

STREAM INVENTORY REPORT

South Fork Salmon Creek

INTRODUCTION

A stream inventory was conducted during October 11, 2007 to October 29, 2007 on South Fork Salmon Creek. The survey began at the confluence with Salmon Creek and extended upstream 3.7 miles.

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

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

South Fork Salmon Creek is a tributary to Salmon Creek, tributary to the South Fork Eel River, tributary to Eel River which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). South Fork Salmon Creek's legal description at the confluence with Salmon Creek is T3S R3E S7. Its location is 40.2147 north latitude and 123.8913 west longitude, LLID number 1238913402146. South Fork Salmon Creek is a third order stream and has approximately 5.6 miles of blue line stream according to the USGS Ettersburg 7.5 minute quadrangle. South Fork Salmon Creek drains a watershed of approximately 12.5 square miles. Elevations range from about 380 feet at the mouth of the creek to 2,000 feet in the headwater areas. Mixed conifer and grasslands dominate the watershed. The watershed is privately owned and is managed for rural subdivision. Vehicle access exists via Highway 101 to Salmon Creek Road. Exit the highway and proceed approximately 2.5 miles on Salmon Creek Road to Thomas Road. Follow Thomas Road to the first bridge and continue on foot downstream about 1,000 feet to the mouth of South Fork Salmon Creek.

METHODS

The habitat inventory conducted in South Fork Salmon Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP) 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.

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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 Salmon Creek 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 Salmon 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 are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

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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 Salmon Creek, 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 Salmon Creek, 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 Salmon Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. 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 Salmon Creek, the dominant composition type and the 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.

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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. Detailed biological sampling was not conducted on South Fork Salmon Creek during the 2007 survey season. However, fish presence was observed from the stream banks during habitat typing in South Fork Salmon Creek. This sampling technique is discussed in the *California Salmonid Stream Habitat Restoration Manual* (Flossi et al, 1998).

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
- 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for South Fork Salmon Creek 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 October 11, 2007 to October 29, 2007, was conducted by T. Fisher, R. Marsh (WSP) and I. Mikus (DFG). The total length of the stream surveyed was 19,420 feet with an additional 705 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.9 cfs on October 30, 2007.

South Fork Salmon Creek is a B2 channel type for 7,847 feet of the stream surveyed (Reach 1), an F4 channel type for 1,943 feet of the stream surveyed (Reach 2) and an F2 channel type for the remaining 9,630 feet of the stream surveyed (Reach 3). B2 channels are moderately entrenched, a moderate gradient, riffle dominated streams with infrequently spaced pools, very stable plan and profile with stable banks and boulder-dominant substrates. F4 channels are entrenched, meandering, riffle/pool streams on low gradients with high width/depth ratios and gravel-dominant substrates. F2 channel types are entrenched, meandering, riffle/pool streams on low gradients with high width/depth ratios and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 45 to 55 degrees Fahrenheit. Air temperatures ranged from 44 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 37% riffle units, 34% pool units and 29% flatwater units (Graph 1). Based on total length of Level II habitat types there were 35% pool units, 34% flatwater units and 30% riffle units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 25% mid-channel pool units, 22% run units and 19% low gradient riffle units (Graph 3). Based on percent total length, mid-channel pool units made up 26%, run units 23%, and low gradient riffle units 17%.

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A total of 110 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 80% (Graph 4), and comprised 83% 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. Thirty of the 110 pools (27%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 110 pool tail-outs measured, 6 had a value of 1 (5.5%); 26 had a value of 2 (23.6%); 30 had a value of 3 (27.3%); 13 had a value of 4 (11.8%) and 35 had a value of 5 (31.8%) (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 8, flatwater habitat types had a mean shelter rating of 26, and pool habitats had a mean shelter rating of 27 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 30 and the main channel pools had a mean shelter rating of 26 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in South Fork Salmon Creek. Graph 7 describes the pool cover in South Fork Salmon Creek. Boulders are the dominant pool cover type followed by bedrock ledges.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 36% of pool tail-outs and boulders were observed in 32% of pool tail-outs.

The mean percent canopy density for the surveyed length of South Fork Salmon Creek was 50%. Fifty percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 83% and 17%, respectively. Graph 9 describes the mean percent canopy in South Fork Salmon Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 89%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the stream banks consisted of 39% cobble/gravel, 32% boulder, 22% bedrock and 7% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 74% of the units surveyed. Additionally, 14% of the units surveyed had coniferous trees as the dominant vegetation type, 6% had brush as the dominant vegetation type and 5% had grass as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Young-of-the-year (YOY) salmonids were observed from the stream banks of South Fork Salmon Creek during the habitat inventory of October 11, 2007 to October 29, 2007.

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DISCUSSION

South Fork Salmon Creek is a B2 channel type for the first 7,847 feet of stream surveyed (Reach 1), an F4 channel type for the next 1,943 feet (Reach 2) and an F2 channel type for the remaining 9,630 feet of stream surveyed (Reach 3). The suitability of B2, F4 and F2 channel types for fish habitat improvement structures is as follows: B2 channel types are excellent for plunge weirs, single and opposing wing-deflectors and log cover. F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover. F2 channel types are fair for plunge weirs, single and opposing wing-deflectors and log cover.

The water temperatures recorded on the survey days October 11, 2007 to October 29, 2007, ranged from 45 to 55 degrees Fahrenheit. Air temperatures ranged from 44 to 72 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 34% of the total length of this survey, riffles 30%, and pools 35%. Thirty of the 110 (27%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third 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. Installing structures that will increase or deepen pool habitat is recommended.

Thirty-two of the 110 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty-three of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-five 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. Sediment sources in South Fork Salmon Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fifty-eight of the 110 pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools was 27. The shelter rating in the flatwater habitats was 26. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in South Fork Salmon Creek. Boulders are the dominant cover type in pools followed by bedrock ledges. 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 50%. Reach 1 had a canopy density of 47.6%, Reach 2 had a canopy density of 61.7% and Reach 3 had a canopy density of 49.6%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 89% and 91%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of

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coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

- 1) South Fork Salmon Creek 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 boulders. Adding high quality complexity with woody cover in the pools is desirable.
- 3) 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.
- 4) Increase the canopy on South Fork Salmon Creek by planting appropriate native vegetation like 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.
- 5) 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 Unit#:	Comments:
0	0001.00	The start of the stream survey began at the confluence with Salmon Creek (within the influence). The first reach was a B2 channel type. Rainfall occurred intermittently throughout the stream habitat survey. There was an active right bank slide (greywacke) estimated at 800' long x 250' high.
681	0012.00	There was an active right bank slide estimated at 300' long x 300' high.
1619	0032.00	There was erosion on the left bank estimated at 30' long x 50' high.
1832	0035.00	Tributary #01 entered from the left bank. The flow was estimated between 1-5 cubic feet per second (cfs) and contributed about 10% to

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the downstream flow. The temperature of the tributary was 50 degrees Fahrenheit. The temperature downstream of the tributary was 51 degrees Fahrenheit. The temperature upstream of the tributary was 52 degrees Fahrenheit. The tributary was accessible to fish (although there was a bedrock cascade with a 5' plunge at the confluence). Steelhead young-of-the-year were observed for at least 100' upstream of the tributary. The slope was measured with a clinometer at 80% at the confluence with South Fork Salmon Creek.

2046	0040.00	Thomas Road, bridge #01, was constructed of concrete and a steel railcar. It was 16.5' wide x 36' high x 200' long.
2307	0047.00	There was a left bank slide (which consisted of bedrock and shale substrates) estimated at 138' long x 200' high.
2767	0053.00	There was a left bank slide estimated at 150' long x 100' high.
2965	0056.00	There was erosion on the left bank estimated at 150' long x 100' high.
3115	0059.00	There was a left bank slide estimated at 75' long x 75' high.
3241	0061.00	There was a boulder riprap structure placed on the right bank.
3241	0061.00	There was an active right bank slide estimated at 300' long x 250' high.
3520	0064.00	Three boulder deflector structures were placed on the left bank.
3714	0067.00	End of boulder riprap structure placement on the right bank.
4144	0073.02	Pike minnow were observed.
4144	0073.09	There was a side channel that had subsurface flow into a corner pool.
4585	0084.00	Tributary #02 entered from the left bank. The flow was less than 1 cfs and contributed to less than 3% of South Fork Salmon Creek's flow. Temperatures of the tributary, and South Fork Salmon Creek upstream and downstream of the tributary were all 46 degrees Fahrenheit. The tributary was inaccessible to fish due to a 4' natural boulder dam with stream channels on either side of it. The surveyors walked upstream of the tributary for about 250' and no fish observed. The slope of the tributary was approximately 25%. Both of the right and left banks were unstable and actively eroding.
4997	0091.00	There was a right bank slide estimated at 200' long x 200' high.
6067	0110.00	There was a small concrete dam with a 2.2' high plunge.
6258	0114.00	There was a right bank slide estimated at 200' long x 225' high.

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6308	0116.00	There were YOY and 1+ steelhead salmonids observed.
6462	0117.00	There was a series of small intermittent slides on right bank.
6767	0121.00	There was a small slide left on the bank estimated at 50' long x 40' high.
6854	0123.00	There was a slide on the left bank estimated at 200' long x 150' high.
7041	0126.00	There was intermittent erosion sites observed on the right bank and estimated at 225' long x 35' high.
7502	0133.00	Tributary #03 entered from the left bank and was flowing at less than 1 cfs and contributed to less than 3% of South Fork Salmon Creek's flow. The temperature of the tributary was 45 degrees Fahrenheit. The temperature of South Fork Salmon Creek both downstream and upstream of the tributary was 46 degrees Fahrenheit. The tributary appeared to be accessible to fish but none were observed when the surveyors checked upstream about 300'. The slope was measured with a clinometer at 25%. About 200' upstream of the tributary there was a large boulder barrier with a 25% slope.
7847	0137.00	Reach 2 begins here the channel is now an F4 channel type.
8992	0154.00	There was a boulder rip-rap structure placed on the right bank.
9170	0158.00	Tributary #04 entered from the right bank. The flow was estimated at less than 1 cfs and the tributary was contributing to less than 3% of South Fork Salmon Creek's flow. The temperature of the tributary was 47 degrees Fahrenheit and the temperature both downstream and upstream of the tributary was 46 degrees Fahrenheit. The tributary was accessible to fish although the surveyors checked upstream about 50' and no fish were observed. The slope was measured with a clinometer at 5%. There was a culvert about 25' upstream of the tributary with a 2' plunge and undercut outlet.
9272	0159.00	There was a log/boulder deflector and rip-rap structure placed on the right bank.
9307	0160.00	There was a slide on the left bank estimated at 170' long x 75' high.
9535	0163.00	There was a ford crossing at the bottom of the habitat unit.
9790	0166.00	Bridge #02 was a steel car bridge ("Weekapaugh Bridge") and was located on Lower Thomas Road. It measured 14' wide x 20' high x 80' long. There was a boulder riprap structure placed on the left bank base of bridge. This unit marks the beginning of reach #3 which was an F2 channel type.

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10159	0172.00	Tributary #05 "Bogus Creek" entered from the right bank. It was flowing at an estimated less than 5 cfs and it contributed to less than 10% of the flow of South Fork Salmon Creek. The temperature of the tributary and South Fork Salmon downstream of the tributary was 50 degrees Fahrenheit. The temperature upstream of the tributary was 52 degrees Fahrenheit. The surveyors checked upstream of the tributary about 200' and it was accessible to fish and one unknown fish was observed. The slope was measured with a clinometer at 6%.
10272	0175.00	There were abundant pikeminnow observed in this unit.
10372	0176.00	There was a boulder riprap structure placed on the left bank.
10512	0179.00	There was an old erosion site that was partially vegetated with grasses on the right bank.
11058	0185.00	There was an active slide on the right bank estimated at 350'+ long x 100' high.
11090	0186.00	There was a boulder riprap structure placed on both the left and right banks.
11112	0187.00	Bridge #03 was a steel car bridge and was located on Lower Thomas Road (private road). It measured 10' wide x 17' high x 48' long.
11275	0189.00	There was a boulder riprap structure placed downstream at the base of an ephemeral tributary.
11275	0189.00	There were intermittent slides on both the right and left banks.
11495	0193.00	There was a boulder riprap structure placed on both the right and left banks. Erosion was observed on the left bank estimated at 60' long x 30' high.
11686	0195.00	Erosion was observed on the left bank.
12511	0210.00	There was an active slide on the right bank estimated at 150' long x 40' high.
13728	0228.00	There was a slide on the right bank estimated at 50' long x 80' high. It was partially vegetated with grasses.
13957	0235.00	There was a slide on the right bank estimated at 94' long x 15' high.
14398	0242.00	There was a slide on the right bank estimated at 125' long x 40' high.
15205	0253.00	There was a slide on the right bank estimated at 75' long x 100' high. It was partially vegetated.

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15691	0258.00	There was an active slide on the right bank estimated at 40' long x 35' high.
15837	0260.00	There were intermittent active slides on the right bank.
16650	0268.00	There was an active slide on the right bank estimated at 25' long x 40' high.
16818	0270.00	There was an active slide on the left bank estimated at 60' long x 150' high.
17620	0287.00	There was an active slide on the left bank estimated at 100' long x 100' high.
18226	0292.00	Tributary #06 "Kinsey Creek" entered from the left bank. It was flowing at an estimated less than 1 cfs and it contributed to less than 20% of South Fork Salmon Creek's flow. The temperature of the tributary was 53 degrees Fahrenheit. Downstream of the tributary the temperature was 52 degrees Fahrenheit. Upstream of the tributary the temperature was 55 degrees Fahrenheit. The tributary was accessible to fish and steelhead YOY were observed when the surveyors checked upstream about 150'. The slope was estimated at 3%.
18226	0292.00	There was a ford crossing at the top of the habitat unit.
18264	0293.00	There was a small wooden footbridge spanning channel.
18499	0296.00	There was a slide on the right bank estimated at 100' long x 10' high.
18550	0298.00	Tributary #07 "Tostin Creek" entered from the right bank. It was flowing at an estimated less than 3 cfs and contributed to less than 20% of the flow of South Fork Salmon Creek. The temperature of the tributary was 54 degrees Fahrenheit. The temperature downstream of the tributary was 55 degrees Fahrenheit. The temperature upstream of the tributary was 57 degrees Fahrenheit. The tributary was accessible to fish and fish were observed by the surveyors when they checked upstream about 200'. The slope was estimated at 3%.
19420	0304.00	The stream survey ended because the South Fork Salmon Creek was barely flowing and there was a lack of landowner permission, as well as the end of habitat typing season. YOY and 1-2+ steelhead, Sacramento pike minnow and California Roach were observed throughout the length of the stream surveyed.

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 }

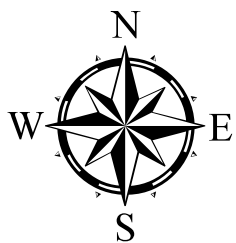
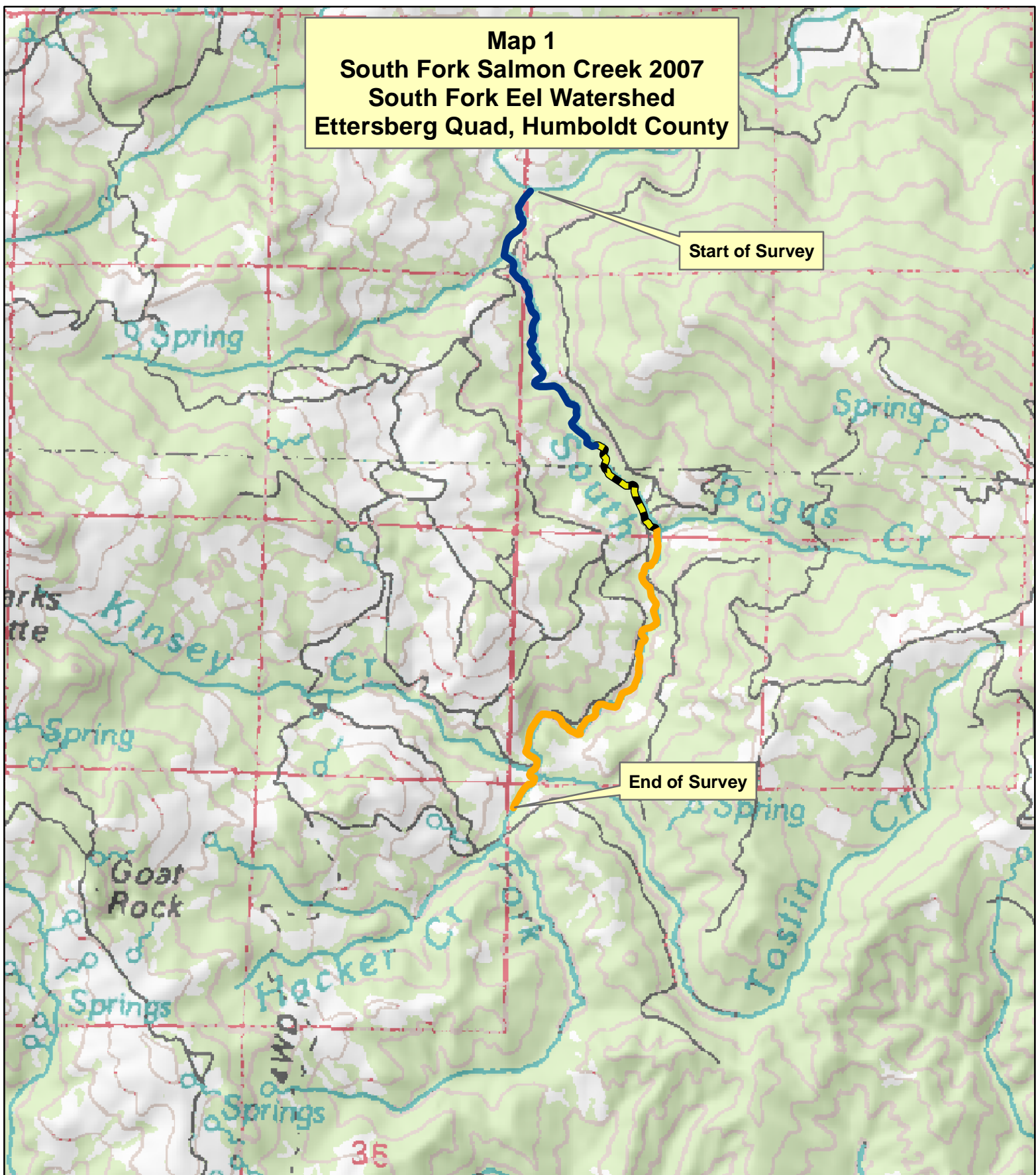
BACKWATER POOLS

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 Salmon Creek 2007
South Fork Eel Watershed
Ettersberg Quad, Humboldt County



Legend

- Reach 1, B2 Channel Type
- - - Reach 2, F4 Channel Type
- Reach 3, F2 Channel Type

0 950 1,900 3,800 Feet

A scale bar with markings for 0, 950, 1,900, and 3,800 feet.



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

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0

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
1	0	DRY	0.3	23	23	0.1									
92	16	FLATWATER	28.8	75	6923	34.4	16.2	0.7	1.6	1369	125953	930	85535		26
110	110	POOL	34.4	64	7089	35.2	17.2	1.0	2.5	1112	122330	1753	192788	1326	27
117	17	RIFFLE	36.6	52	6090	30.3	18.5	0.4	0.9	957	112022	332	38861		8
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
320	143				20125					360305			317184		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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 (%)
62	11	LGR	19.4	55	3413	17.0	22	0.3	1.5	1263	78331	421	26086		6	52
54	5	HGR	16.9	49	2656	13.2	12	0.4	1.2	446	24057	185	10014		15	39
1	1	BRS	0.3	21	21	0.1	8	0.6	1	152	152	91	91		0	54
1	1	POW	0.3	87	87	0.4	14	0.9	2	1157	1157	1041	1041		10	71
71	9	RUN	22.2	65	4580	22.8	17	0.6	1.9	1450	102956	895	63547		19	46
20	6	SRN	6.3	113	2256	11.2	15	0.7	2.4	1283	25657	963	19263		39	49
80	80	MCP	25.0	66	5241	26.0	17	1.1	5.8	1142	91397	1892	151321	1479	25	50
2	2	CCP	0.6	53	106	0.5	15	0.6	1.4	861	1723	977	1955	389	10	32
6	6	STP	1.9	87	523	2.6	17	1.0	3.7	1343	8061	2371	14228	1685	44	52
1	1	CRP	0.3	65	65	0.3	15	0.3	1.9	878	878	790	790	263	60	55
4	4	LSBk	1.3	78	314	1.6	18	1.0	2.9	1348	5392	1821	7285	1320	15	72
16	16	LSBo	5.0	50	801	4.0	20	0.6	2.6	884	14139	900	14394	541	32	49
1	1	PLP	0.3	39	39	0.2	19	3.4	5	741	741	2816	2816	2519	20	78
1	0	DRY	0.3	23	23	0.1										

Total Units
320

Total Units Fully Measured
143

Total Length (ft.)
20125

Total Area (sq.ft.)
354640

Total Volume (cu.ft.)
312831

Table 3 - Summary of Pool Types

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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
88	88	MAIN	80	67	5870	83	16.7	1.1	1150	101181	1468	127759	26
22	22	SCOUR	20	55	1219	17	19.0	0.8	961	21149	760	16725	30

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
110	110	7089	122330	144484

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

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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
80	MCP	73	0	0	28	35	24	30	15	19	13	16
2	CCP	2	0	0	2	100	0	0	0	0	0	0
6	STP	5	0	0	2	33	3	50	1	17	0	0
1	CRP	1	0	0	1	100	0	0	0	0	0	0
4	LSBk	4	0	0	0	0	4	100	0	0	0	0
16	LSBo	15	0	0	5	31	11	69	0	0	0	0
1	PLP	1	0	0	0	0	0	0	0	0	1	100
Total Units			Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
110			0	0	38	35	42	38	16	15	14	13

Mean Maximum Residual Pool Depth (ft.): 2.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Dry Units: 1

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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
62	11	LGR	0	0	0	0	0	0	3	97	0
54	5	HGR	0	0	0	0	0	0	5	95	0
1	1	BRS	0	0	0	0	0	0	0	0	0
117	17	TOTAL RIFFLE	0	0	0	0	0	0	4	96	0
1	1	POW	0	0	0	0	0	0	0	100	0
71	9	RUN	0	0	0	0	0	1	5	94	0
20	6	SRN	0	0	0	0	0	0	8	93	0
92	16	TOTAL FLAT	0	0	0	0	0	0	6	94	0
80	80	MCP	1	1	4	3	0	0	3	84	5
2	2	CCP	0	0	0	0	0	0	5	95	0
6	6	STP	0	0	0	0	0	0	8	92	1
1	1	CRP	0	0	0	30	0	0	5	65	0
4	4	LSBk	0	0	0	1	0	0	0	80	19
16	16	LSBo	0	0	0	2	1	0	2	95	0
1	1	PLP	0	0	0	0	0	0	25	75	0
110	110	TOTAL POOL	0	1	3	3	0	0	3	85	4
320	143	TOTAL	0	1	2	3	0	0	3	87	4

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Dry Units: 1

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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
62	11	LGR	0	0	36	18	18	27	0
54	5	HGR	0	0	0	20	0	40	40
1	1	BRS	0	0	0	0	0	0	100
1	1	POW	0	0	100	0	0	0	0
71	9	RUN	0	0	44	11	0	44	0
20	6	SRN	0	0	50	0	17	33	0
80	80	MCP	0	3	68	4	4	19	4
2	2	CCP	0	0	0	0	50	50	0
6	6	STP	0	0	83	0	0	17	0
1	1	CRP	0	0	100	0	0	0	0
4	4	LSBk	0	0	100	0	0	0	0
16	16	LSBo	0	6	50	13	6	25	0
1	1	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
50	17	83	1	89	91

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 Salmon Creek	LLID:	1238913402146	Drainage:	Eel River - South Fork		
Survey Dates:	10/11/2007 to 10/29/2007	Survey Length (ft.):	20125	Main Channel (ft.):	19420	Side Channel (ft.):	705
Confluence Location:	Quad: ETTERSBURG	Legal Description:	T03SR03ES07	Latitude:	40:12:53.0N	Longitude:	123:53:29.0W

STREAM REACH: 1									
Channel Type: B2			Canopy Density (%): 47.6			Pools by Stream Length (%): 33.7			
Reach Length (ft.): 7847			Coniferous Component (%): 20.6			Pool Frequency (%): 32.0			
Riffle/Flatwater Mean Width (ft.): 13.9			Hardwood Component (%): 79.4			Residual Pool Depth (%):			
BFW:			Dominant Bank Vegetation: Hardwood Trees			< 2 Feet Deep: 47			
Range (ft.): 26 to 62			Vegetative Cover (%): 88.7			2 to 2.9 Feet Deep: 39			
Mean (ft.): 38			Dominant Shelter: Boulders			3 to 3.9 Feet Deep: 8			
Std. Dev.: 10			Dominant Bank Substrate Type: Boulder			>= 4 Feet Deep: 6			
Base Flow (cfs.): 0.9			Occurrence of LWD (%): 0			Mean Max Residual Pool Depth (ft.): 2.2			
Water (F): 45 - 52			Air (F): 44 - 64			Mean Pool Shelter Rating: 32			
Dry Channel (ft): 23			LWD per 100 ft.:						
			Riffles: 0						
			Pools: 0						
			Flat: 0						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 33 Sm Cobble: 6 Lg Cobble: 10 Boulder: 45 Bedrock: 6									
Embeddedness Values (%): 1. 4.1 2. 14.3 3. 24.5 4. 12.2 5. 44.9									

Channel Type:	F4	Canopy Density (%):	61.7	Pools by Stream Length (%):	33.6		
Reach Length (ft.):	1943	Coniferous Component (%):	13.3	Pool Frequency (%):	39.3		
Riffle/Flatwater Mean Width (ft.):	22.3	Hardwood Component (%):	86.7	Residual Pool Depth (%):			
BFW:		Dominant Bank Vegetation:	Hardwood Trees	< 2 Feet Deep:	36		
Range (ft.):	31 to 48	Vegetative Cover (%):	94.3	2 to 2.9 Feet Deep:	45		
Mean (ft.):	39	Dominant Shelter:	Boulders	3 to 3.9 Feet Deep:	0		
Std. Dev.:	7	Dominant Bank Substrate Type:	Cobble/Gravel	>= 4 Feet Deep:	18		
Base Flow (cfs.):	0.9	Occurrence of LWD (%):	7	Mean Max Residual Pool Depth (ft.):	2.5		
Water (F):	45 - 50	Air (F):	50 - 65	Mean Pool Shelter Rating:	39		
Dry Channel (ft):	0	Riffles:	0				
		Pools:	1				
		Flat:	1				
Pool Tail Substrate (%):	Silt/Clay: 0	Sand: 0	Gravel: 36	Sm Cobble: 18	Lg Cobble: 45	Boulder: 0	Bedrock: 0
Embeddedness Values (%):	1. 9.1	2. 36.4	3. 36.4	4. 18.2	5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: F2	Canopy Density (%): 49.6	Pools by Stream Length (%): 36.9
Reach Length (ft.): 9630	Coniferous Component (%): 15.4	Pool Frequency (%): 36.0
Riffle/Flatwater Mean Width (ft.): 19.0	Hardwood Component (%): 84.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 22
Range (ft.): 30 to 52	Vegetative Cover (%): 90.5	2 to 2.9 Feet Deep: 36
Mean (ft.): 39	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 24
Std. Dev.: 6	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 18
Base Flow (cfs.): 0.9	Occurrence of LWD (%): 3	Mean Max Residual Pool Depth (ft.): 2.8
Water (F): 48 - 55 Air (F): 52 - 72	LWD per 100 ft.:	Mean Pool Shelter Rating: 19
Dry Channel (ft): 0	Riffles: 1	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 40 Sm Cobble: 14 Lg Cobble: 14 Boulder: 26 Bedrock: 6		
Embeddedness Values (%): 1. 6.0 2. 30.0 3. 28.0 4. 10.0 5. 26.0		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

Legal Description: T03SR03ES07

Latitude: 40:12:53.0N

Longitude: 123:53:29.0W

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	33	31	22.4
Boulder	43	48	31.8
Cobble / Gravel	53	57	38.5
Sand / Silt / Clay	14	7	7.3

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	7	7	4.9
Brush	11	7	6.3
Hardwood Trees	97	116	74.5
Coniferous Trees	28	13	14.3
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

3

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

StreamName: South Fork Salmon Creek

LLID: 1238913402146

Drainage: Eel River - South Fork

Survey Dates: 10/11/2007 to 10/29/2007

Confluence Location: Quad: ETTERSBURG

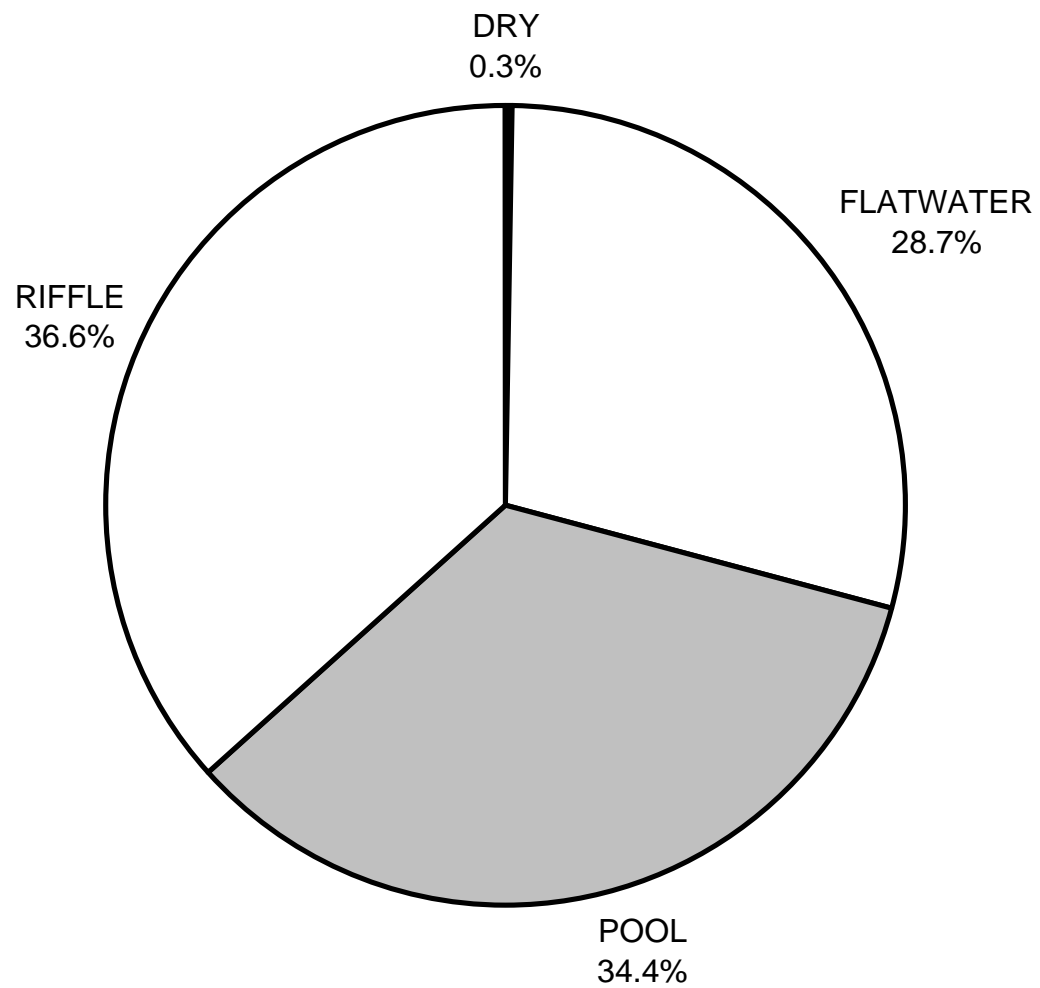
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Longitude: 123:53:29.0W

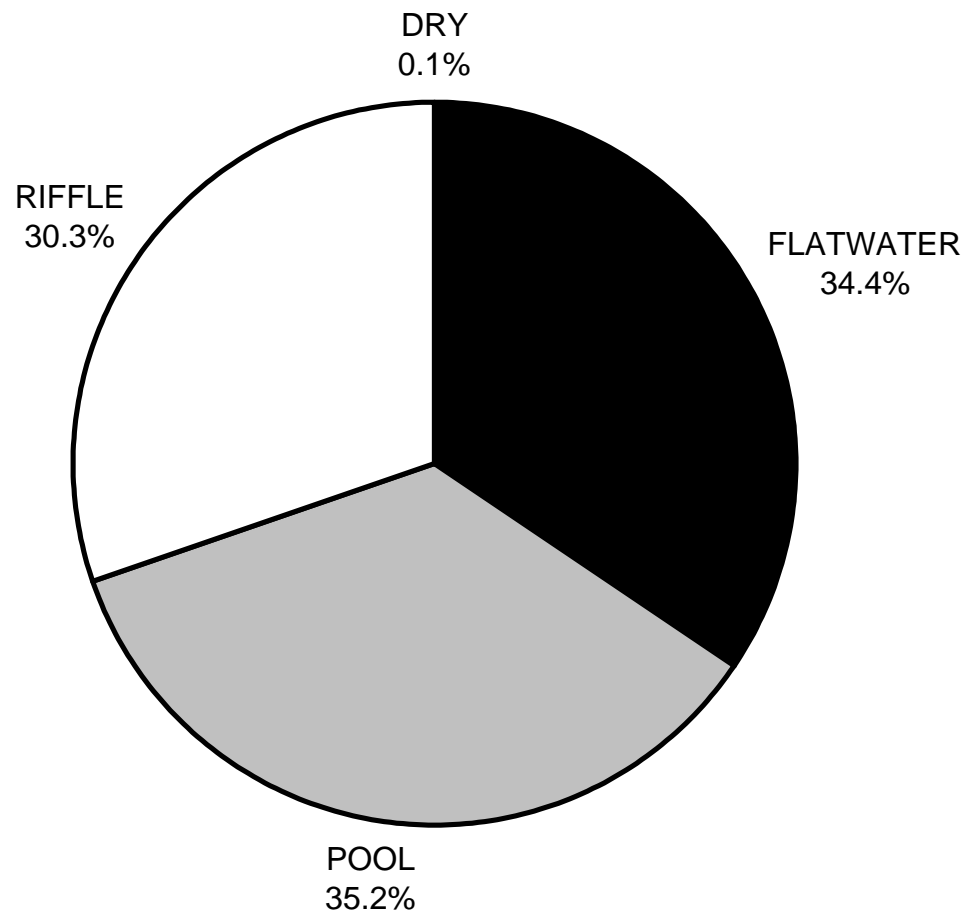
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	0
SMALL WOODY DEBRIS (%)	0	0	1
LARGE WOODY DEBRIS (%)	0	0	3
ROOT MASS (%)	0	0	3
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	4	6	3
BOULDERS (%)	96	94	85
BEDROCK LEDGES (%)	0	0	4

**SOUTH FORK SALMON CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE**



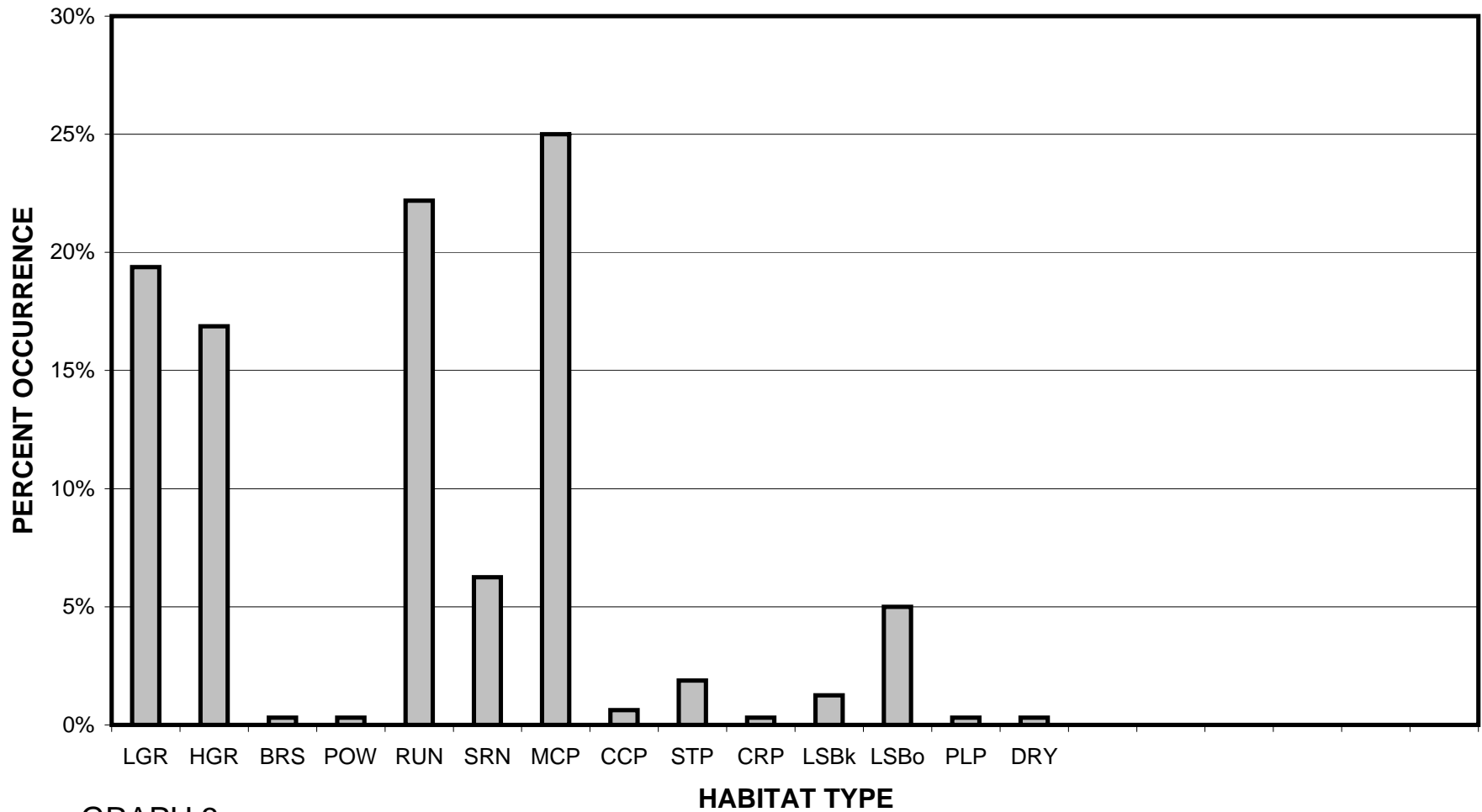
GRAPH 1

**SOUTH FORK SALMON CREEK 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH**

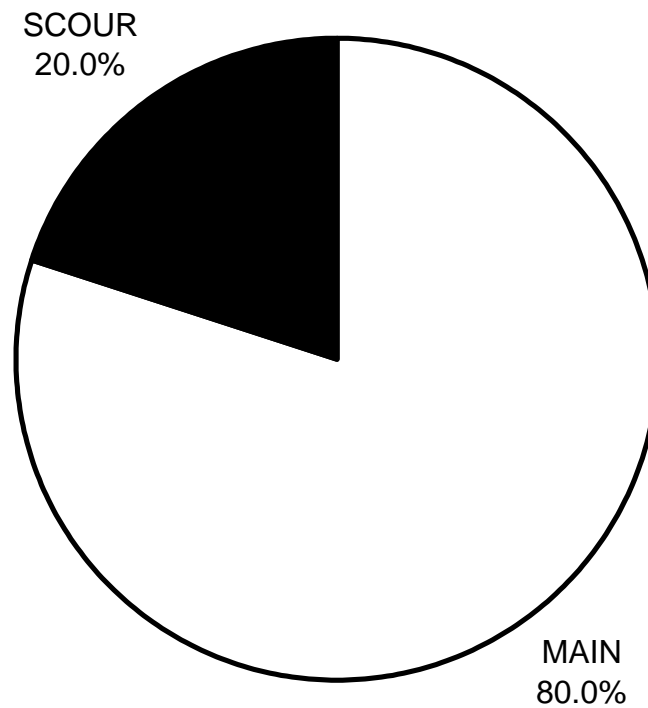


GRAPH 2

SOUTH FORK SALMON CREEK 2007 HABITAT TYPES BY PERCENT OCCURRENCE

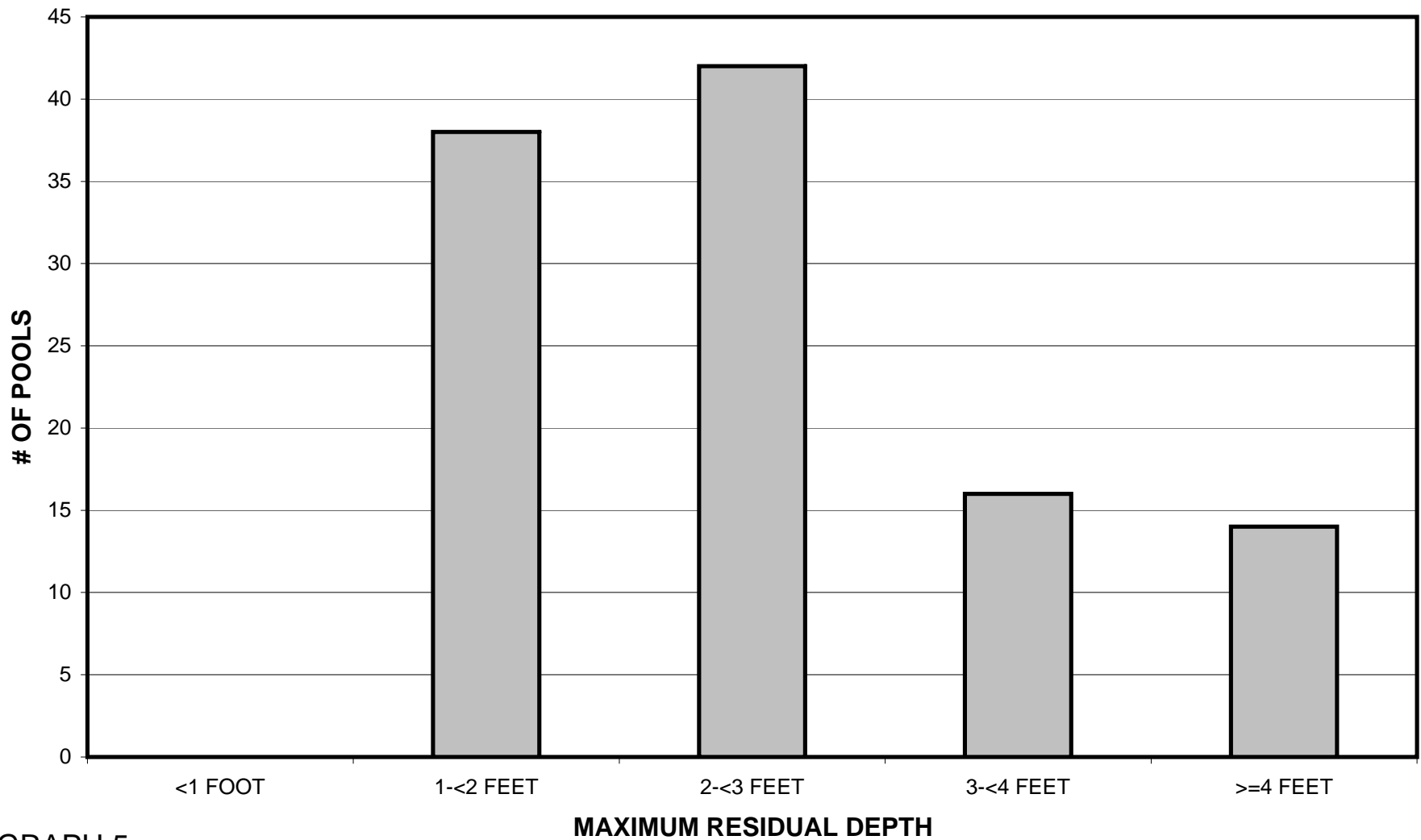


**SOUTH FORK SALMON CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE**



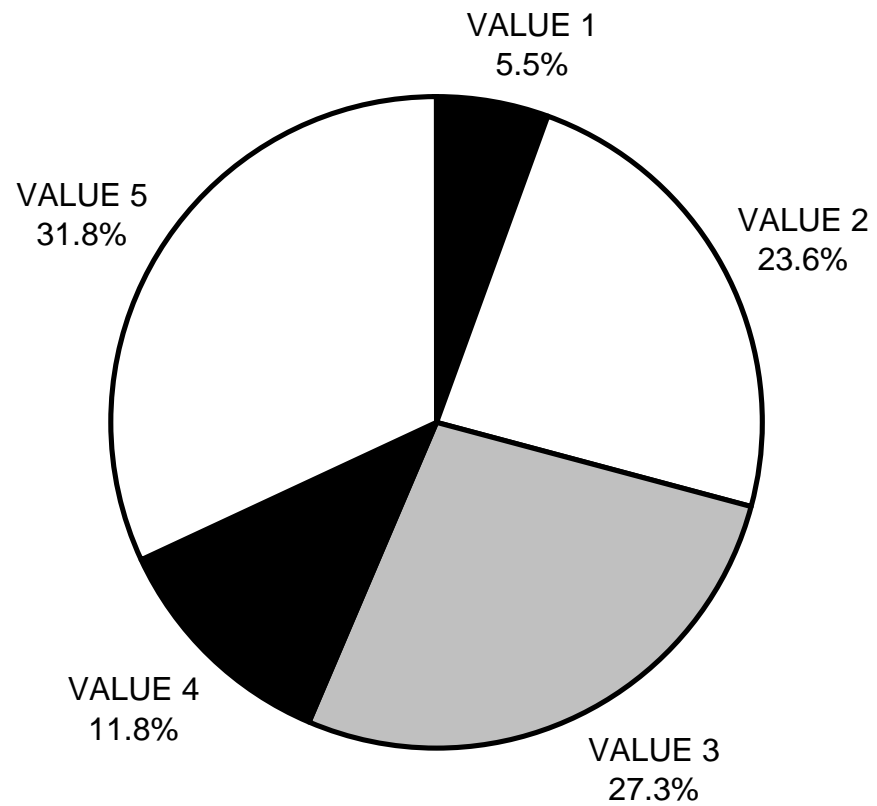
GRAPH 4

SOUTH FORK SALMON CREEK 2007 MAXIMUM DEPTH IN POOLS



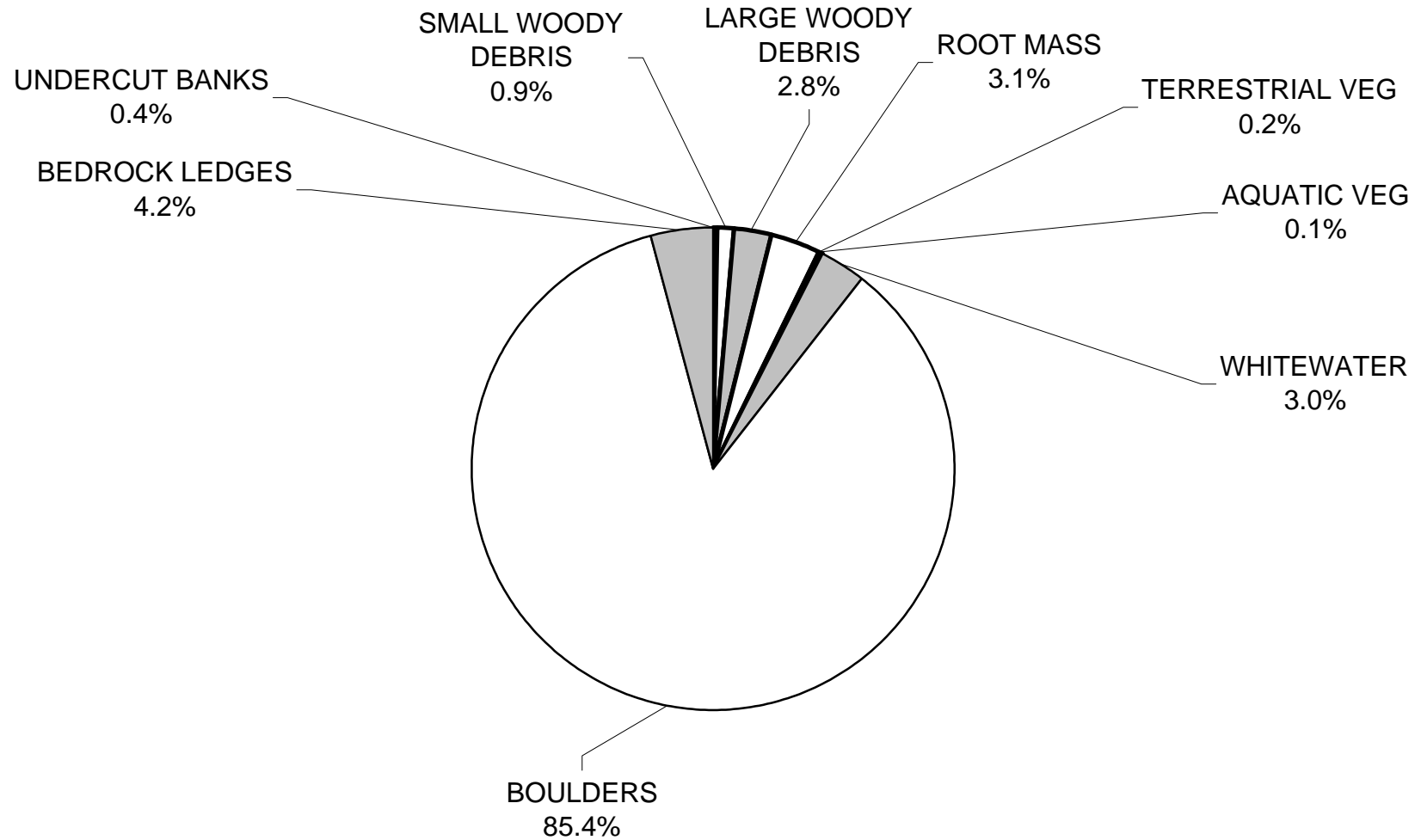
GRAPH 5

SOUTH FORK SALMON CREEK 2007 PERCENT EMBEDDEDNESS



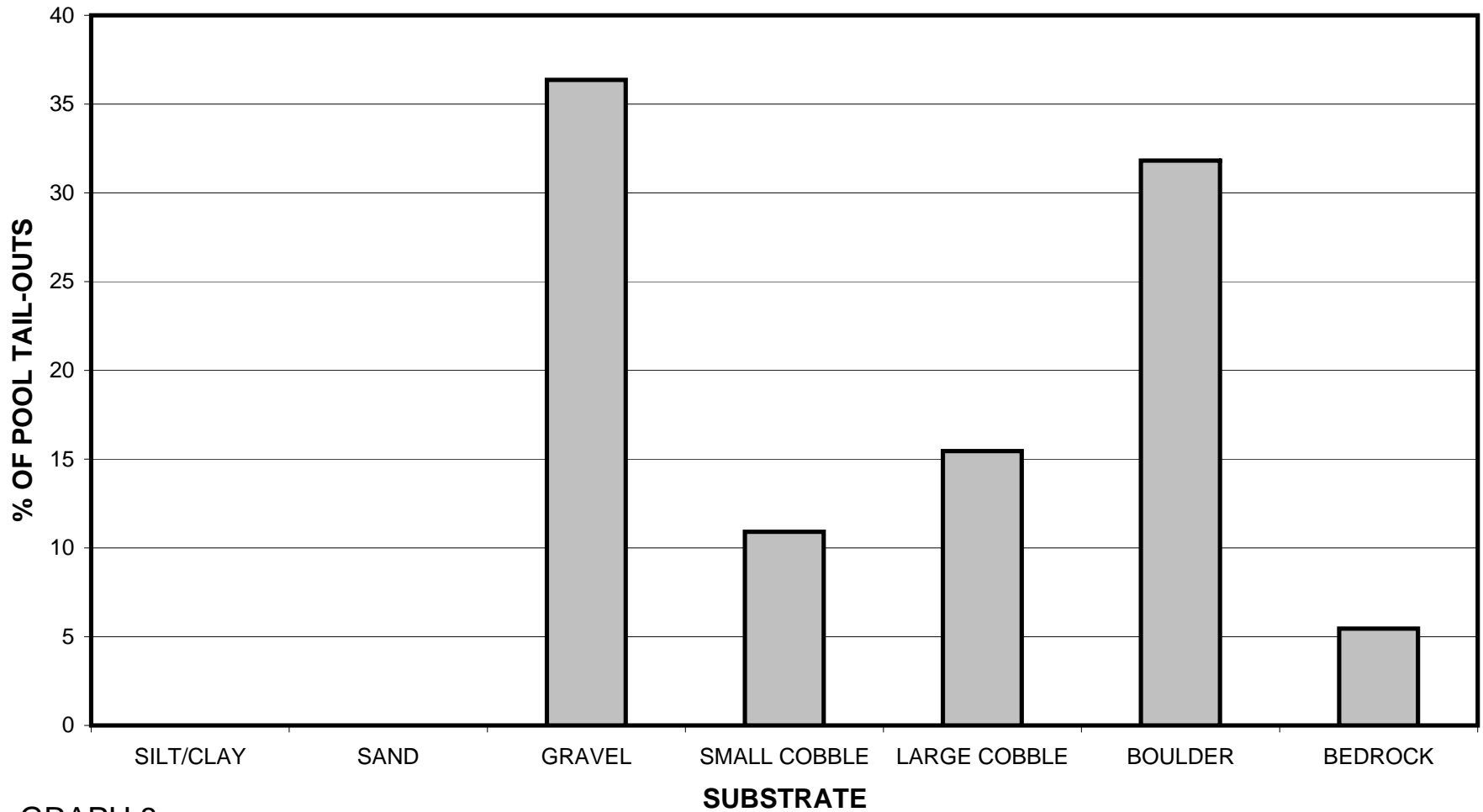
GRAPH 6

SOUTH FORK SALMON CREEK 2007 MEAN PERCENT COVER TYPES IN POOLS



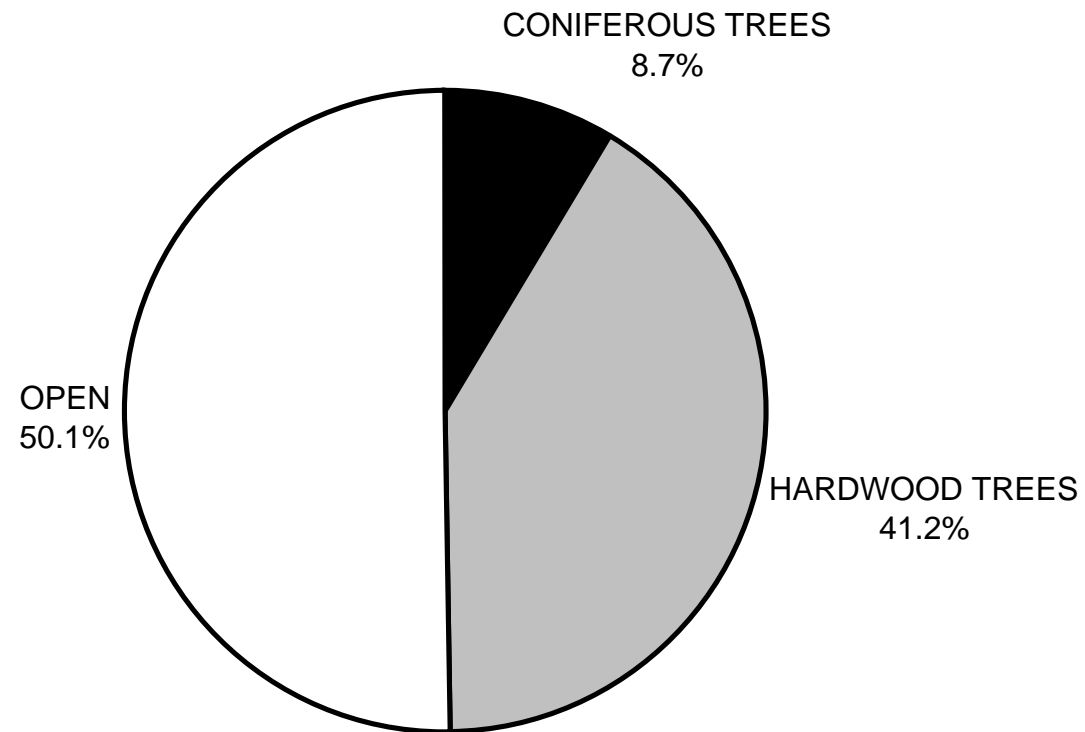
GRAPH 7

SOUTH FORK SALMON CREEK 2007 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



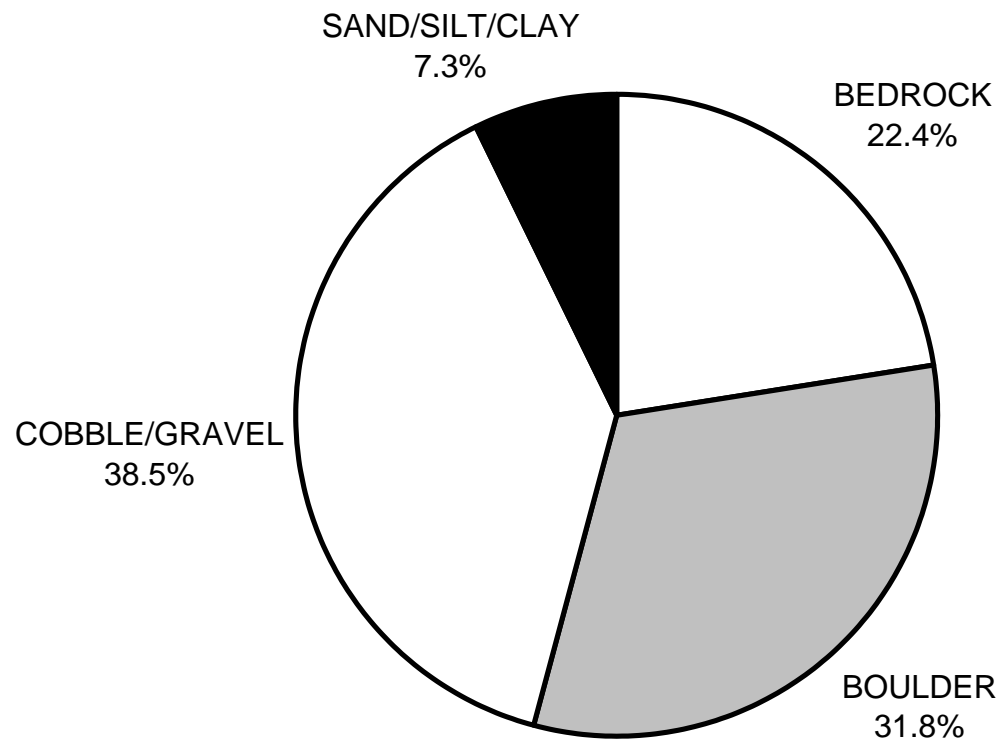
GRAPH 8

**SOUTH FORK SALMON CREEK 2007
MEAN PERCENT CANOPY**



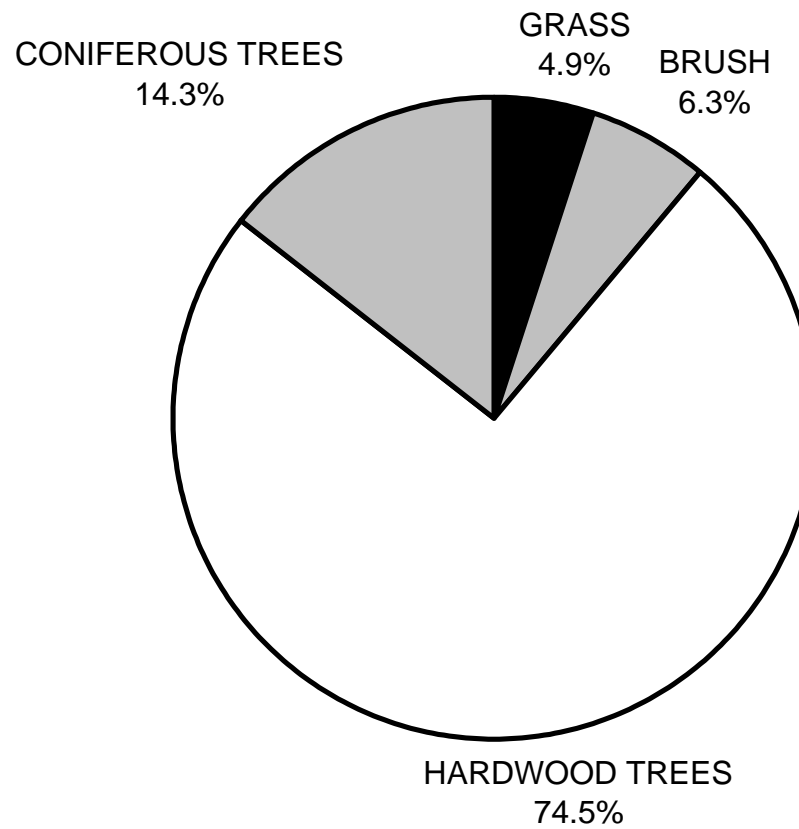
GRAPH 9

**SOUTH FORK SALMON CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**SOUTH FORK SALMON CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11