

# STREAM INVENTORY REPORT

## Rowdy Creek

### INTRODUCTION

A stream inventory was conducted from September 10 to September 19, 2012 on Rowdy Creek. The survey began at the confluence with Smith River and extended upstream 8.6 miles.

The Rowdy 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 Rowdy 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 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

Rowdy Creek is a tributary to Smith River, which drains to the Pacific Ocean. It is located in Del Norte County, California (Map 1). Rowdy Creek's legal description at the confluence with Smith River is T18N R01E S20. Its location is 41.9111 degrees north latitude and -124.1663 degrees west longitude, LLID number 1241648419111. Rowdy Creek is a fourth order stream and has approximately 12 miles of blue line stream according to the USGS Smith River 7.5 minute quadrangle. Rowdy Creek drains a watershed of approximately 34.5 square miles. Elevations range from about sea level at the mouth of the creek to 1,800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production, agriculture, rangeland and urban development. Vehicle access exists via Highway 101.

### METHODS

The habitat inventory conducted in Rowdy Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Wildlife (CDFW) Scientific Aides that conducted the inventory were trained in standardized habitat inventory methods by the CDFW. 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

## Rowdy Creek

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 Rowdy 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". Rowdy 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.

## Rowdy 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 Rowdy 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 not suitable 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 Rowdy 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 Rowdy 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 Rowdy 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.

## Rowdy 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 Rowdy Creek. In addition, underwater observations were made at 18 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 Wildlife. 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

## Rowdy Creek

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Rowdy 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 September 10 to September 19, 2012 was conducted by M. Groff and I. Mikus, (CDFW). The total length of the stream surveyed was 45,470 feet with an additional 1,463 feet of side channel.

Stream flow was not measured on Rowdy Creek.

Rowdy Creek is an F4 channel type for 20,643 feet of the stream surveyed (Reach 1), and an F3 channel type for 24,827 feet of the stream surveyed (Reach 2). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with gravel-dominant substrates. F3 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 61 degrees Fahrenheit. Air temperatures ranged from 51 to 74 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42% pool units, 31% riffle units, and 27% flatwater units (Graph 1). Based on total length of Level II habitat types there were 51% pool units, 28% flatwater units, and 21% riffle units (Graph 2).

## Rowdy Creek

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 33%; low gradient riffle units, 26%; and run units, 15% (Graph 3). Based on percent total length, mid-channel pool units made up 45%, low gradient riffle units made up 18%, and step run units made up 14%.

A total of 155 pools were identified (Table 3). Main channel pools were the most frequently encountered at 80% (Graph 4), and comprised 89% 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. Sixty-six of the 155 pools (43%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 155 pool tail-outs measured, 99 had a value of 1 (64%); 43 had a value of 2 (28%); eight had a value of 3 (5%); and five had a value of 5 (3%) (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 not suitable 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 2, flatwater habitat types had a mean shelter rating of 1, and pool habitats had a mean shelter rating of 2 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 2, scour pools had a mean shelter rating of 2, and backwater pools had a mean shelter rating of 0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Rowdy Creek. Graph 7 describes the pool cover in Rowdy Creek. Small woody debris is the dominant pool cover type followed by boulders.

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 45% of pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 26% of pool tail-outs.

The mean percent canopy density for the surveyed length of Rowdy Creek was 73%. Twenty-seven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 97% and 3%, respectively. Graph 9 describes the mean percent canopy in Rowdy Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 52% cobble/gravel, 31% sand/silt/clay, 9% bedrock, and 8% boulders (Graph 10). Deciduous trees were the dominant vegetation type observed in 93% of the units surveyed. Additionally, 4% of the units surveyed had brush as the dominant vegetation type, and 2% had coniferous trees as the dominant vegetation type (Graph 11).

## Rowdy Creek

### BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 18 sites for species composition and distribution in Rowdy Creek on September 10 and October 22, 2012.

In Reach 1, which comprised the first 20,643 feet of stream, 18 sites were sampled. The reach sites yielded 985 young-of-the-year (YOY) steelhead/rainbow/cutthroat trout (SH/RT/CT), 149 age 1+ SH/RT/CT, 72 age 2+ SH/RT/CT, 29 YOY coho salmon, 443 YOY Chinook salmon, one adult Chinook salmon, 56 sculpin, and 515 three-spine stickleback.

The following chart displays the information yielded from these sites:

2012 Rowdy Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT/CT			Coho		CH
					YOY	1+	2+	YOY	1+	YOY
Reach 1: F4 Channel Type										
09/10/12	1	002	pool	231	18	7	4	0	1	4
	2	003	run	389	0	17	0	0	0	0
	3	004	pool	549	12	5	2	0	0	1
	4	016	run	3195	21	1	0	0	0	0
	5	017	pool	3489	28	1	0	2	0	74
	6	019	run	4078	37	2	0	1	0	9
	7	021	run	4283	36	1	0	0	0	2
	8	024	pool	4805	70	11	10	2	0	44
	9	026	run	5025	110	5	1	1	0	53
	10	028	pool	5363	83	9	4	1	0	94
	11	032	glide	6080	61	5	4	0	0	0
	12	034	run	6673	25	2	0	0	0	2
	13	035	pool	6878	45	24	10	1	0	64
	14	047	pool	8995	47	10	13	20	0	88
10/22/12	15	054	pool	10159	42	7	2	0	0	7
	16	056	pool	10290	120	20	15	0	0	0
	17	126	pool	20309	150	10	2	0	0	1
	18	128	pool	20502	80	12	5	0	0	0

## **Rowdy Creek**

### DISCUSSION

Rowdy Creek is an F4 channel type for the first 20,643 feet of stream surveyed and an F3 channel type for the remaining 24,827 feet. The suitability of F4 and F3 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. F3 channel types are good for bank-placed boulders, single and opposing wing-deflectors and fair for plunge weirs, boulder clusters, channel constrictors and log cover.

The water temperatures recorded on the survey days September 10 to September 19, 2012 ranged from 54 to 61 degrees Fahrenheit. Air temperatures ranged from 51 to 74 degrees Fahrenheit. This is a suitable water temperature range for salmonids. However, 60 degrees Fahrenheit, if sustained, is near the threshold stress level for salmonids. 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 28% of the total length of this survey, riffles 21%, and pools 51%. Sixty-six of the 155 pools (43%) had a maximum residual depth greater than three feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width.

One hundred forty-two of the 155 pool tail-outs measured had embeddedness ratings of 1 or 2. Eight of the pool tail-outs had embeddedness ratings of 3 or 4. Five of the pool tail-outs had a rating of 5, which is considered not suitable 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 ten of the 155 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 2. 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 Rowdy Creek. Small woody debris is the dominant cover type in pools followed by boulders. 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 73%. Reach 1 had a canopy density of 53%; Reach 2 had a canopy density of 90%. In general, revegetation projects are considered when canopy density is less than 80%.



## Rowdy Creek

The percentage of right and left bank covered with vegetation was 100% and 99%, 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) Rowdy 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) There is a four foot high plunge over Rowdy Creek Fish Hatchery dam at 9,044 feet from the confluence. No coho salmon were observed above this dam. Alternatives to provide unimpeded fish passage should be explored and the preferred alternative should be implemented.
- 4) 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.
- 5) Increase the canopy on Reach 1 of Rowdy Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels.

### COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Habitat Unit #:	Comments:
0	0001.00	Start of survey at the confluence with Smith River. The channel type is an F4.
6673	0035.00	Fred Haight Drive crosses the channel. The crossing is a 23' high concrete bridge. Boulder rip-rap lines the left bank beneath the bridge; the right bank below the bridge is bare substrate.
6953	0037.00	An erosion site on the left bank measures approximately 300' long x 14' high. It is contributing sediment ranging in size from silt to small cobble to the channel.

## Rowdy Creek

7967	0043.00	Large woody debris (LWD) and boulder structures on left bank.
8127	0044.00	Boulder rip-rap on right bank measures approximately 8' long x 5' high.
8629	0047.00	LWD structure on right bank. Boulder rip-rap on right bank measures approximately 10' high x 400' long.
8995	0048.00	LWD structure on right bank.
9044	0049.00	There is a four foot high plunge over Rowdy Creek Fish Hatchery dam. Dominie Creek (tributary #01) enters on the right bank. It contributes to approximately 5% of Rowdy Creek's flow. The water temperature downstream of the tributary was 60 degrees Fahrenheit, the water temperature of the tributary was 58 degrees Fahrenheit, and the water temperature upstream of the confluence was 61 degrees Fahrenheit. The slope of the tributary is approximately 2%. There is a 3' high plunge at the mouth over a concrete sill related to the hatchery weir. The sill is approximately 20' long. There is a 1.5' high plunge at the top of the sill. Salmonids were observed in the tributary.
9269	0051.00	U.S. Highway 101 crosses the channel. The crossing is a concrete and steel bridge.
10194	0056.00	Inactive landslide on right bank measures approximately 60' long x 35' high. The slide is mostly revegetated, but is still contributing some fine sediment to the channel.
10956	0062.00	Tributary #02 enters on the right bank. It contributes less than 5% to Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit, the water temperature downstream of the tributary was 55 degrees Fahrenheit, and the water temperature upstream of the confluence was 56 degrees Fahrenheit. The slope of the tributary is approximately 3%. There is a 6.5' high plunge from a culvert with no jump pool below approximately 60' upstream from the mouth. No fish were observed in the tributary.
11552	0063.00	There are remnants of a stream crossing on the right bank: a series of concrete blocks.
12834	0072.04	Small woody debris (SWD) is accumulating across the channel. The accumulation measures approximately 25' wide x 4' high x 3' high. It is not accumulating sediment.
15762	0091.00	An erosion site on the left bank measures approximately 300' long x 9' high; it is contributing fine sediment to the channel.

## Rowdy Creek

19306	0120.00	There is a seep coming out of the left bank.
20143	0126.00	South Fork Rowdy Creek (tributary #03) enters on the left bank. It contributes to approximately 10% of Rowdy Creek's flow. The water temperature of the tributary was 56 degrees Fahrenheit, the water temperature downstream of the tributary was 57 degrees Fahrenheit, and the water temperature upstream of the confluence was 58 degrees Fahrenheit. The slope of the tributary is less than 2%. Salmonids were observed in the tributary.
20557	0130.00	Rowdy Creek Road crosses the channel. The crossing is a 27' wide x 124' long x 10' high concrete bridge.
20643	0131.00	Large woody debris (LWD) structure on the right bank. The channel changes from an F4 to an F3.
20708	0132.00	LWD structure on each bank.
20823	0133.00	LWD structure on the left bank.
21043	0135.00	LWD structure on the right bank.
21156	0136.00	Two LWD structures on the right bank, one LWD structure on the left bank.
21370	0138.00	LWD structure on each bank.
21580	0140.00	LWD structure on left bank.
21689	0141.00	Two LWD structures on the left bank.
21929	0142.00	One LWD on the right bank, two LWD structures on the left bank.
23040	0153.00	LWD/boulder structure on the left bank.
23236	0154.00	LWD/boulder structure on left bank.
23394	0157.00	Tributary #04 enters on the right bank. It contributes to approximately 5% of Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 3%. Salmonids were observed in the tributary.
24122	0161.00	LWD/boulder structure on the left bank.

## Rowdy Creek

24521	0162.00	LWD/boulder structure on the right bank.
24614	0163.00	LWD/boulder structure on each bank and one mid-channel.
24971	0166.00	Tributary #05 enters on the right bank. It contributes to less than 5% of Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 8%. The tributary is not accessible to salmonids.
25380	0170.00	LWD/boulder structure on right bank.
25572	0173.00	LWD/boulder structure on the left bank. Dry left bank tributary.
26011	0175.00	LWD/boulder structure on each bank.
27357	0185.00	Tributary #06 enters on the right bank. It contributes to approximately 5% of Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 56 degrees Fahrenheit. The slope of the tributary is approximately 7%. The tributary is accessible to salmonids, but no fish were observed.
28101	0193.00	Tributary #07 enters on the right bank. It contributes to approximately 10% of Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 56 degrees Fahrenheit. The slope of the tributary is approximately 6%. Salmonids were observed in the tributary.
30053	0205.00	Dry left bank tributary.
30900	0212.00	Dry left bank tributary.
30998	0213.00	Tributary #08 enters on the right bank. It contributes to approximately 10% of Rowdy Creek's flow. The water temperature of the tributary was 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 5%. The tributary is accessible to salmonids, but no fish were observed.
32535	0226.00	Tributary #09 enters on the left bank. The first 175' of the tributary are dry. The water temperature of the tributary was 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is less than 2%. Salmonids were observed in the tributary.

## Rowdy Creek

33201	0231.00	Road 1400 crosses the channel. The crossing is a 15.5' wide x 97' long x 12.5' high railcar bridge. Boulder rip-rap lines both banks beneath the bridge.
3565	0236.00	The left bank is eroding under a redwood root wad. The erosion site measures approximately 80' long x 15' high. It is contributing sediment ranging in size from silt to boulders to the channel.
33650	0237.00	An erosion site on the left bank measures approximately 30' long x 20' high. It is contributing fine sediment to the channel. Water is seeping through the eroding bank.
34306	0243.00	Tributary #10 enters on the left bank. It contributes to less than 5% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 55 degrees Fahrenheit. The slope of the tributary is approximately 10%. Salmonids were observed in the tributary.
35665	0257.00	Tributary #11 enters on the right bank. It contributes to approximately 1% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit, the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 15%. No salmonids were observed.
37107	0271.00	Tributary #12 enters on the left bank. It contributes to approximately 5% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 12%. Salmonids were observed in the tributary.
38170	0279.00	Tributary #13 enters on the right bank. It contributes to 15-20% of Rowdy Creek's flow. The water temperature of the tributary was 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 3%. Salmonids were observed in the tributary.
39104	0285.00	Tributary #14 enters on the right bank. It contributes to approximately 2% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. Fifty feet upstream from the mouth the channel splits in two directions parallel to Rowdy Creek. Both channels are dry and poorly defined.
39609	0292.00	There is a seep coming out of the right bank.

## Rowdy Creek

40129	0298.00	There is a seep coming out of the right bank.
40311	0300.00	There is a seep coming out of the left bank.
41006	0306.00	Copper Creek (tributary #15) enters from the left bank. It contributes to approximately 45% of Rowdy Creek's flow. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 3%. Salmonids were observed in the tributary.
41919	0314.00	Tributary #16 enters on the right bank. It contributes to less than 5% of Rowdy Creek's flow. The water temperature of the tributary was 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. There is a 12' high waterfall approximately 40' upstream from the mouth.
42817	0324.00	Tributary #17 enters on the left bank. It contributes to approximately 2% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 25%. The tributary is not accessible to salmonids.
43235	0328.00	Tributary #18 enters on the right bank. It contributes to approximately 3% of Rowdy Creek's flow. The water temperature of the tributary was 53 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 4%. Salmonids were observed in the tributary.
43754	0331.00	Tributary #19 enters on the left bank. It contributes to approximately 2% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 20%. The tributary is not accessible to salmonids.
45100	0350.00	There is a three foot high plunge over boulders.
45452	0357.00	End of survey. Tributary #20 enters on the right bank. It contributes to approximately 10% of Rowdy Creek's flow. The water temperature of the tributary was 52 degrees Fahrenheit, the water temperature downstream of the tributary was 54 degrees Fahrenheit, and the water temperature upstream of the confluence was 50 degrees Fahrenheit.

## Rowdy Creek

The slope of the tributary is approximately 20%. The tributary is not accessible to salmonids.

The survey was ended at tributary #20 due to time constraints. Over the last 600' of the survey the slope increased to 4.7% and boulders were the dominant substrate. Visual observation 400' upstream of the end of survey point revealed that the slope continued to increase and boulders continued to be the dominant substrate.

## 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.

## Rowdy 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: Rowdy Creek

LLID: 1241648419111 Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER Legal Description: T18NR01ES20 Latitude: 41:54:40.0N Longitude: 124:09:53.0W

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
2	0	DRY	0.5	114	229	0.5									
99	15	FLATWATER	26.6	133	13118	28.0	23.8	0.9	1.7	3942	390238	3245	321232		1
155	155	POOL	41.7	155	23948	51.0	27.9	1.3	3.1	4808	745164	9046	1402140	6926	2
116	15	RIFFLE	31.2	83	9638	20.5	28.5	0.5	1.3	1933	224257	928	107663		2
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
372	185				46933					1359658			1831035		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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 (%)
96	11	LGR	25.8	88	8465	18.0	26	0.5	1.5	1865	179002	849	81470		0	68
20	4	HGR	5.4	59	1173	2.5	36	0.6	2.4	2122	42440	1147	22935		8	70
2	1	GLD	0.5	390	780	1.7	35	0.7	1.9	11515	23030	8061	16121		0	99
56	6	RUN	15.1	106	5931	12.6	28	0.9	2.4	4208	235631	3599	201561		2	69
41	8	SRN	11.0	156	6407	13.7	19	0.9	2.1	2796	114624	2377	97452		1	79
122	122	MCP	32.8	172	21000	44.7	28	1.4	8.5	5471	667445	10479	1278470	8086	2	73
2	2	CCP	0.5	104	209	0.4	20	1.4	3.8	2129	4258	4481	8962	3323	0	91
2	2	CRP	0.5	59	118	0.3	34	2.9	8.2	2426	4852	10410	20820	9505	0	94
2	2	LSL	0.5	26	53	0.1	15	0.8	2.2	324	648	409	817	247	0	95
6	6	LSR	1.6	132	791	1.7	26	0.8	3.9	3107	18640	4103	24617	2815	3	58
7	7	LSBk	1.9	83	580	1.2	31	0.5	2.1	2480	17363	2288	16019	1309	0	75
9	9	LSBo	2.4	94	850	1.8	27	0.7	3.1	2331	20979	2906	26158	1497	1	83
4	4	PLP	1.1	42	167	0.4	32	1.6	5.3	1305	5218	3689	14757	2785	10	67
1	1	DPL	0.3	180	180	0.4	32	0.8	3.2	5760	5760	11520	11520	4608	0	12
2	0	DRY	0.5	114	229	0.5										

Total Units  
372

Total Units Fully Measured  
185

Total Length (ft.)  
46933

Total Area (sq.ft.)  
1339891

Total Volume (cu.ft.)  
1821679

**Table 3 - Summary of Pool Types**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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
124	124	MAIN	80	171	21209	89	27.8	1.4	5417	671703	8009	993093	2
30	30	SCOUR	19	85	2559	11	28.1	0.9	2257	67700	2374	68860	2
1	1	BACKWATER	1	180	180	1	32.0	0.8	5760	5760	4608	4608	0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
155	155	23948	745164	1066561

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

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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
122	MCP	79	0	0	24	20	42	34	24	20	32	26
2	CCP	1	0	0	1	50	0	0	1	50	0	0
2	CRP	1	0	0	0	0	0	0	1	50	1	50
2	LSL	1	0	0	1	50	1	50	0	0	0	0
6	LSR	4	0	0	2	33	1	17	3	50	0	0
7	LSBk	5	0	0	6	86	1	14	0	0	0	0
9	LSBo	6	0	0	5	56	3	33	1	11	0	0
4	PLP	3	0	0	1	25	1	25	1	25	1	25
1	DPL	1	0	0	0	0	0	0	1	100	0	0
<b>Total Units</b>			<b>Total &lt; 1 Foot Max Resid. Depth</b>	<b>Total &lt; 1 Foot % Occurrence</b>	<b>Total 1&lt;2 Foot Max Resid. Depth</b>	<b>Total 1&lt;2 Foot % Occurrence</b>	<b>Total 2&lt;3 Foot Max Resid. Depth</b>	<b>Total 2&lt;3 Foot % Occurrence</b>	<b>Total 3&lt;4 Foot Max Resid. Depth</b>	<b>Total 3&lt;4 Foot % Occurrence</b>	<b>Total &gt;= 4 Foot Max Resid. Depth</b>	<b>Total &gt;= 4 Foot % Occurrence</b>
155			0	0	40	26	49	32	32	21	34	22

Mean Maximum Residual Pool Depth (ft.): 3.1

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Dry Units: 2

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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
96	11	LGR	0	0	0	0	0	0	0	0	0
20	4	HGR	0	0	0	0	0	0	40	60	0
116	15	TOTAL RIFFLE	0	0	0	0	0	0	40	60	0
2	1	GLD	0	0	0	0	0	0	0	0	0
56	6	RUN	0	0	0	0	100	0	0	0	0
41	8	SRN	0	0	100	0	0	0	0	0	0
99	15	TOTAL FLAT	0	0	50	0	50	0	0	0	0
122	122	MCP	0	27	17	5	21	6	2	19	2
2	2	CCP	0	0	0	0	0	0	0	0	0
2	2	CRP	0	0	0	0	0	0	0	0	0
2	2	LSL	0	0	0	0	0	0	0	0	0
6	6	LSR	5	5	5	85	0	0	0	0	0
7	7	LSBk	0	0	0	0	0	0	0	0	0
9	9	LSBo	0	0	0	0	0	0	0	100	0
4	4	PLP	0	33	0	5	0	0	53	10	0
1	1	DPL	0	0	0	0	0	0	0	0	0
155	155	TOTAL POOL	0	25	15	9	18	5	5	20	2
372	185	TOTAL	0	23	16	9	19	5	5	20	2

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Dry Units: 2

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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
96	11	LGR	0	0	64	18	9	9	0
20	4	HGR	0	0	0	75	0	25	0
2	1	GLD	0	0	100	0	0	0	0
56	6	RUN	0	0	83	0	17	0	0
41	8	SRN	0	0	75	25	0	0	0
122	122	MCP	0	2	91	4	1	2	1
2	2	CCP	0	0	100	0	0	0	0
2	2	CRP	0	0	100	0	0	0	0
2	2	LSL	0	0	100	0	0	0	0
6	6	LSR	0	17	67	17	0	0	0
7	7	LSBk	0	0	100	0	0	0	0
9	9	LSBo	0	0	78	11	0	11	0
4	4	PLP	0	0	50	0	0	25	25
1	1	DPL	0	0	100	0	0	0	0

**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
73	3	97	2	100	99

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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: Rowdy Creek LLID: 1241648419111 Drainage: Smith River - Lower  
 Survey Dates: 9/10/2012 to 9/19/2012 Survey Length (ft.): 46933 Main Channel (ft.): 45470 Side Channel (ft.): 1463  
 Confluence Location: Quad: SMITH RIVER Legal Description: T18NR01ES20 Latitude: 41:54:40.0N Longitude: 124:09:53.0W

**Summary of Fish Habitat Elements By Stream Reach**

**STREAM REACH: 1**

Channel Type: F4	Canopy Density (%): 53.0	Pools by Stream Length (%): 66.5
Reach Length (ft.): 20643	Coniferous Component (%): 1.9	Pool Frequency (%): 49.0
Riffle/Flatwater Mean Width (ft.): 26.1	Hardwood Component (%): 98.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 19
Range (ft.): 31 to 200	Vegetative Cover (%): 99.2	2 to 2.9 Feet Deep: 27
Mean (ft.): 90	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 23
Std. Dev.: 44	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 31
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 7	Mean Max Residual Pool Depth (ft.): 3.4
Water (F): 55 - 61 Air (F): 52 - 74	LWD per 100 ft.:	Mean Pool Shelter Rating: 4
Dry Channel (ft): 229	Riffles: 1	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 1 Gravel: 64 Sm Cobble: 27 Lg Cobble: 3 Boulder: 3 Bedrock: 1		
Embeddedness Values (%): 1. 41.4 2. 44.3 3. 11.4 4. 0.0 5. 2.9		

**STREAM REACH: 2**

Channel Type: F3	Canopy Density (%): 89.6	Pools by Stream Length (%): 37.5
Reach Length (ft.): 24827	Coniferous Component (%): 3.3	Pool Frequency (%): 37.1
Riffle/Flatwater Mean Width (ft.): 26.2	Hardwood Component (%): 96.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 32
Range (ft.): 32 to 70	Vegetative Cover (%): 99.9	2 to 2.9 Feet Deep: 35
Mean (ft.): 54	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 19
Std. Dev.: 11	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 14
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 1	Mean Max Residual Pool Depth (ft.): 2.9
Water (F): 54 - 58 Air (F): 51 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 1
Dry Channel (ft): 0	Riffles: 1	
	Pools: 2	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 28 Sm Cobble: 26 Lg Cobble: 32 Boulder: 13 Bedrock: 1		
Embeddedness Values (%): 1. 82.4 2. 14.1 3. 0.0 4. 0.0 5. 3.5		



**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

Latitude: 41:54:40.0N

Longitude: 124:09:53.0W

**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	14	18	8.6
Boulder	13	16	7.8
Cobble / Gravel	105	88	52.2
Sand / Silt / Clay	53	63	31.4

**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	1	0.3
Brush	8	7	4.1
Hardwood Trees	171	174	93.2
Coniferous Trees	6	3	2.4
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 1

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

StreamName: Rowdy Creek

LLID: 1241648419111

Drainage: Smith River - Lower

Survey Dates: 9/10/2012 to 9/19/2012

Confluence Location: Quad: SMITH RIVER

Legal Description: T18NR01ES20

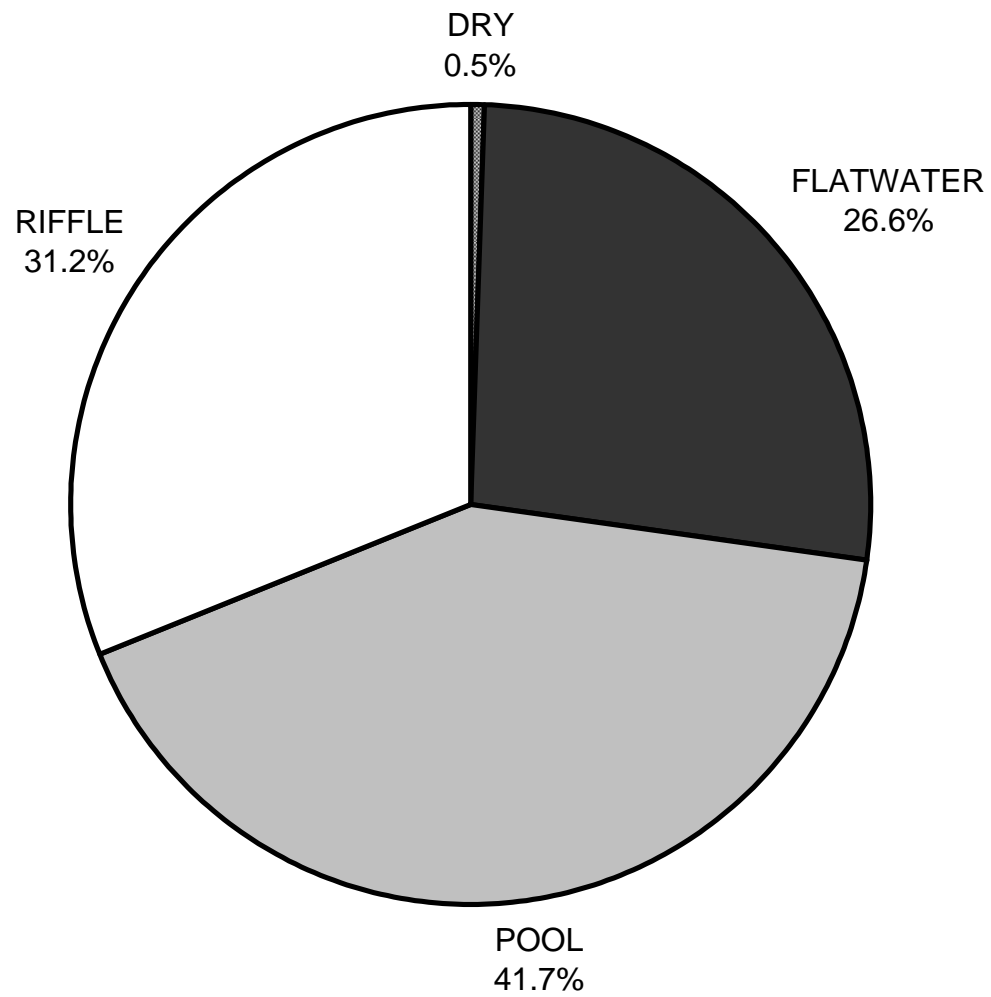
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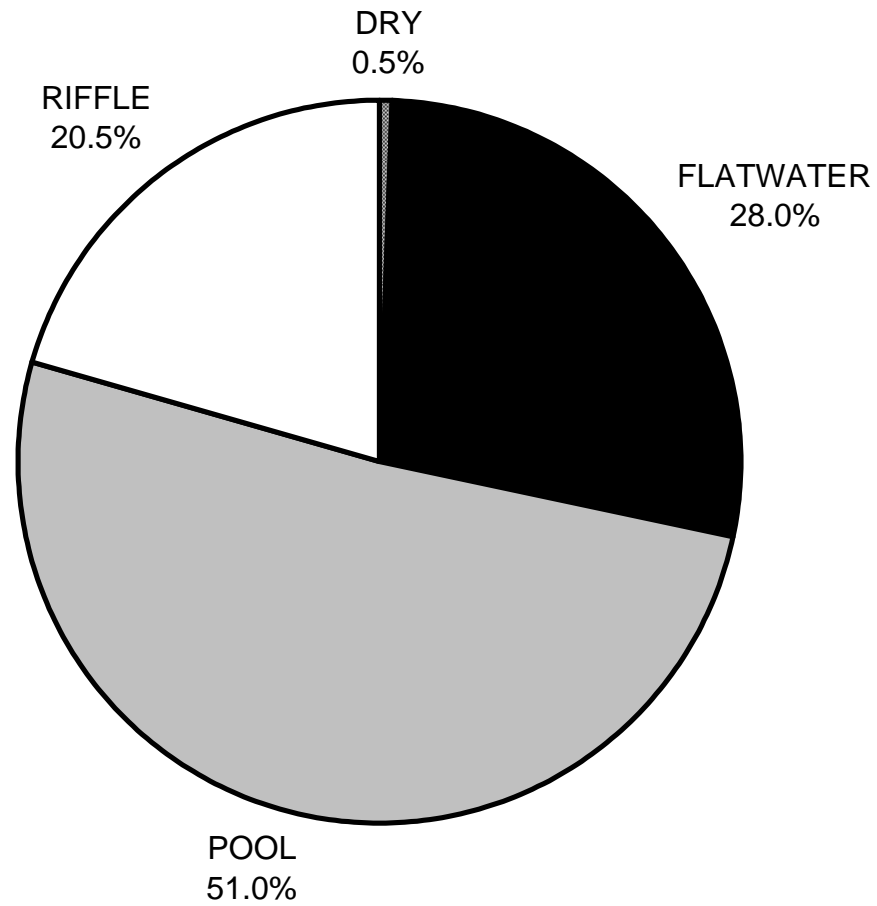
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	0	0
SMALL WOODY DEBRIS (%)	0	0	25
LARGE WOODY DEBRIS (%)	0	50	15
ROOT MASS (%)	0	0	9
TERRESTRIAL VEGETATION (%)	0	50	18
AQUATIC VEGETATION (%)	0	0	5
WHITEWATER (%)	40	0	5
BOULDERS (%)	60	0	20
BEDROCK LEDGES (%)	0	0	2

# ROWDY CREEK 2012 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

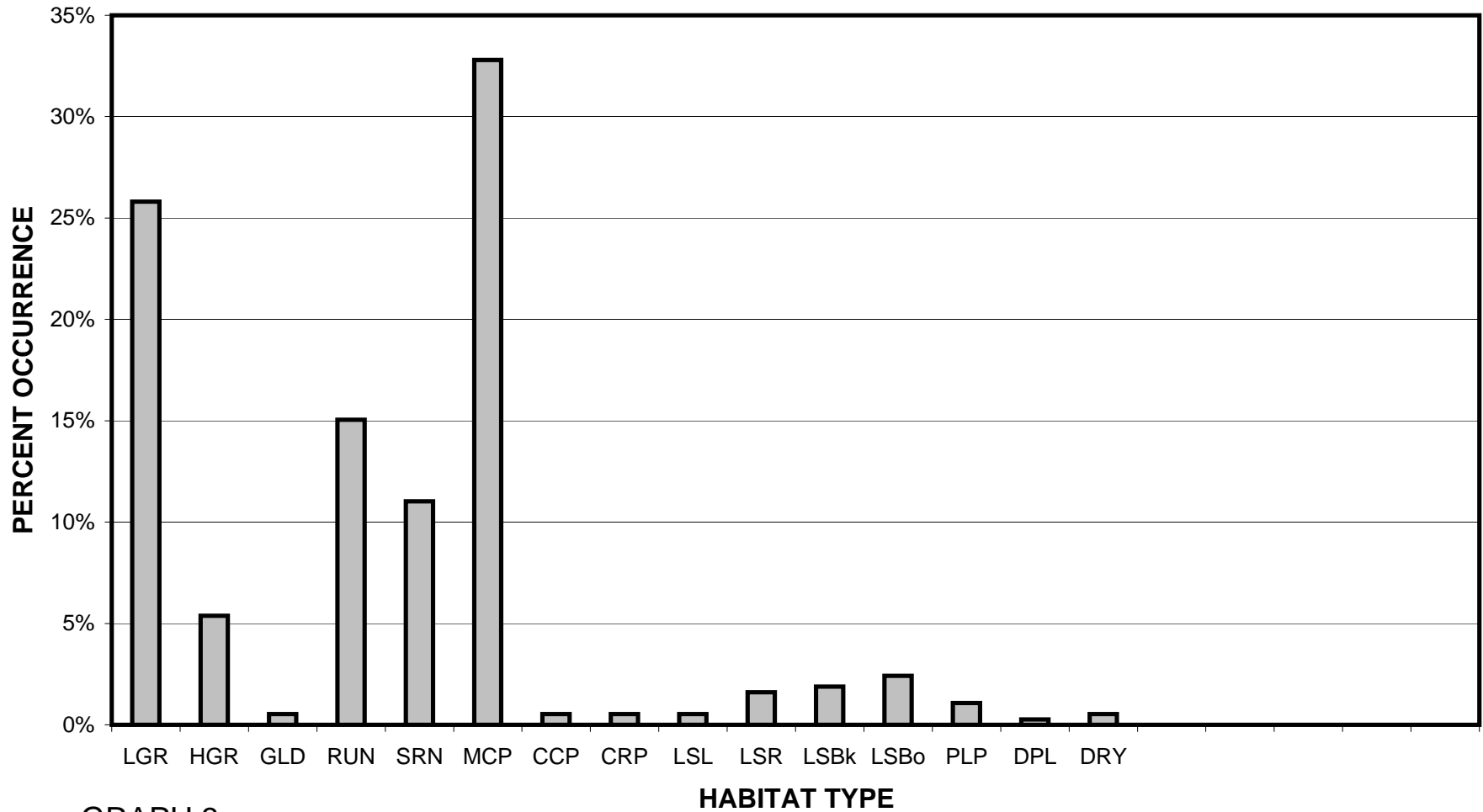
# ROWDY CREEK 2012 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

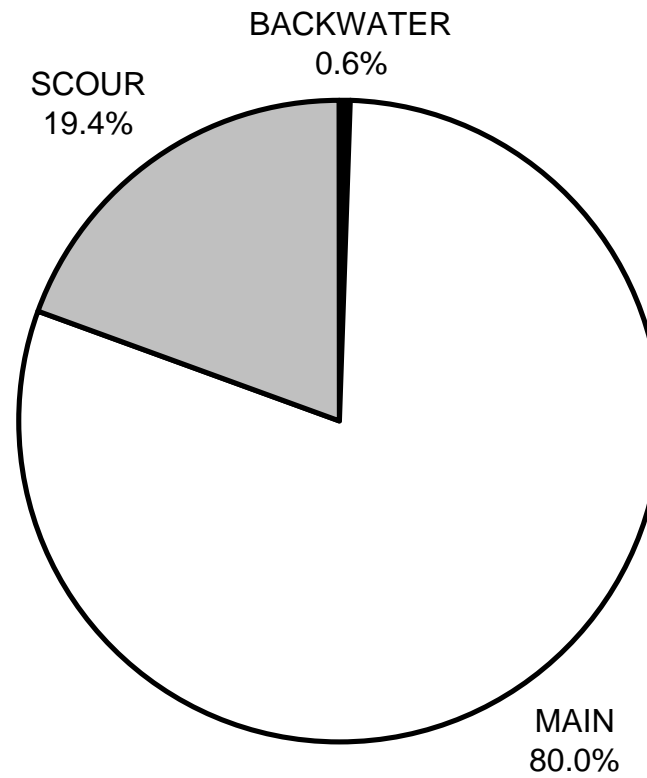
# ROWDY CREEK 2012

## HABITAT TYPES BY PERCENT OCCURRENCE



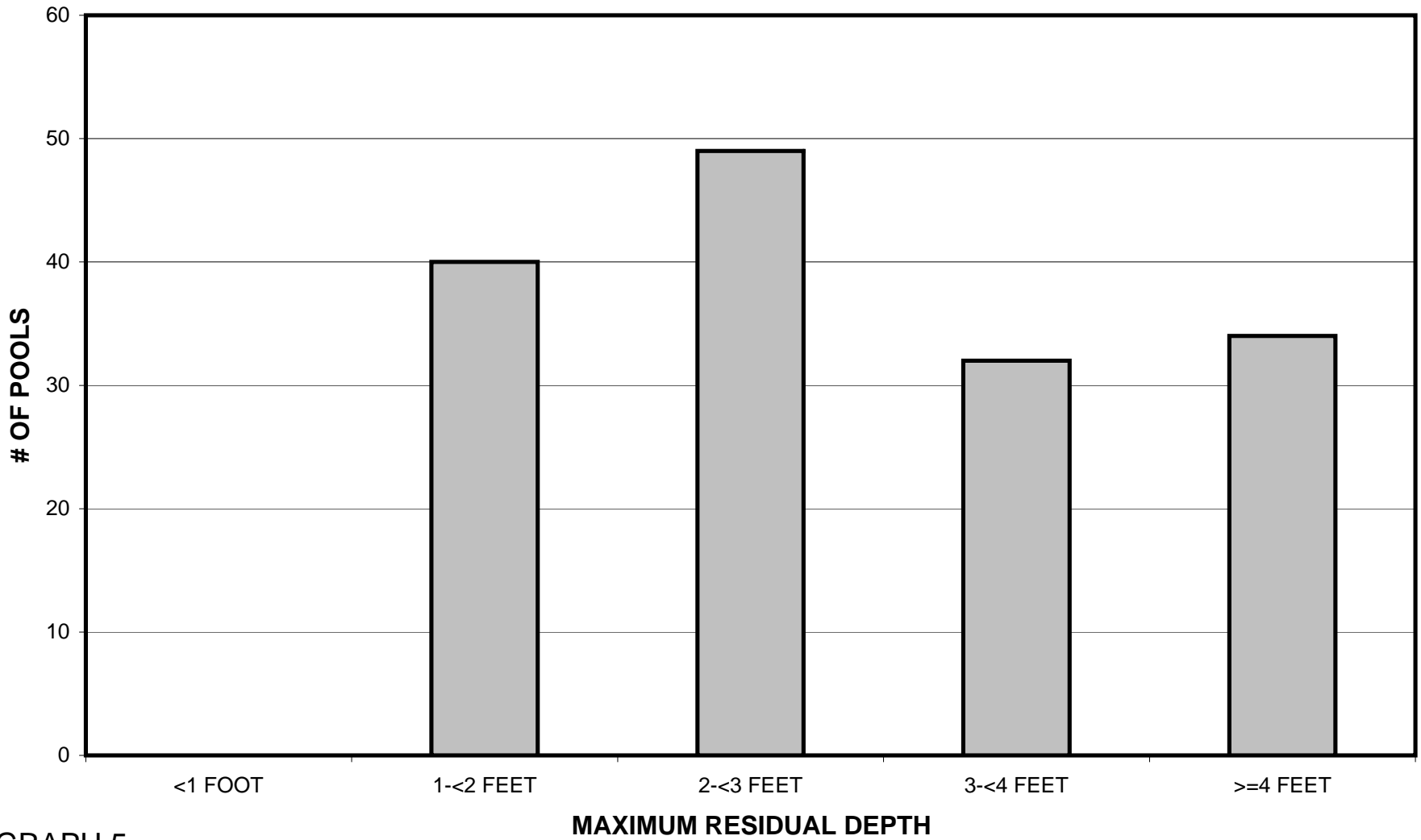
GRAPH 3

# ROWDY CREEK 2012 POOL TYPES BY PERCENT OCCURRENCE



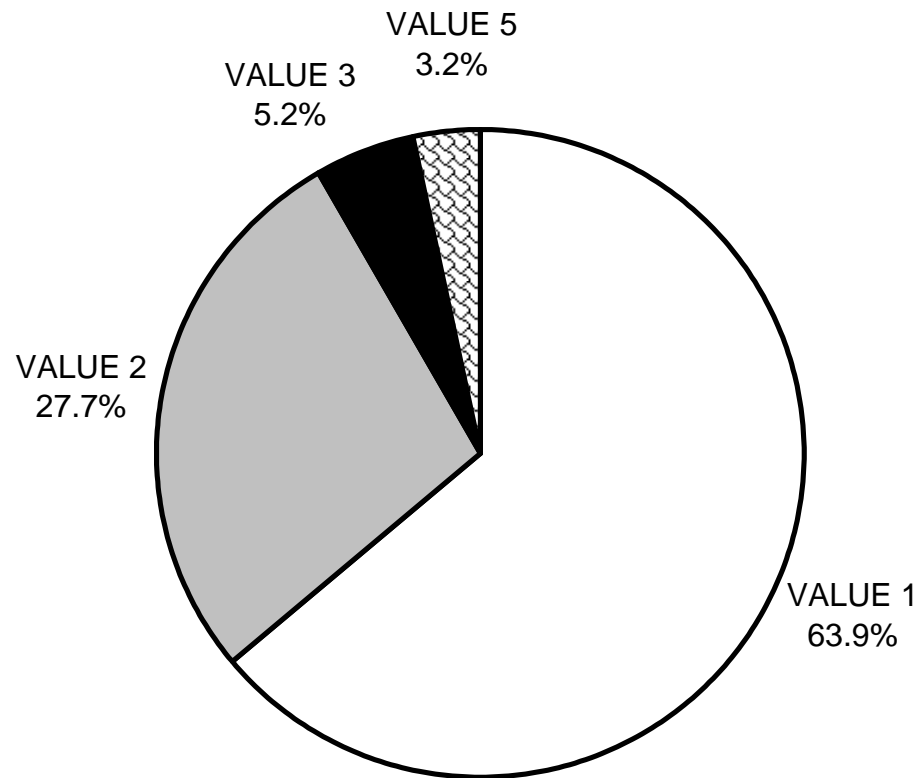
GRAPH 4

# ROWDY CREEK 2012 MAXIMUM DEPTH IN POOLS



GRAPH 5

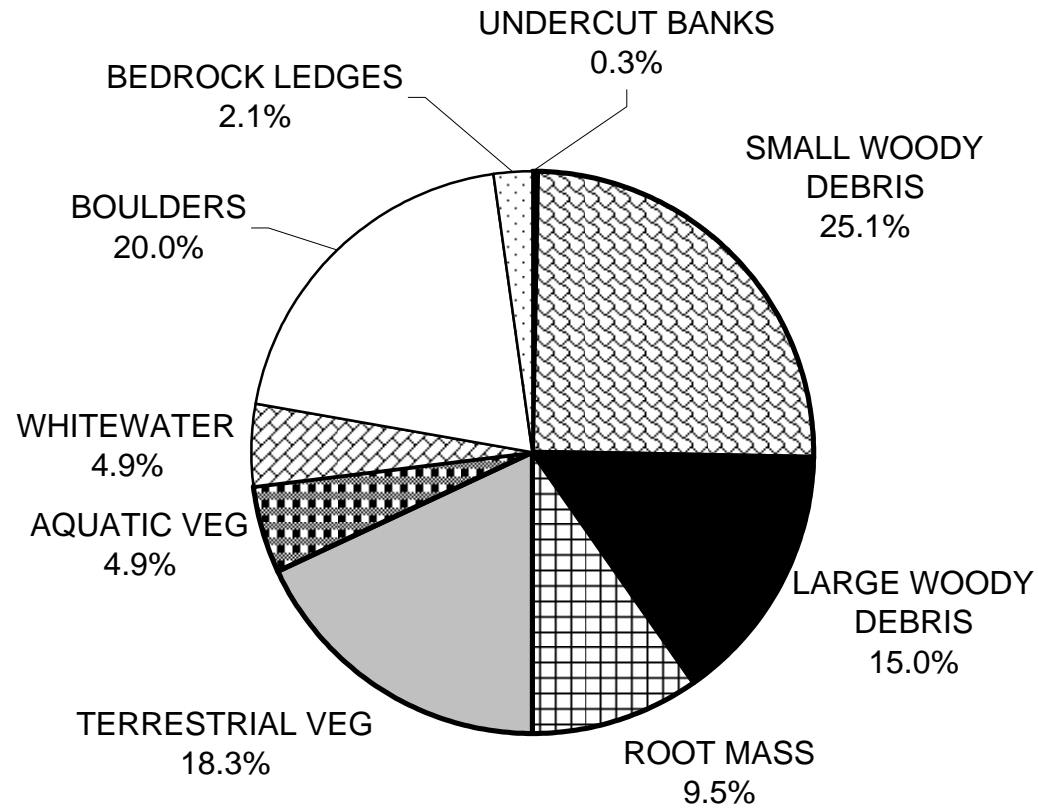
# ROWDY CREEK 2012 PERCENT EMBEDDEDNESS



GRAPH 6

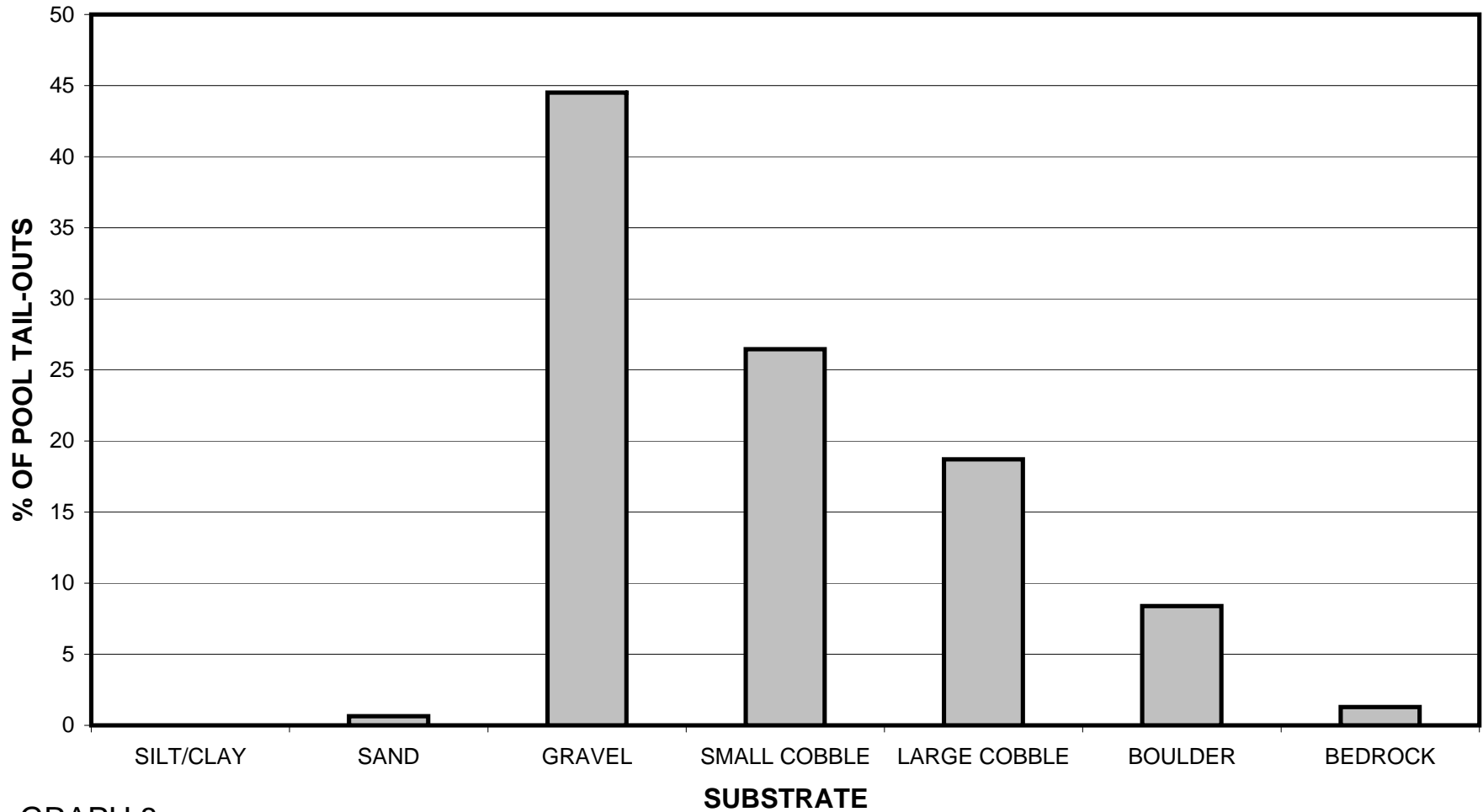


# ROWDY CREEK 2012 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

# ROWDY CREEK 2012 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



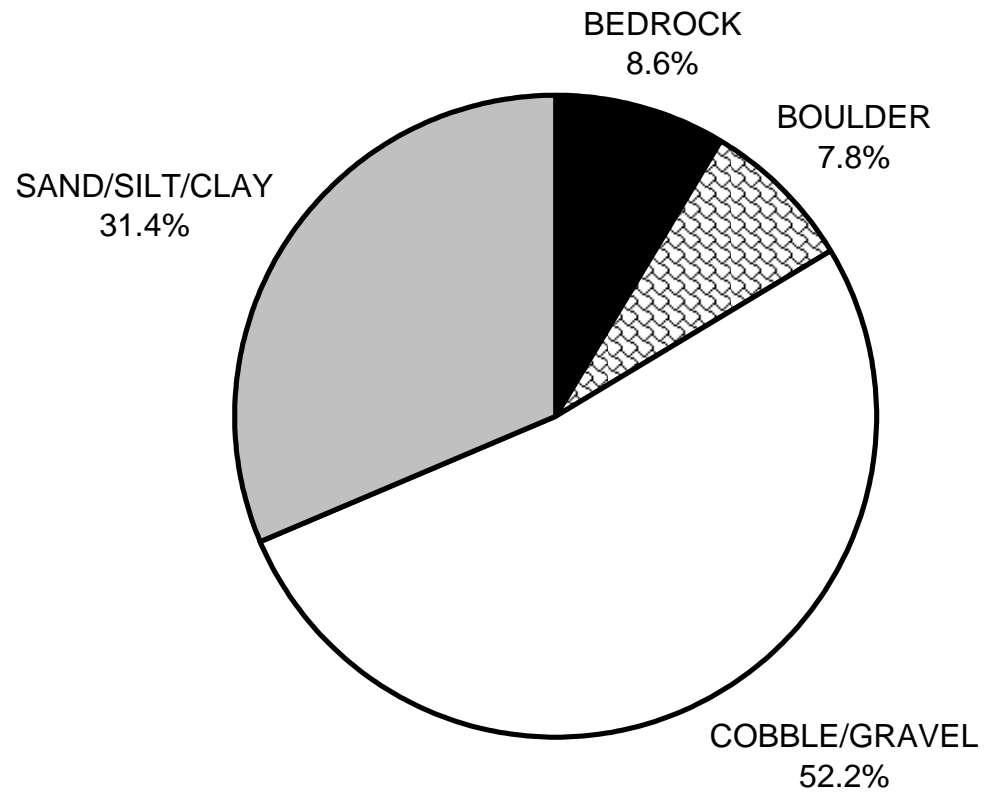
GRAPH 8

# ROWDY CREEK 2012 MEAN PERCENT CANOPY



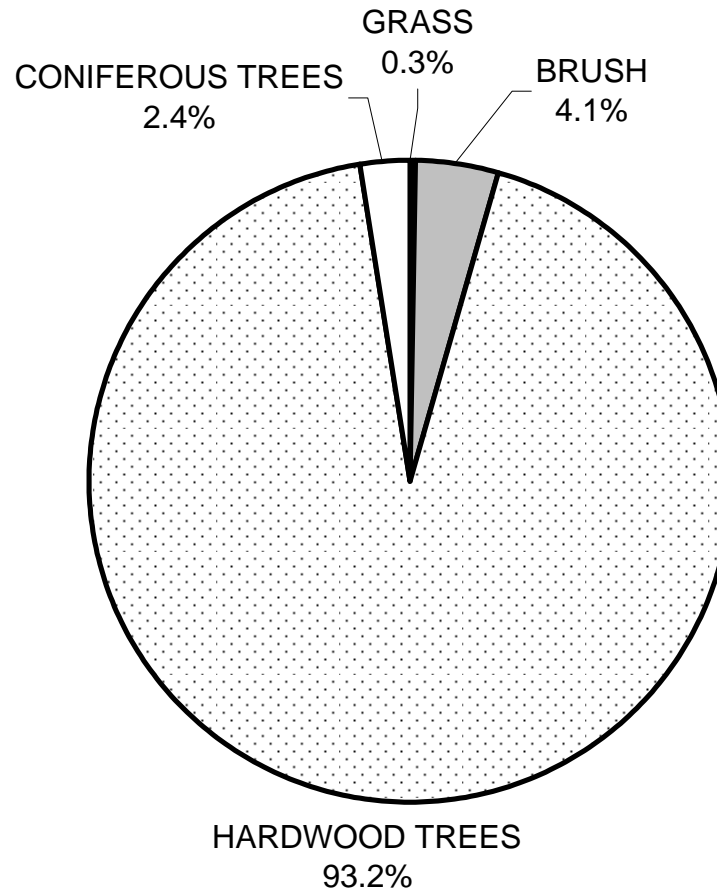
GRAPH 9

# ROWDY CREEK 2012 DOMINANT BANK COMPOSITION IN SURVEY REACH



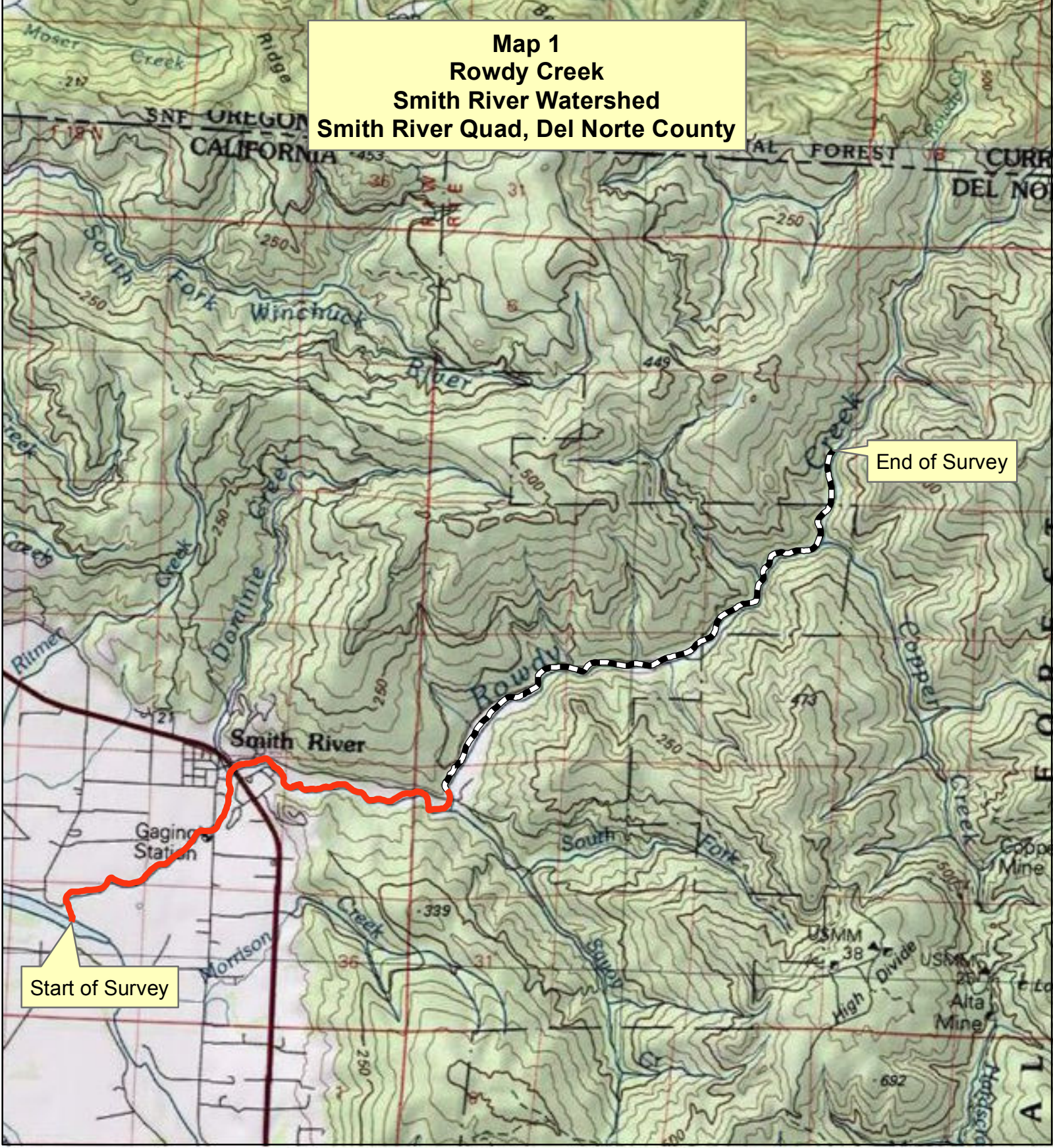
GRAPH 10

# ROWDY CREEK 2012 DOMINANT BANK VEGETATION IN SURVEY REACH



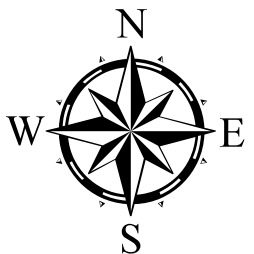
GRAPH 11

**Map 1**  
**Rowdy Creek**  
**Smith River Watershed**  
**Smith River Quad, Del Norte County**



Start of Survey

End of Survey



- Reach 1, Channel Type F4
- - - Reach 2, Channel Type F3

0 2,500 5,000 Feet

