

# STREAM INVENTORY REPORT

## Rockport Creek

### INTRODUCTION

A stream inventory was conducted from August 11 to August 13, 2008 on Rockport Creek. The survey began at the confluence with South Fork Cottaneva Creek and extended upstream 1.2 miles. Stream inventories and reports were also completed for one tributary to Rockport Creek.

The Rockport 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 Rockport 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

Rockport Creek is a tributary to South Fork Cottaneva Creek, tributary to Cottaneva Creek, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Rockport Creek's legal description at the confluence with South Fork Cottaneva Creek is T22N R18W S25. Its location is 39.7366 north latitude and 123.8121 west longitude, LLID number 1238110397368. Rockport Creek is a second order stream and has approximately 1.7 miles of blue line stream according to the USGS Westport 7.5 minute quadrangle. Rockport Creek drains a watershed of approximately 1.3 square miles. Elevations range from about 15 feet at the mouth of the creek to 700 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 1 at Rockport north of Fort Bragg.

### METHODS

The habitat inventory conducted in Rockport Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

### SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the

## Rockport Creek

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 Rockport 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". Rockport 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.

## Rockport 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 Rockport 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 Rockport 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 Rockport 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 Rockport 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.

## Rockport 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 Rockport Creek. In addition, underwater observations were made at 30 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 2.0.18, 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

## Rockport Creek

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Rockport 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 August 11 to August 13, 2008, was conducted by I. Mikus, and S. McSmith, (DFG), and B. Quaglieri, and C. Chavez, (WSP). The total length of the stream surveyed was 6,130 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.16 cfs on August 13, 2008.

Rockport Creek is an E4 channel type for 3,153 feet of the stream surveyed (Reach 1), a B4 channel type for 1,486 feet of the stream surveyed (Reach 2), and an A3 channel type for 1,491 feet of the stream surveyed (Reach 3). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates. A3 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 52 to 64 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 37% pool units, 31% riffle units, 29% flatwater units, 3% dry units and 1% no survey units (Graph 1). Based on total length of Level II habitat types there were 46% flatwater units, 34% riffle units, 17% pool units, and 2% dry units (Graph 2).

## Rockport Creek

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 23%; mid-channel pool units, 18%; and step run units 16% (Graph 3). Based on percent total length, step run units made up 36% low gradient riffle units 19%, and high gradient riffle units 14%.

A total of 66 pools were identified (Table 3). Main channel pools were the most frequently encountered at 52% (Graph 4), and comprised 62% 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. Ten of the 66 pools (15%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 66 pool tail-outs measured, 17 had a value of 1 (25.8%); 17 had a value of 2 (25.8%); 17 had a value of 3 (25.8%); 12 had a value of 4 (18.2%); 3 had a value of 5 (4.5%) (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 10, flatwater habitat types had a mean shelter rating of 5, and pool habitats had a mean shelter rating of 32 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 37. Main channel pools had a mean shelter rating of 28 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Rockport Creek. Graph 7 describes the pool cover in Rockport Creek. Large woody debris is the dominant pool cover type followed by small woody debris.

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 88% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 9% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Rockport Creek was 95%. Five percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 56% and 44%, respectively. Graph 9 describes the mean percent canopy in Rockport Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 94% sand/silt/clay and 6% cobble/gravel (Graph 10). Hardwood trees were the dominant vegetation type observed in 62% of the units surveyed. Additionally, 32% of the units surveyed had coniferous as the dominant vegetation type, and 6% had brush as the dominant vegetation type (Graph 11).

## Rockport Creek

### BIOLOGICAL INVENTORY RESULTS

Thirty sites were snorkel surveyed for species composition and distribution in Rockport Creek on August 25, and September 4, 2008. Water temperatures taken during the survey periods of 0845 to 1545 ranged from 54 to 57 degrees Fahrenheit. Air temperatures ranged from 54 to 64 degrees Fahrenheit. The sites were sampled by A. Renger, T. Tollefson, I. Mikus, and S. McSmith (DFG).

In reach 1, which comprised the first 3,155 feet of stream, 10 sites were sampled. The reach sites yielded 4 young-of-the-year steelhead/rainbow trout (SH/RT), 4 age 1+ SH/RT and 5 sculpin.

In reach 2, 10 sites were sampled starting approximately 3,169 feet from the confluence with South Fork Cottaneva Creek and continuing upstream 1,460 feet. The reach sites yielded one age 2+ SH/RT.

In reach 3, 10 sites were sampled starting approximately 4,695 feet from the confluence with South Fork Cottaneva and continuing upstream 1,044 feet. The reach sites yielded one age 2+ SH/RT.

The following chart displays the information yielded from these sites:

2008 Rockport Creek underwater observations.

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: E4 Channel Type									
08/25/08	1	003	5.2	121	0	0	2	1	0
08/25/08	2	008	4.2	346	0	0	1	1	0
08/25/08	3	018	4.2	731	0	0	0	0	0
08/25/08	4	023	4.2	930	0	0	1	0	0
08/25/08	5	026	5.6	1,248	0	0	0	0	0
08/25/08	6	045	4.2	1,731	0	0	0	0	0
08/25/08	7	054	4.2	2,097	0	0	0	0	0
08/25/08	8	063	5.6	2,326	0	0	0	1	0
08/25/08	9	071	4.2	2,625	0	0	0	0	0
08/25/08	10	075	4.2	2,828	0	0	0	0	0

## Rockport Creek

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 2: B4 Channel Type									
08/25/08	11	82	3.3	3,169	0	0	0	0	0
08/25/08	12	85	4.2	3,310	0	0	0	0	0
08/25/08	13	88	5.6	3,422	0	0	0	0	0
08/25/08	14	98	4.2	3,639	0	0	0	0	0
08/25/08	15	102	4.2	3,790	0	0	0	0	0
08/25/08	16	109	5.6	4,063	0	0	0	0	0
08/25/08	17	115	5.6	4,202	0	0	0	0	0
08/25/08	18	111	5.6	4,082	0	0	0	0	0
08/25/08	19	122	5.6	4,344	0	0	0	0	1
08/25/08	20	132	5.6	4,629	0	0	0	0	0
Reach 3: A3 Channel Type									
09/04/08	21	136	5.6	4,695	0	0	0	0	0
09/04/08	22	143	4.2	4,773	0	0	0	0	0
09/04/08	23	156	5.6	5,149	0	0	0	0	0
09/04/08	24	147	4.2	4,941	0	0	0	0	0
09/04/08	25	154	5.6	5,058	0	0	0	0	0
09/04/08	26	163	4.2	5,408	0	0	0	0	0
09/04/08	27	166	4.2	5,486	0	0	0	0	1
09/04/08	28	169	4.2	5,560	0	0	0	0	0
09/04/08	29	173	5.6	5,681	0	0	0	0	0
09/04/08	30	175	4.2	5,739	0	0	0	0	0



## Rockport Creek

### DISCUSSION

Rockport Creek is an E4 channel type for the first 3,153 feet of stream surveyed and a B4 channel type for the next 1,486 feet and an A3 channel type for the remaining 1,491 feet. The suitability of E4, B4, and A3 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. A3 channel types are generally not suitable for fish habitat improvement structures.

The water temperatures recorded on the survey days August 11 to August 13, 2008, ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 52 to 64 degrees Fahrenheit. To make any conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 46% of the total length of this survey, riffles 34%, and pools 17%. The pools are relatively shallow, with 10 of the 66 (15%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for the E4 and B4 channel types.

Thirty-four of the 66 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-nine of the pool tail-outs had embeddedness ratings of 3 or 4. Three of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Rockport Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Sixty-four of the 66 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 32. The shelter rating in the flatwater habitats was 5. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in Rockport Creek. Large woody debris is the dominant cover type in pools followed by small woody debris.

The mean percent canopy density for the stream was 95%. Reach 1 had a canopy density of 94%, Reach 2 had a canopy density of 94%, and Reach 3 had a canopy density of 96%.

The percentage of right and left bank covered with vegetation was 98% 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.

## Rockport Creek

### RECOMMENDATIONS

- 1) Rockport Creek should be managed as an anadromous, natural production stream.
- 2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 3) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 4) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 5) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

### COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with South Fork Cottaneva Creek. Two salmonid young-of-the-year (YOY) observed in this unit and one 1+.
141	0004.00	Bridge #01 is a private road, and is 8' high x 14' wide x 50'. It is a railcar bridge made of metal and is not a barrier to salmonids.
1248	0026.00	There is a 5.5' old growth log plunge at the top of this unit. This is a possible barrier to salmonids. There is a wall of concrete on the right bank which may be a blown out crossing.
1248	0026.00	Log debris accumulation (LDA) #01 contains 3 pieces of LWD and measures 6' high x 22' wide x 6' long with water flowing through and visible gaps. Sediment retention ranges from silt to gravel and measures 11' wide x 100' long by 3' deep.
1361	0030.00	Two salmonid YOY were observed.

## Rockport Creek

1908	0050.00	Tributary #01 is on the left bank, and contributes to 50% of the downstream flow. The temperature downstream of the confluence was 54 degrees Fahrenheit, the temperature of the tributary was 53 degrees Fahrenheit, and the temperature upstream of the confluence was 54 degrees Fahrenheit. The slope of the tributary was 2% and fish were observed in the 250 feet explored.
2292	0062.00	LDA #02 contains 6 pieces of LWD and measures 6' high x 24' wide x 30' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 6' wide x 30' long by 2' deep.
3350	0087.00	There is erosion on the left bank measuring 25' long x 9' high. There is a 2' diameter log and root mass is in the middle of the creek that is retaining sediment.
3849	0105.00	A 1+ salmonid was observed.
3849	0105.00	LDA #02 contains 5 pieces of LWD and measures 7' high x 30' wide x 18' long with water flowing through and visible gaps. There was no sediment retention.
4014	0106.00	A 1.4' high log plunge.
4063	0109.00	A 2.3' high log plunge with sub-surface flow.
4082	0111.00	A 1.7' high plunge.
4094	0112.00	A 3.3' high plunge. The last 7 units have slope >10%.
4202	0115.00	A 1.4' high plunge.
4235	0118.00	A seeping tributary enters at the bottom of the unit, no fish habitat.
4255	0119.00	Tributary #02 is observed on right bank, and contributes to 5% of the downstream flow. The temperature downstream of the confluence was 54 degrees Fahrenheit, the temperature of the tributary was 54 degrees Fahrenheit, and the temperature upstream of the confluence was 54 degrees Fahrenheit. The slope of the tributary was 3% and appeared accessible to fish, though no fish were observed in the 100 feet explored.
4344	0122.00	A root mass creates a 2.4' high plunge.
4629	0132.00	A 2' high plunge created by a log.
4695	0136.00	A 1.4' high plunge.

## Rockport Creek

4734	0139.00	Small woody debris has accumulated on a root wad and a piece of LWD resulting in a 5' high jump with no jump pool. It is a possible barrier to adult and juvenile salmonids.
5000	0151.00	LDA #04 contains 12 pieces of LWD and measures 7' high x 30' wide x 18' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 7' wide x 40' long by 2' deep.
5058	0154.00	A 2.3' high log plunge.
5472	0165.00	LDA #05 contains 12 pieces of LWD and measures 2' high x 12' wide x 2' long with water flowing through and visible gaps. Sediment retention ranges from silt to large cobble and measures 5' wide x 50' long x 1' deep.
5541	0168.00	LDA #06 contains 2 pieces of LWD and measures 4' high x 7' wide x 6' long with water flowing through and visible gaps. Sediment retention ranges from silt to large cobble and measures 4' wide x 100' long x 2' deep.
5636	0171.00	A 1.2' high plunge created by a log.
6060	0177.00	A 3.4' high plunge created by a log.
6079	0179.00	A 2.2' high plunge created by a log.
6130	0180.00	End of survey due to high gradient; >20% for >200'. No YOY observed since LDA #03 at HU #105. A 2+ was observed at HU#166. Rockport Creek is full of nettles & frequently has orange algae in it. There are numerous pieces of wood in the channel.

## 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.

## Rockport 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: Rockport Creek

LLID: 1238110397368 Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0

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
5	0	DRY	2.8	29	144	2.3									
52	7	FLATWATER	28.9	54	2819	46.0	4.6	0.4	0.9	231	11993	107	5581		5
1	0	NOSURVEY	0.6	20	20	0.3									
66	66	POOL	36.7	16	1068	17.4	8.0	0.9	1.6	127	8404	127	8360	113	32
56	9	RIFFLE	31.1	37	2079	33.9	6.3	0.2	0.5	123	6864	26	1484		10
<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>		
180	82				6130					27261			15425		

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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

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 (%)
42	6	LGR	23.3	28	1161	18.9	5	0.2	0.8	117	4926	23	966		3	96
13	3	HGR	7.2	67	874	14.3	8	0.3	0.9	133	1731	33	435		25	96
1	0	CAS	0.6	44	44	0.7										
23	4	RUN	12.8	26	595	9.7	5	0.4	1.2	196	4498	74	1704		6	97
29	3	SRN	16.1	77	2224	36.3	4	0.4	1.2	277	8045	152	4397		3	95
33	33	MCP	18.3	20	644	10.5	7	0.8	3.4	148	4882	147	4839	130	28	94
1	1	CCP	0.6	16	16	0.3	12	1.3	2	192	192	269	269	250	20	95
1	1	CRP	0.6	27	27	0.4	7	0.7	1	189	189	151	151	132	75	82
10	10	LSL	5.6	16	159	2.6	8	0.7	1.6	112	1124	83	832	70	31	95
21	21	PLP	11.7	11	222	3.6	9	1.0	3.3	96	2017	108	2270	99	38	95
5	0	DRY	2.8	29	144	2.3										
1	0	NS	0.6	20	20	0.3										

Total Units  
180

Total Units Fully Measured  
82

Total Length (ft.)  
6130

Total Area (sq.ft.)  
27603

Total Volume (cu.ft.)  
15863

**Table 3 - Summary of Pool Types**

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

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
34	34	MAIN	52	19	660	62	7.5	0.8	149	5074	134	4547	28
32	32	SCOUR	48	13	408	38	8.5	0.9	104	3330	91	2919	37

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
66	66	1068	8404	7466



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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

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
33	MCP	50	1	3	27	82	4	12	1	3	0	0
1	CCP	2	0	0	0	0	1	100	0	0	0	0
1	CRP	2	0	0	1	100	0	0	0	0	0	0
10	LSL	15	1	10	9	90	0	0	0	0	0	0
21	PLP	32	1	5	16	76	3	14	1	5	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
66	3	5	53	80	8	12	2	3	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Dry Units: 5

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

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
42	4	LGR	70	30	0	0	0	0	0	0	0
13	2	HGR	5	65	30	0	0	0	0	0	0
1	0	CAS									
56	6	TOTAL RIFFLE	38	47	15	0	0	0	0	0	0
23	4	RUN	2	83	15	0	0	0	0	0	0
29	2	SRN	0	0	100	0	0	0	0	0	0
52	6	TOTAL FLAT	1	63	36	0	0	0	0	0	0
33	33	MCP	32	24	32	10	3	0	0	0	0
1	1	CCP	30	0	65	0	5	0	0	0	0
1	1	CRP	60	0	35	0	5	0	0	0	0
10	10	LSL	5	24	72	0	0	0	0	0	0
21	21	PLP	5	44	42	3	0	0	6	0	0
66	66	TOTAL POOL	19	29	42	6	1	0	2	0	0
1	0	NS									
180	78	TOTAL	19	32	41	6	1	0	2	0	0

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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Dry Units: 5

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

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
42	6	LGR	0	0	50	50	0	0	0
13	3	HGR	0	0	67	33	0	0	0
1	0	CAS	0	0	0	0	0	0	0
23	4	RUN	0	0	100	0	0	0	0
29	3	SRN	0	0	100	0	0	0	0
33	33	MCP	9	3	88	0	0	0	0
1	1	CCP	0	0	100	0	0	0	0
1	1	CRP	0	0	100	0	0	0	0
10	10	LSL	0	10	90	0	0	0	0
21	20	PLP	20	5	70	5	0	0	0

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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

---

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
95	44	56	0	98	99

---

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: Rockport Creek LLID: 1238110397368 Drainage: Rockport  
 Survey Dates: 8/11/2008 to 8/13/2008 Survey Length (ft.): 6130 Main Channel (ft.): 6130 Side Channel (ft.): 0  
 Confluence Location: Quad: WESTPORT Legal Description: T22NR18WS25 Latitude: 39:44:12.0N Longitude: 123:48:40.0W

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

**STREAM REACH: 1**

Channel Type: E4	Canopy Density (%): 94.0	Pools by Stream Length (%): 19.3
Reach Length (ft.): 3153	Coniferous Component (%): 32.6	Pool Frequency (%): 36.3
Riffle/Flatwater Mean Width (ft.): 7.6	Hardwood Component (%): 67.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 83
Range (ft.): 8 to 13	Vegetative Cover (%): 99.9	2 to 2.9 Feet Deep: 14
Mean (ft.): 11	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 3
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 44	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 53 - 56 Air (F): 52 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 28
Dry Channel (ft): 0	Riffles: 1	
	Pools: 7	
	Flat: 3	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 97 Sm Cobble: 3 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 48.3 2. 34.5 3. 13.8 4. 3.4 5. 0.0		

**STREAM REACH: 2**

Channel Type: B4	Canopy Density (%): 94.6	Pools by Stream Length (%): 18.8
Reach Length (ft.): 1486	Coniferous Component (%): 53.0	Pool Frequency (%): 38.5
Riffle/Flatwater Mean Width (ft.): 4.1	Hardwood Component (%): 47.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 85
Range (ft.): 9 to 13	Vegetative Cover (%): 96.1	2 to 2.9 Feet Deep: 10
Mean (ft.): 10	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 5
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 22	Mean Max Residual Pool Depth (ft.): 1.7
Water (F): 54 - 55 Air (F): 55 - 63	LWD per 100 ft.:	Mean Pool Shelter Rating: 48
Dry Channel (ft): 77	Riffles: 2	
	Pools: 11	
	Flat: 4	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 5 Gravel: 80 Sm Cobble: 15 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 10.0 2. 20.0 3. 30.0 4. 30.0 5. 10.0		

### Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 3**

Channel Type: A3	Canopy Density (%): 96.0	Pools by Stream Length (%): 12.1
Reach Length (ft.): 1491	Coniferous Component (%): 53.9	Pool Frequency (%): 35.4
Riffle/Flatwater Mean Width (ft.): 3.5	Hardwood Component (%): 46.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 88
Range (ft.): 9 to 11	Vegetative Cover (%): 99.9	2 to 2.9 Feet Deep: 12
Mean (ft.): 10	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 38	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 55 - 56    Air (F): 59 - 62	LWD per 100 ft.:	Mean Pool Shelter Rating: 21
Dry Channel (ft): 67	Riffles: 3	
	Pools: 13	
	Flat: 8	
Pool Tail Substrate (%): Silt/Clay: 0    Sand: 0    Gravel: 82    Sm Cobble: 12    Lg Cobble: 0    Boulder: 6    Bedrock: 0		
Embeddedness Values (%): 1. 5.9    2. 17.6    3. 41.2    4. 29.4    5. 5.9		

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

Stream Name: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

Longitude: 123:48:40.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	6	4	6.1
Sand / Silt / Clay	76	78	93.9

**Mean Percentage of Dominant Stream Bank Vegetation**

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	5	4	5.5
Hardwood Trees	51	50	61.6
Coniferous Trees	26	27	32.3
No Vegetation	0	1	0.6

**Total Stream Cobble Embeddedness Values:** 3

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

StreamName: Rockport Creek

LLID: 1238110397368

Drainage: Rockport

Survey Dates: 8/11/2008 to 8/13/2008

Confluence Location: Quad: WESTPORT

Legal Description: T22NR18WS25

Latitude: 39:44:12.0N

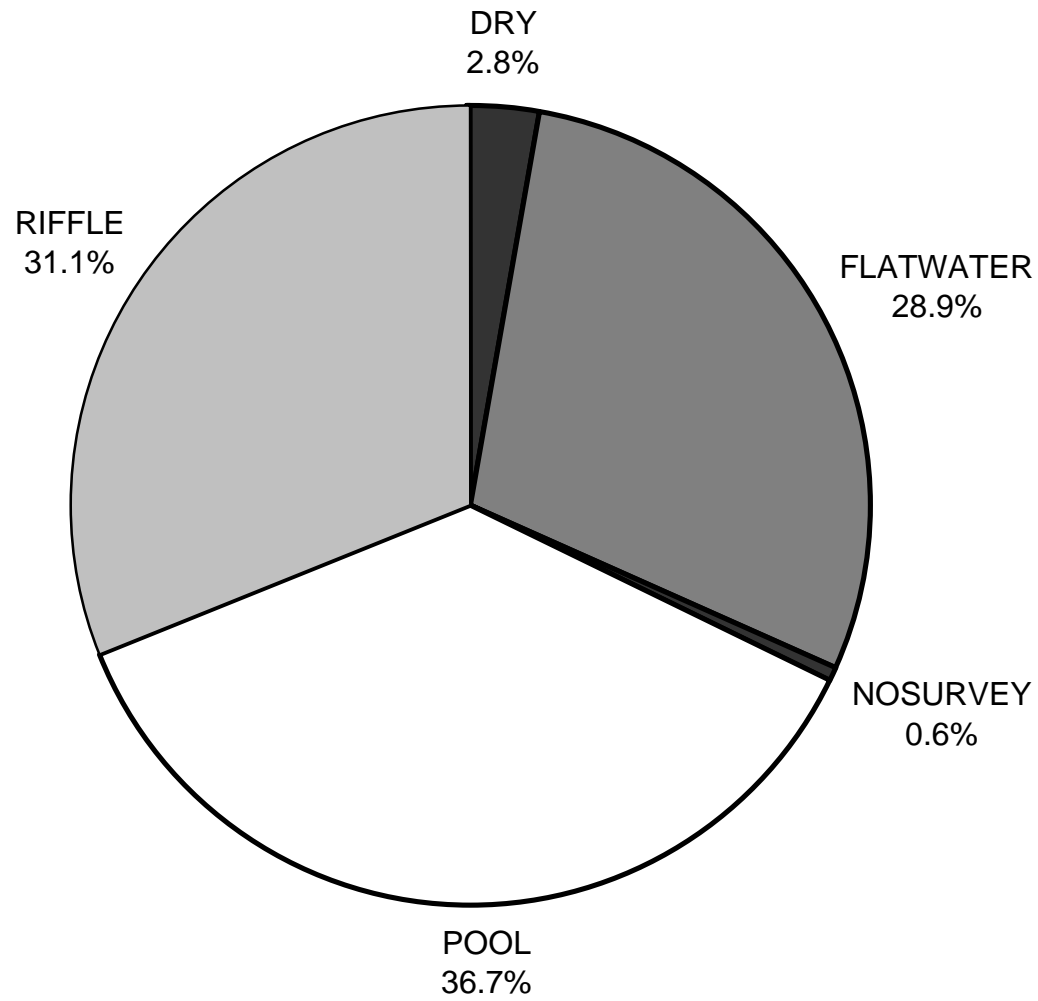
Longitude: 123:48:40.0W

---

	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	38	1	19
SMALL WOODY DEBRIS (%)	47	63	29
LARGE WOODY DEBRIS (%)	15	36	42
ROOT MASS (%)	0	0	6
TERRESTRIAL VEGETATION (%)	0	0	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	2
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

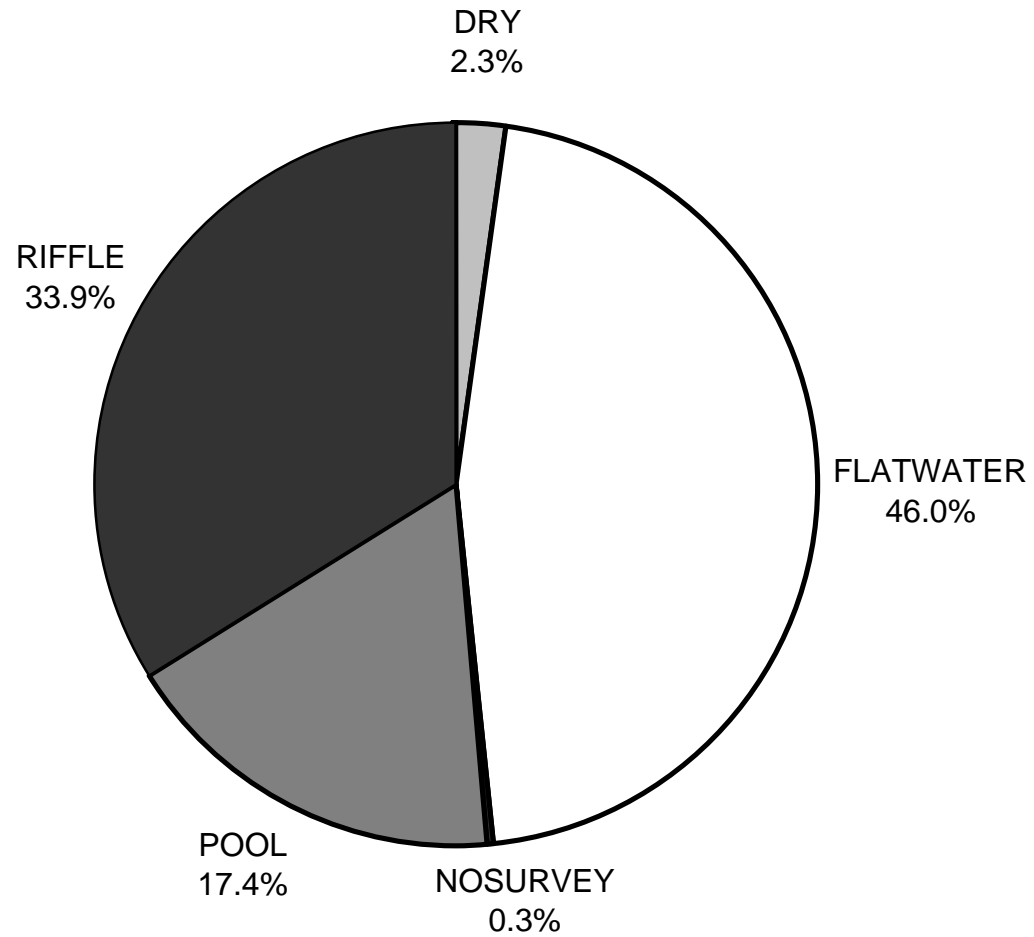


# ROCKPORT CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

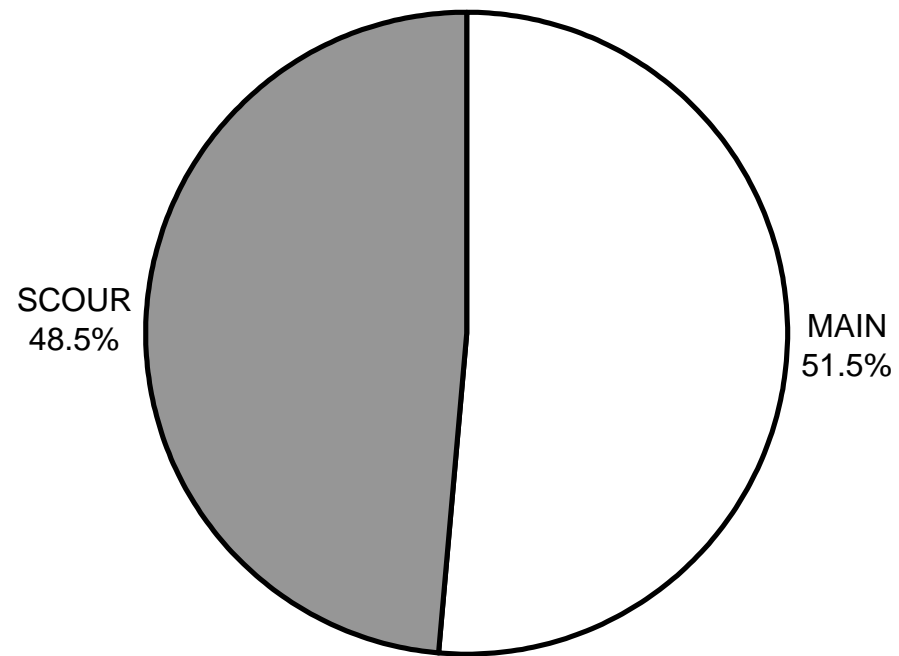
# ROCKPORT CREEK 2008 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

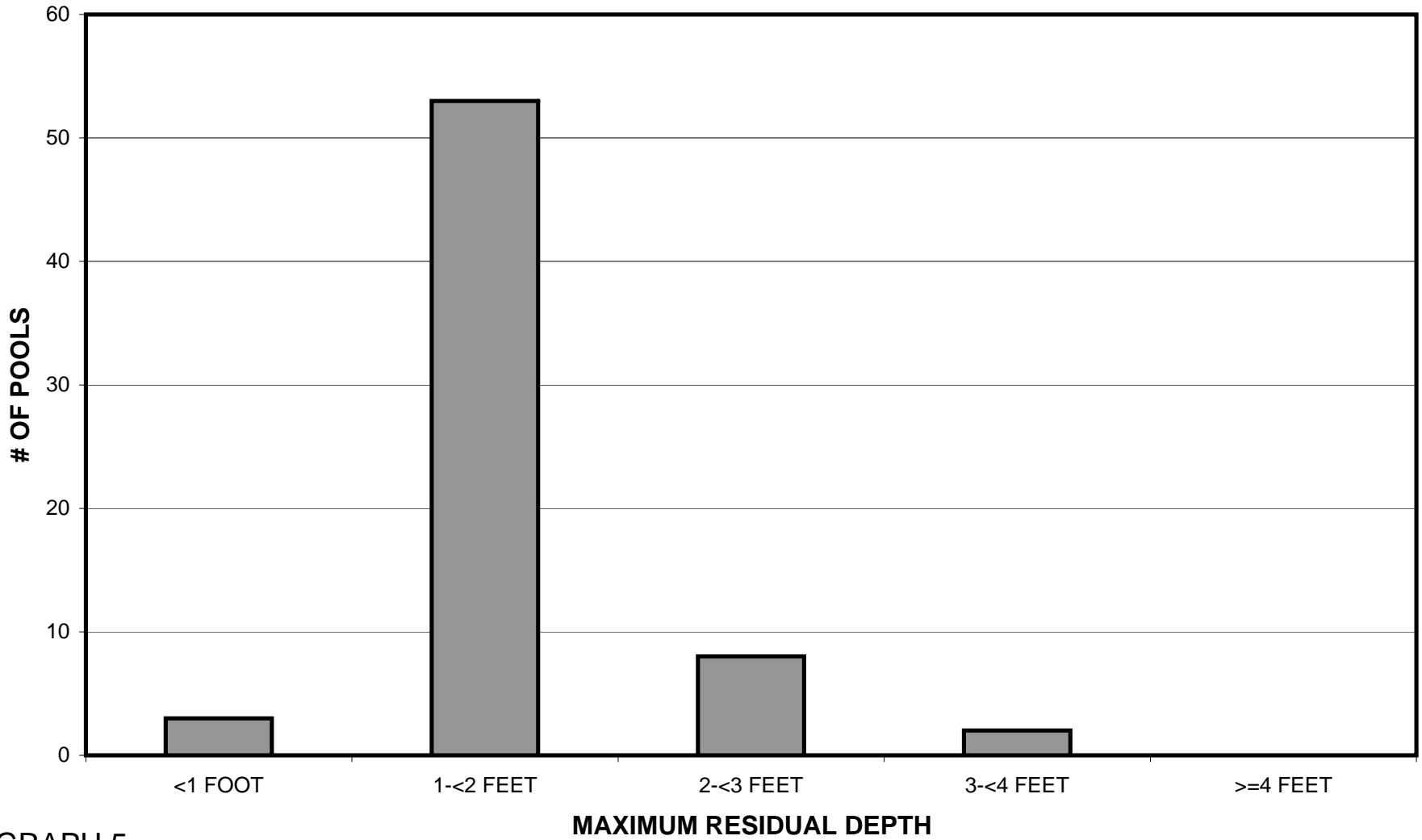


**ROCKPORT CREEK 2008  
POOL TYPES BY PERCENT OCCURRENCE**



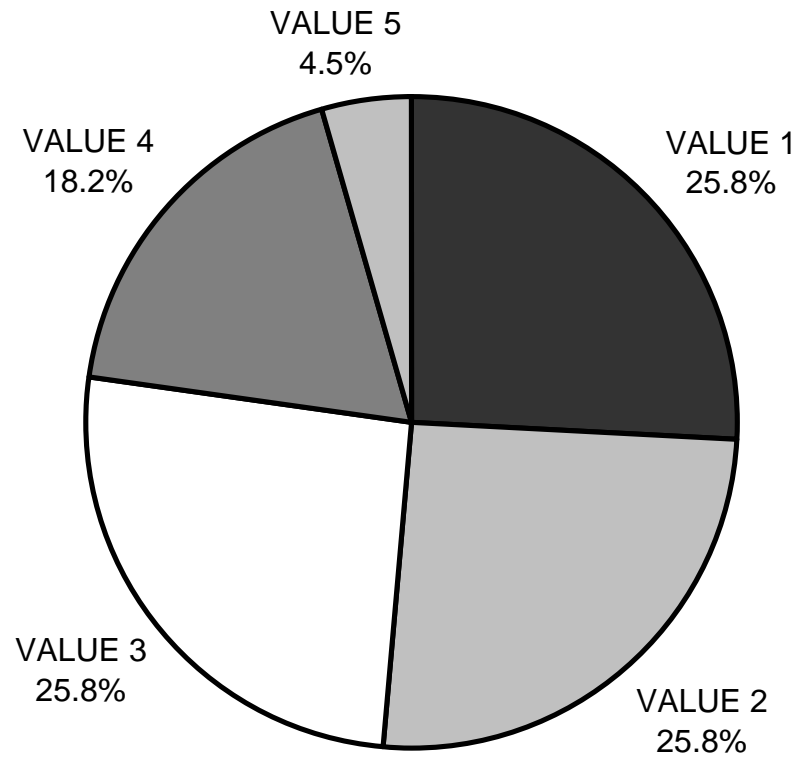
GRAPH 4

# ROCKPORT CREEK 2008 MAXIMUM DEPTH IN POOLS



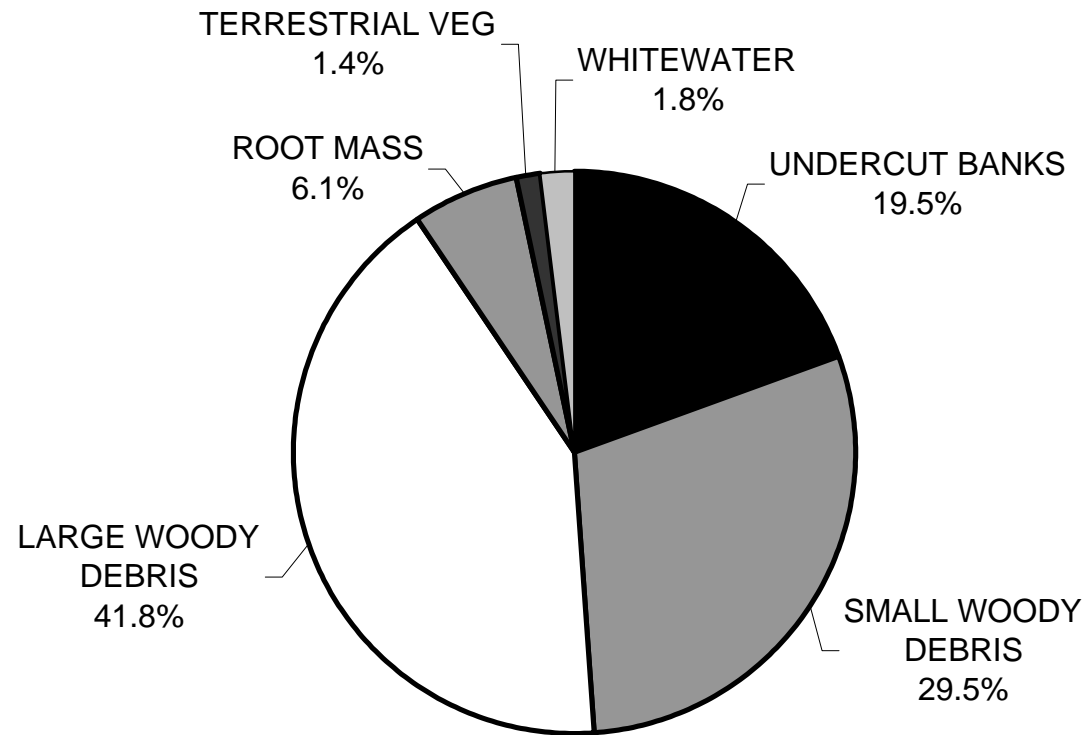
GRAPH 5

# ROCKPORT CREEK 2008 PERCENT EMBEDDEDNESS



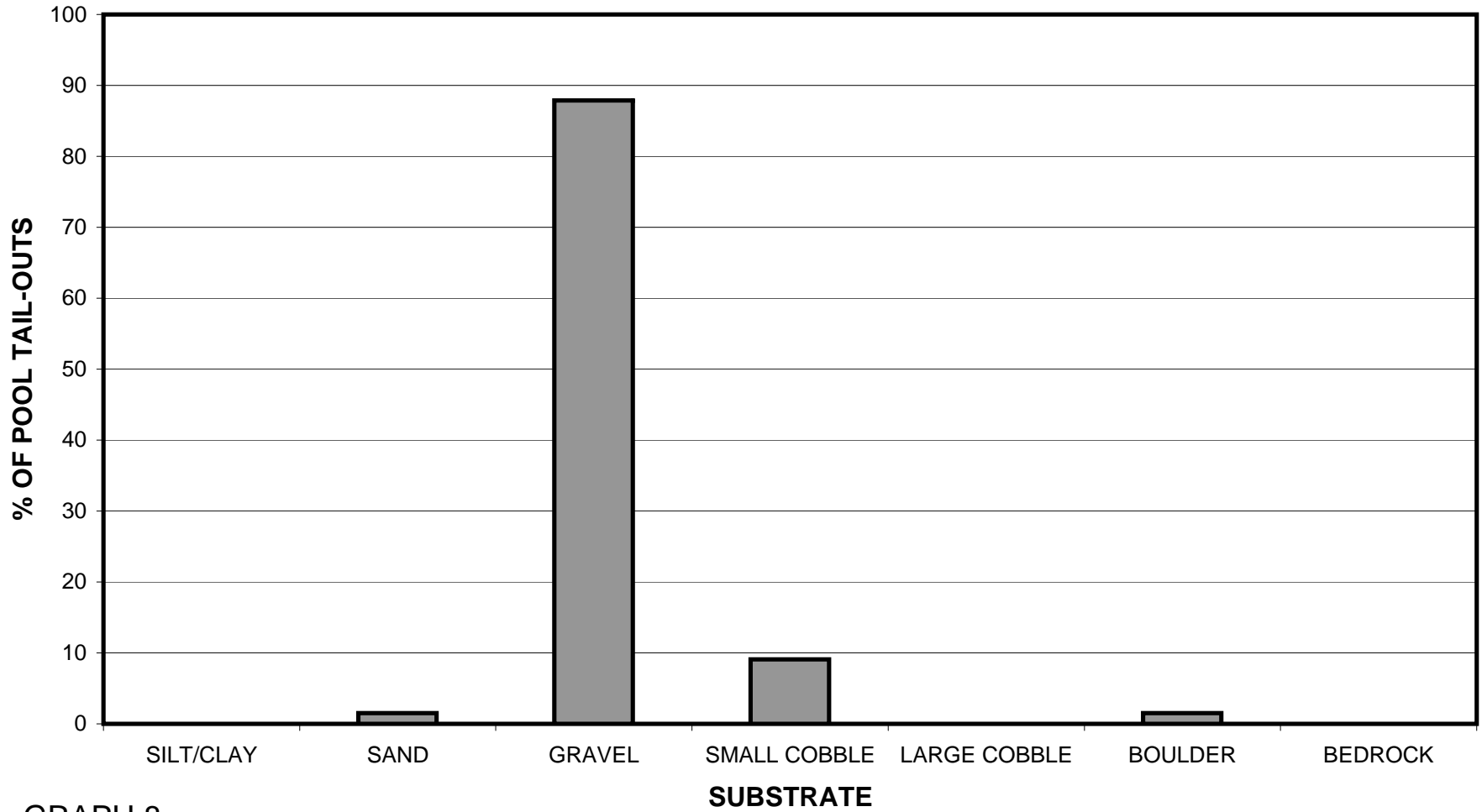
GRAPH 6

# ROCKPORT CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

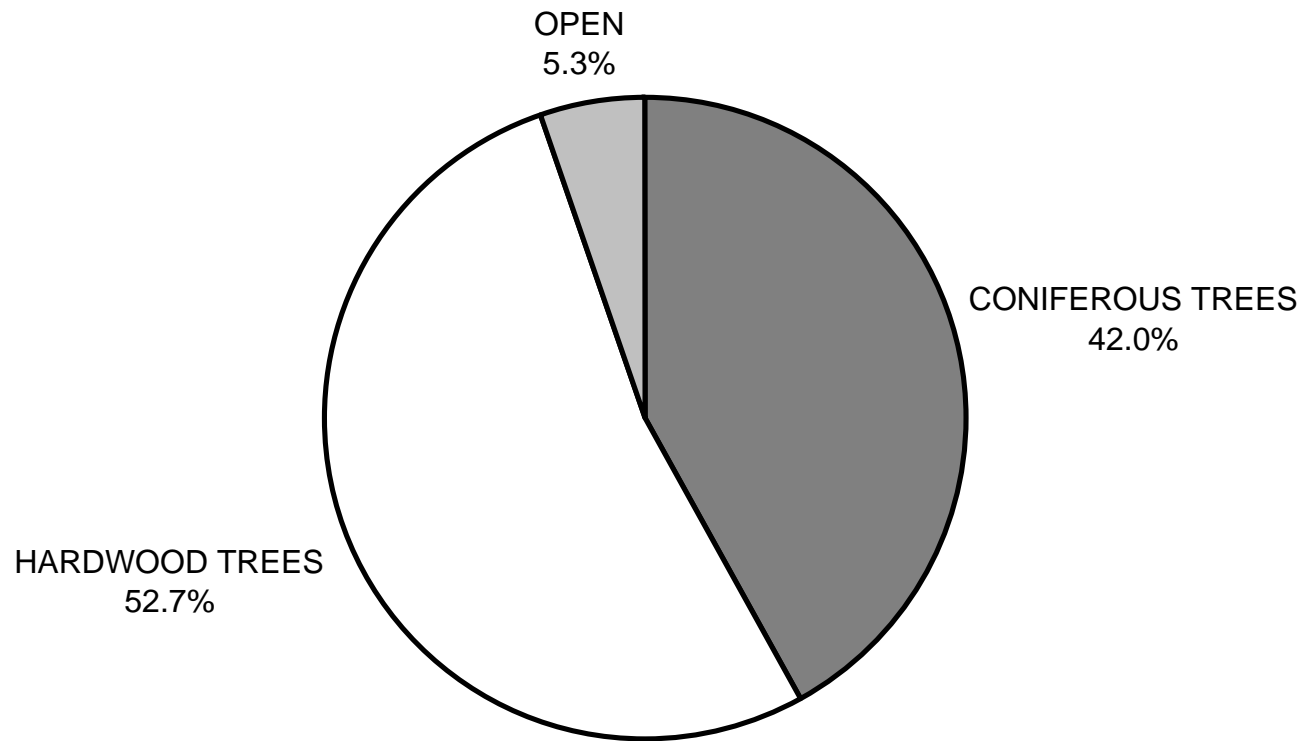
# ROCKPORT CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



GRAPH 8

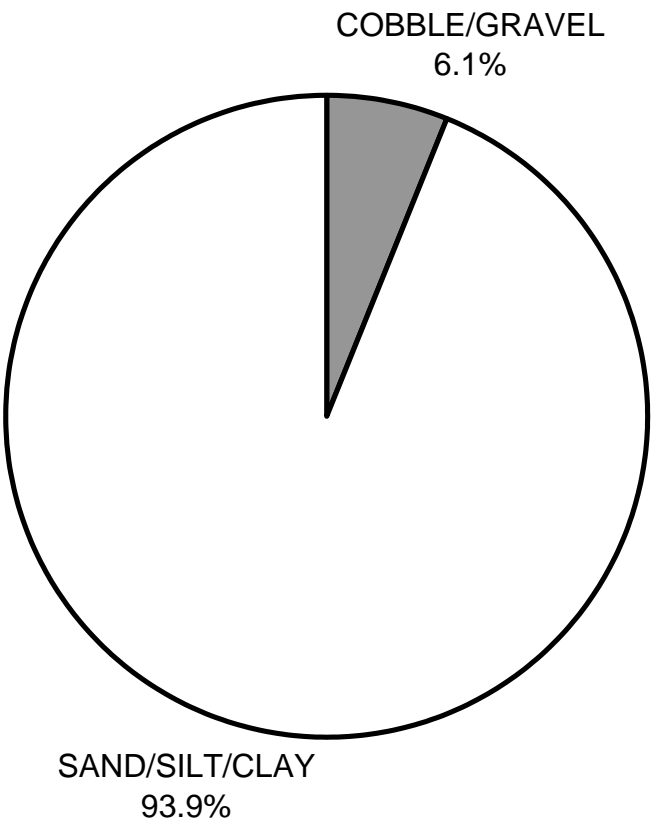


# ROCKPORT CREEK 2008 MEAN PERCENT CANOPY



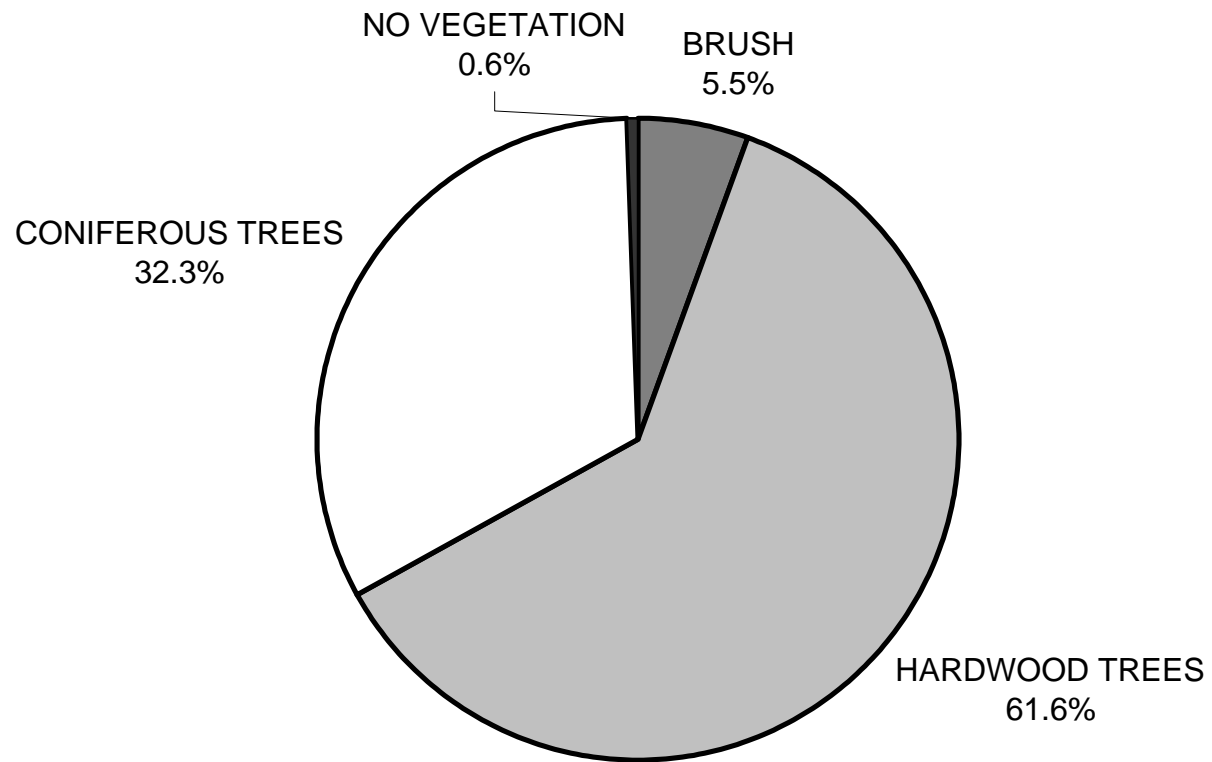
GRAPH 9

**ROCKPORT CREEK 2008  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

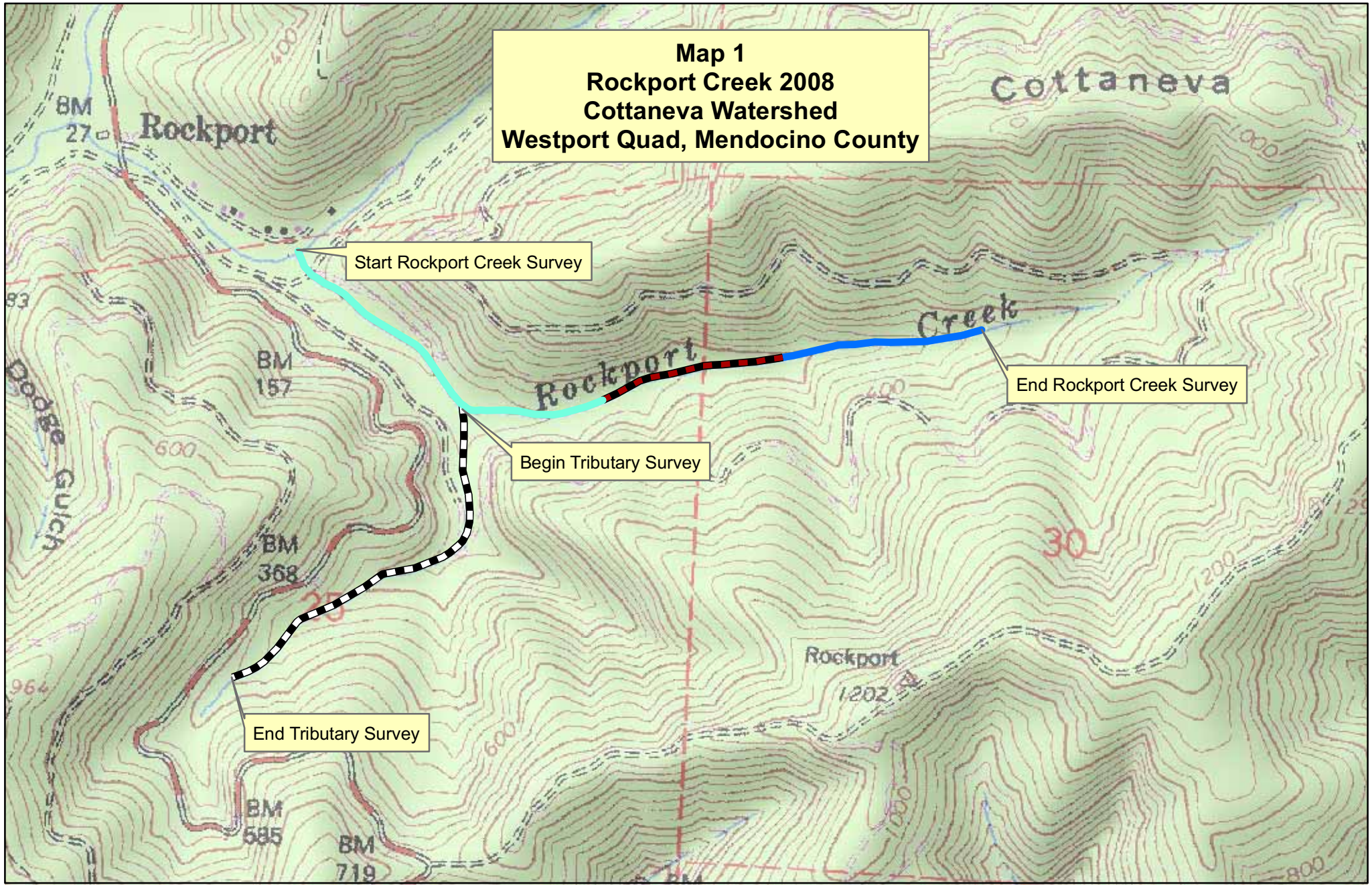
# ROCKPORT CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH







GRAPH 11



**Map 1**  
**Rockport Creek 2008**  
**Cottaneva Watershed**  
**Westport Quad, Mendocino County**



**Legend**

-  Reach 1, E4 Channel Type
-  Reach 3, A3 Channel Type
-  Reach 2, B4 Channel Type
-  Unnamed Tributary

