

STREAM INVENTORY REPORT

North Fork Cottaneva Creek

INTRODUCTION

A stream inventory was conducted from September 9 to September 16, 2008 on North Fork Cottaneva Creek. The survey began at the confluence with Cottaneva Creek and extended upstream 1.7 miles. Stream inventories and reports were also completed for one tributary to North Fork Cottaneva Creek.

The North Fork Cottaneva 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 North Fork Cottaneva 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

North Fork Cottaneva Creek is a tributary to Cottaneva Creek which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). North Fork Cottaneva Creek's legal description at the confluence with Pacific Ocean is T22N R18W S2. Its location is 39.7826° north latitude and 123.8210° west longitude, LLID number 1238199397828. North Fork Cottaneva Creek is a second order stream and has approximately 3.6 miles of blue line stream according to the USGS Hales Grove 7.5 minute quadrangle. North Fork Cottaneva Creek drains a watershed of approximately 4.8 square miles. Elevations range from about 180 feet at the mouth of the creek to 1,200 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 north of Rockport.

METHODS

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

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their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in North Fork Cottaneva 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". North Fork Cottaneva 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.

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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 North Fork Cottaneva 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 North Fork Cottaneva 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 North Fork Cottaneva 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 North Fork Cottaneva 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.

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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 North Fork Cottaneva Creek. In addition, underwater observations were made at 13 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for North Fork Cottaneva 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 9 to September 16, 2008, was conducted by I. Mikus and S. McSmith (DFG). The total length of the stream surveyed was 8,855 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.54 cfs on September 9, 2008.

North Fork Cottaneva Creek is a F4 channel type for 4,009 feet of the stream surveyed (Reach 1), a B3 channel type for 2,904 feet of the stream surveyed (Reach 2), and an A3 channel type for 1,942 feet of the stream surveyed (Reach 3). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with gravel-dominant substrates. B3 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and cobble-dominant substrates. 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 52 to 55 degrees Fahrenheit. Air temperatures ranged from 47 to 58 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% riffle units, 32% pool units, 27% flatwater units, and 2% dry units (Graph 1). Based on total length of Level II habitat types there were 40% flatwater units, 29% riffle units, 29% pool units, and 1% dry units (Graph 2).

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Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 25%; low gradient riffle units, 24%; and run units, 13% (Graph 3). Based on percent total length, step run units occurred 29% of the survey length, mid-channel pool units 24%, and low gradient riffle units 19%.

A total of 83 pools were identified (Table 3). Main channel pools were the most frequently encountered at 81% (Graph 4), and comprised 85% 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. Thirty-three of the 83 pools (40%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 83 pool tail-outs measured, 43 had a value of 1 (51.8%); 17 had a value of 2 (20.5%); 3 had a value of 3 (3.6%); 16 had a value of 4 (19.3%); 4 had a value of 5 (4.8%) (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 5, flatwater habitat types had a mean shelter rating of 13, and pool habitats had a mean shelter rating of 37 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 39, scour 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 North Fork Cottaneva Creek. Graph 7 describes the pool cover in North Fork Cottaneva 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 49% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 34% of the pool tail-outs.

The mean percent canopy density for the surveyed length of North Fork Cottaneva Creek was 89%. Eleven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 35% and 65%, respectively. Graph 9 describes the mean percent canopy in North Fork Cottaneva Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 88% sand/silt/clay, 5% cobble/gravel, 4% boulder, and 3% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 49.5% of the units surveyed. Additionally, 35.7% of the units surveyed had hardwood trees as the dominant vegetation type, and 14.3% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Twenty four sites were snorkel surveyed for species composition and distribution in North Fork Cottaneva Creek on September 17, 2008. Water temperatures taken during the survey period of 0915 to 1255 were all 53 degrees Fahrenheit. Air temperatures ranged from 53 to 54 degrees Fahrenheit. The sites were sampled by I. Mikus and S. McSmith (DFG).

In reach 1, which comprised the first 4,009 feet of stream, two sites were sampled. The reach sites yielded 43 young-of-the-year steelhead/rainbow trout (SH/RT), one age 1+ SH/RT and two age 2+ SH/RT, 10 coho and one three-spine stickleback.

In reach 2, 11 sites were sampled starting approximately 4,053 feet from the confluence with Cottaneva Creek and continuing upstream 2,849 feet. The reach sites yielded 69 young-of-the-year SH/RT, 12 age 1+ SH/RT, 5 age 2+ SH/RT, and 2 coho.

In reach 3, 10 sites were sampled starting approximately 6,953 from the confluence with Cottaneva Creek and continuing upstream 1,554 feet. The reach sites yielded 10 young-of-the-year SH/RT, 6 age 1+ SH/RT, 3 age 2+ SH/RT, and no coho.

The following chart displays the information yielded from these sites:

2008 North Fork Cottaneva Creek underwater observations.

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: F4 Channel Type									
09/17/08	1	004	4.2	154	6	0	27	0	0
09/17/08	2	092	4.2	3,779	4	0	16	1	2
Reach 2: B4 Channel Type									
09/17/08	3	101	4.2	4,053	1	0	2	0	0
09/17/08	4	109	3.4	4,243	1	0	4	0	0
09/17/08	5	120	4.2	4,517	0	0	6	1	1
09/17/08	6	124	3.4	4,636	0	0	3	0	0
09/17/08	7	130	4.2	4,854	0	0	9	0	1
09/17/08	8	134	4.2	5,041	0	0	3	2	0

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Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
09/17/08	9	145	4.2	5,413	0	0	6	2	0
09/17/08	10	159	4.2	5,835	0	0	13	0	1
09/17/08	11	170	4.2	6,203	0	0	13	6	2
09/17/08	12	178	4.2	6,476	0	0	8	0	0
09/17/08	13	189	4.2	6,902	0	0	2	1	0
Reach 3: A3 Channel Type									
9/17/08	14	194	3.4	6,953	0	0	1	0	0
9/17/08	15	198	4.2	7,100	0	0	2	1	0
9/17/08	16	207	4.2	7,377	0	0	2	1	1
9/17/08	17	211	5.6	7,503	0	0	0	1	1
9/17/08	18	215	5.5	7,713	0	0	4	0	0
9/17/08	19	220	4.2	7,848	0	0	0	1	0
9/17/08	20	225	4.2	7,941	0	0	0	1	1
9/17/08	21	227	4.2	8,004	0	0	0	1	0
9/17/08	22	230	4.2	8,108	0	0	1	0	0
9/17/08	23	245	4.2	8,507	0	0	0	0	0

DISCUSSION

North Fork Cottaneva Creek is an F4 channel type for the first 4,009 feet of stream surveyed and a B3 channel type for the next 2,904 feet and an A3 channel type for the remaining 1,942 feet. The suitability of F4, B3 and A3 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. B3 channel types are excellent for plunge weirs, boulder clusters and bank-placed boulders, single and opposing wing-deflectors, and log cover. A3 channel types are generally not suitable for fish habitat improvement structures.

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The water temperatures recorded on the survey days September 9 to September 16, 2008, ranged from 52 to 55 degrees Fahrenheit. Air temperatures ranged from 47 to 58 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 40% of the total length of this survey, riffles 29%, and pools 29%. The pools are relatively deep, with 33 of the 83 (40%) 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 structure that will increase or deepen pool habitat is recommended for the F4 and B3 channel types.

Sixty of the 83 pool tail-outs measured had embeddedness ratings of 1 or 2. Nineteen of the pool tail-outs had embeddedness ratings of 3 or 4. Four 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.

Sixty-nine of the 83 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 37. The shelter rating in the flatwater habitats was 13. 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 North Fork Cottaneva Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. 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 89%. Reach 1 had a canopy density of 87%, Reach 2 had a canopy density of 89%, and Reach 3 had a canopy density of 89%. The percentage of right and left bank covered with vegetation was 99% and 99%, respectively.

RECOMMENDATIONS

- 1) North Fork Cottaneva 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.

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- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 4) In the F4 and B3 channel types, where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 5) 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.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat Unit #:	Comments:
0	0001.00	The survey began where North Fork Cottaneva Creek and Middle Fork Cottaneva Creek confluence and form the mainstem Cottaneva Creek. This unit is the beginning of Reach 1, which is an F4 channel type.
295	009.00	Log debris accumulation (LDA) #01 was 4' high x 73' wide x 8' long and contains 20 pieces of large woody debris (LWD). Water flows through and there are visible gaps. The sediment retained is 20' wide x 90' long x 1' deep and ranges in size from silt to small cobble.
734	0021.00	There is a vehicle bridge over this unit that poses no obstacle to salmonids. The bridge is on a private lumber road and is made of metal. The bridge is 53' long, 13.7' wide and 12.5' above the stream channel.
1027	0023.00	Tributary #01 enters from the right bank and is flowing at an estimated 0.01 cfs and is contributing to approximately 2% of NF Cottaneva's flow. The temperature of the tributary and NF upstream and downstream is 54 degrees Fahrenheit. The tributary is not accessible to fish due to a culvert at the mouth with a 9' plunge. The slope of the tributary is 10% and no fish were observed.
1721	0045.00	LDA #02 is 2' high x 38' wide x 5' long and contains 5 pieces of LWD. Water is flowing through and there are visible gaps. Sediment is being retained and measures approximately 20' wide x 30' long x 1' deep. The sediment ranges in size from silt to small cobble.

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- 1961 0050.00 LDA #03 is 4' high x 54' wide x 20' long and contains 35 pieces of LWD. Water is flowing through and there are no visible gaps. Sediment is being retained in the dimensions of 10' wide x 50' long x 3' deep and ranges in size from silt to small cobble.
- 2801 0071.00 LDA #04 is 3.5' high x 58' wide x 22' long and contains 29 pieces of LWD. Water flows through and there are visible gaps in the LDA. Sediment is being retained and measures approximately 10' wide x 90' long x 2' high and ranges in size from silt to small cobble.
- 3612 0088.00 Tributary #02 enters from the right bank and is flowing at an estimated 0.01 cfs. It is contributing to approximately 2% of North Fork's flow. The temperature of the tributary and of NF upstream and downstream of the tributary is 54 degrees Fahrenheit. The tributary is not accessible to fish because it is choked with debris and there is an inaccessible culvert 100' from the mouth. No fish were observed in the tributary and its slope is 12%.
- 3978 0099.00 Tributary #03, named Dunn Creek, is entering from the right bank and is flowing at an estimated 0.2 cfs, contributing to approximately 30% of North Fork's flow. The temperature of Dunn Creek and NF upstream and downstream is 54 degrees Fahrenheit. The tributary is accessible to fish and was surveyed for habitat by a DFG survey crew. Salmonids are in Dunn Creek.
- 4009 0100.00 This unit marks the beginning of Reach 2, which is a B3 channel type.
- 4608 0124.00 LDA #05 is 6.5' high x 33' wide x 15' long and contains 26 pieces of LWD. Water is flowing through and there are visible gaps in the LDA. Sediment is being retained in the dimensions of 10' wide x 80' long x 2' deep and it ranges in size from silt to small cobble. Salmonids are above the LDA.
- 4750 0128.00 LDA #06 is 7.6' high x 32' wide x 4' long and contains 22 pieces of LWD. Water is flowing through, but there are no visible gaps. Sediment is being retained in the dimensions of 7' wide x 40' long x 3' high and ranges in size from silt to small cobble. Salmonids are above the LDA.
- 4877 0131.00 LDA #07 is 4' high x 28' wide x 10' long and contains 19 pieces of LWD. Water is flowing through and there are visible gaps in the LDA. Sediment is being retained and measures approximately 10' wide x 30' long x 2' deep and ranges in size from silt to large cobble. Salmonids are above the LDA.

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4932	0132.00	LDA #08 is 5' high x 46' wide x 8' long and contains 29 pieces of LWD. Water is flowing through the LDA but there are no visible gaps in it. Sediment is being retained and measures approximately 8' wide x 120' long x 2' deep and ranges in size from silt to large cobble. Salmonids are above the LDA.
6012	0165.00	LDA #09 is 8' high x 35' wide x 14' long and contains 14 pieces of LWD. Water is flowing through the LDA and there are no visible gaps. Sediment is not being retained by this LDA. Salmonids are above the LDA.
6219	0172.00	LDA #10 is 8' high x 17' wide x 3' long and contains 6 pieces of LWD. Water is not flowing through it and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 10' long x 25' wide x 5' deep and ranges in size from silt to gravel. Salmonids are above the LDA.
6476	0179.00	LDA #11 is 5' high x 34' wide x 5' long and contains 12 pieces of LWD. Water flows through and there are no visible gaps. Sediment is being retained in the dimensions of 15' wide x 50' long x 4' deep and ranges in size from silt to large cobble. Salmonids are above the LDA.
6513	0181.00	The top 10' of this unit NF Cottaneva is flowing under wood and boulders.
6792	0187.00	Two young-of-the-year salmonids were observed in this unit.
6913	0190.00	Reach 3 begins at this unit; it is an A3 channel type.
7090	0198.00	LDA #12 is 5' high x 35' wide x 7' long and contains 9 pieces of LWD. Water flows through and there are no visible gaps in the LDA. Sediment is not being retained above the LDA. Fish are above the LDA.
7201	0203.00	LDA #13 is 6' high x 22' wide x 16' long and contains 10 pieces of LWD. Water does not flow through and there are visible gaps. Sediment is being retained in the dimensions of 10' wide x 60' long x 3' high and ranges in size from silt to large cobble. Fish are above the LDA.
7482	0211.00	There was a boulder plunge 1.7' high.
7614	0213.00	LDA #14 is 7' high x 43' wide x 15' long and contains 16 pieces of LWD. Water is flowing through and there are visible gaps. Sediment is being retained in the estimated dimensions of 8' wide x 50' long x 2' deep and ranges in size from silt to small cobble. Salmonids are above the LDA.

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- 7713 0216.00 Tributary #04 enters from the left bank at the top of this unit. It is flowing at an estimated 0.1 cfs and is contributing to approximately 35% of North Fork's flow. The temperature of the tributary and NF upstream and downstream of the tributary is 53 degrees Fahrenheit. It is accessible to fish and it has a slope of 6%. Salmonids are in the tributary.
- 7982 0227.00 Tributary #05 enters from the left bank and is flowing at an estimated 0.05 cfs. It is contributing to approximately 10% of North Fork's flow. The temperature of the tributary is 53 degrees Fahrenheit. The temperature of NF upstream and downstream of the tributary is 54 and 53 degrees Fahrenheit, respectively. It is not accessible to fish as it has a 25% slope. No fish are observed in the tributary.
- 7982 0227.00 Seven young-of-the-year salmonids are in this unit.
- 8141 0231.00 LDA #15 is 5' high x 19' wide x 3' long and contains 4 pieces of LWD. Water does not flow through and there are visible gaps. Sediment is being retained and it measures approximately 10' wide x 120' long x 2' deep and ranges in size from silt to large cobble. Fish are above the LDA.
- 8172 0234.00 There is a left bank slide that is 50' high x 80' long, and is contributing sediment in the size range from silt to large cobble.
- 8420 0242.00 LDA #16 is 5' high x 20' wide x 8' long and contains 7 pieces of LWD. Water is not flowing through and there are no visible gaps. Sediment is being retained in the approximate dimensions of 10' wide x 40' long x 3' deep and ranges in size from silt to large cobble. Fish were not observed above the LDA and it is probably a barrier to adults and juveniles due to a plunge and is currently a barrier due to the retained sediment causing the creek to go dry.
- 8543 0246.00 LDA #17 is 10' high x 38' long x 7' long and contains 11 pieces of LWD. Water is not flowing through and there are no visible gaps. Sediment is being retained in the dimensions of 10' wide x 120' long and 3' deep and ranges in size from silt to large cobble. No fish are above the LDA and it is a probably a barrier and probable end of anadromy due to a 7' plunge.
- 8792 0254.00 There is a boulder plunge of 1.8'.
- 8855 0257.00 End of survey due to a bedrock waterfall that is 11' high. Jump pool max depth is 1.2'. Probable end of anadromy. No fish have been observed from Habitat Unit 240.

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REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

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

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828 Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE Legal Description: T22NR18WS02 Latitude: 39:46:58.0N Longitude: 123:49:12.0W

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
4	0	DRY	1.6	24	96	1.1									
69	11	FLATWATER	26.8	52	3586	40.5	8.5	0.5	1.1	380	26225	206	14246		13
1	0	NOSURVEY	0.4	33	33	0.4									
83	83	POOL	32.3	31	2534	28.6	11.4	0.8	1.9	349	28927	359	29766	301	37
100	12	RIFFLE	38.9	26	2606	29.4	8.6	0.2	0.4	123	12263	26	2556		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
257	106				8855					67414			46568		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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 (%)
61	7	LGR	23.7	27	1639	18.5	8	0.2	0.6	140	8523	31	1875		1	88
38	5	HGR	14.8	25	949	10.7	10	0.2	0.6	99	3751	18	696		10	89
1	0	BRS	0.4	18	18	0.2									10	
34	6	RUN	13.2	31	1059	12.0	8	0.4	1.5	221	7507	106	3599		4	89
35	5	SRN	13.6	72	2527	28.5	8	0.5	2.1	571	19993	327	11452		24	87
65	65	MCP	25.3	32	2096	23.7	12	0.8	5.7	378	24547	406	26365	344	40	89
2	2	STP	0.8	24	48	0.5	8	0.8	1.8	200	400	164	328	144	8	92
1	1	CRP	0.4	44	44	0.5	11	0.4	1.2	460	460	230	230	184	10	95
8	8	LSL	3.1	25	201	2.3	10	0.5	1.9	260	2080	182	1458	127	38	84
4	4	LSBo	1.6	22	88	1.0	8	0.5	1.45	183	731	124	497	90	9	93
3	3	PLP	1.2	19	57	0.6	13	1.0	3.8	237	710	296	889	266	33	94
4	0	DRY	1.6	24	96	1.1										
1	0	NS	0.4	33	33	0.4										

Total Units
257

Total Units Fully Measured
106

Total Length (ft.)
8855

Total Area (sq.ft.)
68699

Total Volume (cu.ft.)
47388

Table 3 - Summary of Pool Types

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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
67	67	MAIN	81	32	2144	85	11.7	0.8	372	24946	338	22662	39
16	16	SCOUR	19	24	390	15	10.1	0.6	249	3980	147	2359	28

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
83	83	2534	28927	25021

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

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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
65	MCP	78	2	3	32	49	24	37	6	9	1	2
2	STP	2	0	0	2	100	0	0	0	0	0	0
1	CRP	1	0	0	1	100	0	0	0	0	0	0
8	LSL	10	0	0	8	100	0	0	0	0	0	0
4	LSBo	5	1	25	3	75	0	0	0	0	0	0
3	PLP	4	0	0	1	33	1	33	1	33	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
83	3	4	47	57	25	30	7	8	1	1

Mean Maximum Residual Pool Depth (ft.): 1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Dry Units: 4

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02 Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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
61	7	LGR	0	0	0	0	0	0	0	100	0
38	5	HGR	0	20	13	0	0	0	0	67	0
1	1	BRS	0	0	0	0	0	0	100	0	0
100	13	TOTAL RIFFLE	0	12	8	0	0	0	20		

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Dry Units: 4

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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
61	7	LGR	0	0	29	43	29	0	0
38	5	HGR	0	0	20	20	60	0	0
1	1	BRS	0	0	0	0	0	0	100
34	6	RUN	0	0	83	0	0	17	0
35	5	SRN	0	0	80	0	20	0	0
65	64	MCP	0	17	72	2	6	2	2
2	2	STP	0	100	0	0	0	0	0
1	1	CRP	0	0	100	0	0	0	0
8	8	LSL	13	13	63	13	0	0	0
4	4	LSBo	0	25	25	25	25	0	0
3	3	PLP	0	33	33	0	0	33	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
89	65	35	0	99	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: North Fork Cottaneva Creek LLID: 1238199397828 Drainage: Rockport
 Survey Dates: 9/9/2008 to 9/16/2008 Survey Length (ft.): 8855 Main Channel (ft.): 8855 Side Channel (ft.): 0
 Confluence Location: Quad: HALES GROVE Legal Description: T22NR18WS02 Latitude: 39:46:58.0N Longitude: 123:49:12.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 87.5	Pools by Stream Length (%): 35.5
Reach Length (ft.): 4009	Coniferous Component (%): 58.3	Pool Frequency (%): 35.4
Riffle/Flatwater Mean Width (ft.): 9.2	Hardwood Component (%): 41.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 40
Range (ft.): 21 to 37	Vegetative Cover (%): 99.3	2 to 2.9 Feet Deep: 43
Mean (ft.): 25	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 14
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 3
Base Flow (cfs.): 0.5	Occurrence of LWD (%): 42	Mean Max Residual Pool Depth (ft.): 2.3
Water (F): 54 - 55 Air (F): 51 - 55	LWD per 100 ft.:	Mean Pool Shelter Rating: 46
Dry Channel (ft): 0	Riffles: 4	
	Pools: 11	
	Flat: 8	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 66 Sm Cobble: 29 Lg Cobble: 6 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 80.0 2. 14.3 3. 5.7 4. 0.0 5. 0.0		

STREAM REACH: 2

Channel Type: B3	Canopy Density (%): 89.9	Pools by Stream Length (%): 27.7
Reach Length (ft.): 2904	Coniferous Component (%): 72.7	Pool Frequency (%): 31.9
Riffle/Flatwater Mean Width (ft.): 7.8	Hardwood Component (%): 27.3	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 79
Range (ft.): 17 to 28	Vegetative Cover (%): 98.8	2 to 2.9 Feet Deep: 17
Mean (ft.): 21	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 3
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.5	Occurrence of LWD (%): 39	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 52 - 54 Air (F): 47 - 58	LWD per 100 ft.:	Mean Pool Shelter Rating: 31
Dry Channel (ft): 0	Riffles: 6	
	Pools: 13	
	Flat: 9	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 34 Sm Cobble: 52 Lg Cobble: 10 Boulder: 3 Bedrock: 0		
Embeddedness Values (%): 1. 37.9 2. 34.5 3. 3.4 4. 20.7 5. 3.4		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: A3	Canopy Density (%): 89.8	Pools by Stream Length (%): 15.8
Reach Length (ft.): 1942	Coniferous Component (%): 67.0	Pool Frequency (%): 28.4
Riffle/Flatwater Mean Width (ft.): 8.3	Hardwood Component (%): 33.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 68
Range (ft.): 15 to 28	Vegetative Cover (%): 99.2	2 to 2.9 Feet Deep: 26
Mean (ft.): 20	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 5
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.5	Occurrence of LWD (%): 31	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 52 - 54	Air (F): 51 - 57	LWD per 100 ft.:
Dry Channel (ft): 96	Riffles: 7	Pools: 19
	Pools: 19	Flat: 7
	Flat: 7	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 0	Gravel: 42
	Sm Cobble: 16	Lg Cobble: 26
	Boulder: 11	Bedrock: 5
Embeddedness Values (%): 1. 21.1	2. 10.5	3. 0.0
	4. 52.6	5. 15.8

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS02

Latitude: 39:46:58.0N

Longitude: 123:49:12.0W

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	6	1	3.3
Boulder	3	5	3.8
Cobble / Gravel	6	5	5.2
Sand / Silt / Clay	90	94	87.6

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	17	13	14.3
Hardwood Trees	47	28	35.7
Coniferous Trees	41	63	49.5
No Vegetation	0	1	0.5

Total Stream Cobble Embeddedness Values: 2

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

StreamName: North Fork Cottaneva Creek

LLID: 1238199397828

Drainage: Rockport

Survey Dates: 9/9/2008 to 9/16/2008

Confluence Location: Quad: HALES GROVE

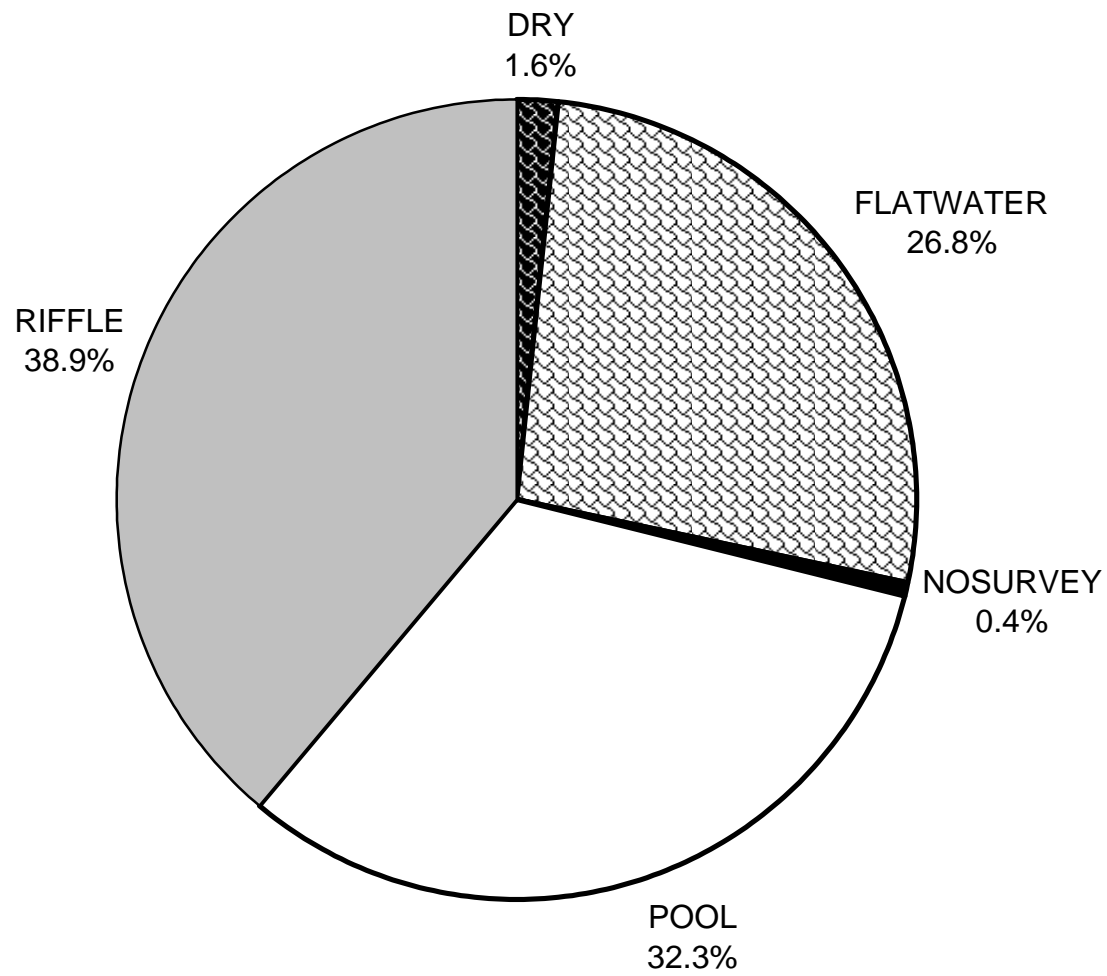
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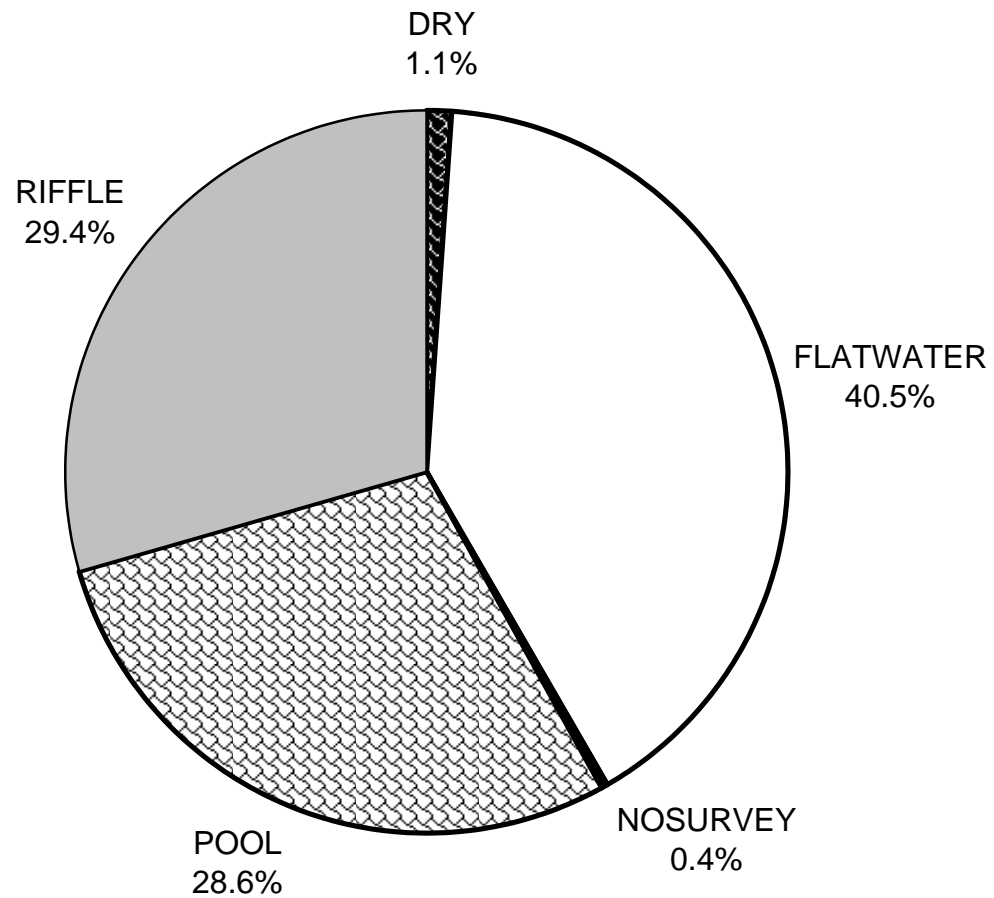
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	18	11
SMALL WOODY DEBRIS (%)	12	21	25
LARGE WOODY DEBRIS (%)	8	47	45
ROOT MASS (%)	0	3	2
TERRESTRIAL VEGETATION (%)	0	2	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	20	0	0
BOULDERS (%)	60	9	15
BEDROCK LEDGES (%)	0	0	0

NORTH FORK COTTANEVA CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



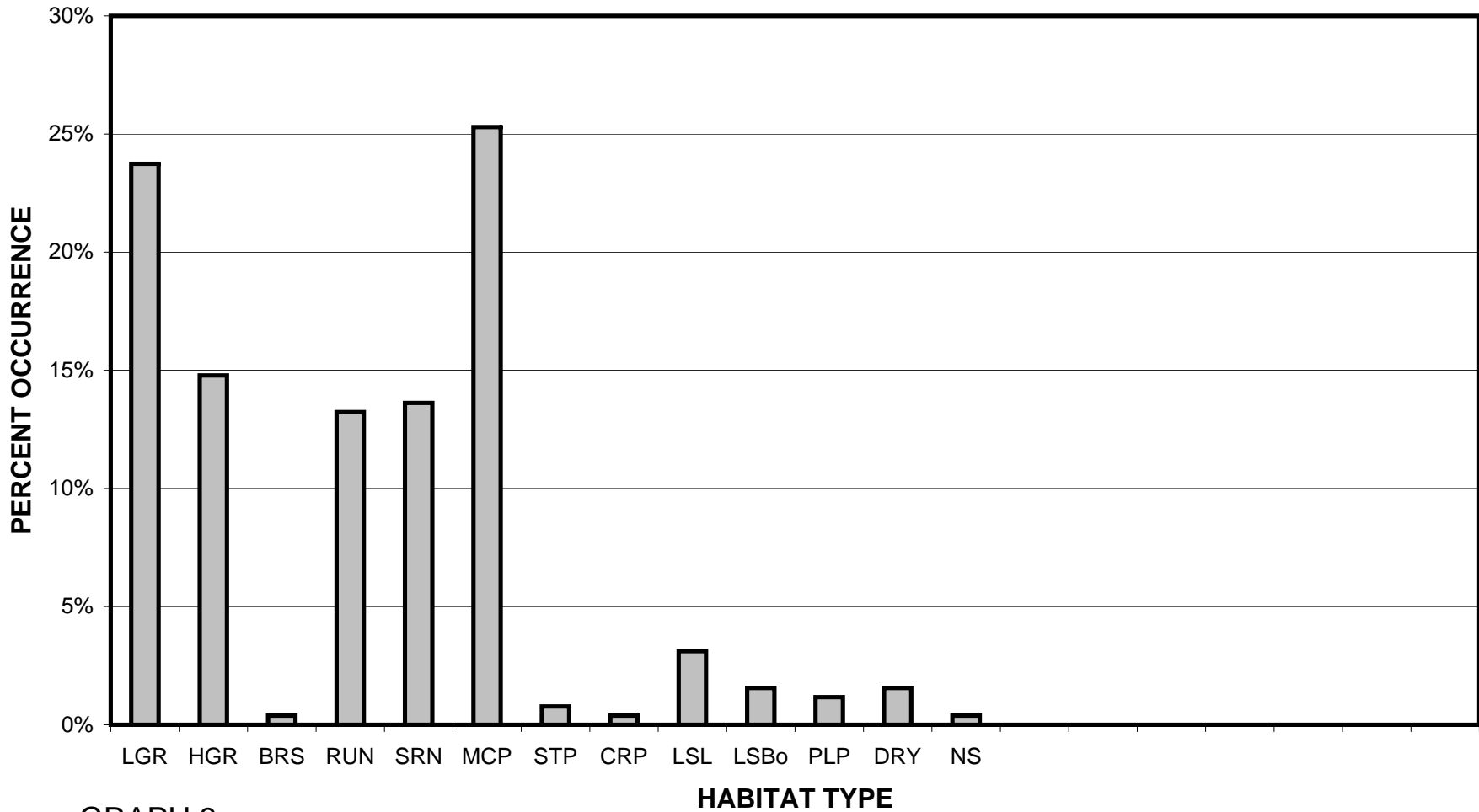
GRAPH 1

NORTH FORK COTTANEVA CREEK 2008 HABITAT TYPES BY PERCENT TOTAL LENGTH



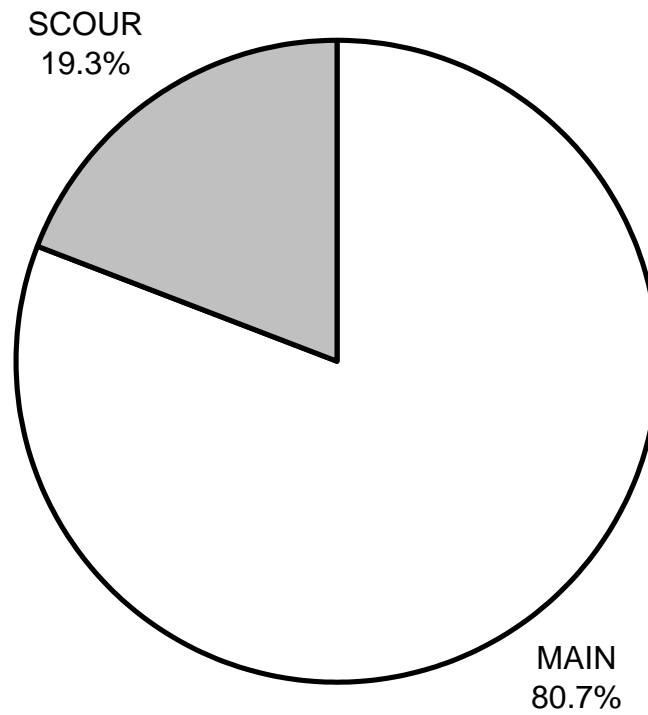
GRAPH 2

NORTH FORK COTTANEVA CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



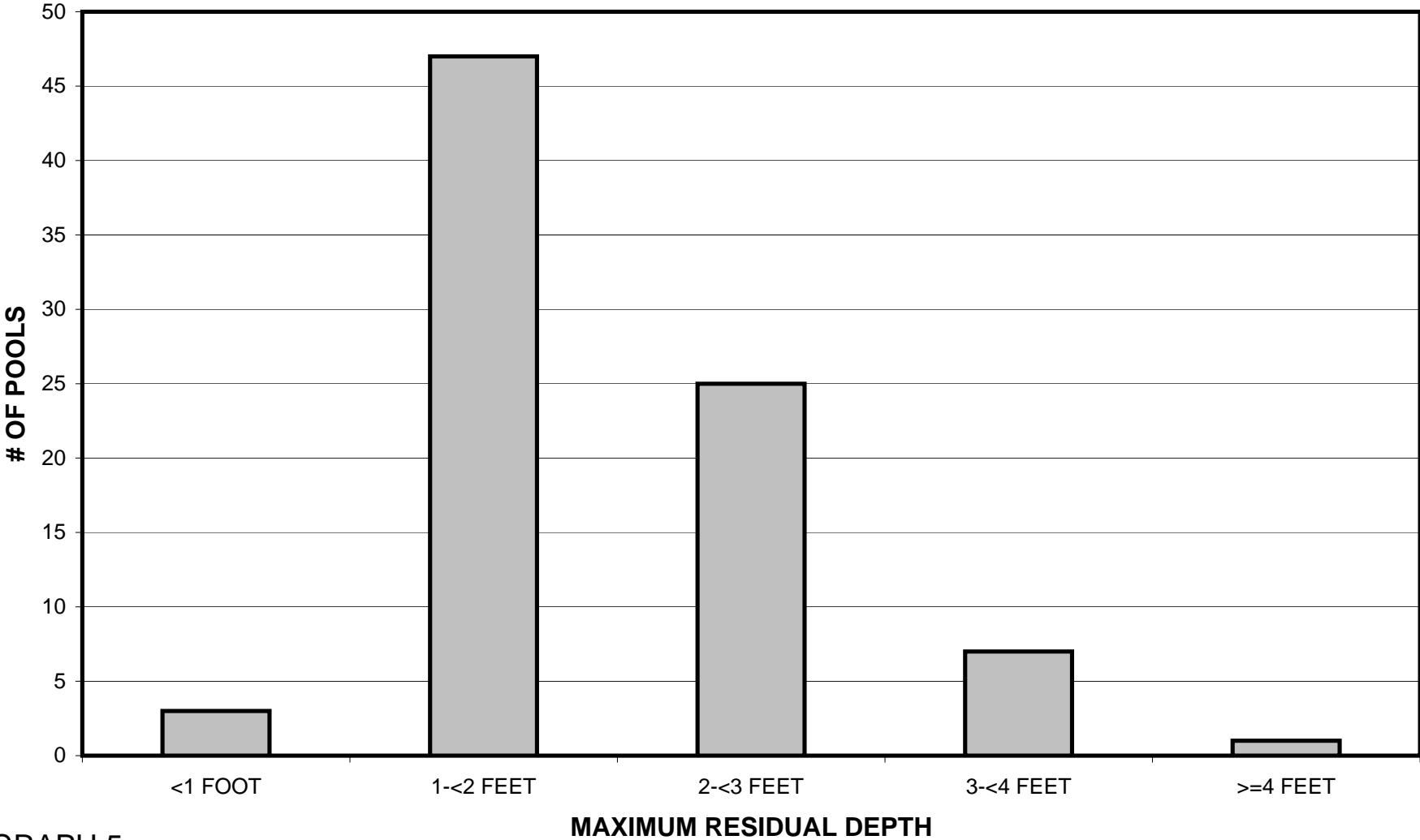
GRAPH 3

NORTH FORK COTTANEVA CREEK 2008 POOL TYPES BY PERCENT OCCURRENCE



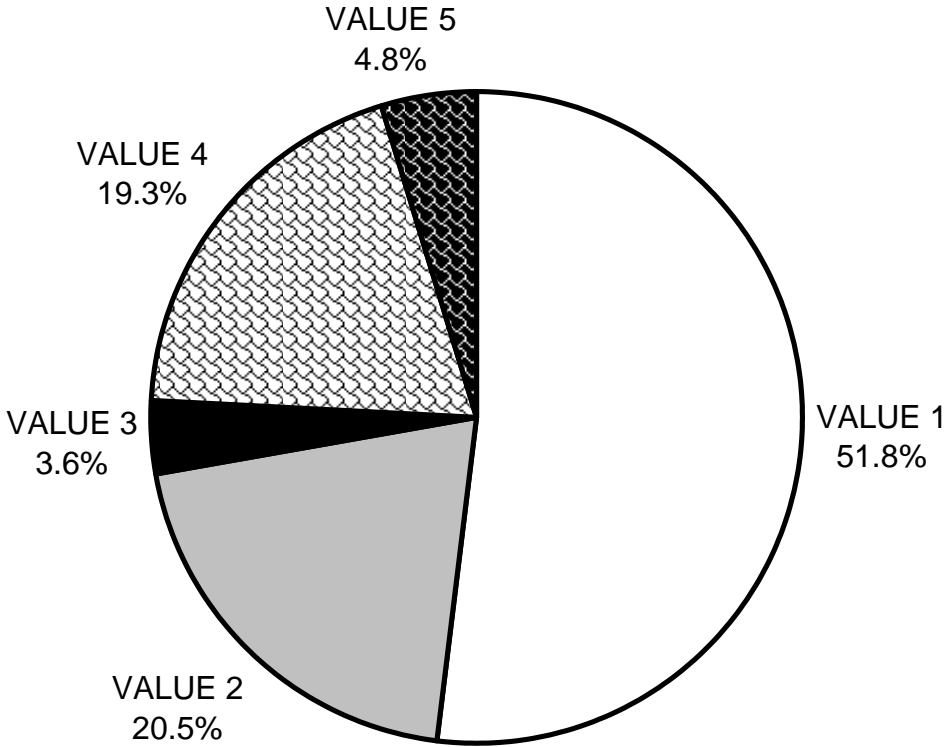
GRAPH 4

**NORTH FORK COTTANEVA CREEK 2008
MAXIMUM DEPTH IN POOLS**



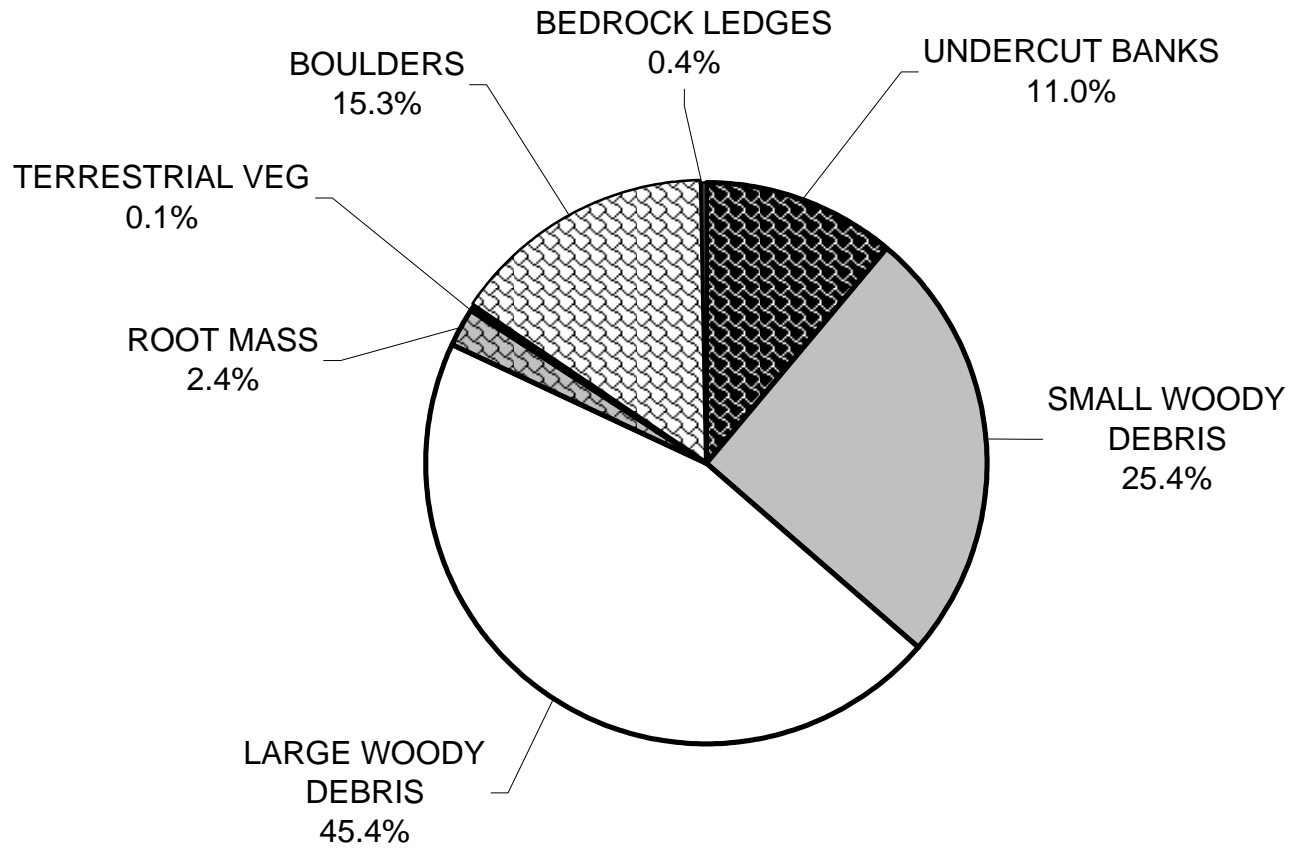
GRAPH 5

**NORTH FORK COTTANEVA CREEK 2008
PERCENT EMBEDDEDNESS**



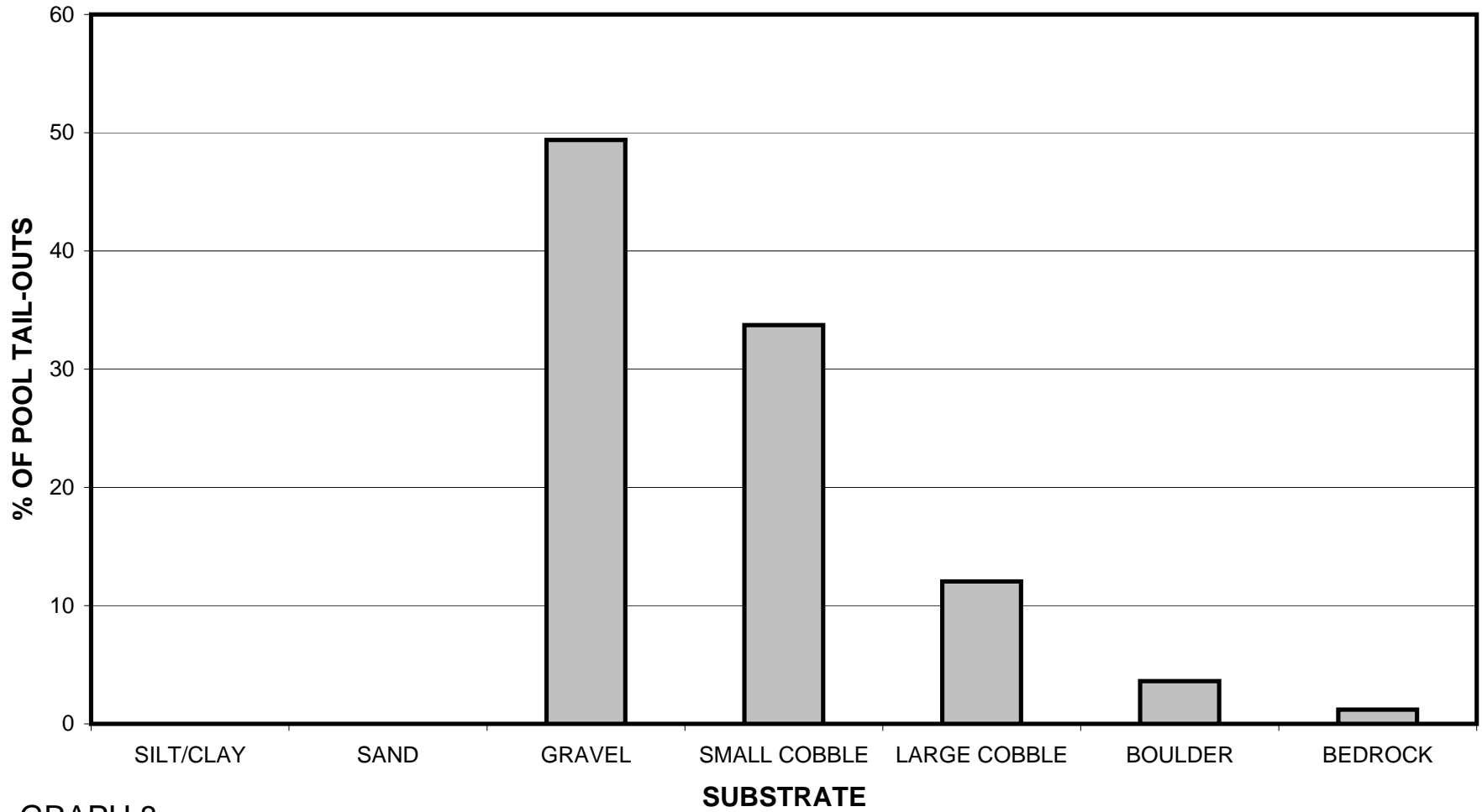
GRAPH 6

NORTH FORK COTTANEVA CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



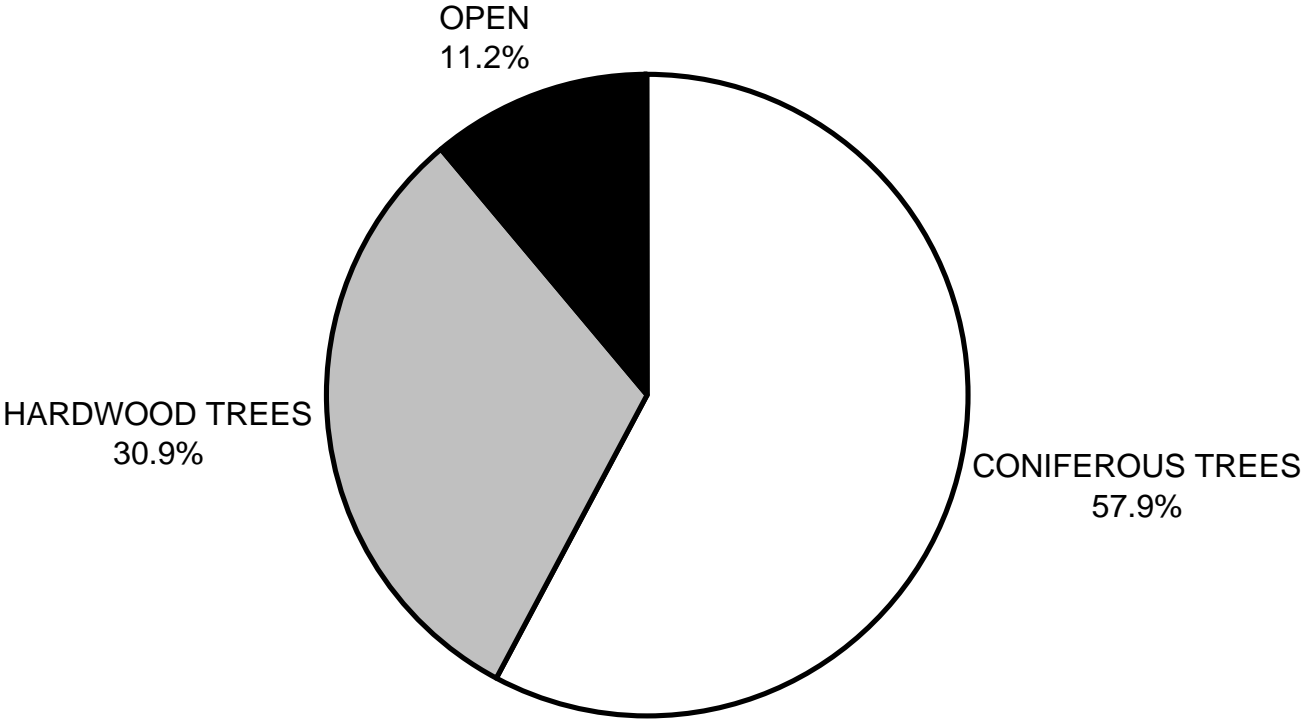
GRAPH 7

NORTH FORK COTTANEVA CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



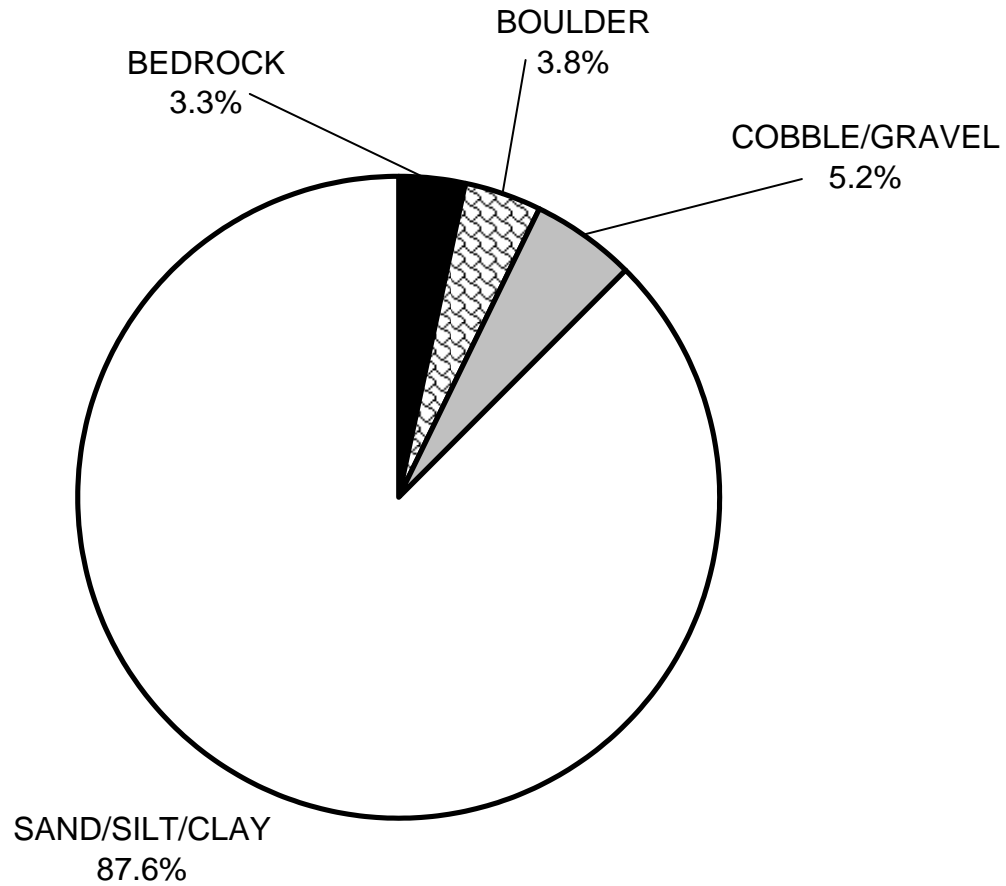
GRAPH 8

**NORTH FORK COTTANEVA CREEK 2008
MEAN PERCENT CANOPY**



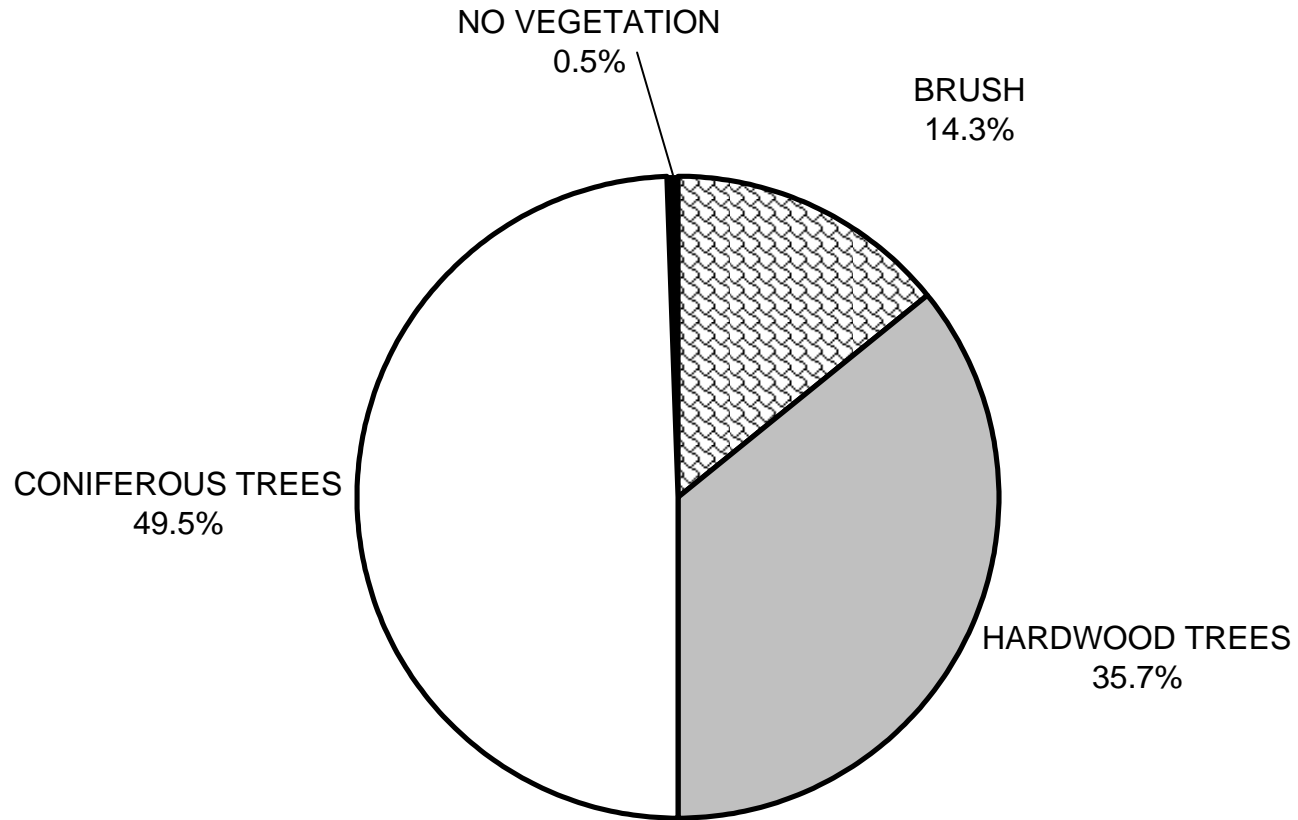
GRAPH 9

NORTH FORK COTTANEVA CREEK 2008 DOMINANT BANK COMPOSITION IN SURVEY REACH



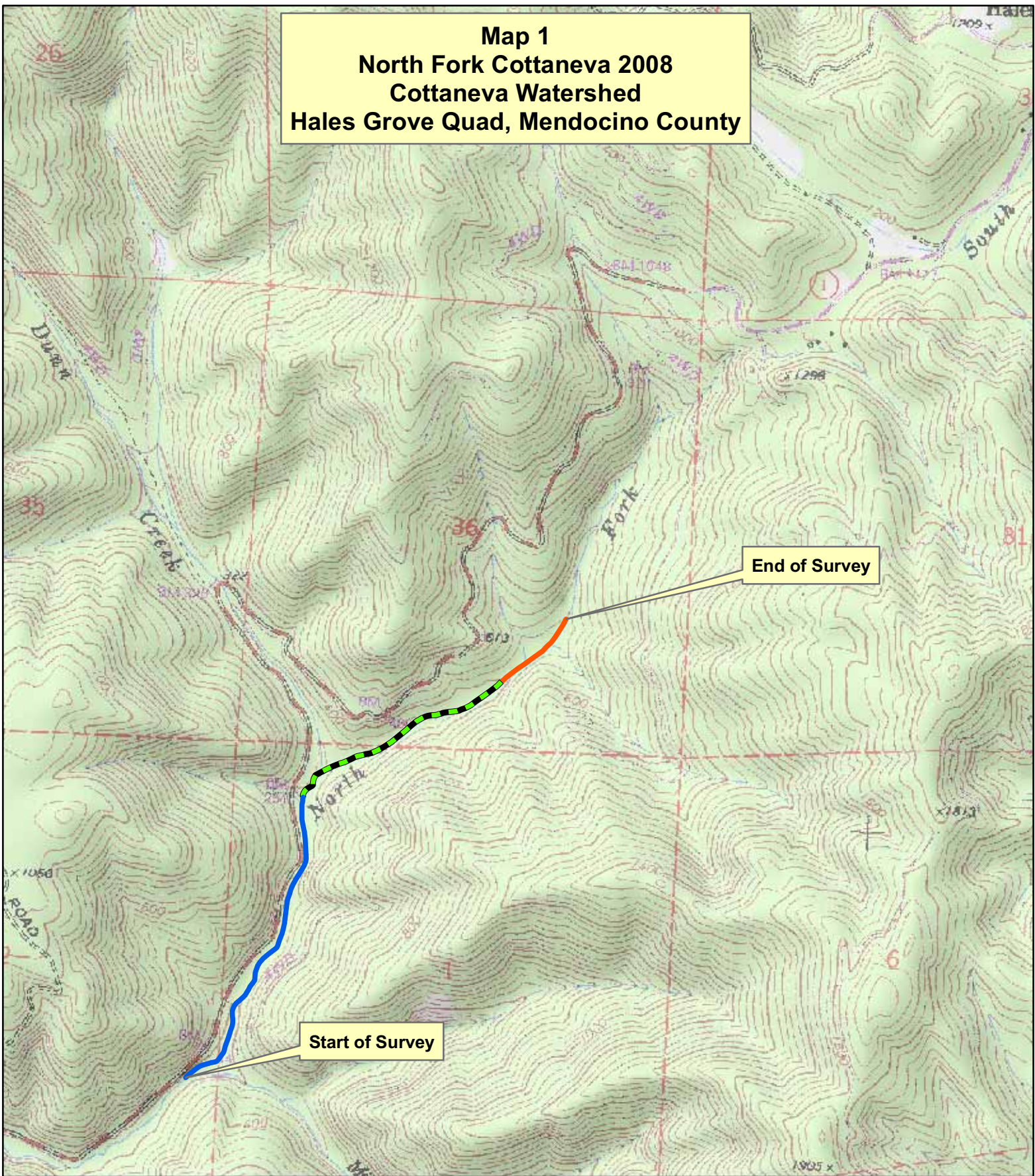
GRAPH 10

NORTH FORK COTTANEVA CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH



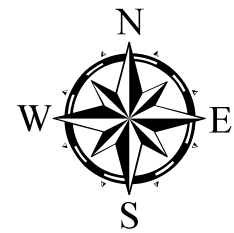
GRAPH 11

Map 1
North Fork Cottaneva 2008
Cottaneva Watershed
Hales Grove Quad, Mendocino County



End of Survey

Start of Survey



Legend

- Reach 1, F4 Channel Type
- - - Reach 2, B3 Channel Type
- Reach 3, A3 Channel Type

