STREAM INVENTORY REPORT

Upper Redwood Creek
aka "Pollock Creek"

INTRODUCTION

A stream inventory was conducted from June 23 to July 9, 2009 on the upper reach of Redwood Creek commonly known as and hereinafter referred to as Pollock Creek. The survey began at the confluence with China Creek and extended upstream 2.7 miles.

The Pollock 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 Pollock 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

Pollock 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). Pollock Creek's legal description at the confluence with South Fork Eel River is T04S R02E S24. Its location is 40.0974 north latitude and 123.9106 west longitude, LLID number 1238352401218. Pollock Creek is a first order stream and has approximately 2.3 miles of blue line stream according to the USGS Briceland 7.5 minute quadrangle. Pollock Creek drains a watershed of approximately 2.7 square miles. Elevations range from about 600 feet at the mouth of the creek to 1,100 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 101 to Redwood Drive to Briceland Thorn Road.

METHODS

The habitat inventory conducted in Pollock Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The 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 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 Pollock 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". Pollock 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 Pollock 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 Pollock 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 Pollock 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 Pollock 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.

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 Pollock Creek. In addition, underwater observations were made at 17 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 Pollock 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 June 23 to July 9, 2009, was conducted by T. Fleming, J. Coombes and N. Talkington (WSP), and I. Mikus (DFG). The total length of the stream surveyed was 14,164 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.6 cfs on June 23, 2009.

Pollock Creek is a B3 channel type for 11,400 feet of the stream surveyed (Reach 1), an E3 channel type for 1,800 feet of the stream surveyed (Reach 2), and a G3 channel type for 964 feet of the stream surveyed (Reach 3). B3 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and cobble-dominant substrates. E3 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and cobble-dominant substrates. G3 channels are entrenched “gully” step-pool channels on moderate gradients with low width /depth ratios, very stable with cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 53 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% pool units, 29% flatwater units, and 28% riffle units (Graph 1). Based on total length of Level II habitat types there were 44% pool units, 37% flatwater units, and 16% riffle units (Graph 2).

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Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 30%; low gradient riffle units, 28%; and run units, 18% (Graph 3). Based on percent total length, mid-channel pool units made up 35%, step run units 21%, and run units 17%.

A total of 161 pools were identified (Table 3). Main channel pools were the most frequently encountered at 75% (Graph 4), and comprised 81% 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-one of the 161 pools (25%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 161 pool tail-outs measured, 38 had a value of 1 (23.6%); 73 had a value of 2 (45.3%); 40 had a value of 3 (24.8%); 4 had a value of 4 (2.5%); 6 had a value of 5 (3.7%) (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 0, flatwater habitat types had a mean shelter rating of 1, and pool habitats had a mean shelter rating of 36 (Table 1). Of the pool types, scour pools had the highest mean shelter rating at 37. Main channel pools had a mean shelter rating of 36 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Pollock Creek. Graph 7 describes the pool cover in Pollock Creek. Small woody debris is 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. Small cobble was the dominant substrate observed in 47% of the pool tail-outs. Gravel was the next most frequently observed dominant substrate type and occurred in 43% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Pollock Creek was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 80% and 20%, respectively. Graph 9 describes the mean percent canopy in Pollock Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 91%. The mean percent left bank vegetated was 92%. The dominant elements composing the structure of the stream banks consisted of 68% sand/silt/clay, 22% cobble/gravel, 9% bedrock, and 1% boulder (Graph 10). Hardwood trees were the dominant vegetation type observed in 58% of the units surveyed. Additionally, 37% of the units surveyed had coniferous trees as the dominant vegetation type, and 5% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Seventeen sites were snorkel surveyed for species composition and distribution in Pollock Creek on June 23, 2009. Water temperatures taken during the sampling period of 1230 to 1530 were all 52 degrees Fahrenheit. Air temperatures were all 68 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG) and T. Fleming (WSP).

In reach 1, which comprised the first 11,400 feet of stream, two sites were sampled. The reach sites yielded 21 young-of-the-year steelhead/rainbow trout (SH/RT) and 38 coho.

In reach 2, 11 sites were sampled starting approximately 11,401 from the confluence with China Creek and continuing upstream 1,800 feet. The reach sites yielded 32 young-of-the-year SH/RT and 8 coho.

In reach 3, four sites were sampled starting approximately 13,201 from the confluence with China Creek and continuing upstream 964 feet. The reach sites yielded 27 young-of-the-year SH/RT.

The following chart displays the information yielded from these sites:

2009 Pollock Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: B3 Channel Type									
07/13/09	1	002	4.2	125	19	0	0	26	0
07/13/09	2	273	4.2	10,339	3	0	0	12	0
Reach 2: E3 Channel Type									
07/13/09	3	325	5.2	12,056	4	0	0	8	0
07/13/09	4	335	4.2	12,342	3	0	0	0	0
07/13/09	5	339	4.2	12,410	5	0	0	0	0
07/13/09	6	341	4.2	12,486	1	0	0	0	0
07/13/09	7	343	4.2	12,541	2	0	0	0	0
07/13/09	8	345	4.2	12,594	3	0	0	0	0
07/13/09	9	347	4.2	12,637	1	0	0	0	0
07/13/09	10	355	5.2	12,876	4	0	0	0	0
07/13/09	11	357	5.2	12,946	0	0	0	0	0
07/13/09	12	358	4.2	12,973	6	0	0	0	0
07/13/09	13	366	4.2	13,185	3	0	0	0	0

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Reach 3: G3 Channel Type									
07/13/09	14	375	5.2	13,449	3	0	0	0	0
07/13/09	15	382	4.2	13,652	9	0	0	0	0
07/13/09	16	390	4.2	14,018	8	0	0	0	0
07/13/09	17	392	4.2	14,064	7	0	0	0	0

DISCUSSION

Pollock Creek is a B3 channel type for the first 11,400 feet of stream surveyed, an E3 channel type for the next 1,800 feet, and a G3 channel type for the remaining 964 feet. The suitability of B3, E3, and G3 channel types for fish habitat improvement structures is as follows: B3 channel types are excellent for plunge weirs, boulder clusters and bank-placed boulders, single and opposing wing-deflectors, and log cover. E3 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. G3 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 23 to July 9, 2009, ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 53 to 72 degrees Fahrenheit. To make any 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 37% of the total length of this survey, riffles 16%, and pools 44%. Forty-one of the 161 (25%) 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 large wood structures that will increase or deepen pool habitat is recommended.

One hundred eleven of the 161 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty-four of the pool tail-outs had embeddedness ratings of 3 or 4. Six 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.

One hundred forty-six of the 161 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 is 36. The shelter rating in the flatwater habitats is 1. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Pollock Creek. Small woody debris is 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 95%. Reach 1 had a canopy density of 95.2%, reach 2 had a canopy density of 94.7%, and reach 3 had a canopy density of 94.5%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 91% and 92%, 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) Pollock Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. Adding high quality complexity with woody cover in the pools is desirable.

4) 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.

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 #:	Comment:
0	0001.00	Survey begins at the confluence of China Creek and Redwood Creek.
125	0003.00	Beginning at habitat unit #003, Pollock Creek is out of the influence of the confluence of China and Redwood Creeks. Left bank erosion 10' high x 25' long and is contributing sediment ranging in size from fines to gravel.
158	0004.00	There is left bank erosion that is 20' high x 16' long. It is contributing fines to boulders.

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373	0010.00	There is erosion on the right bank that is 35' high x 75' long. It is contributing fines to boulders.
687	0018.00	There is erosion on the left bank that is 20' long x 10 ft high. It is contributing fines to gravel.
847	0022.00	There is right bank erosion 25' long x 12' high. It is contributing fines to gravel.
870	0023.00	There is right bank erosion 80' long x 20' high, contributing fines to gravel and trees.
1078	0026.00	There is left bank erosion 15' long x 8' high. It is contributing fines to boulders.
1258	0032.00	Log debris accumulation (LDA) #01 contains 12 pieces of large woody debris (LWD) and measures 5.5’ high x 66’ wide x 20’ long with water flowing through and visible gaps. Retained sediment ranges from fines to large cobble and measures 65’ wide x 50’ long x 3’ deep. Fish are upstream of the LDA.
1345	0035.00	There is left bank erosion that is 60' long x 7' high and contributing fines to gravel.
1453	0037.00	Tributary #01 enters on the right bank. The flow contributes to 12% of the downstream flow. The temperature downstream of the tributary is 58 degrees Fahrenheit, the temperature of the tributary is 57 degrees Fahrenheit, and the temperature upstream of the confluence is 57 degrees Fahrenheit. The slope of the tributary is 5%. Fish were observed in the 75 feet surveyed.
1612	0040.00	There is left bank erosion that is 10' high x 30' long. It is contributing fines to cobble.
1779	0043.00	There is right bank erosion that is 50' long x 6' high and contributing fines to cobble.
2066	0047.00	Bridge #01 is an unnamed private road, and is 8’ high x 39’ wide x 77’ long. It is a railcar bridge made of metal and wood.
2112	0049.00	There is right bank erosion that is 40' long x 3' high and contributing fines to cobble.
2233	0053.00	There is right bank erosion that is 100' high x 75' long and contributing fines to cobble and small trees.

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2428	0059.00	There is erosion on the left bank 50' high x 25' wide. It is contributing fine sediment to gravel and trees.
2452	0060.00	There is a plunge of 1.2 ft at the top of habitat unit caused by large woody debris across bank.
2551	0062.00	There is right bank erosion that is 100' long x 10' high. It is adding fine sediment to large cobble.
2813	0070.00	There is right bank erosion that is 12' long x 3' wide and contributing fine sediment to large cobble.
3063	0075.00	There is left bank erosion that is 50’ long x 25’ high and contributing fines to cobble.
3223	0080.00	There is right bank erosion that is 75' long x 7' high and contributing fine sediment to gravel and trees.
3342	0084.00	LDA #02 contains 11 pieces of LWD and measures 5’ high x 46’ wide x 13’ long with water flowing through, though there are no visible gaps. Retained sediment ranges from fines to small cobble and measures 43’ wide x 64’ long x 4’ deep.
3480	0088.00	There is right bank erosion that is 45' long x 8' high and contributing fine sediment to small cobble and trees. There is left bank erosion that is 10' high x 50' long and contributing fine sediment to gravel.
3526	0089.00	LDA #03 contains 13 pieces of LWD and measures 5.5’ high x 35’ wide x 19’ long with water flowing through and visible gaps. Retained sediment ranges from fines to gravel and measures 39’ wide x 15’ long x 3’ deep. There is erosion on the right bank that is 90’ high x 10’ long contributing fine sediment to boulders and trees. Fish are upstream of the LDA.
3596	0092.00	There is right bank erosion that is 50' long x 25' high and contributing fines to small cobble.
3925	0103.00	There is erosion on the left bank that is 15' high x 10' wide and contributing fine sediment to cobble and trees.
4063	0107.00	There is erosion on the right bank that is 100' long x 40' high and contributing fine sediment to large cobble and trees.
4184	0110.00	There is left bank erosion that is 50' long x 3' high and contributing fine sediment to gravel and trees.

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4198	0111.00	LDA #04 contains 9 pieces of LWD and measures 6’ high x 45’ wide x 27’ long with water flowing visible gaps. Retained sediment ranges from fines to small cobble and measures 35’ wide x 32’ long x 1’ deep. Fish are upstream of the LDA. There is erosion on the left bank that is 15’ high x 30’ long contributing fines to gravel sized sediment and trees.
4398	0115.00	There is right bank erosion that is 8' high x 50' long and contributing fine sediment to boulders.
4490	0118.00	There is right bank erosion that is 25' long x 75' high and contributing fine sediment to boulder and trees.
4555	0120.00	There is right bank erosion that is 20' high x 15' long and contributing fine sediment to gravel.
4575	0121.00	There is erosion on the right bank that is 50' long x 5' high and contributing fine sediment to gravel and trees.
4768	0123.00	There is right bank erosion that is 20' long x 3' high and contributing fine sediment to large cobble.
4801	0124.00	Tributary #02 enters on the right bank. The flow is contributing 5% to the downstream flow. The temperature downstream of the tributary is 59 degrees Fahrenheit, the temperature of the tributary is 56 degrees Fahrenheit, and the temperature upstream of the confluence is 57 degrees Fahrenheit. The slope of the tributary is 5%. Fish were not observed in the 150 feet surveyed. The tributary was dry for 75 feet upstream of the mouth. LDA #05 contains 3 pieces of LWD and measures 6’ high x 33’ wide x 9’ long with water flowing through visible gaps. Retained sediment ranges from fines to large cobble and measures 15’ wide x 30’ long x 2’ deep. There are fish upstream of the LDA. There is erosion 3' high x 30' long and is contributing fine sediment to small cobble and contributing trees to LDA.
5165	0133.00	There is right bank erosion 5' high x 25' long and contributing fine sediment to boulders.
5194	0134.00	There is right bank erosion 5' high x 30' long.
5371	0137.00	There is right bank erosion 30' high x 40' long. It is contributing fine sediment to gravel and trees.
5548	0141.00	There is right bank erosion 55' long x 10' high and contributing fine sediment to large cobble.

5735	0146.00	There is left bank erosion 40' high x 5' wide and is contributing fine sediment to gravel and trees.
5949	0152.00	There is right bank erosion 25' long x 8' high and contributing fine sediment to boulders.
6131	0154.00	Tributary #03 enters on the right bank. The flow is contributes to 10% of the downstream flow. The temperature downstream of the tributary is 58 degrees Fahrenheit, the temperature of the tributary is 58 degrees Fahrenheit, and the temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is 5%. Fish were not observed in the 150 feet surveyed.
6290	0158.00	There is erosion on the right bank that is 100' high x 150' long and contributing fine sediment to gravel and trees.
6580	0166.00	There is left bank erosion that is 100' long x 4' high and contributing fine sediment to small cobble.
6790	0173.00	There is left bank erosion 5' high x 50' long and contributing fine sediment to large cobble and trees.
6878	0177.00	There is erosion on the left bank that is 10' high x 25' long and contributing fine sediment to large cobble and trees.
6986	0182.00	There is erosion on the right bank that is 40' long x 20' high and contributing fine sediment to boulder and trees.
7236	0188.00	LDA #06 contains 8 pieces of LWD and measures 5.5’ high x 27’ wide x 51’ long with water flowing through and visible gaps. Retained sediment ranges from fine to small cobble and measures 12’ wide x 28’ long x 3’ deep. Fish are upstream of the LDA. There is erosion on the left bank 75' long x 8' high and it is contributing fine sediment to large cobble and trees.
7330	0192.00	Tributary #04 enters on the right bank. It is not currently flowing. The temperature downstream of the tributary is 56 degrees Fahrenheit and the temperature upstream of the confluence is 58 degrees Fahrenheit. The slope of the tributary is 10%. Fish were not observed in the 100 feet surveyed.
7447	0194.00	There is right bank erosion 10' high x 15' long and contributing fine sediment to gravel.

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7584	0196.00	There is left bank erosion 75' long x 8' high and contributing fine sediment to boulders.
7867	0204.00	There is left bank erosion 25' long x 50' high and contributing fine sediment to gravel.
7929	0206.00	There is right bank erosion 25' high x 50' long and contributing fine sediment to gravel.
8047	0210.00	LDA #07 contains 44 pieces of LWD and measures 6’ high x 34’ wide x 73’ long with water flowing though there are no visible gaps. Retained sediment ranges from fines to small cobble and measures 8’ wide x 45’ long x 2’ deep. The right bank erosion 40' long x 5' high and is contributing fine sediment to boulders and trees. There is left bank erosion 50' long x 10' high and it is contributing fine sediment to large cobble and trees.
8212	0213.00	There is left bank erosion 40' long x 5' high and contributing fine sediment to gravel.
8431	0218.00	There is erosion on left bank that is 50' high x 10' long and contributing fine sediment to gravel and trees. LDA #08 contains 4 pieces of LWD and measures 4’ high x 24’ wide x 6’ long with water flowing through thought there are not any visible gaps. Retained sediment ranges from fines to small cobble and measures 10’ wide x 21’ long x 1’ deep. There are fish upstream.
8960	0232.00	LDA #09 contains 15 pieces of LWD and measures 4’ high x 24’ wide x 37’ long with water flowing through and visible gaps. It is not retaining sediment. Fish are upstream of the LDA.
9006	0233.00	Road on left bank that is causing erosion that is 50' long x 5' high and contributing fine sediment to gravel and trees.
9228	0241.00	There is left bank erosion 20' long x 5' high and contributing fine sediment to large cobble and trees.
9320	0242.00	There is left bank erosion 20' long x 5' high and contributing fine sediment to large cobble and trees.
9467	0246.00	There is left bank erosion 47' long x 10' high and contributing fine sediment to boulder and trees.

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9467	0246.00	LDA #10 contains 12 pieces of LWD and measures 4’ high x 22’ wide x 35’ long with water flowing through and visible gaps. The LDA is not retaining sediment. There are fish upstream.
9613	0250.00	There is seepage and fallen trees on the left bank. Flagging from 1998 labeled Habitat Unit #235.
9639	0252.00	Tributary #05 enters on the left bank. The flow contributes to 5% of the downstream flow. The temperature downstream of the tributary is 55 degrees Fahrenheit, the temperature of the tributary is 55 degrees Fahrenheit, and the temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is 4%. Fish were not observed in the 100 feet surveyed. The tributary is dry 100’ upstream of the mouth.
9772	0254.00	There is right bank erosion 50' long x 5' high and contributing fine sediment to boulders and trees.
9912	0258.00	Tributary #06 enters on the right bank. The flow contributes to 25% of the downstream flow. The temperature downstream of the tributary is 55 degrees Fahrenheit, the temperature of the tributary is 57 degrees Fahrenheit, and the temperature upstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is 3%. Fish were observed in the 250 feet surveyed.
9980	0262.00	There is left bank erosion 50' long x 5' high and contributing fine sediment to small cobble. There is right bank erosion 25' long x 5' high and contributing fine sediment to small cobble and trees.
10092	0267.00	LDA #11 contains 6 pieces of LWD and measures 4.5’ high x 15’ wide x 16’ long with water flowing through visible gaps. Retained sediment is primarily fines and measures 4’ wide x 5’ long x 1’ deep. Fish are upstream of the LDA.
10156	0269.00	There is right bank erosion that is 50' long x 10' high and contributing fine sediment to gravel and trees.
10177	0270.00	LDA #12 contains 7 pieces of LWD and measures 9’ high x 13’ wide x 45’ long with water flowing through visible gaps. No sediment is being retained.
10325	0273.00	There is left bank erosion that is 30' long x 5' high and contributing fine sediment to small cobbles and trees.
10396	0277.00	Bridge #02 is an unnamed private road, and is 9’ high x 14’ wide x 30’ long. It is a flatcar bridge made of metal.

11005	0293.00	There is right bank erosion 50' long x 5' high and contributing fine sediment to large cobble.
11275	0301.00	Tributary #07 enters on the right bank. The flow contributes to 10% of the downstream flow. The temperature downstream of the tributary is 54 degrees Fahrenheit, the temperature of the tributary is 54 degrees Fahrenheit, and the temperature upstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is 5%. Fish were observed in the 150 feet surveyed.
11386	0304.00	There is left bank erosion 50' long x 5' high and contributing fine sediment to boulders.
11400	0305.00	Reach 2 begins. The new channel type is E3. The left and right banks are sloped due to culvert removal.
11498	0309.00	There is erosion on the left bank contributing fine sediment to boulders and trees. There is right bank erosion contributing fine sediment to small cobble.
11607	0312.00	There is a 1993 flag for habitat unit #264.
11704	0313.00	LDA #13 contains 14 pieces of LWD and measures 5.5’ high x 9.5’ wide x 14’ long with water flowing through visible gaps. There is no retained sediment. Fish are upstream.
11894	0321.00	There is erosion on the right bank that is 15' long x 10' high and contributing fine sediment to gravel and trees.
12030	0325.00	There is right bank erosion that is 25' long x 10' high and contributing fine sediment to boulders and trees.
12056	0326.00	LDA #14 contains 9 pieces of LWD and measures 7.5’ high x 9’ wide x 13’ long with water flowing visible gaps. Retained sediment consists of fines and duff and measures 3’ wide x 5’ long x 1’ deep.
12342	0336.00	There is right bank erosion 100' long x 15' high and contributing fine sediment to gravel and trees.
12468	0341.00	Tributary #08 enters on the left bank. It is not flowing. The temperature downstream of the tributary is 54 degrees Fahrenheit and the temperature upstream of the confluence is 54 degrees Fahrenheit. The slope of the tributary is 10%. Fish were not observed in the 100 feet surveyed.

Pollock Creek

12576	0345.00	There is right bank erosion 10' long x 5' high and contributing fine sediment to boulders.
12594	0346.00	There is right bank erosion 15' long x 5' high and contributing fine sediment to large cobble.
12744	0350.00	There is erosion on the right bank that is 50' long x 10' high contributing fine sediment to large cobble.
13121	0364.00	There is left bank erosion 75' long x 5' high and contributing fine sediment to gravel and trees.
13185	0367.00	There is right bank erosion, contributing fine sediment, duff and small wood. The channel is completely obscured and water is flowing under the obstruction.
13984	0390.00	There is erosion on the left bank that is 30' long x 15' high and contributing fine sediment to large cobble and trees.
14164	0395.00	End of survey due to a 5' jump covered created by small woody debris.

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.

Pollock Creek

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]	

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

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0

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
113	17	FLATWATER	28.6	47	5273	37.2	6.7	0.4	0.7	228	25710	100	11336		1
9	0	NOSURVEY	2.3	30	271	1.9									
161	161	POOL	40.8	39	6290	44.4	10.9	0.8	1.7	435	70063	547	88012	435	36
112	20	RIFFLE	28.4	21	2330	16.5	6.4	0.2	0.4	94	10573	24	2657		0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
395	198	14164	106345	102005

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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 (%)
111	19	LGR	28.1	21	2318	16.4	6	0.2	0.6	96	10694	24	2671		0	96
1	1	BRS	0.3	12	12	0.1	6	0.3	0.8	58	58	17	17		0	100
72	10	RUN	18.2	33	2367	16.7	7	0.4	1	154	11074	71	5113		2	96
41	7	SRN	10.4	71	2906	20.5	6	0.4	1.4	333	13646	142	5829		0	96
119	119	MCP	30.1	42	5025	35.5	11	0.9	4.8	476	56625	627	74574	506	36	95
1	1	CCP	0.3	18	18	0.1	8	0.5	1.1	144	144	101	101	72	5	99
1	1	STP	0.3	44	44	0.3	11	1.3	2.5	460	460	644	644	598	30	92
2	2	CRP	0.5	46	93	0.7	8	0.6	1.6	372	744	276	551	201	50	93
16	16	LSL	4.1	30	478	3.4	12	0.7	5.1	372	5953	411	6578	332	66	94
9	9	LSR	2.3	26	237	1.7	9	0.4	1.5	268	2413	208	1874	94	21	90
10	10	LSBk	2.5	29	293	2.1	8	0.7	4	258	2578	294	2942	214	11	95
2	2	LSBo	0.5	39	78	0.6	13	0.5	1.6	471	941	302	605	235	5	98
1	1	PLP	0.3	24	24	0.2	9	0.4	0.7	205	205	144	144	82	0	96
9	0	NS	2.3	30	271	1.9										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
395	198	14164	105534	101643

Table 3 - Summary of Pool Types

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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
121	121	MAIN	75	42	5087	81	11.1	0.9	473	57229	503	60384	36
40	40	SCOUR	25	30	1203	19	10.5	0.6	321	12834	231	9240	37

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
161	161	6290	70063	69625

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

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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
119	MCP	74	6	5	78	66	23	19	10	8	2	2
1	CCP	1	0	0	1	100	0	0	0	0	0	0
1	STP	1	0	0	0	0	1	100	0	0	0	0
2	CRP	1	0	0	2	100	0	0	0	0	0	0
16	LSL	10	2	13	10	63	3	19	0	0	1	6
9	LSR	6	2	22	7	78	0	0	0	0	0	0
10	LSBk	6	3	30	6	60	0	0	0	0	1	10
2	LSBo	1	0	0	2	100	0	0	0	0	0	0
1	PLP	1	1	100	0	0	0	0	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
161	14	9	106	66	27	17	10	6	4	2

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009 Dry Units: 0

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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
111	20	LGR	0	0	0	0	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	0	0	0
112	21	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
72	10	RUN	0	80	20	0	0	0	0	0	0
41	8	SRN	0	0	0	0	0	0	0	0	0
113	18	TOTAL FLAT	0	80	20	0	0	0	0	0	0
119	119	MCP	20	26	18	20	7	0	0	5	5
1	1	CCP	0	0	0	100	0	0	0	0	0
1	1	STP	30	40	10	20	0	0	0	0	0
2	2	CRP	30	20	0	20	30	0	0	0	0
16	16	LSL	9	31	43	13	5	0	0	0	0
9	9	LSR	14	29	11	34	8	0	0	4	0
10	10	LSBk	41	16	0	22	4	3	0	8	7
2	2	LSBo	0	30	0	10	10	0	0	50	0
1	1	PLP	0	0	0	0	0	0	0	0	0
161	161	TOTAL POOL	19	26	19	20	7	0	0	5	4
9	0	NS									
395	200	TOTAL	19	26	19	20	7	0	0	5	4

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009 Dry Units: 0

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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
111	19	LGR	0	0	58	21	21	0	0
1	1	BRS	0	0	0	0	0	0	100
72	10	RUN	0	0	70	30	0	0	0
41	7	SRN	0	0	71	14	0	14	0
119	119	MCP	0	1	90	4	3	0	2
1	1	CCP	0	0	100	0	0	0	0
1	1	STP	0	0	100	0	0	0	0
2	2	CRP	0	0	100	0	0	0	0
16	16	LSL	0	0	94	0	6	0	0
9	9	LSR	0	0	89	0	11	0	0
10	10	LSBk	0	0	90	10	0	0	0
2	2	LSBo	0	0	100	0	0	0	0
1	1	PLP	0	0	0	100	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	20	80	0	91	92

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009 Survey Length (ft.): 14164 Main Channel (ft.): 14164 Side Channel (ft.): 0

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B3
Reach Length (ft.): 11400
Riffle/Flatwater Mean Width (ft.): 7.8
BFW:
Range (ft.): 10 to 26
Mean (ft.): 20
Std. Dev.: 4
Base Flow (cfs.): 0.6
Water (F): 54 - 60 Air (F): 54 - 72
Dry Channel (ft): 0

Canopy Density (%): 95.2
Coniferous Component (%): 16.3
Hardwood Component (%): 83.7
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 92.4
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 13
LWD per 100 ft.:
Riffles: 2
Pools: 5
Flat: 2

Pools by Stream Length (%): 49.5
Pool Frequency (%): 44.1
Residual Pool Depth (%):
< 2 Feet Deep: 70
2 to 2.9 Feet Deep: 19
3 to 3.9 Feet Deep: 7
>= 4 Feet Deep: 3
Mean Max Residual Pool Depth (ft.): 1.8
Mean Pool Shelter Rating: 40

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 1 Gravel: 49 Sm Cobble: 41 Lg Cobble: 6 Boulder: 1 Bedrock: 2

Embeddedness Values (%): 1. 23.1 2. 50.0 3. 20.9 4. 2.2 5. 3.7

STREAM REACH: 2

Channel Type: E3
Reach Length (ft.): 1800
Riffle/Flatwater Mean Width (ft.): 4.7
BFW:
Range (ft.): 9 to 13
Mean (ft.): 10
Std. Dev.: 1
Base Flow (cfs.): 0.6
Water (F): 54 - 56 Air (F): 53 - 57
Dry Channel (ft): 0

Canopy Density (%): 94.8
Coniferous Component (%): 29.5
Hardwood Component (%): 70.5
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 90.2
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 18
LWD per 100 ft.:
Riffles: 2
Pools: 6
Flat: 3

Pools by Stream Length (%): 30.0
Pool Frequency (%): 34.9
Residual Pool Depth (%):
< 2 Feet Deep: 95
2 to 2.9 Feet Deep: 5
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.3
Mean Pool Shelter Rating: 17

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 5 Gravel: 18 Sm Cobble: 77 Lg Cobble: 0 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 27.3 2. 22.7 3. 45.5 4. 0.0 5. 4.5

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: G3
Reach Length (ft.): 964
Riffle/Flatwater Mean Width (ft.): 3.4
BFW:
Range (ft.): 7 to 10
Mean (ft.): 9
Std. Dev.: 1
Base Flow (cfs.): 0.6
Water (F): 56 - 58 Air (F): 55 - 59
Dry Channel (ft): 0

Canopy Density (%): 94.5
Coniferous Component (%): 53.0
Hardwood Component (%): 47.0
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 79.5
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 16
LWD per 100 ft.:
Riffles: 2
Pools: 9
Flat: 1

Pools by Stream Length (%): 11.6
Pool Frequency (%): 17.9
Residual Pool Depth (%):
< 2 Feet Deep: 100
2 to 2.9 Feet Deep: 0
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.2
Mean Pool Shelter Rating: 12

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 20 Sm Cobble: 80 Lg Cobble: 0 Boulder: 0 Bedrock: 0
Embeddedness Values (%): 1. 20.0 2. 20.0 3. 40.0 4. 20.0 5. 0.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

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	17	19	9.1
Boulder	1	1	0.5
Cobble / Gravel	41	46	22.0
Sand / Silt / Clay	139	132	68.4

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	8	12	5.1
Hardwood Trees	113	117	58.1
Coniferous Trees	77	69	36.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

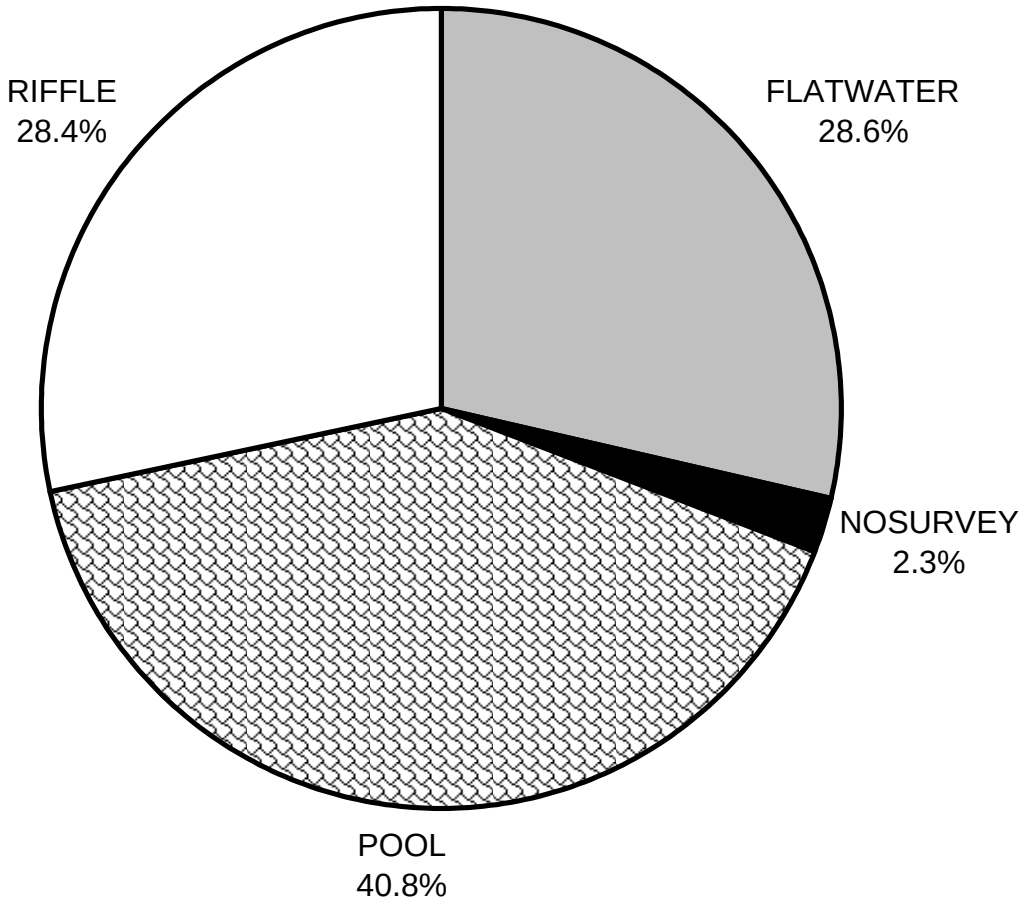
StreamName: Redwood Creek LLID: 1238352401218 Drainage: Eel River - South Fork

Survey Dates: 6/23/2009 to 7/9/2009

Confluence Location: Quad: MIRANDA Legal Description: T04SR03ES10 Latitude: 40:07:18.0N Longitude: 123:50:07.0W

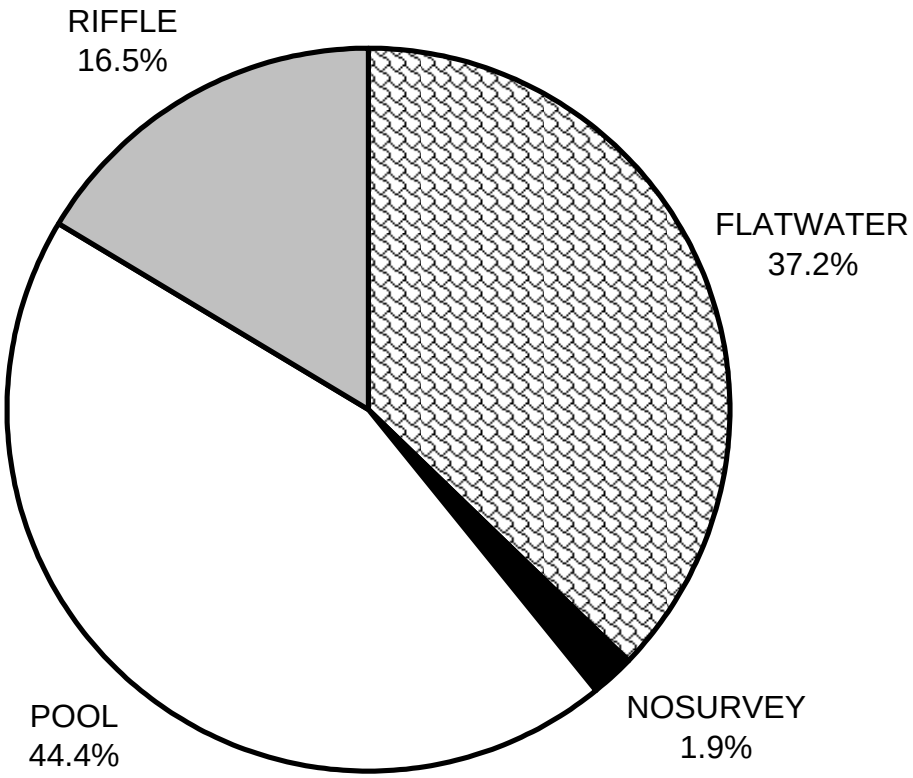
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	19
SMALL WOODY DEBRIS (%)	0	80	26
LARGE WOODY DEBRIS (%)	0	20	19
ROOT MASS (%)	0	0	20
TERRESTRIAL VEGETATION (%)	0	0	7
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	5
BEDROCK LEDGES (%)	0	0	4

REDWOOD CREEK 2009
HABITAT TYPES BY PERCENT OCCURRENCE



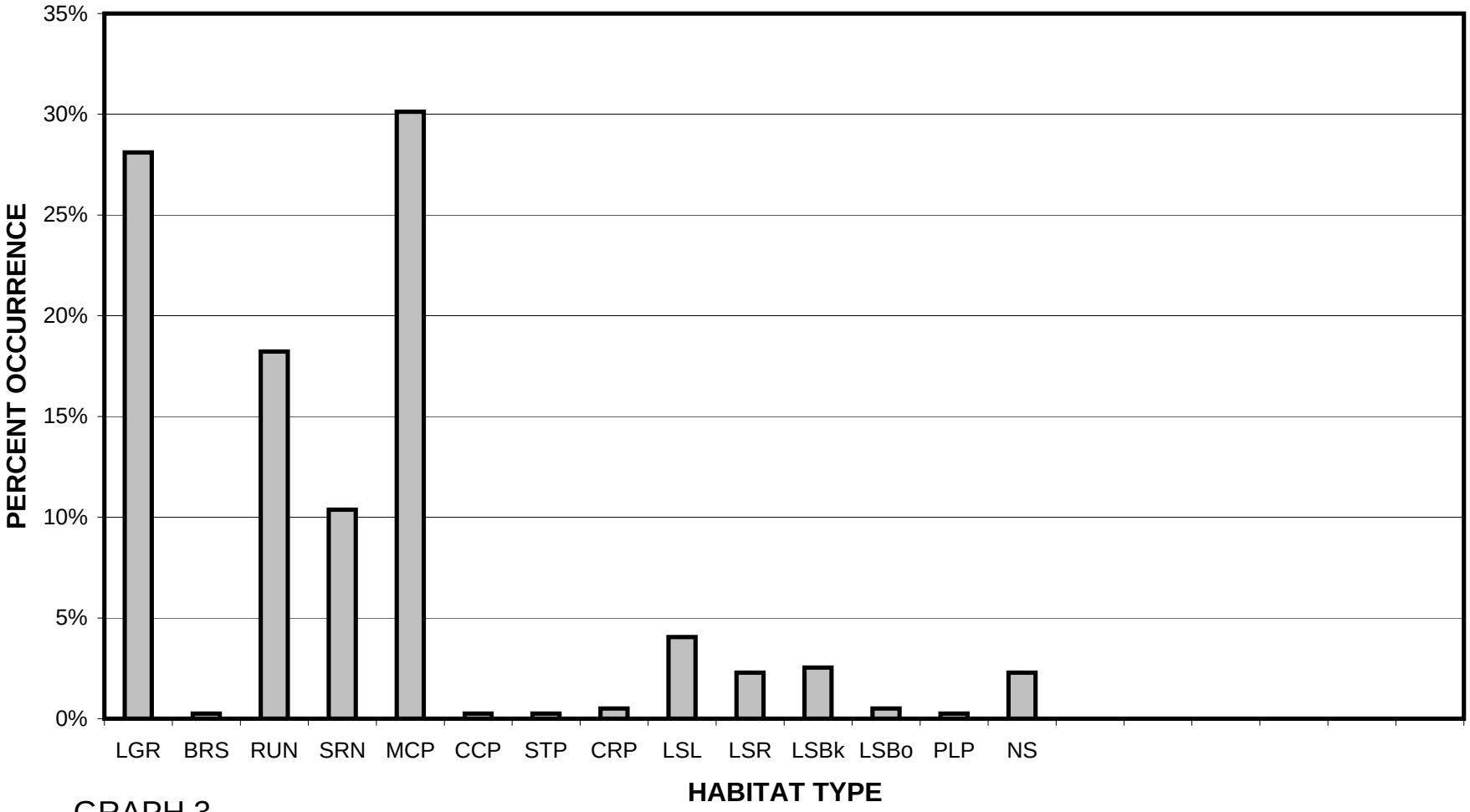
GRAPH 1

REDWOOD CREEK 2009
HABITAT TYPES BY PERCENT TOTAL LENGTH



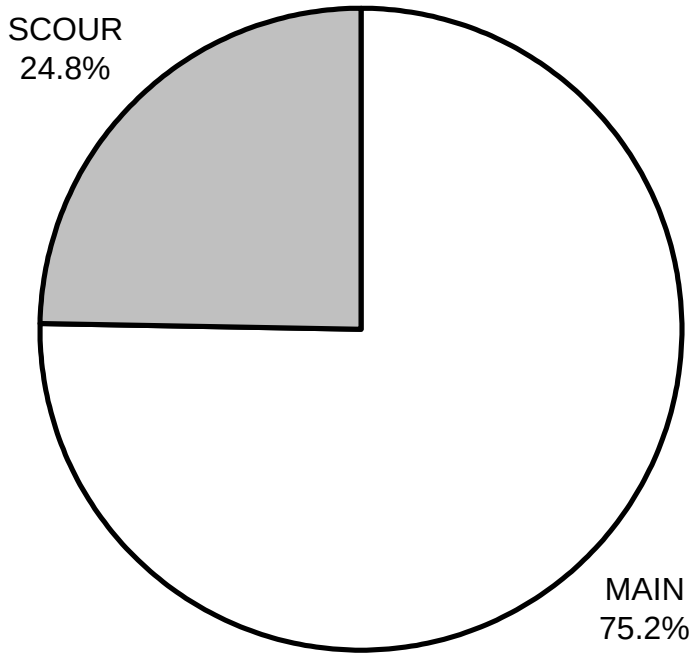
GRAPH 2

REDWOOD CREEK 2009
HABITAT TYPES BY PERCENT OCCURRENCE



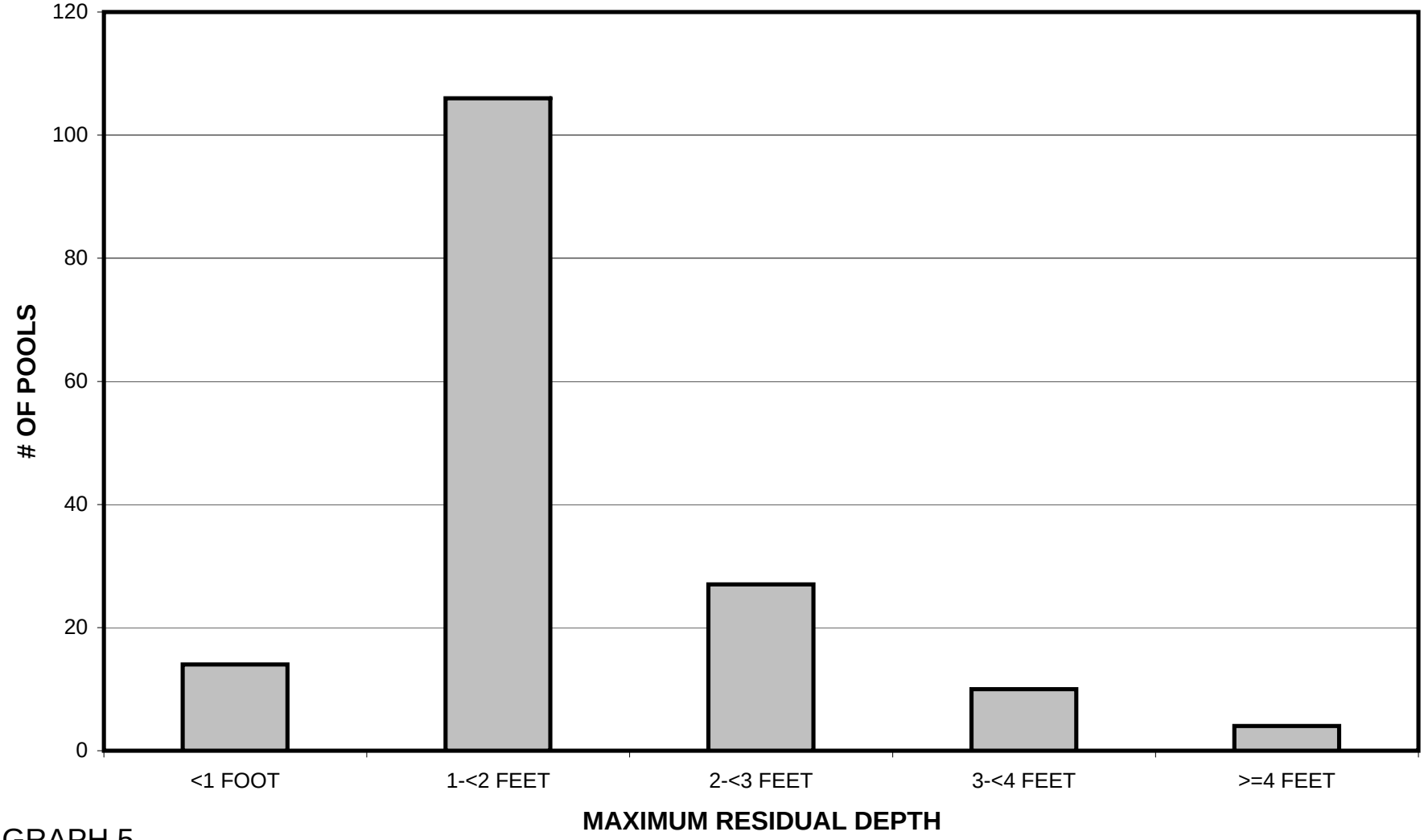
GRAPH 3

REDWOOD CREEK 2009
POOL TYPES BY PERCENT OCCURRENCE



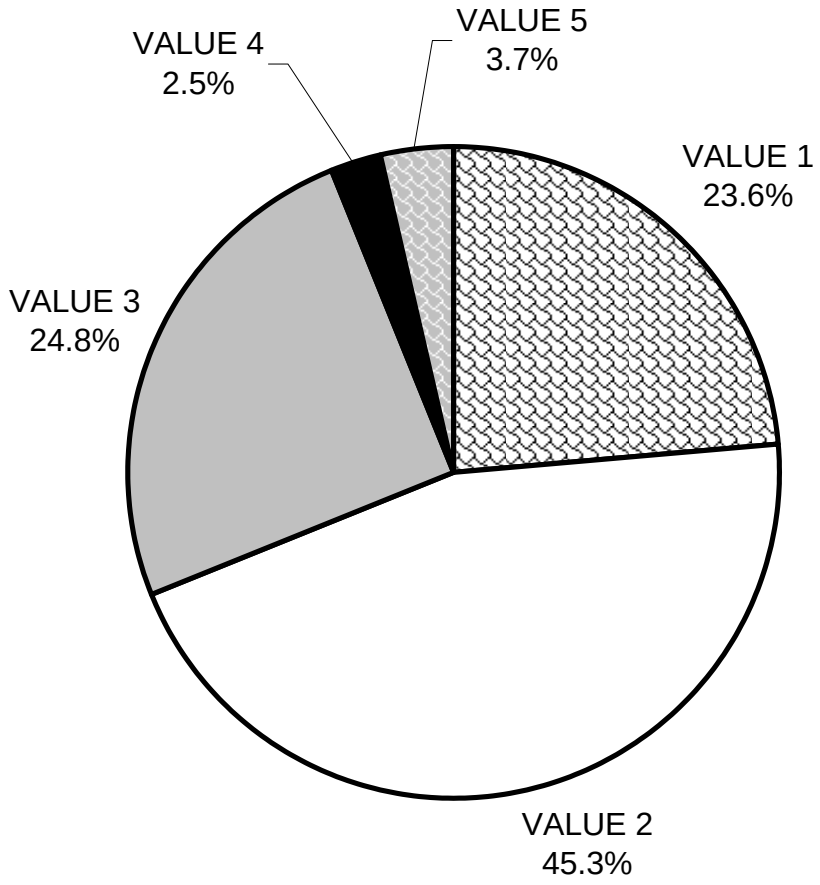
GRAPH 4

REDWOOD CREEK 2009
MAXIMUM DEPTH IN POOLS



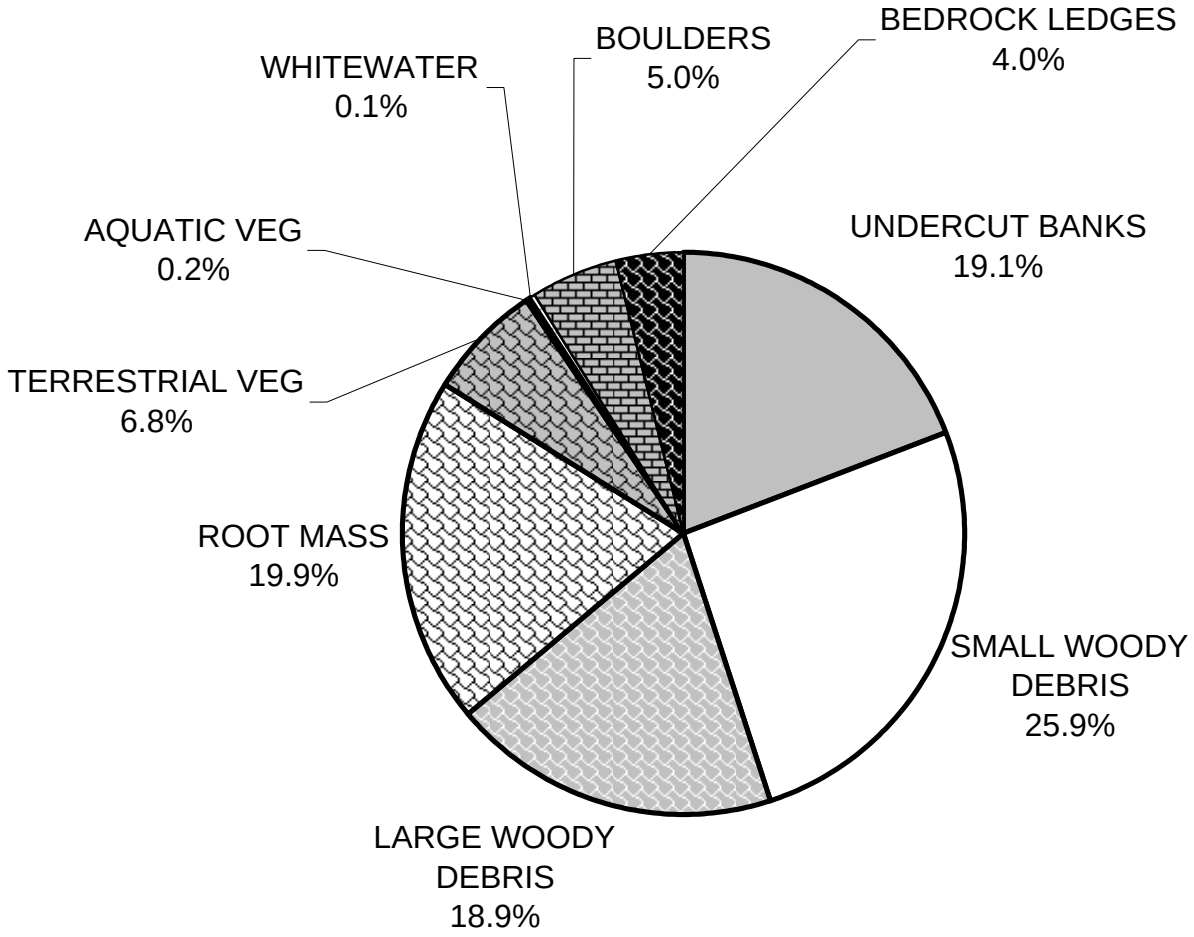
GRAPH 5

REDWOOD CREEK 2009
PERCENT EMBEDDEDNESS



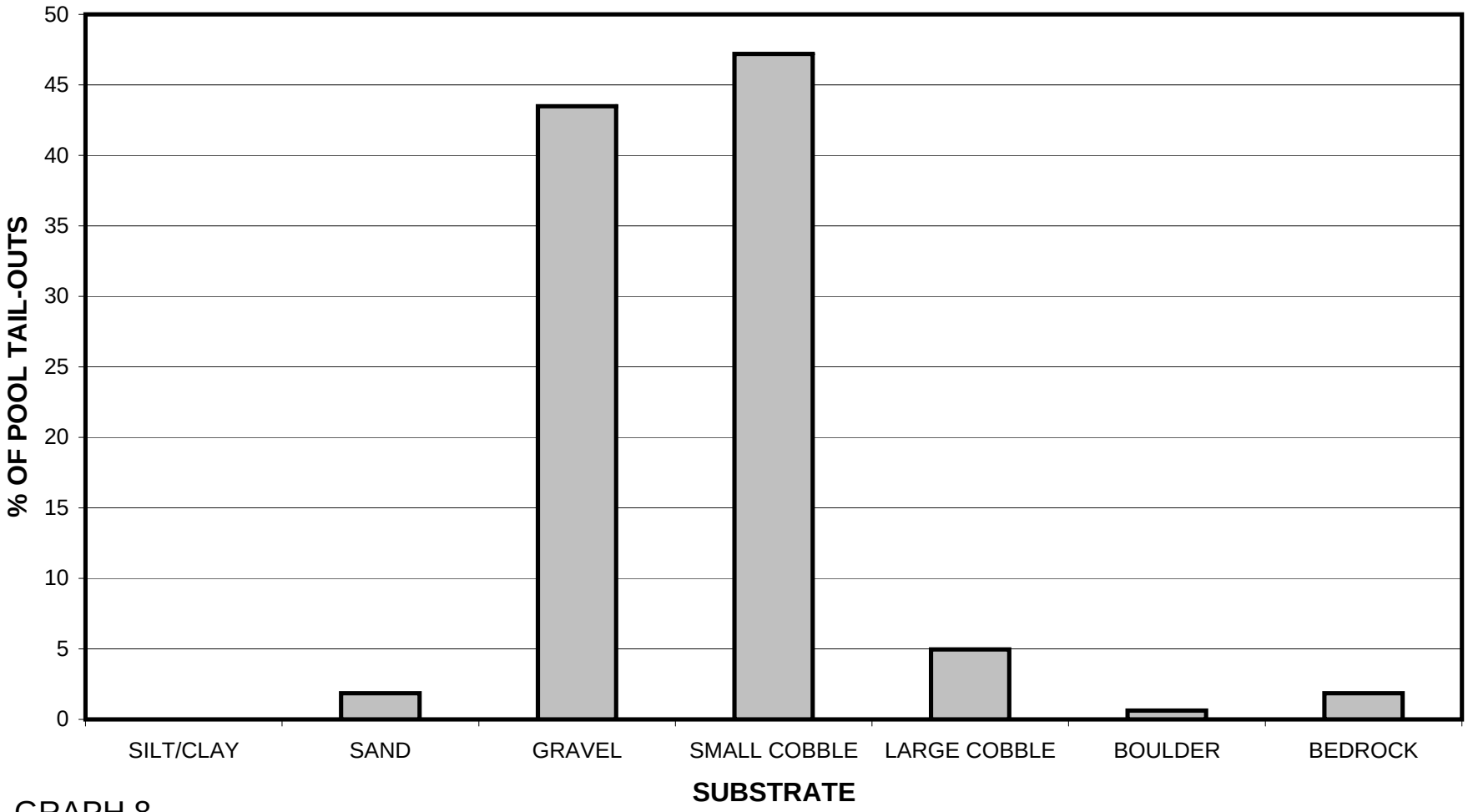
GRAPH 6

REDWOOD CREEK 2009
MEAN PERCENT COVER TYPES IN POOLS



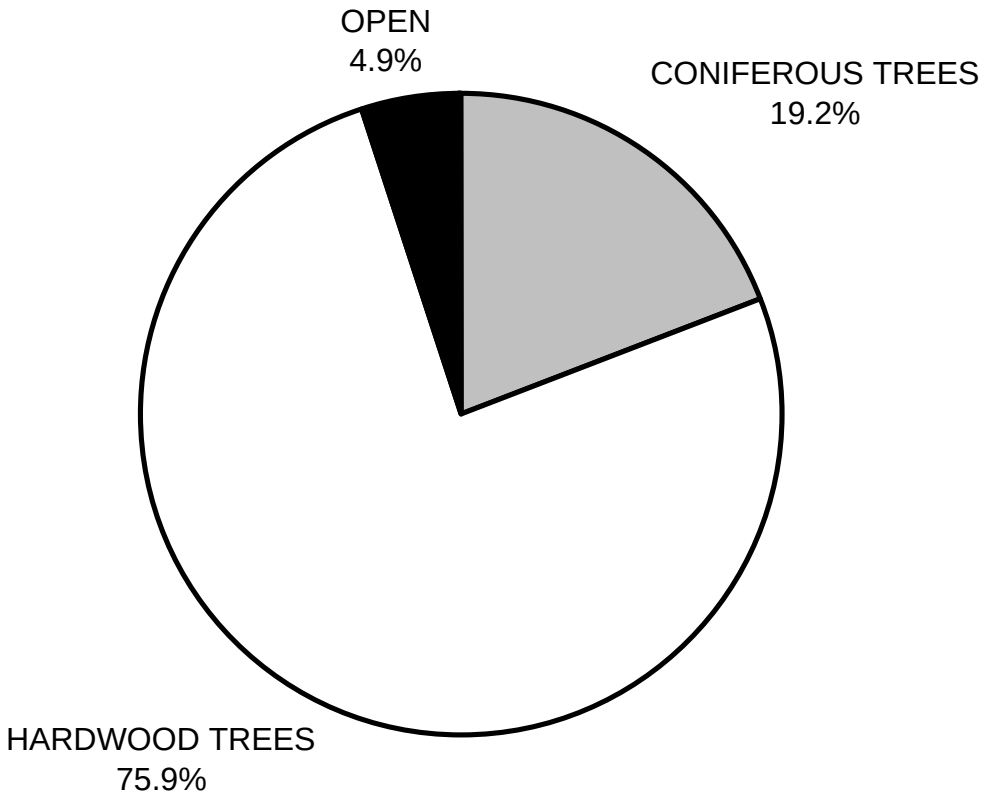
GRAPH 7

REDWOOD CREEK 2009
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



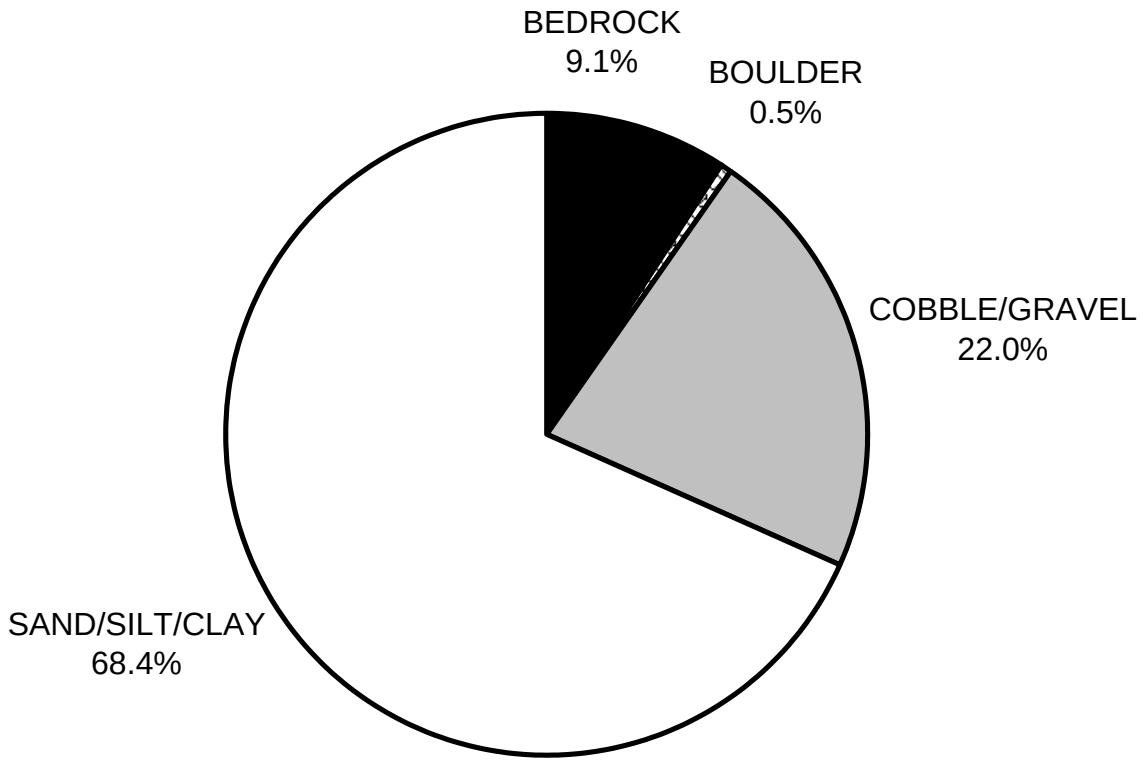
GRAPH 8

REDWOOD CREEK 2009
MEAN PERCENT CANOPY



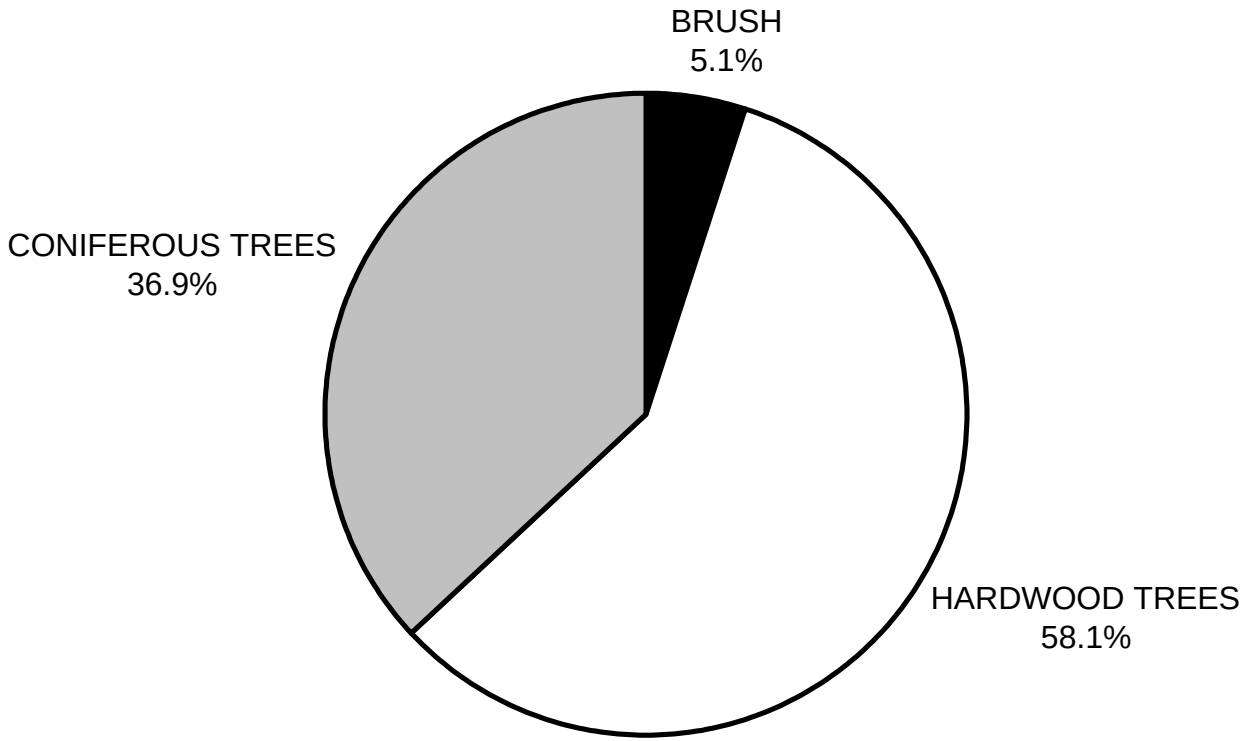
GRAPH 9

REDWOOD CREEK 2009
DOMINANT BANK COMPOSITION IN SURVEY REACH

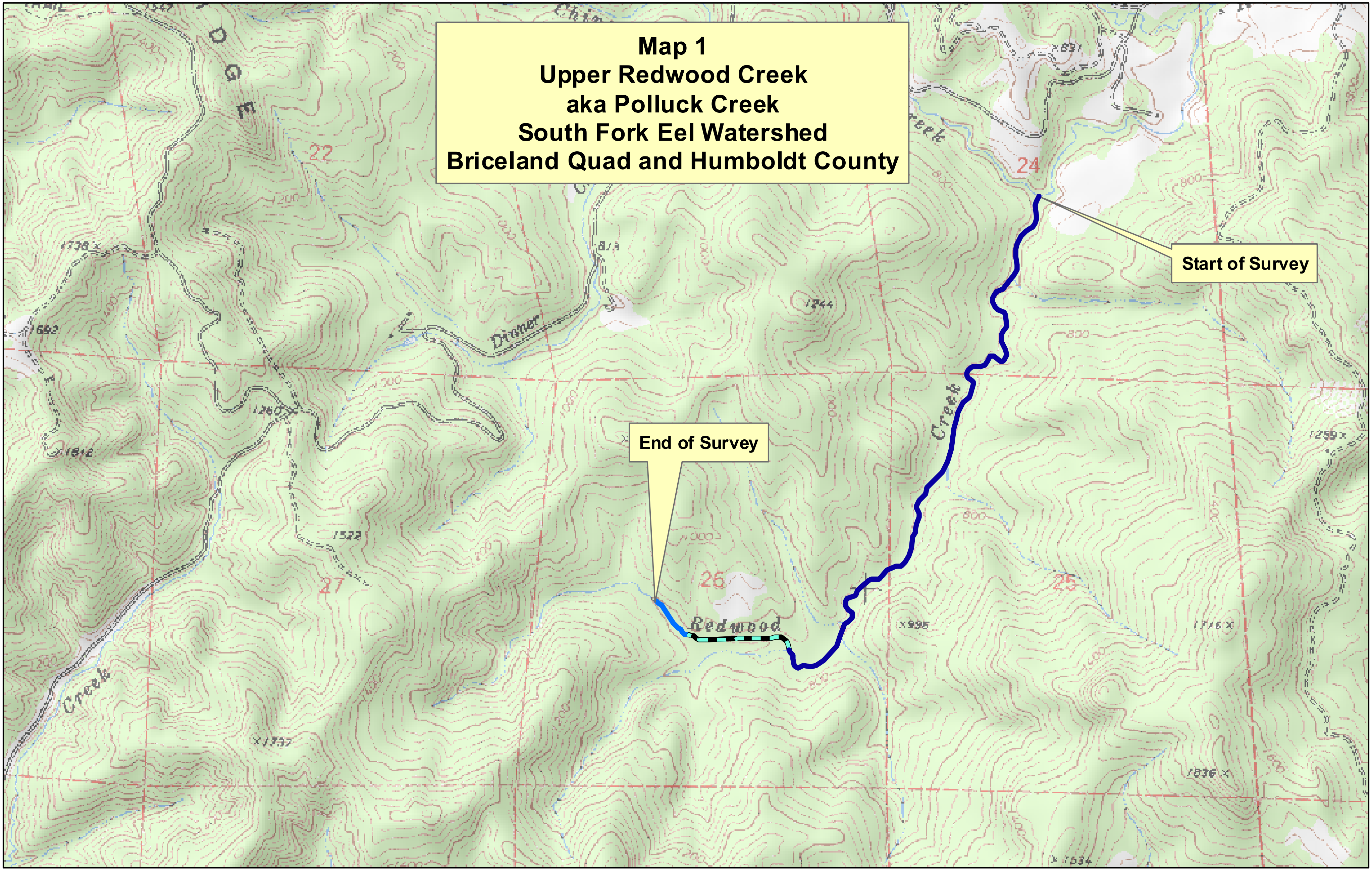


GRAPH 10

REDWOOD CREEK 2009
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11



Legend

N
W E
S

- Reach 1, B3 Channel Type
- Reach 2, E3 Channel Type
- Reach 3, G3 Channel Type

0 1,500 3,000 Feet

RESOURCES AGENCY
CALIFORNIA
DEPARTMENT
FISH & GAME