

STREAM INVENTORY REPORT

Fish Creek

INTRODUCTION

A stream inventory was conducted during August 13, 2007 to August 14, 2007 on Fish Creek. The survey began at the confluence with South Fork Eel River and extended upstream 1.0 mile.

The Fish Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Fish Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Fish Creek is a tributary to South Fork Eel River, tributary to Eel River which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Fish Creek's legal description at the confluence with the South Fork Eel River is T3S R3E S11. Its location is 40.2211 north latitude and 123.8018 west longitude, LLID number 1238007402212. Fish Creek is a second order stream and has approximately 3.8 miles of blue line stream according to the USGS Miranda 7.5 minute quadrangle. Fish Creek drains a watershed of approximately 4.5 square miles. Elevations range from about 164 feet at the mouth of the creek to 800 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is primarily state park and is managed for recreation. Vehicle access exists via Highway 101 to the Miranda/Phillipsville exit; to the Avenue of the Giants; go under the freeway and take a right onto the Avenue of the Giants; park on Fish Creek Road.

METHODS

The habitat inventory conducted in Fish 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.

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

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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 Fish 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". Fish 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.

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 Fish 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

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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 Fish 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 Fish 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 Fish 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.

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.

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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 during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Fish Creek. In addition, underwater observations were made at 6 sites using techniques 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
- 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 Fish 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

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- 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 13, 2007 to August 14, 2007, was conducted by J. Pixley and B. Rahn (WSP). The total length of the stream surveyed was 5,498 feet with an additional 200 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.13 cfs on August 16, 2007.

Fish Creek is a B4 channel type for 2,047 feet of the stream surveyed (Reach 1) and a B3 channel type for 3,651 feet of the stream surveyed (Reach 2).

B4 channels are moderately entrenched, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel-dominant substrates. B3 channels are moderately entrenched, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width/depth ratios and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 62 degrees Fahrenheit. Air temperatures ranged from 56 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 33% riffle units, 28% flatwater units, 25% pool units, 11% dry units, 2% culvert units, and 2% no survey units (Graph 1). Based on total length of Level II habitat types there were 41% riffle units, 30% flatwater units, 17% dry units, 8% pool units, 3% culvert units, and 1% no survey units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 26% low gradient riffle units, 23% mid-channel pool units, and 18% run units (Graph 3). Based on percent total length, low gradient riffle units made up 32%, step run units 21%, and dry units 17%.

A total of 14 pools were identified (Table 3). Main channel pools were encountered, at 100% (Graph 4), and comprised 100% 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. Eight of the 14 pools (57%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 14 pool tail-outs measured, 3 had a value of 1 (21.4%); 5 had a value of 2 (35.7%); 1 had a value of 3 (7.1%); 5

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had a value of 4 (35.7%) (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 18, flatwater habitat types had a mean shelter rating of 26, and pool habitats had a mean shelter rating of 26 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 26 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Root mass is the dominant cover type in Fish Creek. Graph 7 describes the pool cover in Fish Creek. Boulders are the dominant pool cover type followed by root mass.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 57% of pool tail-outs and small cobble observed in 21% of pool tail-outs.

The mean percent canopy density for the surveyed length of Fish Creek was 96%. Four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 49% and 51%, respectively. Graph 9 describes the mean percent canopy in Fish Creek.

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 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 54.5% of the units surveyed. Additionally, 43.2% had hardwood trees as the dominant vegetation, and 2.3% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Six sites were surveyed by snorkel survey for species composition and distribution in Fish Creek on September 24, 2007. Water temperatures taken during the electrofishing period of 1245 to 1405 ranged from 55 to 55 degrees Fahrenheit. Air temperatures ranged from 61 to 66 degrees Fahrenheit. The sites were sampled by P. Divine (DFG) and T. Fisher (WSP).

In reach 1, which comprised the first 2,047 feet of stream from the confluence with South Fork Eel River, 3 sites were sampled. The reach sites yielded 1 young-of-the-year steelhead/rainbow trout (SH/RT) and 6 age 1+ SH/RT.

In reach 2, starting at the end of reach 1, 3 sites were sampled from 2,317 upstream of the confluence with South Fork Eel River to 2,630 feet. The reach sites yielded 1 young-of-the-year steelhead/rainbow trout (SH/RT), 2 age 1+ SH/RT, and 1 age 2+ SH/RT.

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The following chart displays the information yielded from these sites:

2007 Fish Creek Underwater Observations.

Date	Site #	Habitat Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: B4 Channel Type									
09/24/07	1	007	4.2	1,252	0	0	1	1	0
09/24/07	2	005.2	4.2	1,308	0	0	0	1	0
09/24/07	3	012	4.2	1,841	0	0	0	4	0
Reach 2: B3 Channel Type									
09/24/07	4	017	4.2	2,317	0	0	1	1	1
09/24/07	5	019	4.2	2,387	0	0	0	0	0
09/24/07	6	021	4.2	2,630	0	0	0	1	0

DISCUSSION

Fish Creek is B4 channel type for the first 2,047 feet of stream surveyed and a B3 channel type for the next 3,651 feet. The suitability of B4 and B3 channel types for fish habitat improvement structures is as follows: B4 channels are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, log cover, and single and opposing wing-deflectors. B3 channels are excellent for plunge weirs, boulder clusters, bank placed boulders, log cover, and single and opposing wing-deflectors.

The water temperatures recorded on the survey days August 13, 2007 to August 14, 2007, ranged from 56 to 62 degrees Fahrenheit. Air temperatures ranged from 56 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 30% of the total length of this survey, riffles 41%, and pools 8%. Eight of the 14 (57%) 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 first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

Eight of the 14 pool tail-outs measured had embeddedness ratings of 1 or 2. Six of the pool tail-outs had embeddedness ratings of 3 or 4. Cobble embeddedness measured to be 25% or less, a

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rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Fish Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eleven of the 14 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 26. 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 root mass in Fish Creek. Boulders are the dominant cover type in pools followed by root mass. 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 96%. Reach 1 had a canopy density of 96%, Reach 2 had a canopy density of 96.4%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 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) Fish Creek should be managed as an anadromous, natural production stream.
- 2) Replace the concrete box culvert at the Avenue of the Giants with a structure that will provide unimpeded fish passage.
- 3) 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.
- 4) 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.
- 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.

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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 survey began at the confluence with the South Fork Eel River. The channel type for reach 1 was a B4. The stream channel was dry from the mouth to an outlet pool downstream of a culvert.
446	0002.00	This was a culvert outlet pool that contained 2+ year old salmonids and young-of-the-year (YOY) salmonids.
482	0003.00	Culvert #01 was the Avenue of the Giants culvert, it was made of concrete and measured 5.5' high x 6' wide x 190' long. There was a plunge of 2', into an outlet pool. The max depth within 5' of the outlet was 1.3'. The culvert's slope was 4%, it had concrete baffles. The culvert was constructed in the 1930's. This culvert does not meet Department of Fish and Game or NOAA Fisheries fish passage criteria and should be replaced with a structure that provides unimpeded fish passage.
931	0005.00	There was negligible flow here at this unit.
1237	0006.00	A dry right bank tributary enters at this unit. It was dry for the first 150' above the dry section no fish were observed.
1880	0013.00	There was a small log debris accumulation (LDA).
1946	0015.00	The channel type changes at the bottom of this unit. Reach 2 is a B3 channel type.
2317	0017.00	LDA #01 was 6' high x 35' wide x 12' long and contained 3 pieces of large woody debris (LWD). Water flowed through, and there were visible gaps. Sediment was retained in the dimensions of 30' wide x 50' long x 3' deep and ranged in size from gravel to boulder.
3000	0025.00	LDA #02 was 8' high x 38' wide x 30' long and contained 4 pieces of LWD. Water flowed through, there were visible gaps and sediment was retained in the dimensions of 28' wide x 80' long x 4' deep and ranged in size from gravel to cobble.
3175	0026.00	There was sediment being retained at the top of this unit due to an old growth log in the channel.
3785	0029.00	There was a 6' long pool in this dry section and a 1+ salmonid was observed in it.

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4581	0040.00	Juvenile salmonids were observed in this unit.
5056	0048.00	LDA #03 was 8' high x 50' wide x 40' long and contained 16 pieces of LWD. There was no water flowing through it and no visible gaps. The sediment retained measured 40' wide x 200' long x 5' wide and ranged from gravel to cobble.
5096	0049.00	Sediment trapped by LDA #03 continues through this unit and up to habitat unit #051.
5340	0052.00	There was left bank erosion through this unit and into the next. Juvenile salmonids were observed in this unit.
5498	0053.00	End of survey due to a property boundary that we did not have permission to pass.

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 }

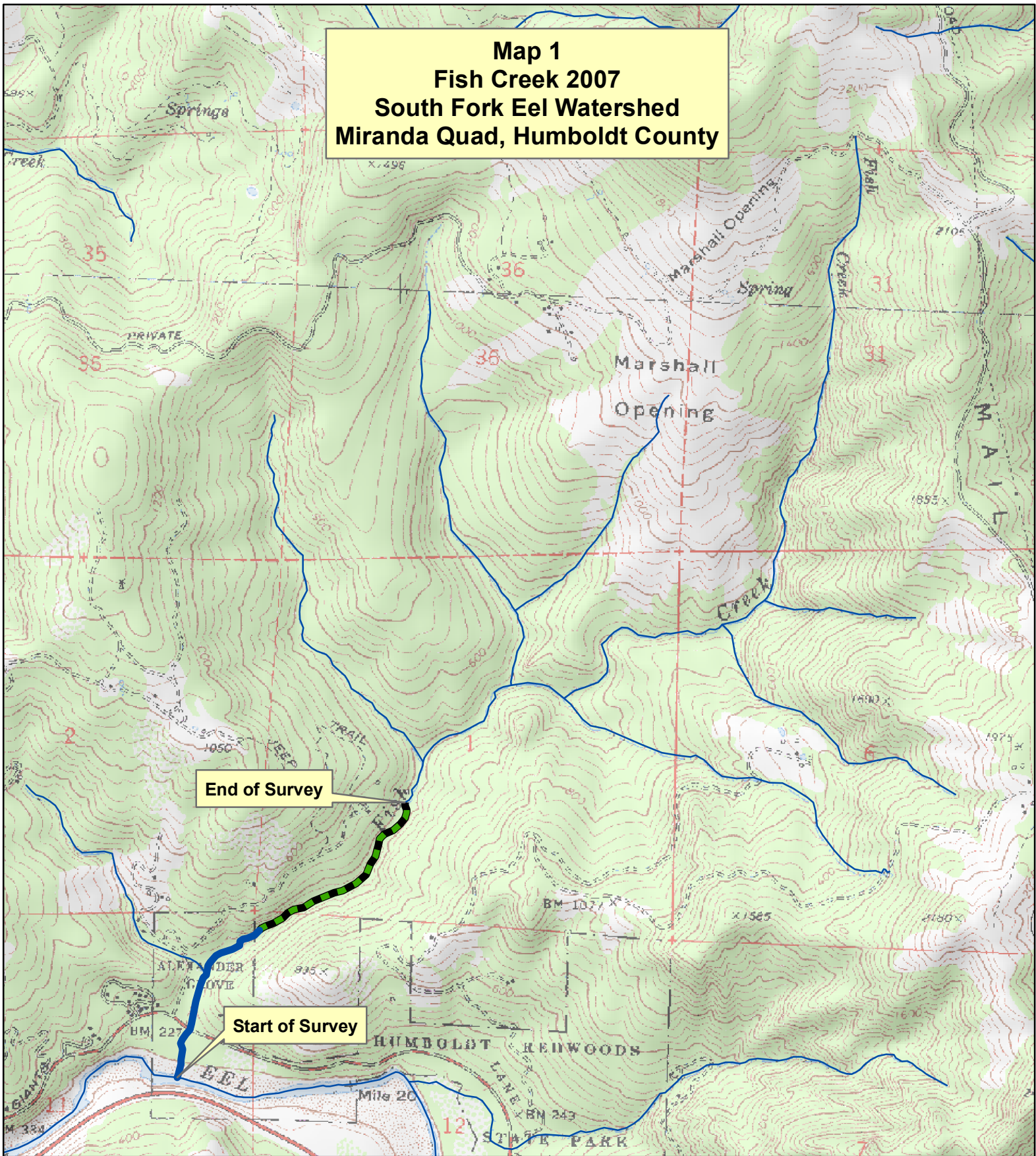
BACKWATER POOLS

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
Fish Creek 2007
South Fork Eel Watershed
Miranda Quad, Humboldt County



Legend

- Reach 1, B4 Channel Type
- - - Reach 2, B3 Channel Type

0 600 1,200 2,400 Feet



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

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0

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	1	CULVERT	1.8	190	190	3.3	6.0	0.1	0.5	1140	1140	114	114		
6	0	DRY	10.5	164	983	17.3									
16	5	FLATWATER	28.1	105	1682	29.5	8.2	0.7	1.3	845	13526	546	8735		26
1	0	NOSURVEY	1.8	40	40	0.7									
14	14	POOL	24.6	34	480	8.4	11.7	0.9	2.1	368	5148	430	6019	324	26
19	3	RIFFLE	33.3	122	2323	40.8	8.3	0.6	1.1	1029	19559	582	11057		18
Total Units	Total Units Fully Measured			Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)			
57	23			5698						39372		25925			

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

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 (%)
15	1	LGR	26.3	121	1809	31.7	7	0.5	1.1	1071	16065	536	8033		5	93
4	2	HGR	7.0	128	514	9.0	9	0.6	1.1	1009	4034	605	2421		25	98
10	4	RUN	17.5	50	496	8.7	7	0.7	2	274	2739	213	2127		25	98
6	1	SRN	10.5	198	1186	20.8	12	0.6	1.4	3131	18788	1879	11273		30	97
13	13	MCP	22.8	31	398	7.0	12	0.9	3	332	4311	405	5266	304	23	98
1	1	STP	1.8	82	82	1.4	12	0.7	2.2	836	836	753	753	585	60	82
6	0	DRY	10.5	164	983	17.3										82
1	1	CUL	1.8	190	190	3.3	6	0.1	0.5	1140	1140	114	114			98
1	0	NS	1.8	40	40	0.7										

Total Units
57

Total Units Fully Measured
23

Total Length (ft.)
5698

Total Area (sq.ft.)
47914

Total Volume (cu.ft.)
29986

Table 3 - Summary of Pool Types

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

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
14	14	MAIN	100	34	480	100	11.7	0.9	368	5148	324	4543	26

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
14	14	480	5148	4543

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

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

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
13	MCP	93	1	8	5	38	5	38	2	15	0	0
1	STP	7	0	0	0	0	1	100	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
14	1	7	5	36	6	43	2	14	0	0

Mean Maximum Residual Pool Depth (ft.): 2.1

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Dry Units: 6

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

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
15	1	LGR	0	0	70	0	0	0	0	30	0
4	2	HGR	0	0	10	25	5	0	0	58	3
19	3	TOTAL RIFFLE	0	0	30	17	3	0	0	48	2
10	3	RUN	10	3	7	80	0	0	0	0	0
6	1	SRN	20	0	35	35	0	0	0	0	10
16	4	TOTAL FLAT	13	3	14	69	0	0	0	0	3
13	13	MCP	16	3	14	30	3	0	1	33	0
1	1	STP	45	30	15	0	0	0	0	10	0
14	14	TOTAL POOL	18	5	14	28	3	0	1	31	0
1	0	CUL									
1	0	NS									
57	21	TOTAL	15	4	16	34	3	0	1	28	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Dry Units: 6

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

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
15	1	LGR	0	0	100	0	0	0	0
4	2	HGR	0	0	100	0	0	0	0
10	3	RUN	0	33	67	0	0	0	0
6	1	SRN	0	0	100	0	0	0	0
13	13	MCP	8	23	69	0	0	0	0
1	1	STP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
96	51	49	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: Fish Creek	LLID: 1238007402212	Drainage: Eel River - South Fork
Survey Dates: 8/13/2007 to 8/14/2007	Survey Length (ft.): 5698	Main Channel (ft.): 5498
		Side Channel (ft.): 200
Confluence Location: Quad: MYERS FLAT	Legal Description: T03SR03ES11	Latitude: 40:13:16.0N
		Longitude: 123:48:03.0W

STREAM REACH: 1										
Channel Type:	B4					Canopy Density (%):	96.0		Pools by Stream Length (%):	6.8
Reach Length (ft.):	1946					Coniferous Component (%):	79.0		Pool Frequency (%):	25.0
Riffle/Flatwater Mean Width (ft.):	7.5					Hardwood Component (%):	21.0		Residual Pool Depth (%):	
BFW:						Dominant Bank Vegetation:	Coniferous Trees		< 2 Feet Deep:	50
Range (ft.):	17	to	22			Vegetative Cover (%):	87.8		2 to 2.9 Feet Deep:	50
Mean (ft.):	19					Dominant Shelter:	Root masses		3 to 3.9 Feet Deep:	0
Std. Dev.:	2					Dominant Bank Substrate Type:	Sand/Silt/Clay		>= 4 Feet Deep:	0
Base Flow (cfs.):	0.1					Occurrence of LWD (%):	14		Mean Max Residual Pool Depth (ft.):	2.2
Water (F):	56 - 56	Air (F):	61 - 63			LWD per 100 ft.:			Mean Pool Shelter Rating:	10
Dry Channel (ft):	720					Riffles:	0			
						Pools:	2			
						Flat:	3			
Pool Tail Substrate (%):	Silt/Clay: 25	Sand: 0	Gravel: 25	Sm Cobble: 0	Lg Cobble: 50	Boulder: 0	Bedrock: 0			
Embeddedness Values (%):	1. 50.0	2. 0.0	3. 25.0	4. 25.0	5. 0.0					

Channel Type:	B3			Canopy Density (%):			96.4			Pools by Stream Length (%):			9.3			
Reach Length (ft.):	3552			Coniferous Component (%):			35.3			Pool Frequency (%):			24.4			
Riffle/Flatwater Mean Width (ft.):	9.0			Hardwood Component (%):			64.7			Residual Pool Depth (%):						
BFW:				Dominant Bank Vegetation:			Hardwood Trees			< 2 Feet Deep:			40			
Range (ft.):	17	to	23	Vegetative Cover (%):			98.9			2 to 2.9 Feet Deep:			40			
Mean (ft.):	20			Dominant Shelter:			Boulders			3 to 3.9 Feet Deep:			20			
Std. Dev.:	2			Dominant Bank Substrate Type:			Sand/Silt/Clay			>= 4 Feet Deep:			0			
Base Flow (cfs.):	0.1			Occurrence of LWD (%):			17			Mean Max Residual Pool Depth (ft.):			2.1			
Water (F):	56	-	62	Air (F):	56	-	70	LWD per 100 ft.:			Mean Pool Shelter Rating:			33		
Dry Channel (ft):	263			Riffles:			2									
				Pools:			6									
				Flat:			3									
Pool Tail Substrate (%):	Silt/Clay: 0		Sand: 0		Gravel: 70		Sm Cobble: 30		Lg Cobble: 0		Boulder: 0		Bedrock: 0			
Embeddedness Values (%):	1. 10.0		2. 50.0		3. 0.0		4. 40.0		5. 0.0							

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

Latitude: 40:13:16.0N

Longitude: 123:48:03.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	22	22	100.0

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	2.3
Hardwood Trees	11	8	43.2
Coniferous Trees	10	14	54.5
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: Fish Creek

LLID: 1238007402212

Drainage: Eel River - South Fork

Survey Dates: 8/13/2007 to 8/14/2007

Confluence Location: Quad: MYERS FLAT

Legal Description: T03SR03ES11

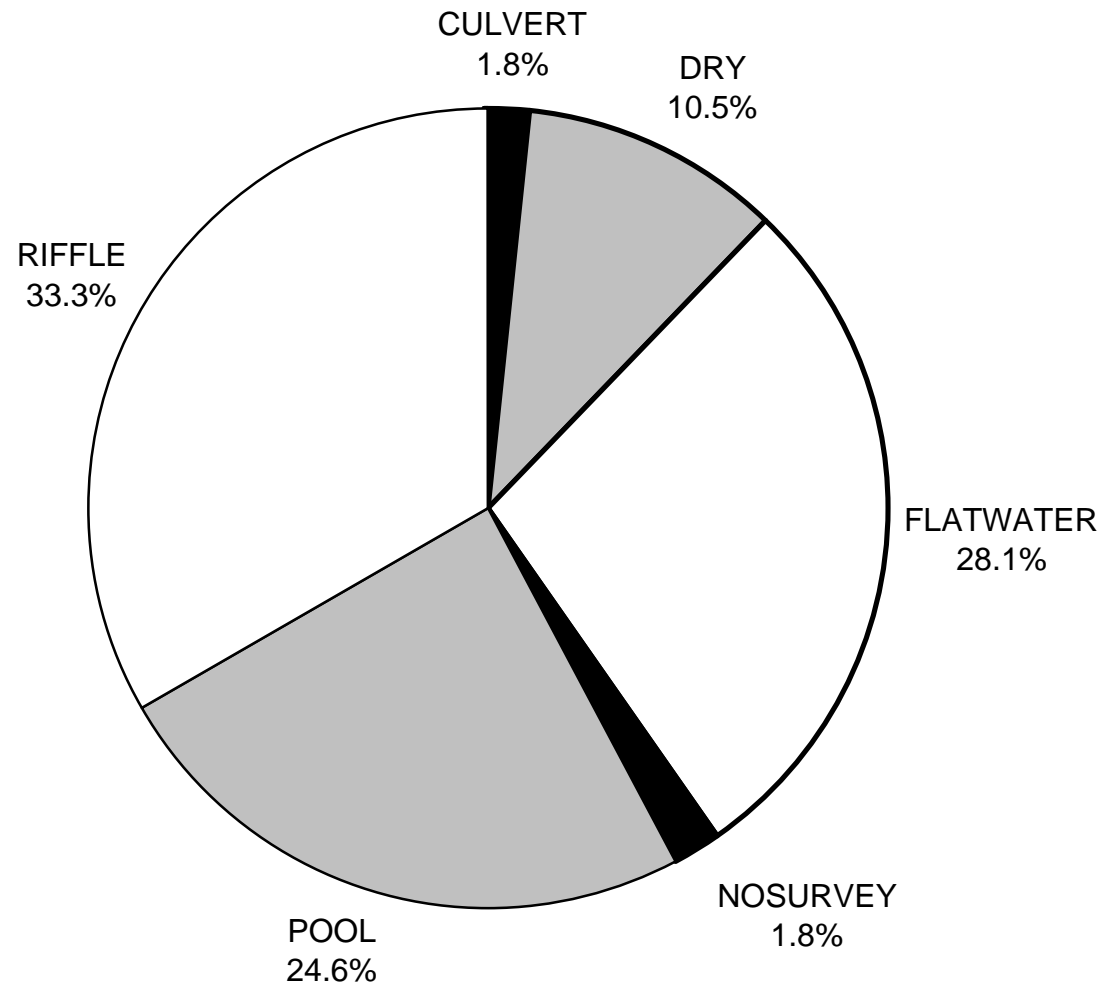
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Longitude: 123:48:03.0W

	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	13	18
SMALL WOODY DEBRIS (%)	0	3	5
LARGE WOODY DEBRIS (%)	30	14	14
ROOT MASS (%)	17	69	28
TERRESTRIAL VEGETATION (%)	3	0	3
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	1
BOULDERS (%)	48	0	31
BEDROCK LEDGES (%)	2	3	0

FISH CREEK 2007

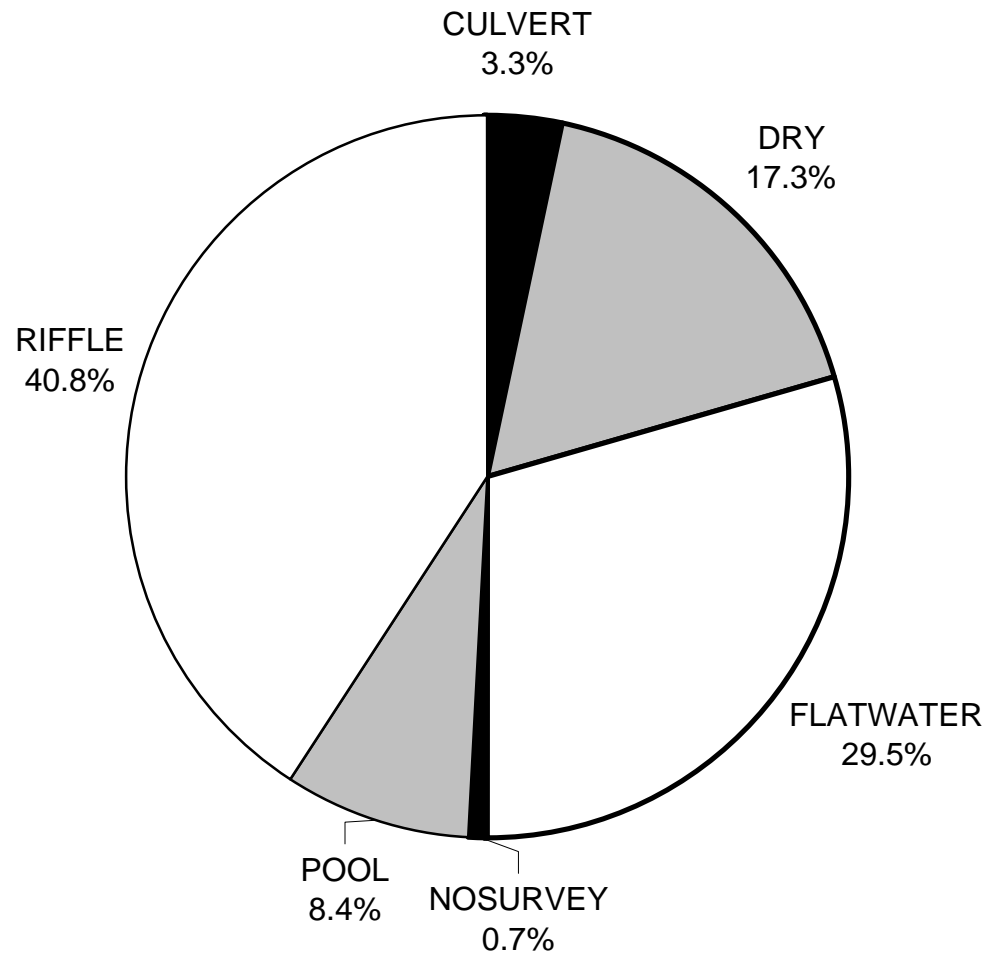
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

FISH CREEK 2007

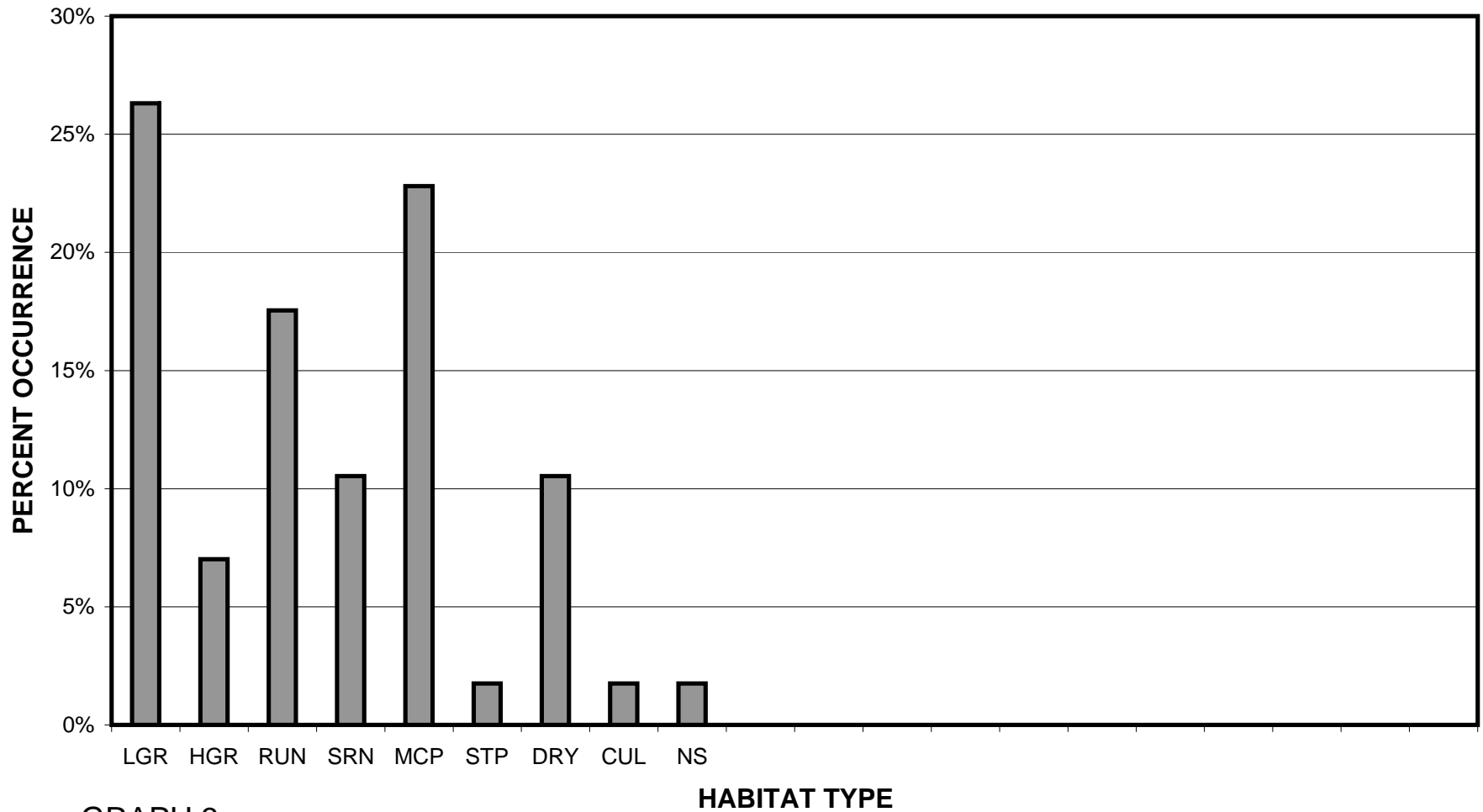
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

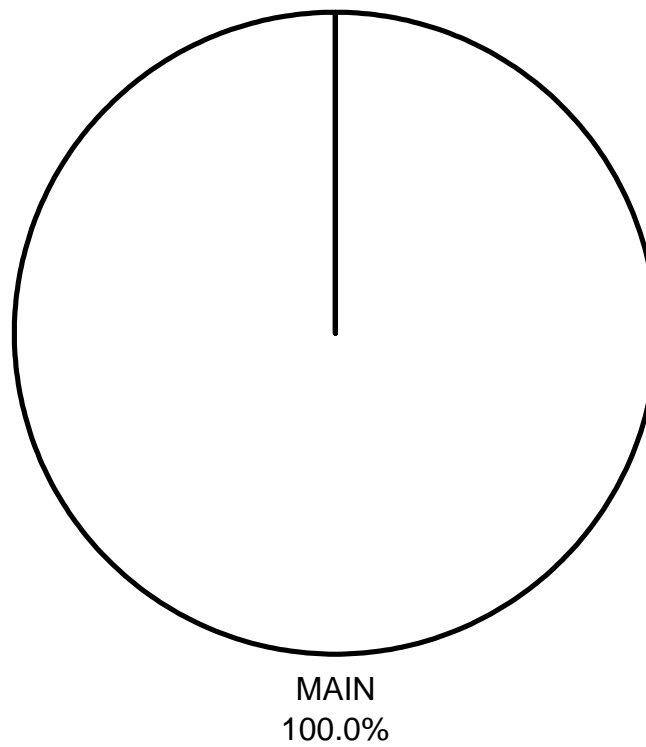
FISH CREEK 2007

HABITAT TYPES BY PERCENT OCCURRENCE



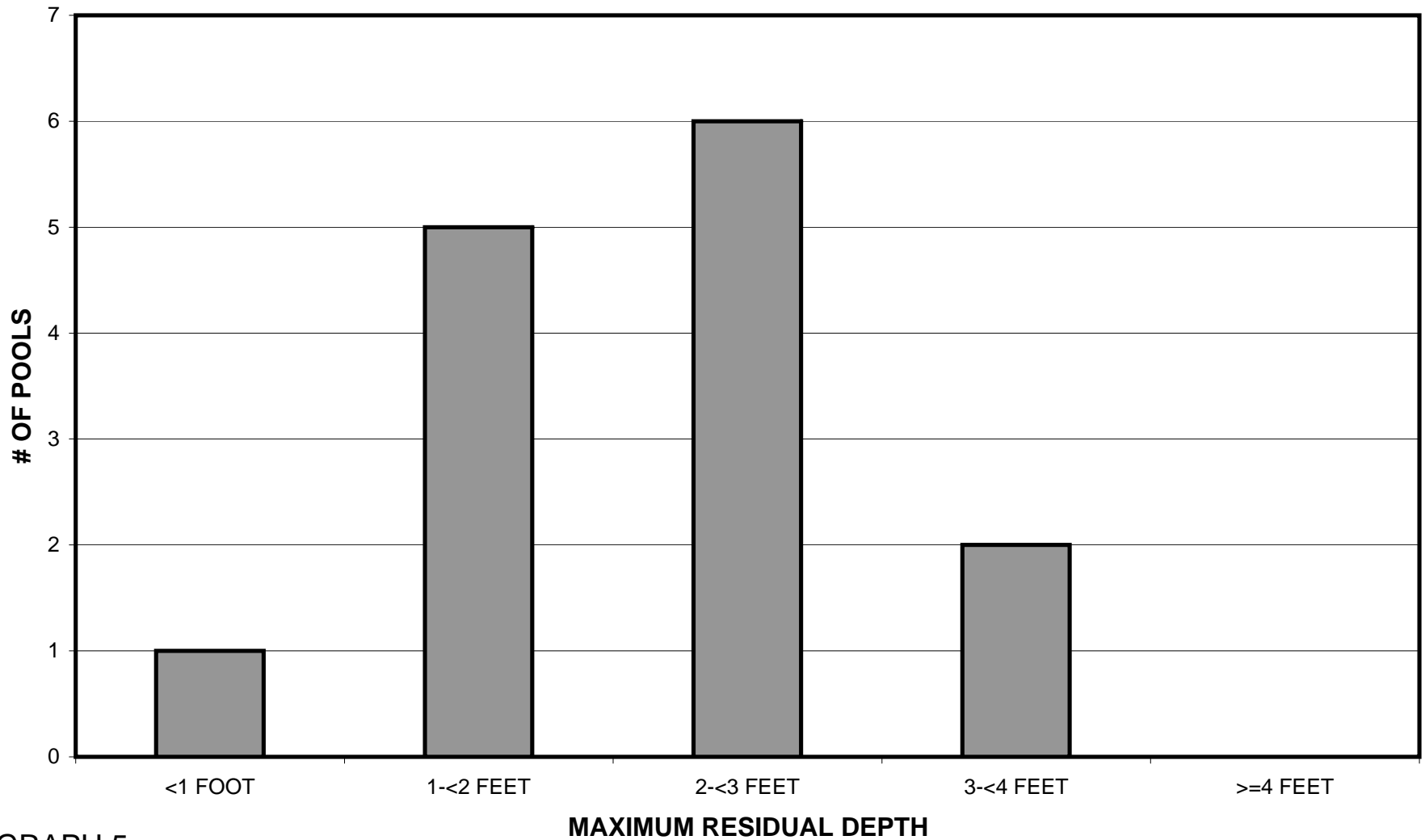
GRAPH 3

FISH CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE



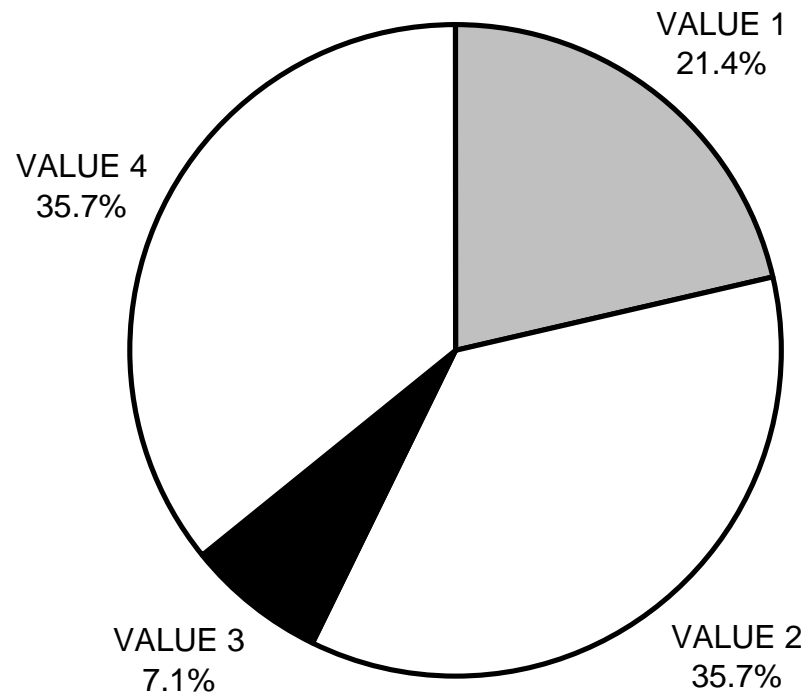
GRAPH 4

**FISH CREEK 2007
MAXIMUM DEPTH IN POOLS**



GRAPH 5

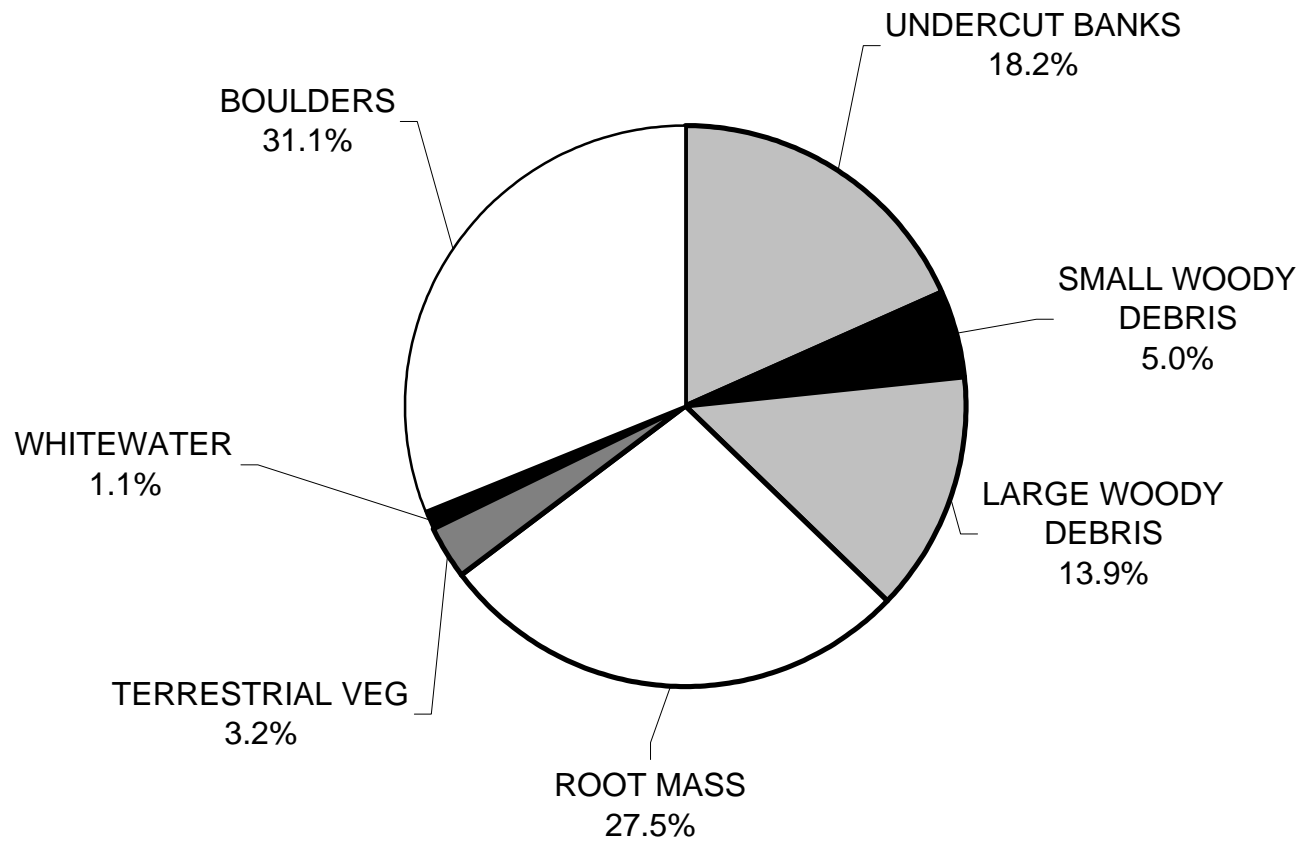
FISH CREEK 2007 PERCENT EMBEDDEDNESS



GRAPH 6

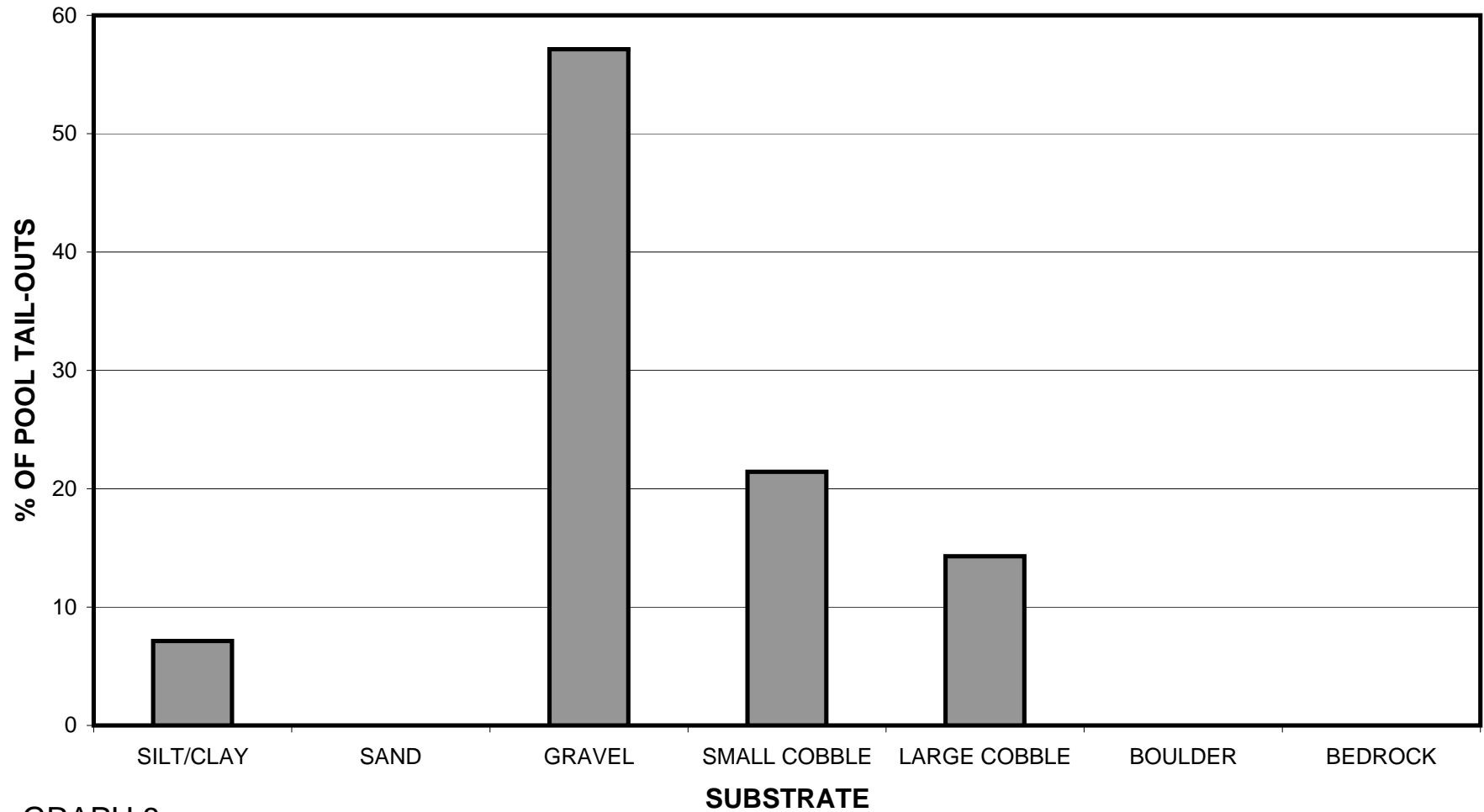
FISH CREEK 2007

MEAN PERCENT COVER TYPES IN POOLS



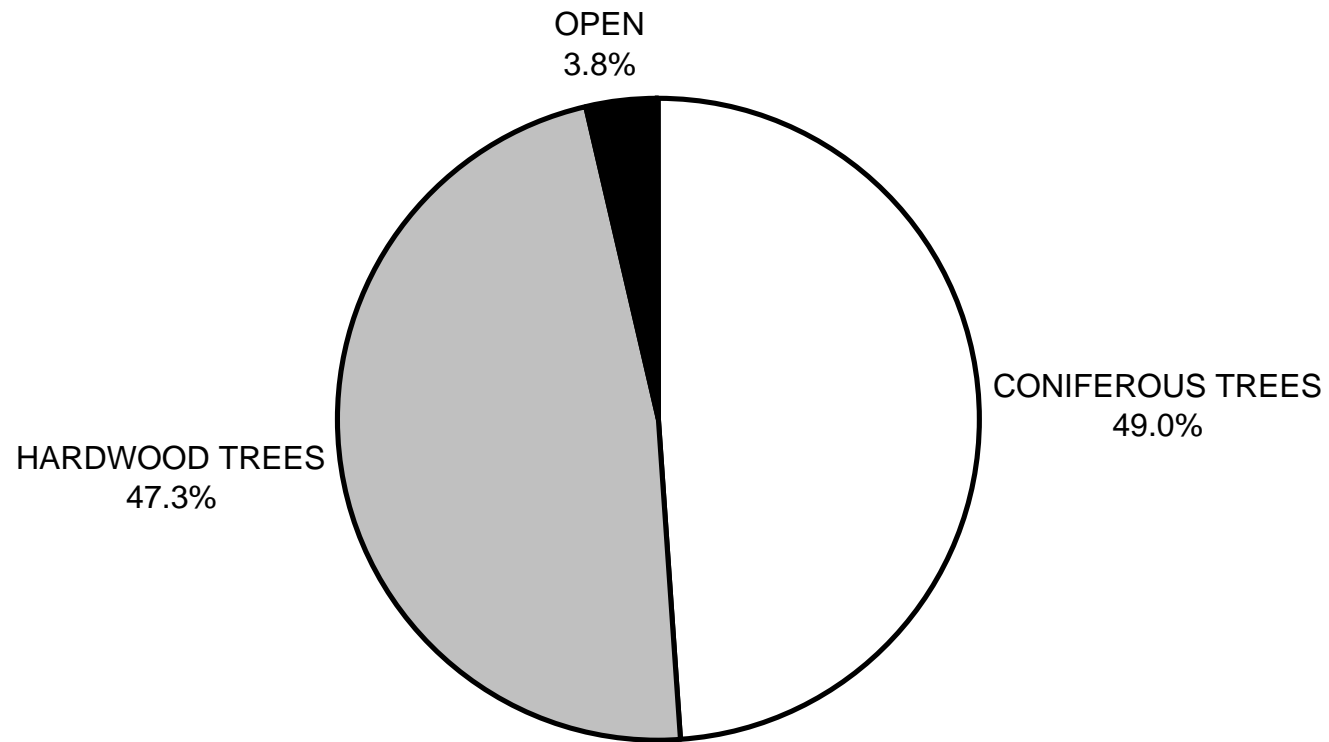
GRAPH 7

FISH CREEK 2007
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



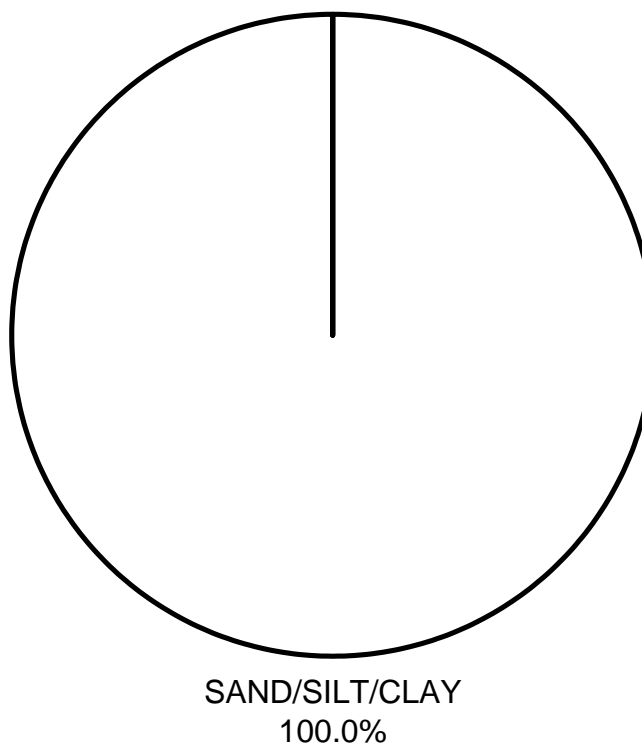
GRAPH 8

**FISH CREEK 2007
MEAN PERCENT CANOPY**



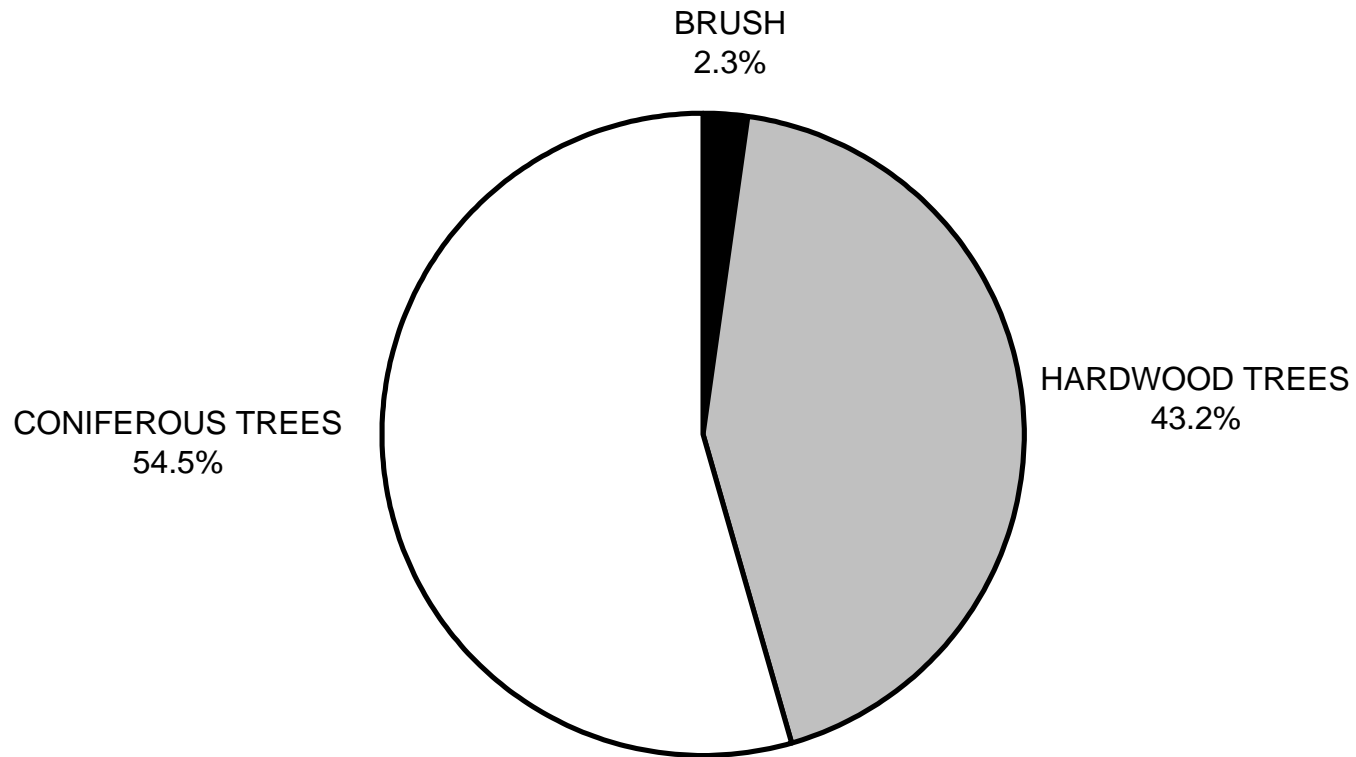
GRAPH 9

FISH CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

FISH CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11