

STREAM INVENTORY REPORT

Redwood Creek

INTRODUCTION

A stream inventory was conducted from June 15 to July 6, 2009 on Redwood Creek. The survey began at the confluence with South Fork Eel River and extended upstream 7.4 miles. Stream inventories and reports were also completed for three tributaries to Redwood Creek.

The Redwood 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 Redwood 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

Redwood Creek is a tributary to the South Fork Eel River, tributary Eel River, which drains to the Pacific Ocean. It is located in Humboldt County, California (Map 1). Redwood Creek's legal description at the confluence with South Fork Eel River is T04S R03E S10. Its location is 40.1216 degrees north latitude and 123.8352 degrees west longitude, LLID number 1238352401218. Redwood Creek is a third order stream and has approximately 31 miles of blue line stream according to the USGS Miranda 7.5 minute quadrangle. Redwood Creek drains a watershed of approximately 23.3 square miles. Elevations range from about 250 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed hardwood forest and mixed conifer forest dominate the watershed. The watershed is entirely privately owned and is managed as a rural subdivision. Vehicle access exists via Briceland Thorn Road.

METHODS

The habitat inventory conducted in Redwood 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

Redwood Creek

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 Redwood 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". Redwood 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.

Redwood Creek

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 Redwood 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 Redwood 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Redwood 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 Redwood 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.

Redwood Creek

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 Redwood Creek. In addition, underwater observations were made at four 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

Redwood Creek

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Redwood 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 15 to July 6, 2009, was conducted by J. Ferreira, R. Okey (WSP), and I. Mikus (DFG). The total length of the stream included in this survey was 39,215 feet with an additional 686 feet of side channel. Of the 39,215 feet included, 4,915 feet was not habitat inventoried due to lack of access.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.6 cfs on July 8, 2009.

Redwood Creek is an F4 channel type for 20,917 feet of the stream surveyed (Reach 1), an undetermined channel type for 3,754 feet for the reach not surveyed (Reach 2), and an F4 channel type for 15,230 feet of the stream surveyed (Reach 3). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 68 degrees Fahrenheit. Air temperatures ranged from 56 to 78 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42% flatwater units, 41% pool units, and 16% riffle units (Graph 1). Based on total length of Level II habitat types there were 47% flatwater units, 44% pool units, and 8% riffle units (Graph 2).

Sixteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were run units, 21%; step run units, 16%; mid-channel pool units, 16%; and

Redwood Creek

low gradient riffle units, 13% (Graph 3). Based on percent total length step run units made up 23%, mid-channel pool units 20%, and run units 18%.

A total of 133 pools were identified (Table 3). Scour pools were the most frequently encountered at 56% (Graph 4), and comprised 52% 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. Seventy of the 131 pools (53%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 130 pool tail-outs measured, 92 had a value of 1 (70.8%); 29 had a value of 2 (22.3%); 2 had a value of 3 (1.5%); 7 had a value of 5 (5.4%) (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 21, flatwater habitat types had a mean shelter rating of 9, and pool habitats had a mean shelter rating of 21 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 22. Main channel pools had a mean shelter rating of 19 and backwater pools had a mean shelter rating of 15 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Redwood Creek. Graph 7 describes the pool cover in Redwood Creek. Boulders are the dominant pool cover type followed by terrestrial vegetation.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 40% of the pool tail-outs. Boulders were the next most frequently observed dominant substrate type and occurred in 22% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Redwood Creek was 67%. Thirty-three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 78% and 22%, respectively. Graph 9 describes the mean percent canopy in Redwood Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 90%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the stream banks consisted of 63% sand/silt/clay, 15% cobble/gravel, 12% boulder, and 11% bedrock (Graph 10). Deciduous trees were the dominant vegetation type observed in 69% of the units surveyed. Additionally, 19% of the units surveyed had coniferous trees as the dominant vegetation type, and 11% had brush as the dominant vegetation type (Graph 11).

Redwood Creek

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at four sites for species composition and distribution in Redwood Creek on July 13, 2009. The water temperature taken during the survey period of 0940 to 1150 was 60 degrees Fahrenheit. The air temperature was 64 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG).

In reach 1, which comprised the first 20,917 feet of stream, four sites were sampled. The reach sites yielded 65 young-of-the-year steelhead/rainbow trout (SH/RT), one age 1+ SH/RT, one age 2+ SH/RT, five coho, one Sacramento pikeminnow, 12 three-spine stickleback and over 160 California roach.

Reaches 2 and 3 were not sampled.

2009 Redwood 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: F4 Channel Type									
07/13/09	1	023	5.4	2,283	14	0	0	0	0
	2	036	5.4	3,675	3	0	0	0	0
	3	044	3.2	5,058	22	0	1	0	0
	4	120	4.2	15,231	26	1	0	5	0

DISCUSSION

Redwood Creek is an F4 channel type for the first 20,917 feet of stream surveyed, an undetermined channel type for the next 3,754 feet, and an F4 channel type for the remaining 15,230 feet. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days June 15 to July 6, 2009, ranged from 56 to 68 degrees Fahrenheit. Air temperatures ranged from 56 to 78 degrees Fahrenheit. To make any conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 47% of the total length of this survey, riffles 9%, and pools 44%. Seventy of the 131 pools (53%) pools had a maximum residual depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three feet, occupy at least half the width of

Redwood Creek

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 twenty-one of the 130 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. Seven 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.

Seventy-five of the 130 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 21. The shelter rating in the flatwater habitats is 9. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Redwood Creek. Boulders are the dominant cover type in pools followed by terrestrial vegetation. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 67%. Reach 1 had a canopy density of 57%, and Reach 3 had a canopy density of 77%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 90% and 91%, 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) Redwood 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 boulders. 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.

Redwood Creek

- 5) Increase the canopy on Redwood Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

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	Start of survey at the confluence with the South Fork Eel River. The channel type is an F4.
130	0003.00	There is erosion on the right bank approximately 50' high.
580	0007.00	A small cobble weir spans the channel.
869	0010.00	There is a dry tributary on the left bank. The mouth of the tributary is a perched culvert with a 15' high plunge.
1291	0014.00	There is erosion on the right bank measuring approximately 100' high is contributing sediment ranging in size from silt to boulders.
1584	0018.00	Out of the influence of the South Fork Eel River.
1708	0019.00	Briceland Road crosses the channel. The concrete bridge measures 23' wide x 60' long x approximately 30' high.
2811	0029.00	There is erosion on the right bank approximately 50' high.
3675	0037.00	There is erosion on the left bank approximately 150' high x 350' long. It is contributing sediment ranging in size from silt to boulders and woody debris.
4735	0042.00	There is erosion on the left bank approximately 220' long x 100' high. It is contributing sediment ranging in size from silt to cobble. It is also contributing large woody debris (LWD).
5685	0049.00	Old cars are armoring the right bank. There is erosion on the left bank with willows and alders growing at toe.
5957	0051.00	There is a dry tributary on the left bank.

Redwood Creek

6292	0055.00	Briceland Road crosses the channel. The concrete bridge measures 15' wide x 25' high x 62' long.
7857	0061.01	There is erosion on the left bank.
8094	0065.00	Tributary #01 (Marshall Creek) enters from the right bank. The estimated flow is 0.2 cfs; it is contributing approximately 5 percent to the flow of Redwood Creek. The water temperature downstream and upstream of the tributary is 63 degrees Fahrenheit; the water temperature of the tributary is 58 degrees Fahrenheit. The slope of the tributary is 13%. An unknown salmonid was observed in the tributary.
8395	0069.00	Briceland Road crosses the channel. The metal and concrete bridge measures 30' wide x 25' high x 117' long. A boulder weir spans the channel. There is boulder riprap on the right bank under the bridge and the on the left bank downstream of the bridge.
8892	0070.00	A boulder weir spans the channel. There is boulder riprap on right bank.
9260	0073.00	A boulder weir at spans the channel.
9481	0076.00	Erosion on the left bank is contributing sediment ranging in size from silt to boulders.
10293	0081.00	There are large pieces of concrete in channel, most measuring about 6' x 12' x 3'.
11652	0092.00	Tributary #02 enters on the left bank. The estimated flow is 0.25 cfs, and it contributes approximately 5 percent to the flow of Redwood Creek. The water temperature downstream of the tributary is 59 degrees Fahrenheit, the water temperature of the tributary is 58 degrees Fahrenheit, and the water temperature upstream of the confluence is 60 degrees Fahrenheit. The estimated slope of the tributary is 2 percent. Unidentified fish are present in the tributary.
11752	0093.00	A private road crosses the channel. The metal bridge measures 14' wide x 18' high x 50' long.
12106	0095.00	There is a dry tributary on the right bank.
12235	0096.00	Erosion on the right bank is contributing fine sediment.
12937	0104.00	There is erosion on the left bank.
13007	0105.00	There is an overturned car in the channel on the right bank.

Redwood Creek

15231	0121.00	Briceland Road crosses the channel. The concrete and metal bridge measures 20' wide x 22.5' high x 101' long. There is boulder riprap on both banks below the bridge.
15698	0127.00	There is erosion on the right bank that measures 50' high x 40' long.
16250	0131.02	The left bank is armored with boulders.
17409	0150.00	There is a dry tributary on the right bank.
17950	0157.00	There is erosion on the right bank contributing sediment ranging in size from silt to boulders.
18097	0159.00	There is erosion on the right bank measuring 50' high contributing sediment ranging in size from silt to boulders and LWD.
18646	0163.00	There is erosion on the left bank.
19042	0167.00	A wooden footbridge crosses the channel. It measures 3.5' wide x 16' high x 100' long.
19457	0170.00	Tributary #03 enters from the left bank. The estimated flow is 0.1 cfs; it contributes approximately one percent of the flow to Redwood Creek. The water temperature downstream of the tributary is 64 degrees Fahrenheit, the water temperature of the tributary is 62 degrees Fahrenheit, and the water temperature upstream of the tributary is 69 degrees Fahrenheit. The slope of the tributary is approximately four percent. No fish were observed in the tributary.
24083	0182.00	There is erosion on the right bank.
24635	0187.00	There is boulder riprap on the left bank.
24795	0188.00	A private road crosses the channel. The metal bridge measures 13' wide x 18.3' high x 100' long.
25309	0190.00	There is erosion on the left bank.
25616	0193.00	There is erosion on the right bank contributing sediment ranging in size from silt to cobble, and LWD.
25687	0194.00	There is erosion on the right bank.
26551	0203.00	A private road crosses the channel. The wood, metal and concrete bridge measures 10' wide x 16.5' high x 100' long.

Redwood Creek

27131	0206.00	There is erosion on the right bank contributing small woody debris (SWD), and sediment ranging in size from silt to gravel.
27360	0208.00	There is a dry tributary on the right bank.
29116	0222.00	There is erosion on the left bank.
29399	0224.00	The right bank is armored with boulders. There is a log/rootwad structure in the channel.
29729	0227.00	There is a log/rootwad structure in the channel.
29950	0229.00	There are four large rootwad/log structures on right bank and left bank.
30312	0233.00	Tributary #04 (Somerville Creek) enters from the right bank. The estimated flow is 0.25 cfs; it is contributing approximately five percent to the flow of Redwood Creek. The water temperature upstream and downstream of the tributary is 62 degrees Fahrenheit; the water temperature of the tributary is also 62 degrees Fahrenheit. Unidentified fish are present in the tributary.
30477	0234.00	Old Briceland Road crosses the channel. The concrete bridge measures 33' wide x 15.7' high x 100' long.
30668	0236.00	The left bank is armored with boulders.
31006	0240.00	There is erosion on the left bank.
31234	0242.00	The right bank is armored with boulders. There is erosion on the right bank.
31506	0243.00	There is boulder riprap on the right bank.
31553	0244.00	There is a dry tributary on the right bank. There is erosion on the right bank contributing sediment ranging in size from silt to cobble, and SWD.
31648	0245.00	There is erosion measuring 15' high actively contributing sediment ranging in size from silt to gravel.
31982	0249.00	There is a dry tributary on the right bank.
32233	0252.00	A private road crosses the channel. The metal railcar bridge measures 10' wide x 17.5' high x 50' long. There is boulder riprap on both banks below the bridge.

Redwood Creek

32412	0255.00	Woody debris is accumulating in the channel.
32614	0258.00	There is erosion on the right bank.
32728	0259.00	There is erosion on the left bank is contributing LWD, and sediment ranging in size from silt to gravel.
32807	0260.00	There is erosion on both banks.
32899	0262.00	There is erosion on the left bank.
33388	0266.00	There is erosion on the right bank contributing sediment ranging in size from silt to gravel, and LWD.
33692	0268.00	There is erosion on the left bank.
33807	0269.00	There is a dry tributary on the right bank.
33935	0270.00	There is erosion on the right bank.
34221	0272.00	Tributary #05 (Miller Creek) enters from the left bank. The estimated flow is 0.1 cfs; it is contributing approximately five percent to flow of Redwood Creek. The water temperature downstream of the of the tributary is 62 degrees Fahrenheit, the water temperature of the tributary is 62 degrees Fahrenheit, and the water temperature upstream of the tributary is 64 degrees Fahrenheit. The slope of the tributary is approximately one percent. Unidentified fish are present in the tributary.
35017	0279.00	Two culverts on the left bank are discharging water into the channel. A landslide on the right bank is contributing sediment ranging in size from silt to gravel.
35295	0282.00	There is a dry tributary on the right bank. There is erosion on the right bank.
36035	0293.00	There is erosion on the right bank.
36324	0295.00	A boulder weir spans the channel. There is an associated rootwad on the left bank.
36420	0296.00	A boulder weir spans the channel. A private road crosses the channel. The metal bridge measures 12' wide x 21.3' high x 100' long.

Redwood Creek

36533	0297.00	There is a log/boulder structure on the left bank. It is out of the wetted width.
36599	0298.00	There are two log/boulder structures on left bank.
36717	0299.00	There is erosion on the right bank.
37073	0303.00	There is erosion site the left bank.
37173	0304.00	There is a dry tributary on the right bank.
37464	0308.00	There is boulder riprap at the base of an erosion site on the right bank. This is the site of the 2008 dam removal.
37566	0309.00	There is a dry tributary on the left bank.
37612	0310.00	There is a log structure on the left bank.
37638	0311.00	There are three log structures on the left bank.
37751	0312.00	There is a log structure on the right bank.
37823	0313.00	There is a rootwad structure on the right bank.
37904	0314.00	There is a log structure on the right bank.
38027	0315.00	There is a log structure on the right bank.
38438	0316.00	There are three structures on the left bank: two log/boulder structures and one rootwad/boulder structure.
38731	0318.00	There are two log structures on the left bank and one log structure on the right bank. There is erosion on the left bank.
38813	0319.00	There is an inactive landslide on the right bank.
39215	0323.00	End of survey at confluence of China Creek and Upper Redwood (Pollock) Creek.

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.

Redwood 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: 6/15/2009 to 7/6/2009

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
1	0	DRY	0.3	321	321	0.9									
137	21	FLATWATER	42.2	119	16275	46.5	23.8	0.9	1.8	3153	431937	2844	389637		9
3	0	NOSURVEY		1638	4915										
133	133	POOL	40.9	115	15339	43.8	25.1	1.6	3.3	3024	402164	6656	871899	5425	21
54	8	RIFFLE	16.6	56	3051	8.7	23.6	0.6	1.2	1040	56180	518	27977		21
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
328	162				39901					890281.1			1289513		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Redwood Creek

LLID: 1238352401218

Drainage: Eel River - South Fork

Survey Dates: 6/15/2009 to 7/6/2009

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 (%)
44	6	LGR	13.5	60	2642	7.6	25	0.5	1.4	1140	50157	477	20995		8	79
10	2	HGR	3.1	41	409	1.2	19	0.9	2.4	742	7417	641	6409		60	62
15	3	GLD	4.6	128	1918	5.5	35	1.1	2.1	4770	71550	5100	76505		0	39
69	9	RUN	21.2	90	6186	17.7	22	0.9	2.9	2411	166367	2006	138380		13	74
53	9	SRN	16.3	154	8171	23.4	22	0.9	3	3355	177840	2931	155318		8	59
53	53	MCP	16.3	133	7037	20.1	26	1.5	8.9	3659	193925	8030	417576	6415	19	65
2	2	CCP	0.6	84	169	0.5	22	2.0	4.8	1905	3810	4190	8381	3894	15	55
1	1	STP	0.3	72	72	0.2	18	1.4	2.5	1037	1037	2074	2074	1452	20	63
24	24	CRP	7.4	132	3163	9.0	24	1.8	5.3	3360	80650	7767	186409	6280	23	63
6	6	LSL	1.8	109	656	1.9	25	1.8	5.2	2789	16731	5693	34158	4801	63	86
16	16	LSR	4.9	109	1739	5.0	23	1.4	5	2502	40029	4010	64160	3294	29	79
22	22	LSBk	6.8	91	1993	5.7	27	2.0	5.8	2448	53866	6463	135724	5587	7	75
6	6	LSBo	1.8	61	366	1.0	23	1.2	4.2	1527	9161	3110	18660	2584	19	24
1	1	PLP	0.3	63	63	0.2	14	0.6	2.9	882	882	1235	1235	529	20	100
2	2	DPL	0.6	40	81	0.2	26	1.4	3.4	1036	2073	1762	3524	1140	15	67
1	0	DRY	0.3	321	321	0.9										
3	0	NS		1638	4915											

Total Units
328

Total Units Fully Measured
162

Total Length (ft.)
39901

Total Area (sq.ft.)
875495.1

Total Volume (cu.ft.)
1269506

Stream Name:	Redwood Creek	LLID:	1238352401218	Drainage:	Eel River - South Fork
Survey Dates:	6/15/2009 to 7/6/2009				
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
56	56	MAIN	42	130	7278	47	25.8	1.5	3550	198772	6233	342822	19
75	75	SCOUR	56	106	7980	52	24.5	1.7	2684	201319	4940	365589	22
2	2	BACKWATER	2	41	81	1	26.0	1.4	1036	2073	1140	2280	15
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
133	133				15339					402164.3		710691.5	

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: 6/15/2009 to 7/6/2009

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
52	MCP	40	0	0	9	17	20	38	12	23	11	21
2	CCP	2	0	0	0	0	1	50	0	0	1	50
1	STP	1	0	0	0	0	1	100	0	0	0	0
24	CRP	18	0	0	0	0	6	25	11	46	7	29
6	LSL	5	0	0	0	0	2	33	2	33	2	33
16	LSR	12	0	0	0	0	8	50	5	31	3	19
21	LSBk	16	0	0	1	5	6	29	4	19	10	48
6	LSBo	5	0	0	1	17	4	67	0	0	1	17
1	PLP	1	0	0	0	0	1	100	0	0	0	0
2	DPL	2	0	0	0	0	1	50	1	50	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
131			0	0	11	8	50	38	35	27	35	27

Mean Maximum Residual Pool Depth (ft.): 3.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Redwood Creek

LLID: 1238352401218

Drainage: Eel River - South Fork

Survey Dates: 6/15/2009 to 7/6/2009

Dry Units: 1

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
44	6	LGR	0	0	0	0	25	0	0	75	0
10	2	HGR	0	0	0	0	0	0	48	53	0
54	8	TOTAL RIFFLE	0	0	0	0	13	0	24	64	0
15	3	GLD	0	1	2	3	4	5	6	7	8
69	9	RUN	0	22	8	12	1	0	0	49	8
53	9	SRN	0	14	7	14	11	7	6	41	0
137	21	TOTAL FLAT	0	18	7	13	7	4	3	44	3
53	53	MCP	6	9	4	4	28	2	2	44	1
2	2	CCP	0	18	25	40	0	0	0	18	0
1	1	STP	0	0	0	0	0	0	25	55	20
24	24	CRP	25	11	8	13	32	1	0	9	0
6	6	LSL	6	23	33	14	0	0	0	23	0
16	16	LSR	11	17	12	47	4	0	0	9	0
22	22	LSBk	7	5	9	24	15	7	0	18	16
6	6	LSBo	0	0	0	0	12	0	12	76	0
1	1	PLP	0	0	0	0	0	0	60	40	0
2	2	DPL	0	0	0	0	25	0	35	40	0
133	133	TOTAL POOL	10	10	8	14	21	2	3	30	3
3	0	NS									
328	162	TOTAL	8	10	8	14	19	2	4	32	3

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Redwood Creek

LLID: 1238352401218

Drainage: Eel River - South Fork

Survey Dates: 6/15/2009 to 7/6/2009

Dry Units: 1

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
44	6	LGR	0	0	0	100	0	0	0
10	2	HGR	0	0	0	0	0	100	0
15	3	GLD	0	0	100	0	0	0	0
69	9	RUN	0	0	56	11	22	0	11
53	9	SRN	0	0	56	22	22	0	0
53	53	MCP	4	25	45	6	8	11	2
2	2	CCP	0	50	50	0	0	0	0
1	1	STP	0	0	0	0	0	0	100
24	24	CRP	0	17	71	8	0	0	4
6	6	LSL	0	0	83	17	0	0	0
16	16	LSR	0	19	75	6	0	0	0
22	22	LSBk	0	18	50	14	14	0	5
6	6	LSBo	0	17	50	0	17	17	0
1	1	PLP	0	0	100	0	0	0	0
2	2	DPL	0	50	50	0	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: 6/15/2009 to 7/6/2009

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
67	22	78	0	90	91

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

Open units represent habitat units with zero canopy cover.

Stream Name:	Redwood Creek	LLID:	1238352401218	Drainage:	Eel River - South Fork
Survey Dates:	6/15/2009 to 7/6/2009	Survey Length (ft.):	39901	Main Channel (ft.):	39215
				Side Channel (ft.):	686
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

Channel Type: F4			Canopy Density (%): 57.1			Pools by Stream Length (%): 36.3			
Reach Length (ft.): 20917			Coniferous Component (%): 28.2			Pool Frequency (%): 35.3			
Riffle/Flatwater Mean Width (ft.): 27.2			Deciduous Component (%): 71.8			Residual Pool Depth (%):			
BFW:			Dominant Bank Vegetation: Deciduous Trees			< 2 Feet Deep: 15			
Range (ft.): 33 to 91			Vegetative Cover (%): 91.4			2 to 2.9 Feet Deep: 31			
Mean (ft.): 57			Dominant Shelter: Boulders			3 to 3.9 Feet Deep: 22			
Std. Dev.: 18			Dominant Bank Substrate Type: Sand/Silt/Clay			>= 4 Feet Deep: 32			
Base Flow (cfs.): 1.6			Occurrence of LWD (%): 2			Mean Max Residual Pool Depth (ft.): 3.4			
Water (F): 58 - 68			Air (F): 59 - 78			Mean Pool Shelter Rating: 16			
Dry Channel (ft): 321			Riffles: 0						
			Pools: 0						
			Flat: 0						
Pool Tail Substrate (%):			Silt/Clay: 0	Sand: 0	Gravel: 26	Sm Cobble: 11	Lg Cobble: 15	Boulder: 43	Bedrock: 5
Embeddedness Values (%):			1. 60.0	2. 29.2	3. 3.1	4. 0.0	5. 7.7		

Channel Type:	NA					Canopy Density (%):		Pools by Stream Length (%): 0.0					
Reach Length (ft.):	3754					Coniferous Component (%):		Pool Frequency (%): 0.0					
Riffle/Flatwater Mean Width (ft.):						Deciduous Component (%):		Residual Pool Depth (%):					
BFW:						Dominant Bank Vegetation:		< 2 Feet Deep:					
Range (ft.):	34	to			34	Vegetative Cover (%): 0.0		2 to 2.9 Feet Deep:					
Mean (ft.):	34						Dominant Shelter:		3 to 3.9 Feet Deep:				
Std. Dev.:	0						Dominant Bank Substrate Type:		>= 4 Feet Deep:				
Base Flow (cfs.):	1.6						Occurrence of LWD (%):		Mean Max Residual Pool Depth (ft.):				
Water (F):	65	-	65	Air (F):	76	-	76	LWD per 100 ft.:		Mean Pool Shelter Rating:			
Dry Channel (ft):	0						Riffles:						
							Pools:						
							Flat:						
Pool Tail Substrate (%):	Silt/Clay:		Sand:		Gravel:		Sm Cobble:		Lg Cobble:		Boulder:		Bedrock:
Embeddedness Values (%):	1.		2.		3.		4.		5.	0.0			

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: F4	Canopy Density (%): 78.0	Pools by Stream Length (%): 50.9
Reach Length (ft.): 15230	Coniferous Component (%): 15.3	Pool Frequency (%): 47.6
Riffle/Flatwater Mean Width (ft.): 17.2	Deciduous Component (%): 84.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Deciduous Trees	< 2 Feet Deep: 2
Range (ft.): 31 to 64	Vegetative Cover (%): 88.8	2 to 2.9 Feet Deep: 45
Mean (ft.): 44	Dominant Shelter: Root masses	3 to 3.9 Feet Deep: 32
Std. Dev.: 11	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 21
Base Flow (cfs.): 1.6	Occurrence of LWD (%): 11	Mean Max Residual Pool Depth (ft.): 3.2
Water (F): 56 - 65 Air (F): 56 - 78	LWD per 100 ft.:	Mean Pool Shelter Rating: 26
Dry Channel (ft): 0	Riffles: 0	
	Pools: 1	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 3 Gravel: 54 Sm Cobble: 25 Lg Cobble: 14 Boulder: 2 Bedrock: 3		
Embeddedness Values (%): 1. 81.5 2. 15.4 3. 0.0 4. 0.0 5. 3.1		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Redwood Creek

LLID: 1238352401218

Drainage: Eel River - South Fork

Survey Dates: 6/15/2009 to 7/6/2009

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	18	17	10.80
Boulder	20	18	11.73
Cobble / Gravel	26	22	14.81
Sand / Silt / Clay	98	105	62.65

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	2	2	1.23
Brush	19	18	11.42
Hardwood Trees	106	116	68.52
Coniferous Trees	35	26	18.83
No Vegetation	0	0	0.00

Total Stream Cobble Embeddedness Values:

1

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

StreamName: Redwood Creek

LLID: 1238352401218

Drainage: Eel River - South Fork

Survey Dates: 6/15/2009 to 7/6/2009

Confluence Location: Quad: MIRANDA

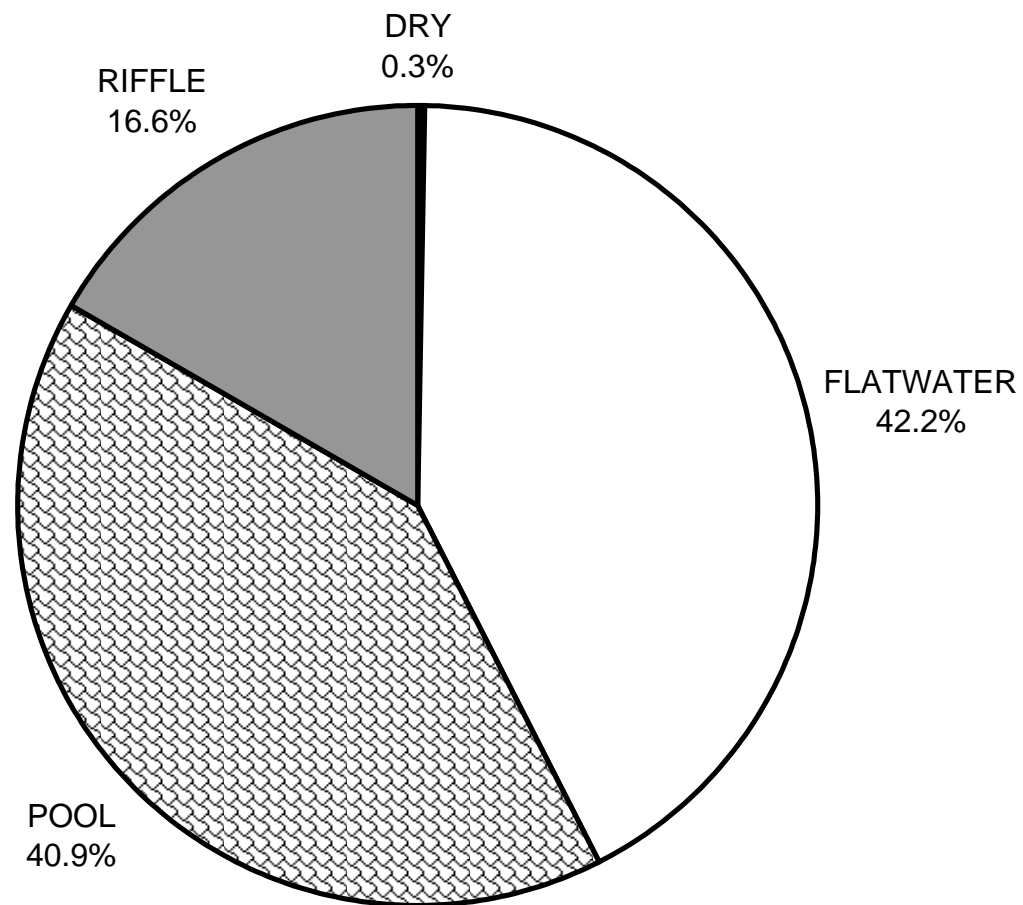
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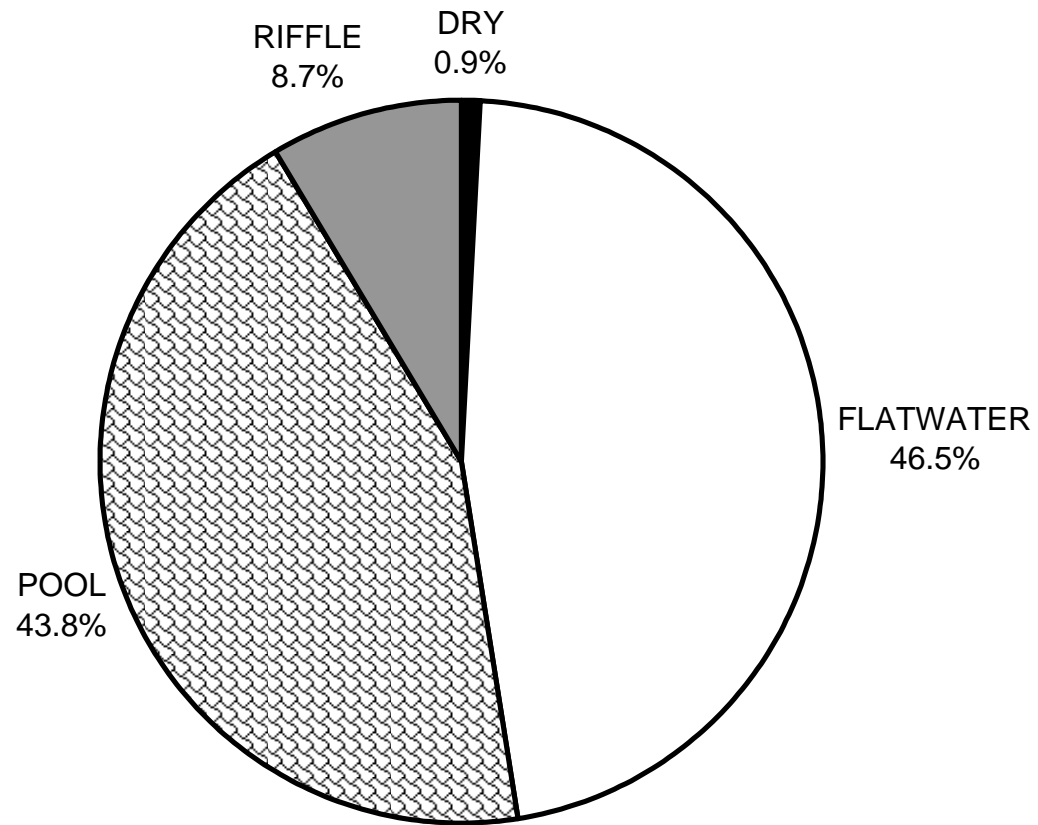
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	10
SMALL WOODY DEBRIS (%)	0	18	10
LARGE WOODY DEBRIS (%)	0	7	8
ROOT MASS (%)	0	13	14
TERRESTRIAL VEGETATION (%)	13	7	21
AQUATIC VEGETATION (%)	0	4	2
WHITEWATER (%)	24	3	3
BOULDERS (%)	64	44	30
BEDROCK LEDGES (%)	0	3	3

REDWOOD CREEK 2009 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

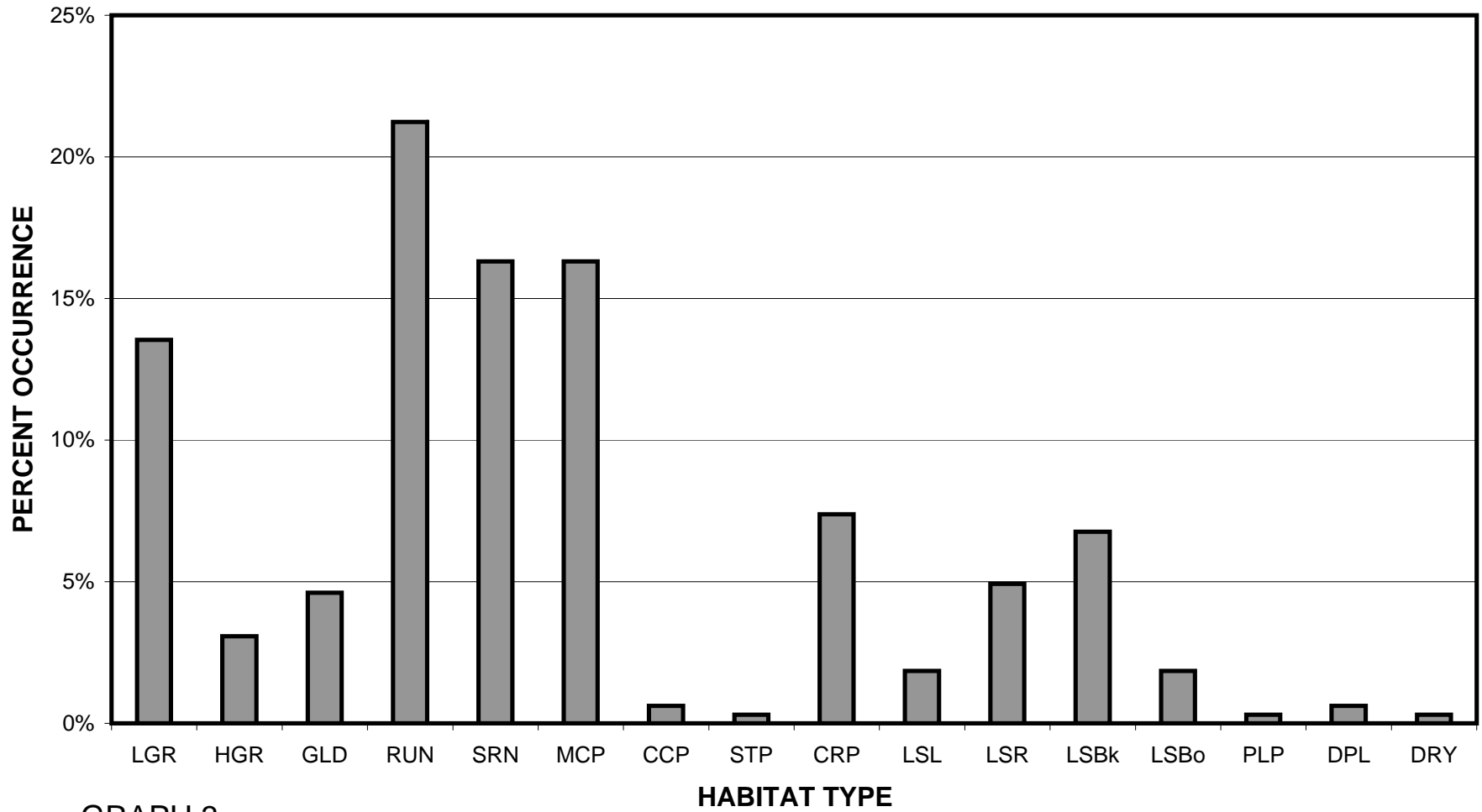
**REDWOOD CREEK 2009
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

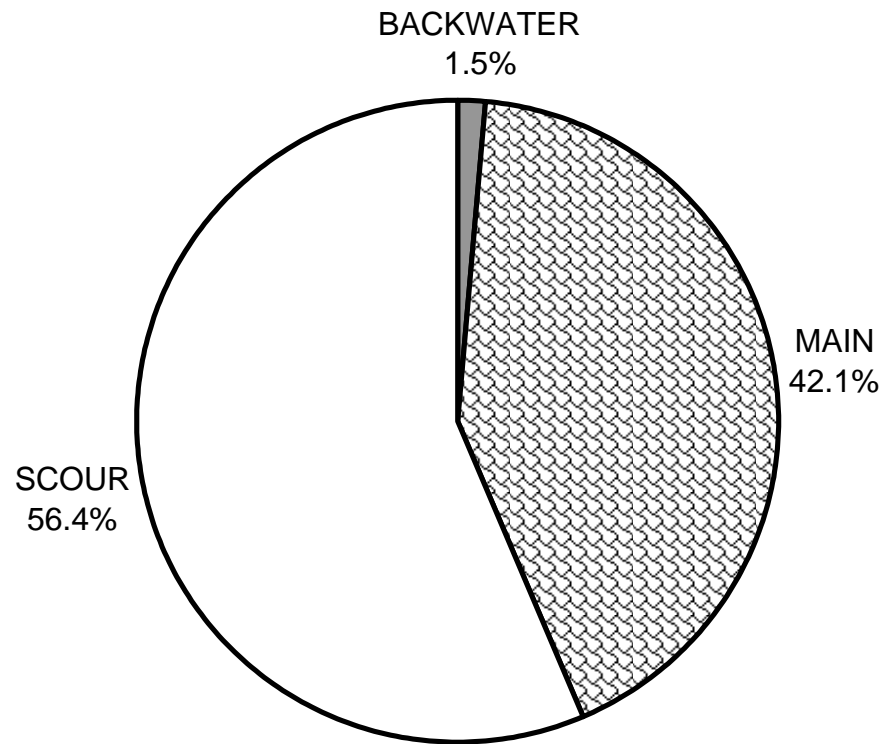
REDWOOD CREEK 2009

HABITAT TYPES BY PERCENT OCCURRENCE



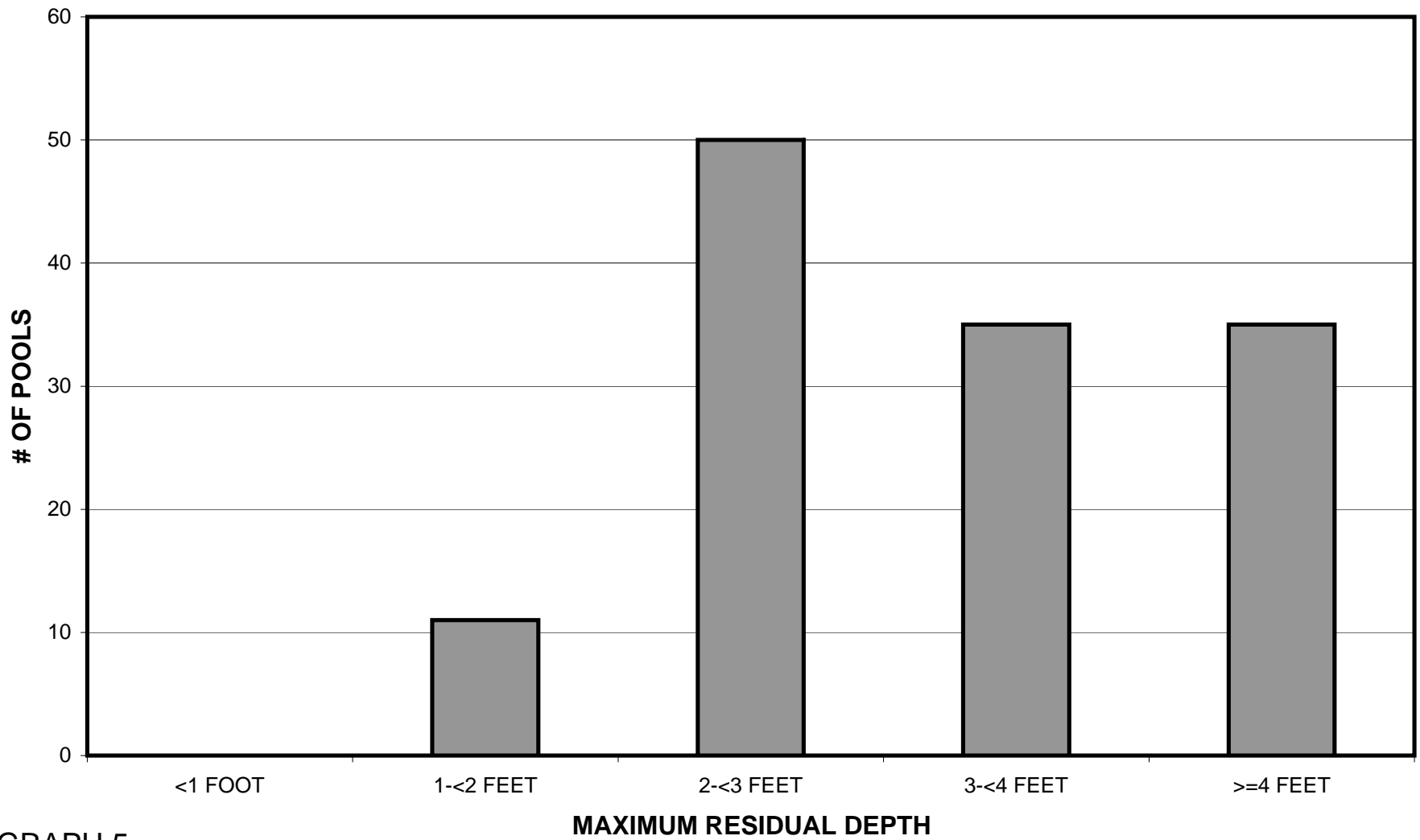
GRAPH 3

**REDWOOD CREEK 2009
POOL TYPES BY PERCENT OCCURRENCE**



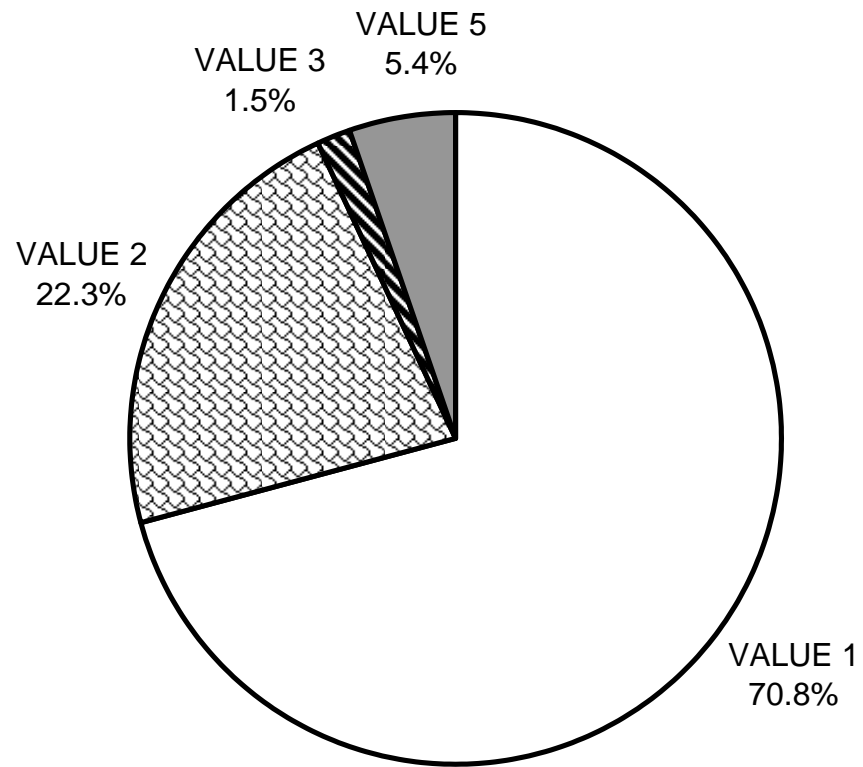
GRAPH 4

REDWOOD CREEK 2009 MAXIMUM DEPTH IN POOLS



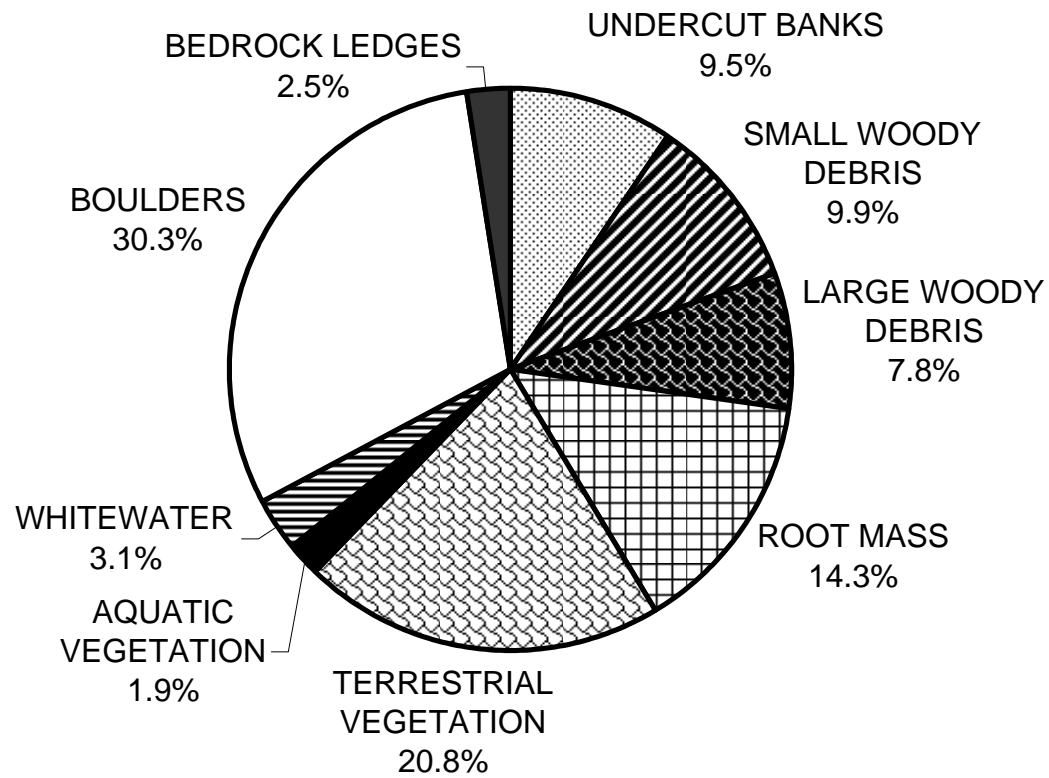
GRAPH 5

REDWOOD CREEK 2009 PERCENT EMBEDDEDNESS



GRAPH 6

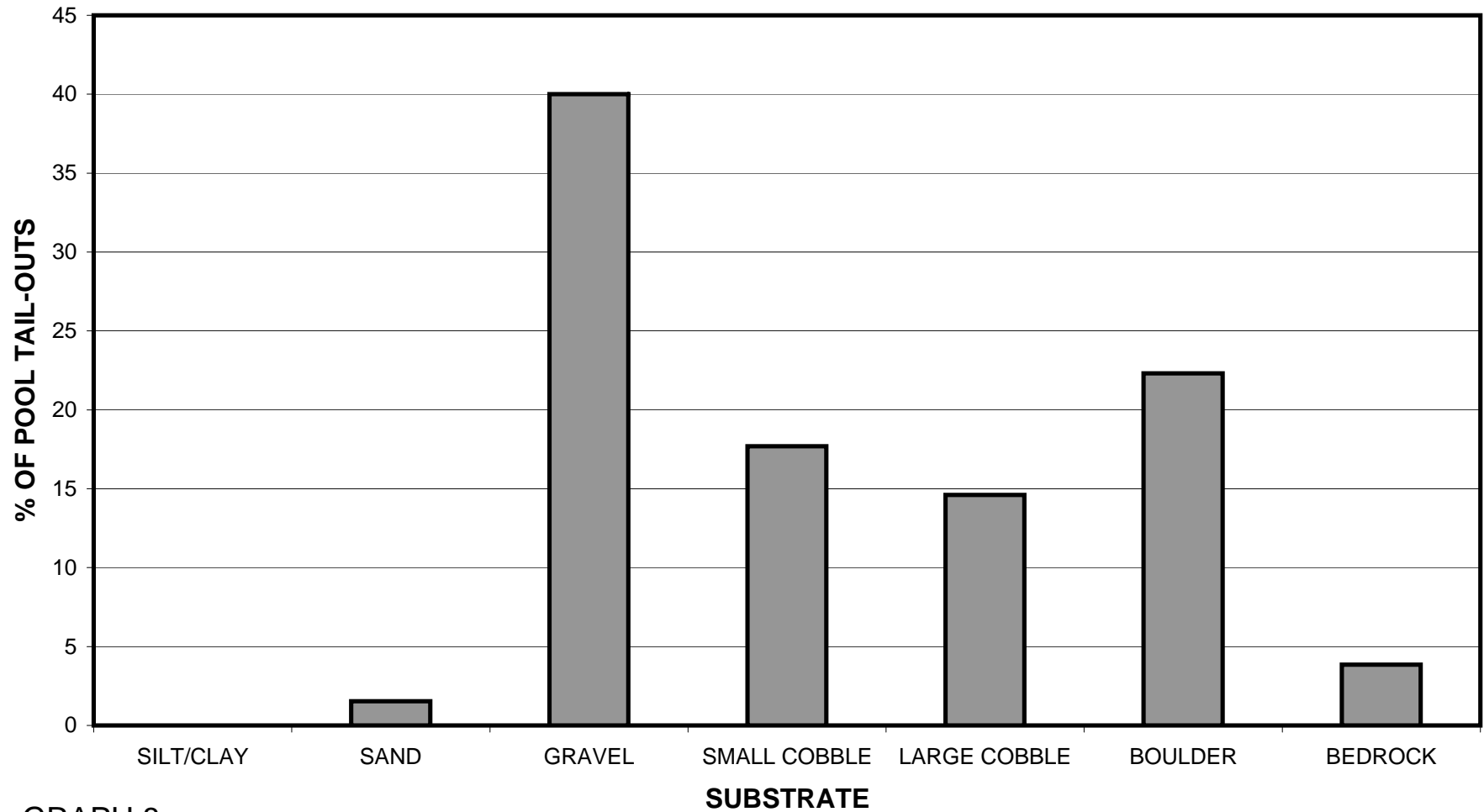
REDWOOD CREEK 2009 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

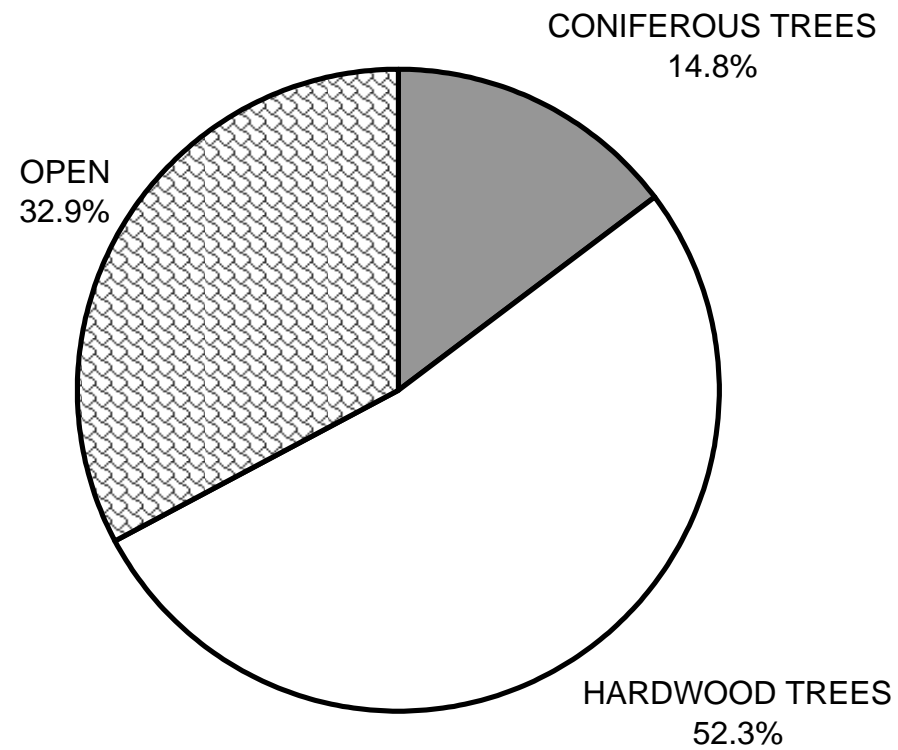
REDWOOD CREEK 2009

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



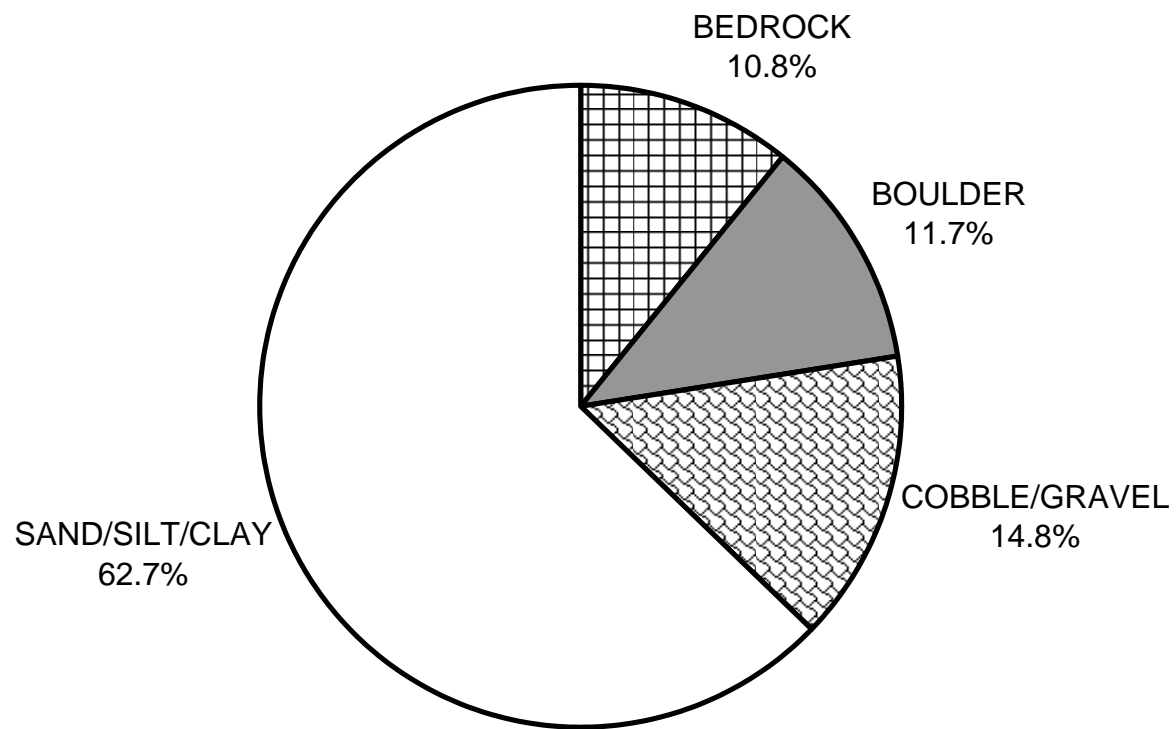
GRAPH 8

REDWOOD CREEK 2009 MEAN PERCENT CANOPY



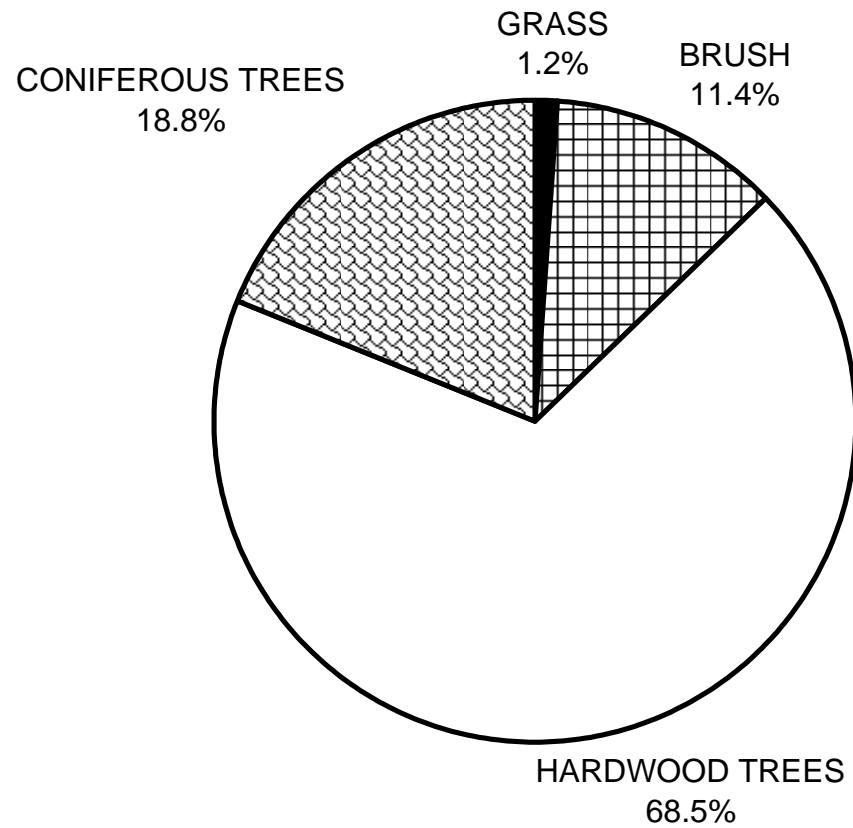
GRAPH 9

**REDWOOD CREEK 2009
DOMINANT BANK COMPOSITION IN SURVEY REACH**



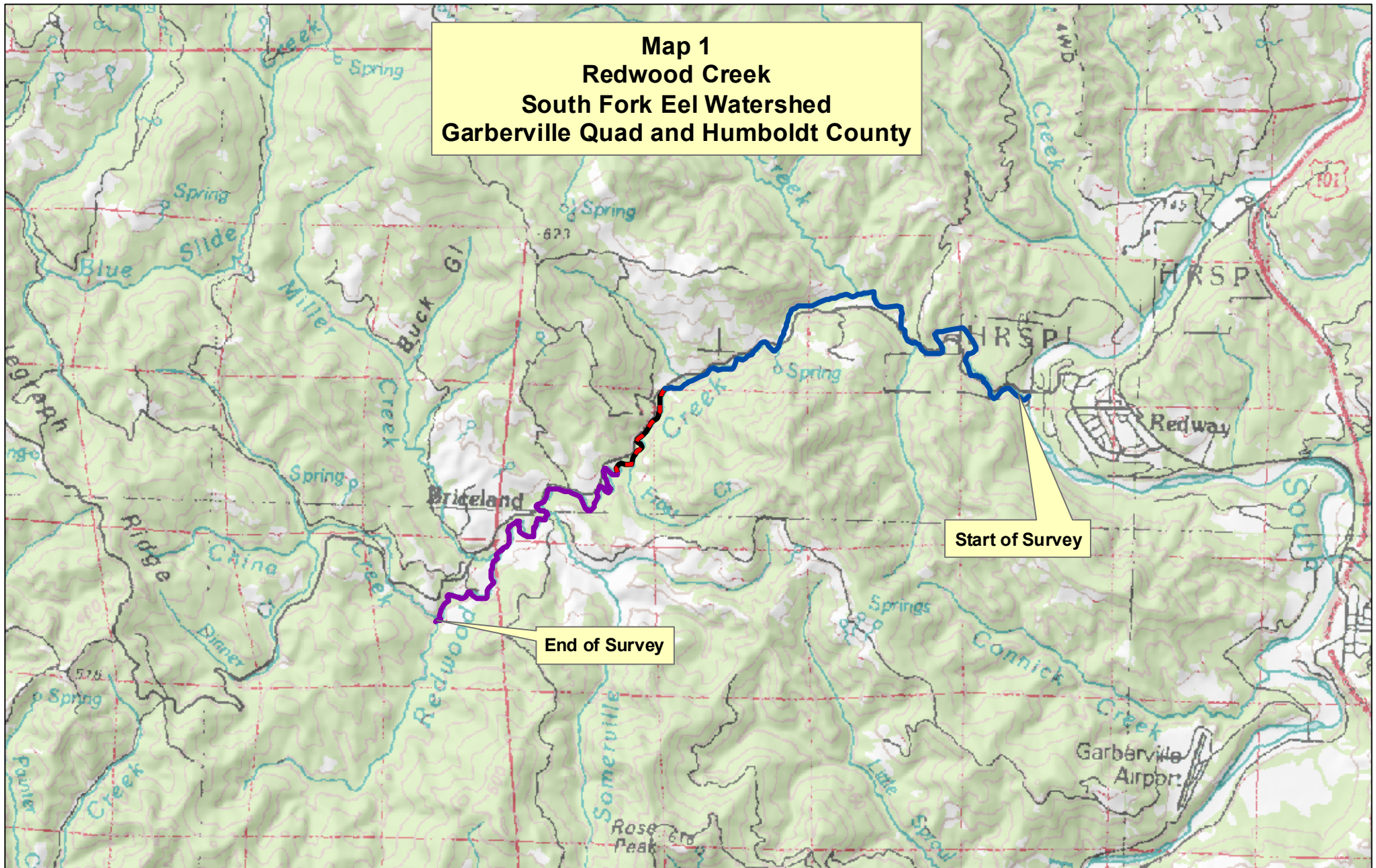
GRAPH 10

**REDWOOD CREEK 2009
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Map 1
Redwood Creek
South Fork Eel Watershed
Garberville Quad and Humboldt County



Legend

- Reach 1, F4 Channel Type
- Reach 2, Not Surveyed
- Reach 3, F4 Channel Type

