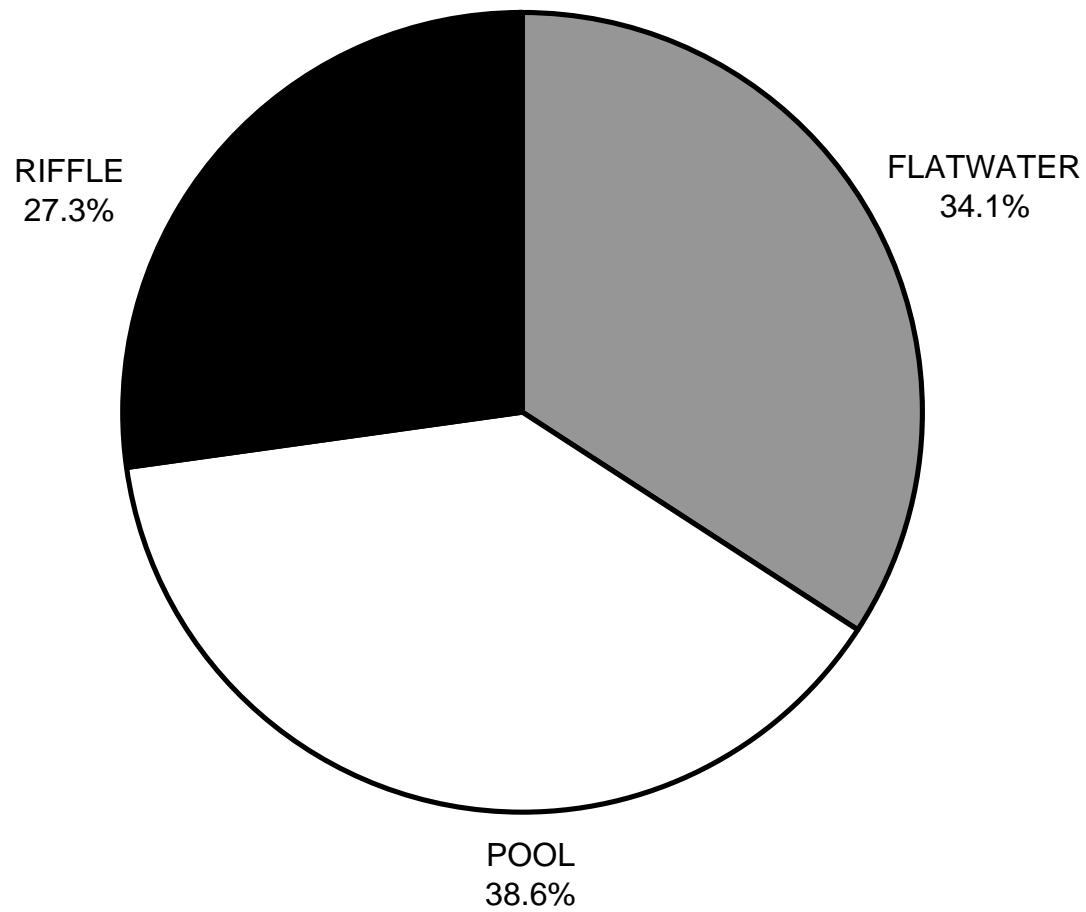
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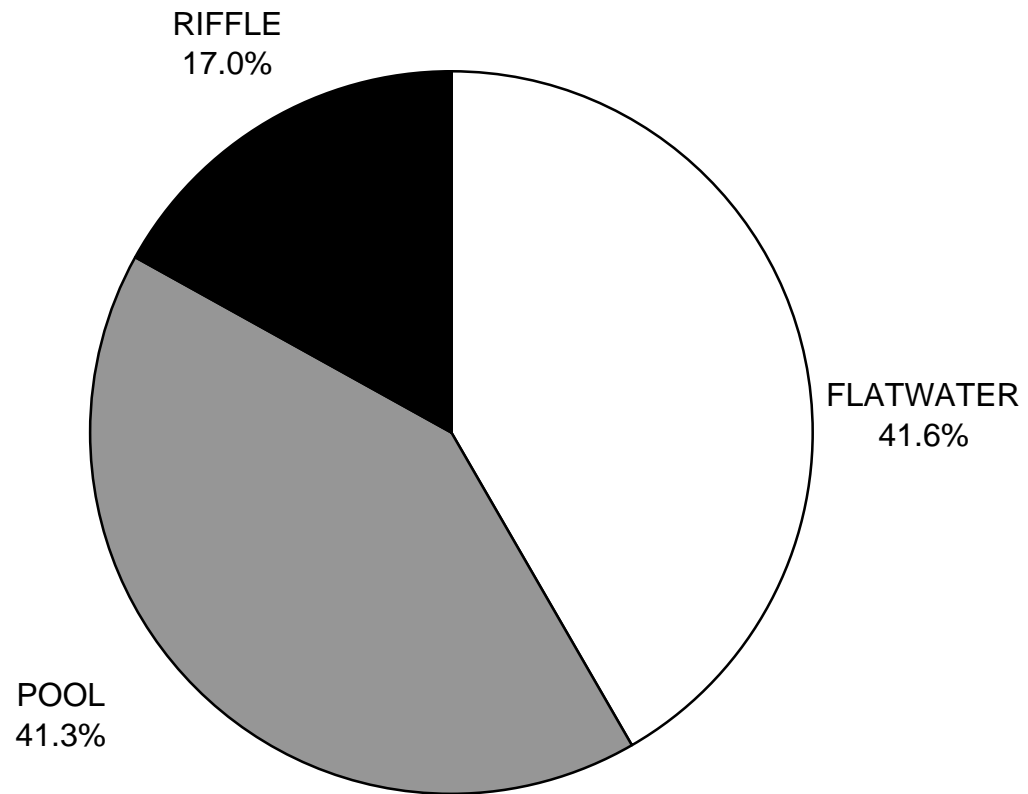
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	16	12
SMALL WOODY DEBRIS (%)	13	22	18
LARGE WOODY DEBRIS (%)	6	6	10
ROOT MASS (%)	0	0	9
TERRESTRIAL VEGETATION (%)	46	27	20
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	1	0	0
BOULDERS (%)	34	26	10
BEDROCK LEDGES (%)	0	4	22

**SOUTH FORK EEL RIVER 2007
HABITAT TYPES BY PERCENT OCCURRENCE**



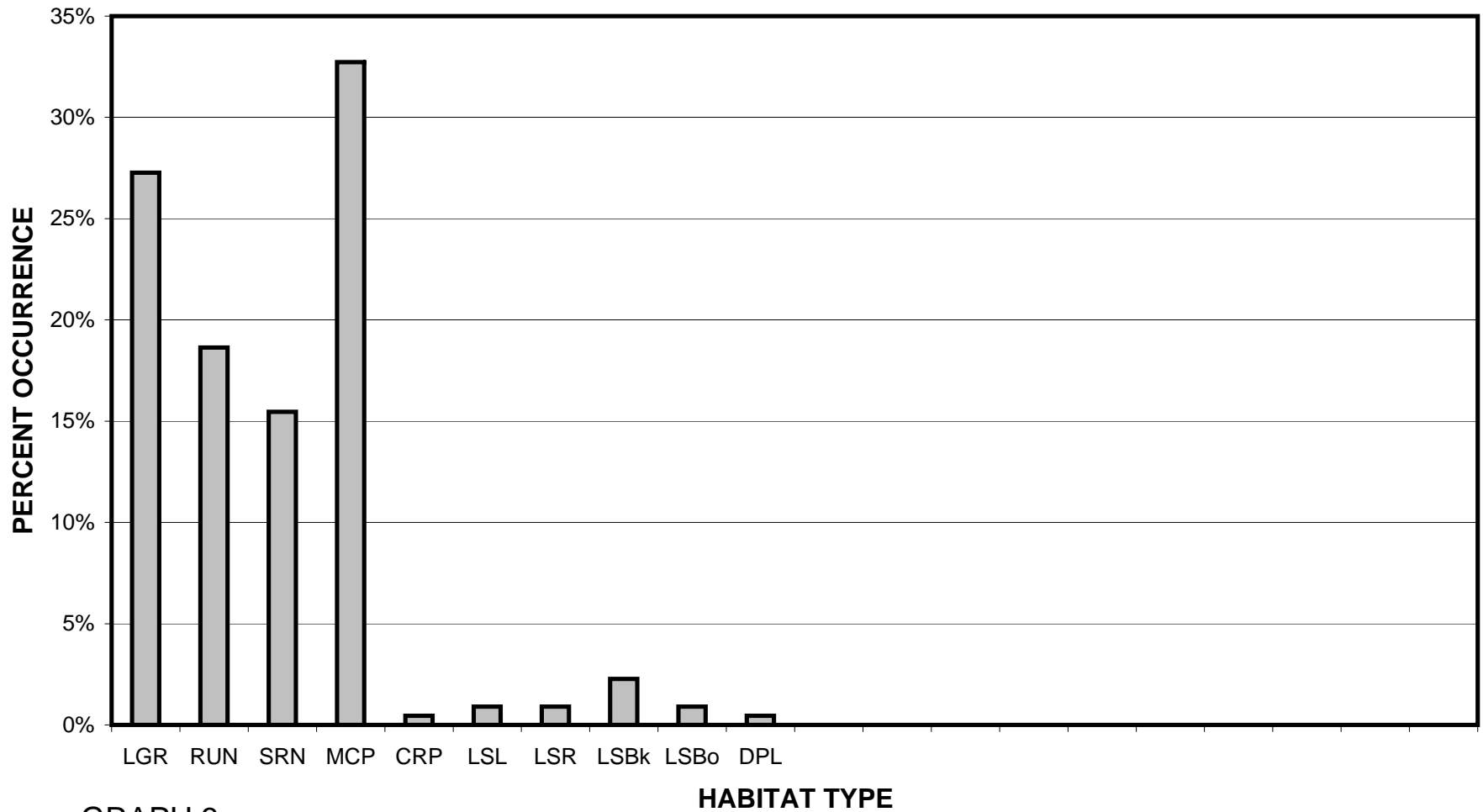
GRAPH 1

SOUTH FORK EEL RIVER 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH



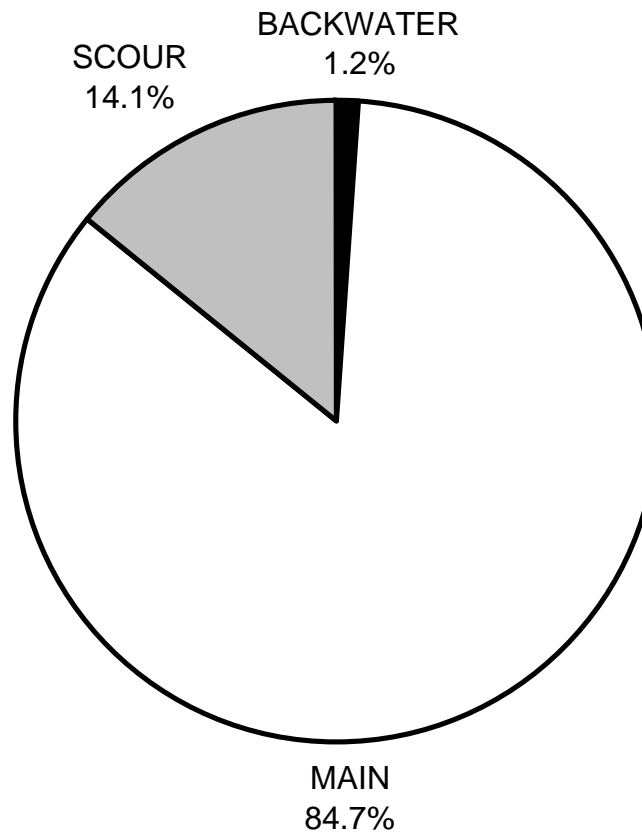
GRAPH 2

SOUTH FORK EEL RIVER 2007 **HABITAT TYPES BY PERCENT OCCURRENCE**



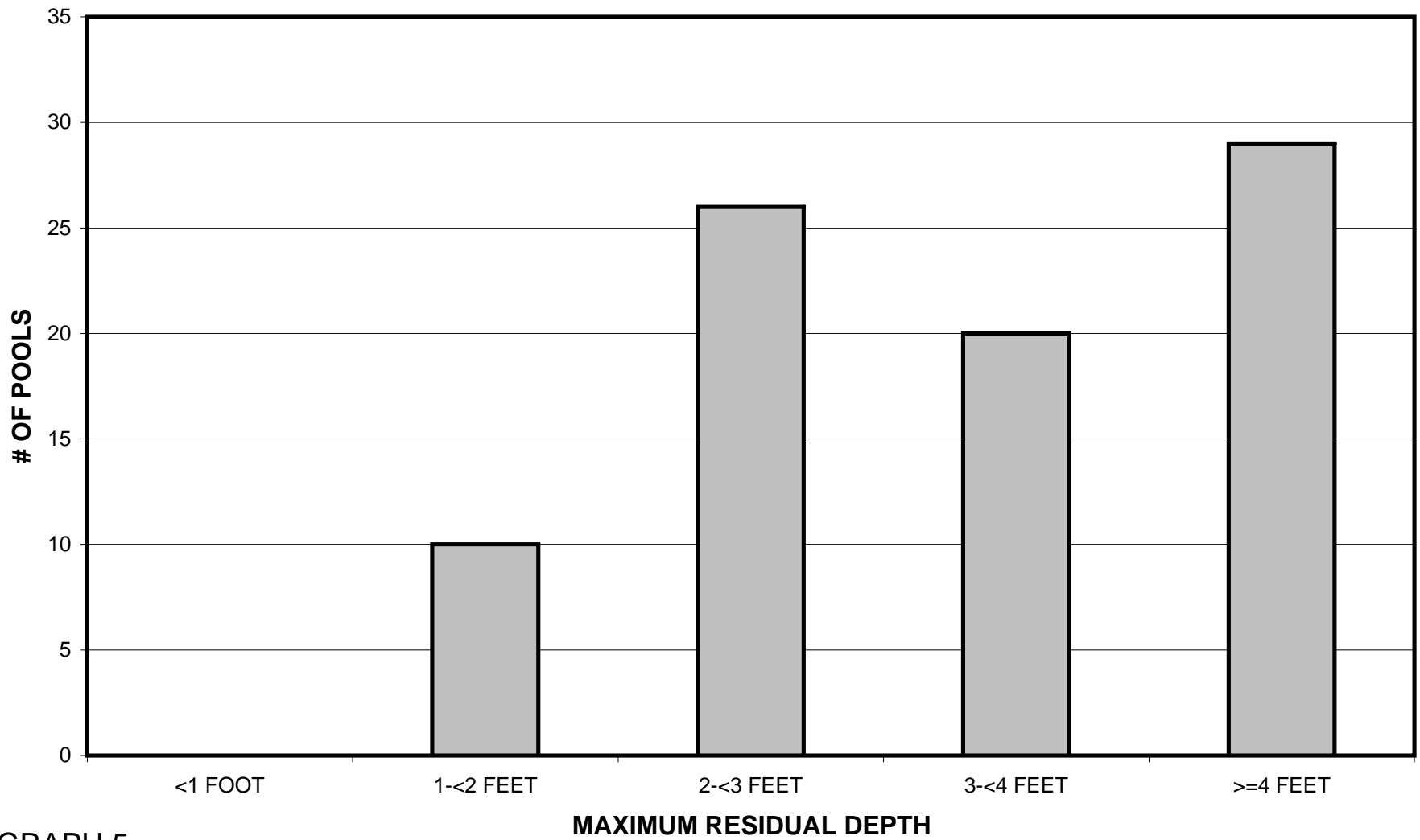
GRAPH 3

**SOUTH FORK EEL RIVER 2007
POOL TYPES BY PERCENT OCCURRENCE**



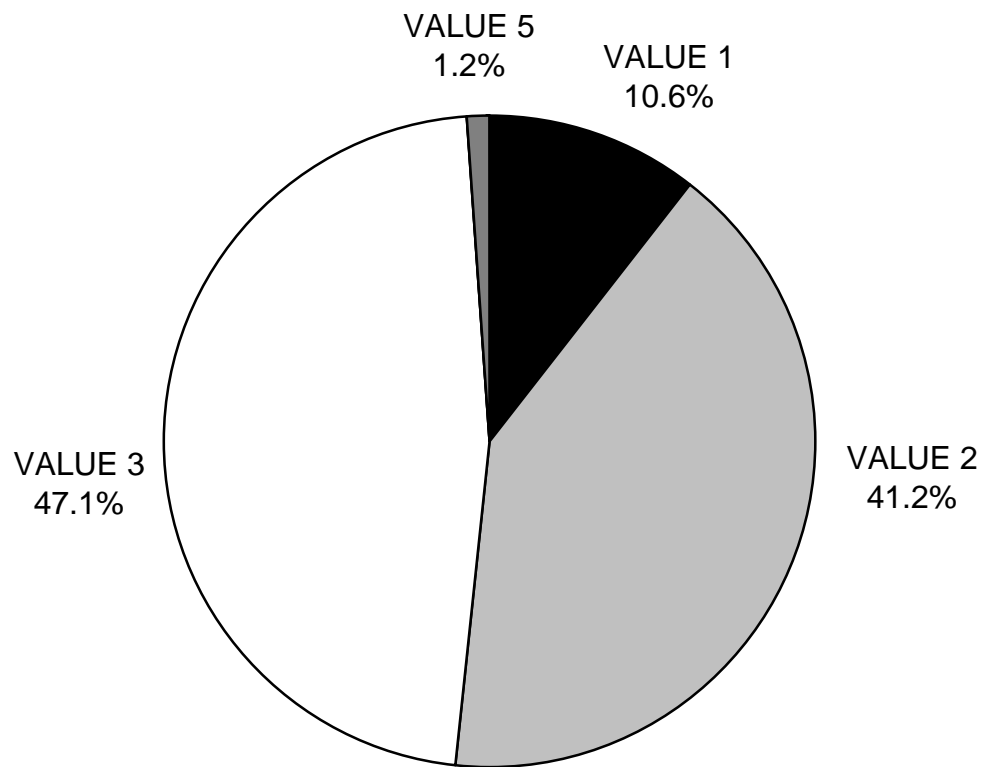
GRAPH 4

SOUTH FORK EEL RIVER 2007 MAXIMUM DEPTH IN POOLS



GRAPH 5

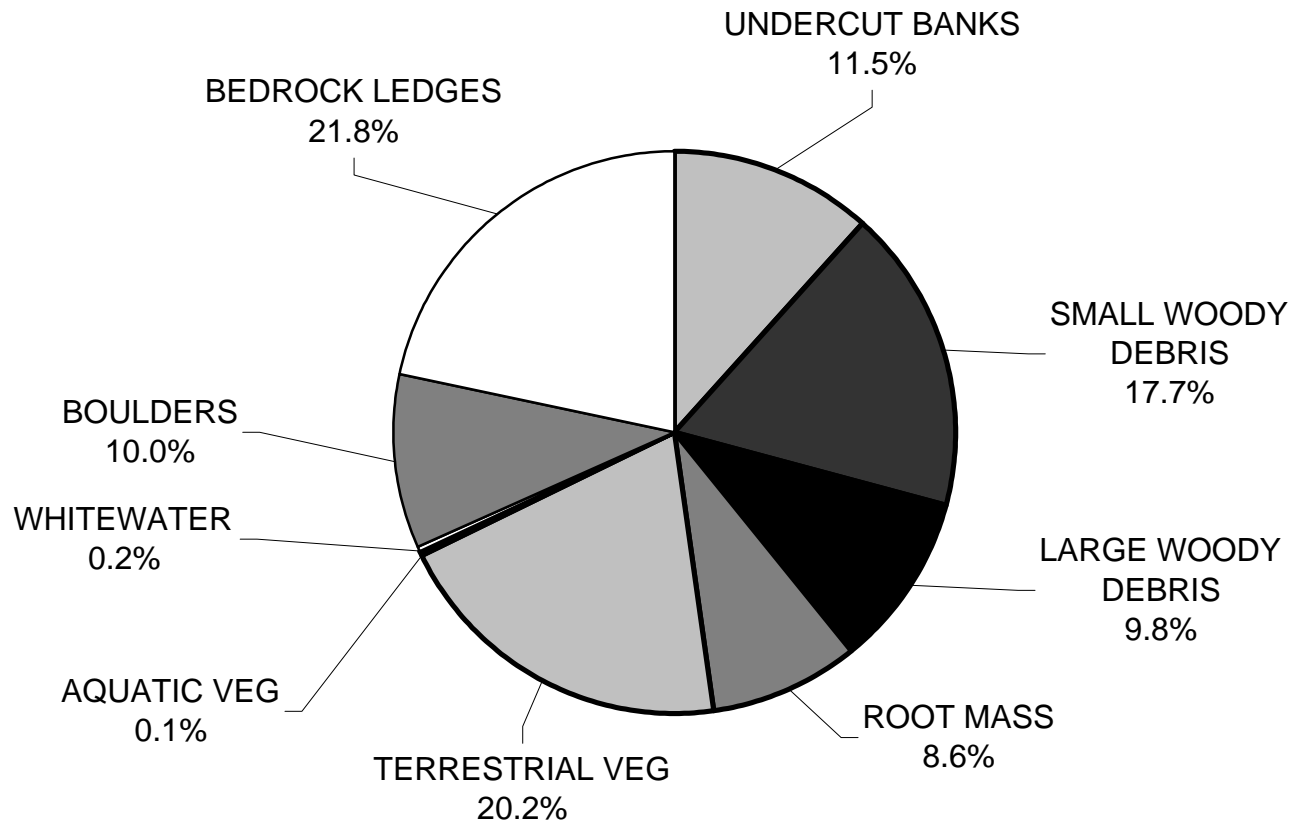
SOUTH FORK EEL RIVER 2007 PERCENT EMBEDDEDNESS



GRAPH 6

SOUTH FORK EEL RIVER 2007

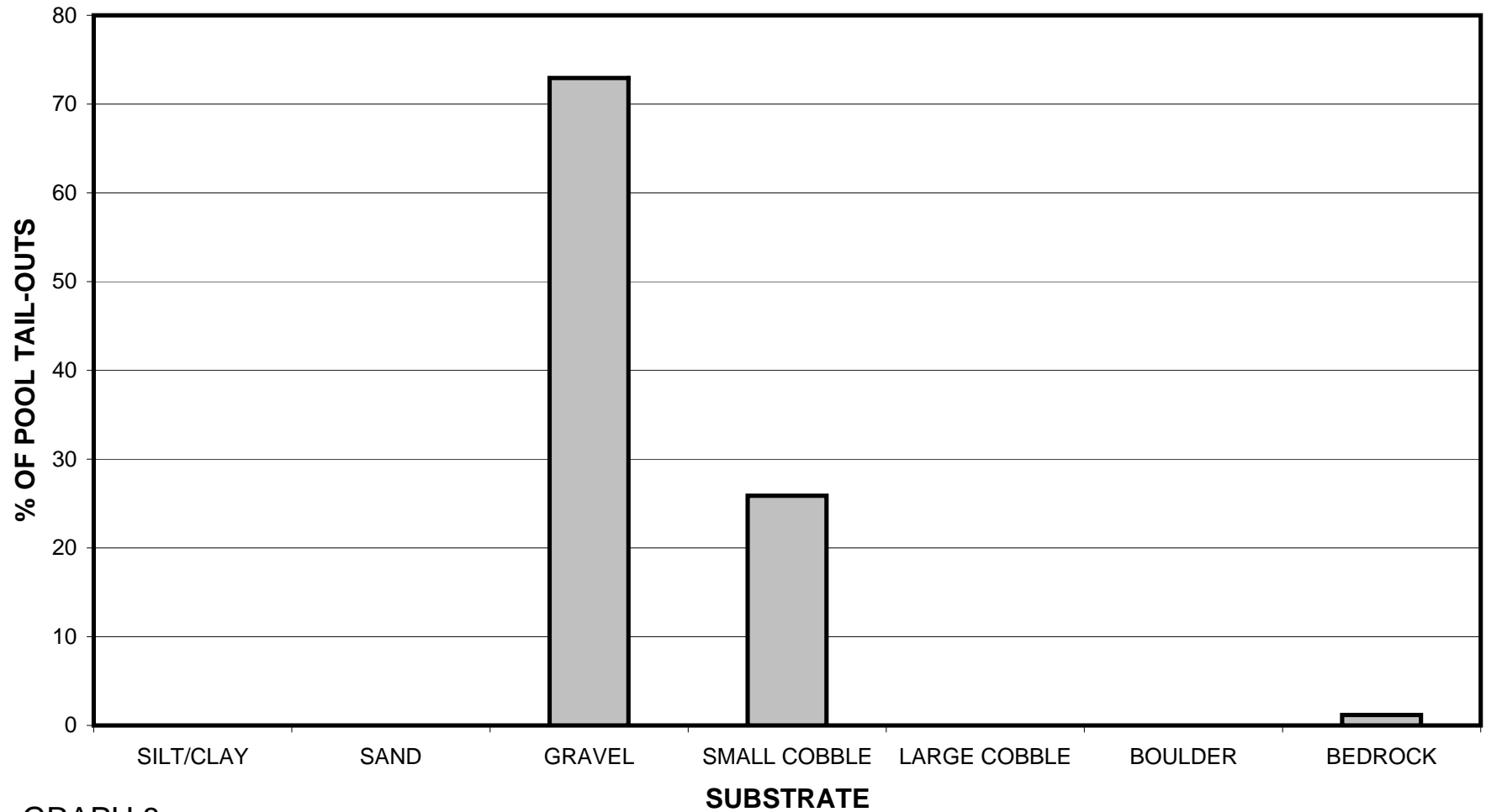
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

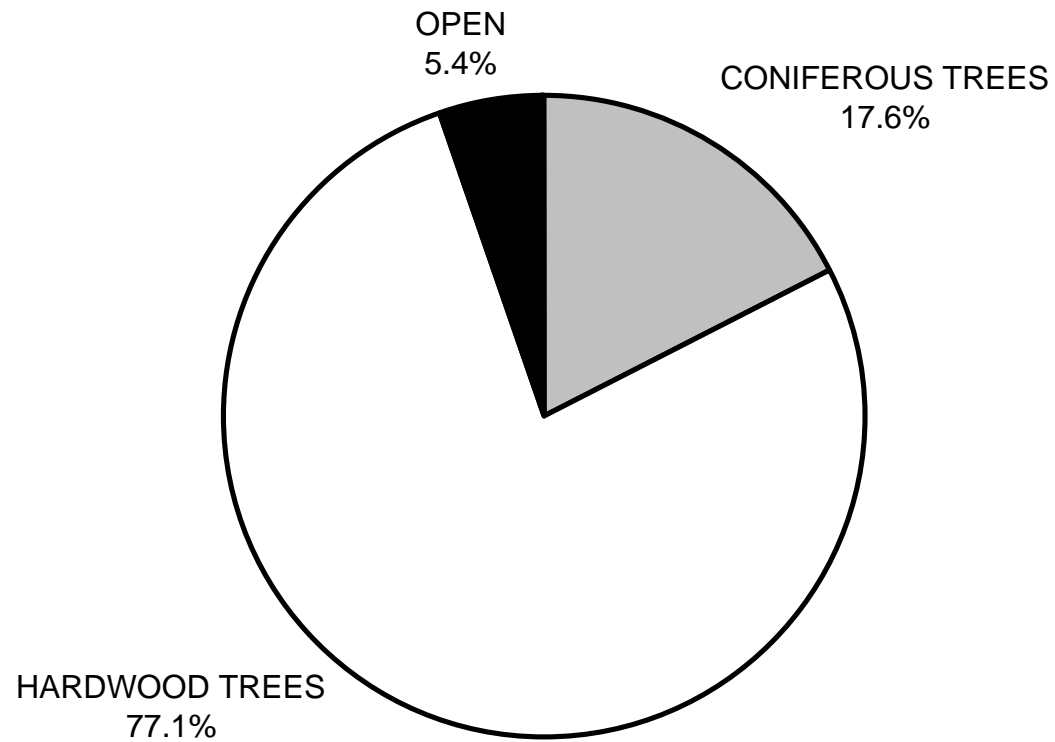
SOUTH FORK EEL RIVER 2007

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



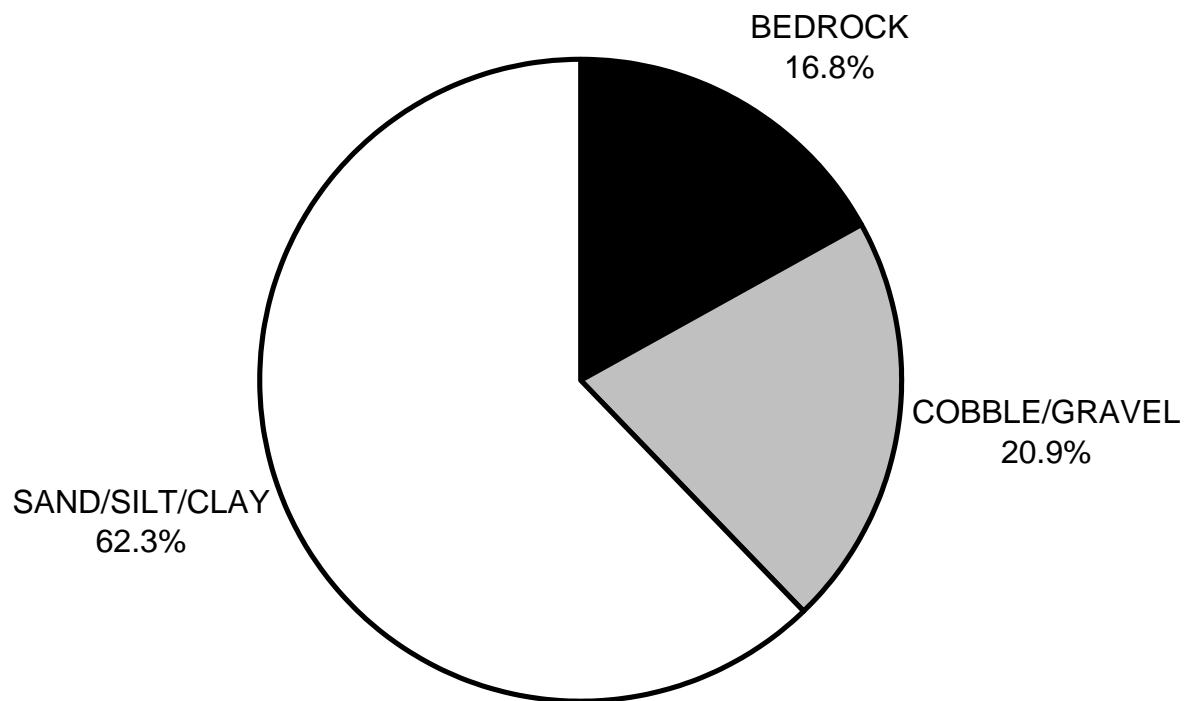
GRAPH 8

**SOUTH FORK EEL RIVER 2007
MEAN PERCENT CANOPY**



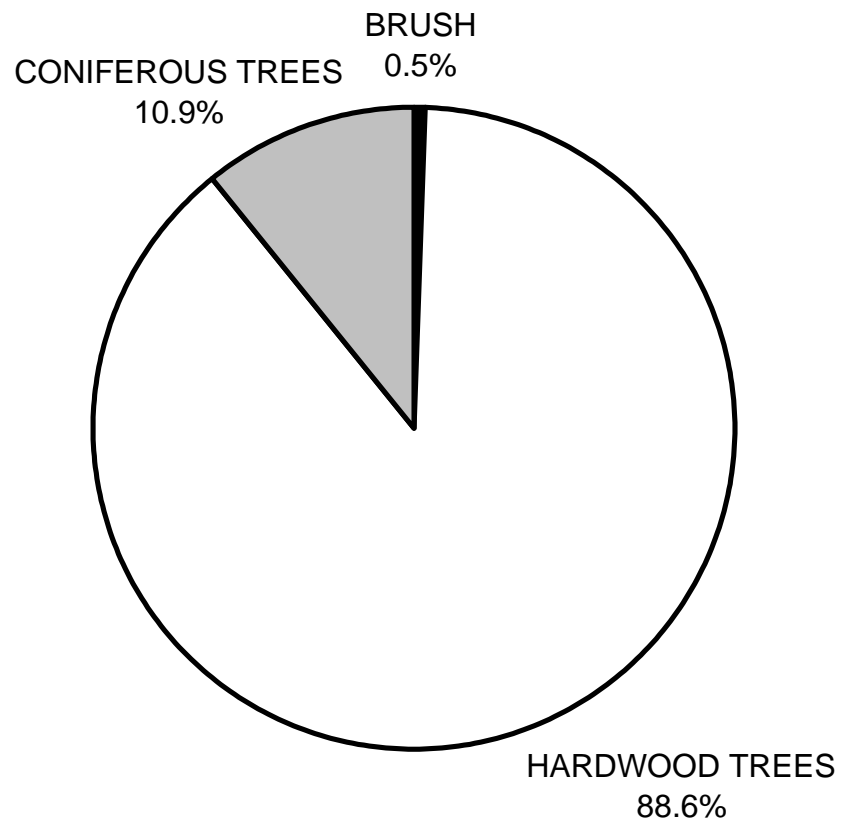
GRAPH 9

**SOUTH FORK EEL RIVER 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**SOUTH FORK EEL RIVER 2007
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11