

# STREAM INVENTORY REPORT

## Dunn Creek

### INTRODUCTION

A stream inventory was conducted from September 2 to September 9, 2008 on Dunn Creek. The survey began at the confluence with North Fork Cottaneva Creek and extended upstream 1.5 miles. Stream inventories and reports were also completed for one tributary to Dunn Creek.

The Dunn 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 Dunn 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

Dunn Creek is a tributary to North Fork Cottaneva Creek, tributary to Cottaneva Creek, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Dunn Creek's legal description at the confluence with North Fork Cottaneva Creek is T22N R18W S01. Its location is 39.7926° north latitude and 123.8161° west longitude, LLID number 1238149397927. Dunn Creek is a second order stream and has approximately 1.8 miles of blue line stream according to the USGS Hales Grove 7.5 minute quadrangle. Dunn Creek drains a watershed of approximately 2.0 square miles. Elevations range from about 270 feet at the mouth of the creek to 1,100 feet in the headwater areas mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Highway 1 north of Rockport.

### METHODS

The habitat inventory conducted in Dunn 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

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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 Dunn 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". Dunn 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 Dunn 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 Dunn 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 Dunn 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 Dunn 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 Dunn Creek. In addition, underwater observations were made at 17 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, 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 Dunn 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 2 to September 9, 2008, was conducted by B. Leonard, and M. Westersund (WSP). The total length of the stream surveyed was 7,855 feet with an additional 104 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.21 cfs on September 3, 2008.

Dunn Creek is a B4 channel type for 4,729 feet of the stream surveyed (Reach 1) and an E4 channel type for 3,230 feet of the stream surveyed (Reach 2). 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. 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.

Water temperatures taken during the survey period ranged from 52 to 58 degrees Fahrenheit. Air temperatures ranged from 48 to 64 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 33% flatwater units, 19% riffle units, 4% dry units and 4% no survey units (Graph 1). Based on total length of Level II habitat types there were 48% flatwater units, 21% pool units, 15% dry units, 12% riffle units, 3% no survey units, and 1% culvert units (Graph 2).

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Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 38%; step run units, 21%; and low gradient riffle units, 19% (Graph 3). Based on percent total length, step run units made up 36%, mid-channel pool units 20%, and dry units 15%.

A total of 82 pools were identified (Table 3). Main channel pools were the most frequently encountered at 99% (Graph 4), and comprised 99% 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. Nine of the 81 pools (11%) measured had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 79 pool tail-outs measured, 65 had a value of 1 (82.3%); 13 had a value of 2 (16.5%); 1 had a value of 5 (1.3%) (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 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 22, flatwater habitat types had a mean shelter rating of 7, and pool habitats had a mean shelter rating of 35 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 35. Scour pools had a mean shelter rating of 5 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Dunn Creek. Graph 7 describes the pool cover in Dunn Creek. Small woody debris is the dominant pool cover type followed by large 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 84% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 10% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Dunn Creek was 92%. Eight percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 21% and 79%, respectively. Graph 9 describes the mean percent canopy in Dunn Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 94%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 79% sand/silt/clay and 21% cobble/gravel (Graph 10). Coniferous trees were the dominant vegetation type observed in 76.3% of the units surveyed. Additionally, 20.1% of the units surveyed had hardwood trees as the dominant vegetation type, and 3.1% had brush as the dominant vegetation type (Graph 11).

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### BIOLOGICAL INVENTORY RESULTS

Seventeen sites were snorkel surveyed for species composition and distribution in Dunn Creek on September 18, 2008. Water temperatures taken during the survey period of 1145 to 1340 were 53 degrees Fahrenheit. Air temperatures ranged from 52 to 60 degrees Fahrenheit. The sites were sampled by I. Mikus and S. McSmith (DFG).

In reach 1, 10 sites were sampled starting approximately 40 feet from the confluence with North Fork Cottaneva and continuing upstream 3,911 feet. The reach sites yielded 81 young-of-the-year steelhead/rainbow trout (SH/RT), 7 age 1+ SH/RT, and 2 coho salmon yoy.

In reach 2, seven sites were sampled starting approximately 4,585 feet from the confluence with North Fork Cottaneva and continuing upstream 950 feet. The reach sites yielded one age 1+ SH/RT.

The following chart displays the information yielded from these sites:

2008 Dunn Creek underwater observations.

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: B4 Channel Type									
9/18/08	1	003	4.2	40	0	0	1	1	0
9/18/08	2	007	4.2	282	1	0	8	0	0
9/18/08	3	017	4.2	739	0	0	10	0	0
9/18/08	4	023	4.2	931	1	0	4	1	0
9/18/08	5	032	4.2	1,221	0	0	11	1	0
9/18/08	6	039	4.2	1,446	0	0	8	0	0
9/18/08	7	054	4.2	2,071	0	0	12	0	0
9/18/08	8	070	4.2	2,606	0	0	13	2	0
9/18/08	9	075	4.2	2,808	0	0	11	1	0
9/18/08	10	115	4.2	3,951	0	0	1	1	0

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Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 2: E4 Channel Type									
9/18/08	11	136	4.2	4,585	0	0	0	0	0
9/18/08	12	137	4.2	4,600	0	0	0	1	0
9/18/08	13	153	4.2	5,071	0	0	0	0	0
9/18/08	14	159	4.2	5,251	0	0	0	0	0
9/18/08	15	162	4.2	5,340	0	0	0	0	0
9/18/08	16	165	4.2	5,441	0	0	0	0	0
9/18/08	17	169	4.2	5,535	0	0	0	0	0

## DISCUSSION

Dunn Creek is a B4 channel type for the first 4,729 feet of stream surveyed and an E4 channel type for the remaining 3,230 feet. The suitability of B4 and E4 channel types for fish habitat improvement structures is as follows: B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors.

The water temperatures recorded on the survey days September 2 to September 9, 2008, ranged from 52 to 58 degrees Fahrenheit. Air temperatures ranged from 48 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 48% of the total length of this survey, riffles 12%, and pools 21%. The pools are relatively shallow, with 9 of the 81 (11%) pools measured 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.



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Seventy-eight of the 79 pool tail-outs measured had embeddedness ratings of 1 or 2. None of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Seventy-four of the 79 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 35. The shelter rating in the flatwater habitats was 7. 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 Dunn Creek. Small woody debris is the dominant cover type in pools followed by large 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 92%. Reach 1 had a canopy density of 91%, Reach 2 had a canopy density of 93%.

The percentage of right and left bank covered with vegetation was 94% and 94%, 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) Dunn 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) The Highway 1 culvert crossing at 2863' is a barrier to juvenile and adult anadromous salmonids and should be upgraded to provide unimpeded fish passage.
- 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) 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.
- 6) 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 watershed.

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### 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 North Fork Cottaneva Creek. Access is via Highway 1 at mile marker 92.23. Begin Reach 1, a B4 channel type.
282	0007.00	This unit is out of the influence of North Fork Cottaneva Creek.
417	0011.00	Log debris accumulation (LDA) #01 contains 9 pieces of large woody debris (LWD) and measures 7' high x 30' wide x 20' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 8' wide x 15' long x 3' deep. Fish were observed above the LDA.
491	0013.00	LDA #02 contains 1 piece of LWD and measures 2' high x 17' wide x 1' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 8' wide x 15' long x 4' deep. Fish were observed above the LDA.
533	0015.00	LDA #03 contains 5 pieces of LWD and measures 5' high x 30' wide x 20' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 30' wide x 30' long x 5' deep. Fish were observed above the LDA.
585	0016.00	LDA #04 contains 5 pieces of LWD and measures 3' high x 20' wide x 10' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 10' wide x 30' long x 2' deep. Fish were observed above the LDA.
834	0020.00	LDA #05 contains 4 pieces of LWD and measures 5' high x 20' wide x 4' long with water flowing through and visible gaps. Sediment retention ranges from sand to large cobble and measures 5' wide x 25' long x 2' deep. Fish were observed above the LDA.
875	0022.00	LDA #06 contains 1 piece of LWD and measures 2' high x 12' wide x 4' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 10' wide x 12' long x 1' deep. Fish were observed above the LDA.

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949	0023.00	LDA #07 contains 3 pieces of LWD and measures 4' high x 20' wide x 12' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 12' wide x 13' long x 2' deep. Fish were observed above the LDA.
1056	0026.00	LDA #08 contains 2 pieces of LWD and measures 5' high x 25' wide x 10' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 12' wide x 20' long x 2' deep. Fish were observed above the LDA.
1194	0030.00	LDA #09 contains 5 pieces of LWD and measures 5' high x 25' wide x 20' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 4' wide x 15' long x 1' deep. Fish were observed above the LDA.
1474	0040.00	LDA #10 contains 7 pieces of LWD and measures 5' high x 28' wide x 15' long with water flowing through and no visible gaps. Sediment retention measures 6' wide x 24' long x and 2' deep. Fish were observed above the LDA.
1731	0046.00	LDA #11 contains 9 pieces of LWD and measures 9' high x 30' wide x 15' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 30' wide x 20' long x 5' deep. Fish were observed above the LDA.
1803	0047.00	LDA #12 contains 7 pieces of LWD and measures 6' high x 20' wide x 20' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 18' wide x 7' long x 3' deep. Fish were observed above the LDA.
1928	0051.00	LDA #13 contains 8 pieces of LWD and measures 4' high x 18' wide x 23' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 12' wide x 15' long x 3' deep. Fish were observed above the LDA.
2010	0052.00	This unit is unsurveyable due to a large collection of LWD.
2085	0055.00	This unit is unsurveyable due to a large collection of LWD. LDA #14 contains 4 pieces of LWD and measures 5' high x 25' wide x 15' long with water flowing through and visible gaps. Sediment retention ranges from sand to gravel and measures 5' wide x 20' long x 1' deep. Fish were observed above the LDA.
2184	0059.00	LDA #15 contains 5 pieces of LWD and measures 5' high x 20' wide x 13' long with water flowing through and no visible gaps. Sediment

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		retention ranges from sand to cobble and measures 10' wide x 10' long x 1' deep. Fish were observed above the LDA.
2261	0062.00	LDA #16 contains 1 piece of LWD and measures 5' high x 20' wide x 10' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 5' wide x 6' long x 0.6' deep. Fish were observed above the LDA.
2394	0066.00	LDA #17 contains 4 pieces of LWD and measures 4' high x 20' wide x 6' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 12' wide x 5' long x 3' deep. Fish were observed above the LDA.
2416	0067.00	LDA #18 contains 4 pieces of LWD and measures 5' high x 30' wide x 10' long with water flowing through and visible gaps. Sediment retention ranges from sand to cobble and measures 10' wide x 12' long x 3' deep. Fish were observed above the LDA.
2846	0076.00	LDA #19 contains 3 pieces of LWD and measures 4' high x 20' wide x 30' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 18' wide x 45' long x 2' deep. Fish were observed above the LDA.
2852	0078.00	There is a 4.5' plunge serving as a possible juvenile barrier.
2863	0079.00	Culvert #01, under Highway 1, is constructed of concrete and metal and measures 9' high x 9' wide x 88' long with a diameter of 9' and a plunge height of 4'. The maximum depth within the culvert was 1' created by baffles and the slope of the culvert was approximately 4%. There is a series of backflooding rock weirs below the culvert inlet with broken cables and missing rocks. There is a 3' jump from a pool below up to the culvert inlet. There are gabions with broken wire holding rock armor in place on the left bank. This culvert serves as a barrier to juvenile and adult anadromous salmonids.
3019	0093.00	Tributary #01, located on the left bank, is flowing and contributes approximately 0.01% to the downstream flow of Dunn Creek. The temperature downstream of the confluence was 56 degrees Fahrenheit, the temperature of the tributary was 56 degrees Fahrenheit, and the temperature upstream of the confluence was 56 degrees Fahrenheit. The tributary is not accessible to fish due to a 20% slope. No salmonids were observed in the 50 feet explored.
3139	0097.00	LDA #20 contains 1 piece of LWD and measures 2' high x 13' wide x 3' long with water flowing through and visible gaps. Sediment retention

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- ranges from sand to small cobble and measures 5' wide x 25' long x 1' deep. Fish were observed above the LDA.
- 3181 0097.01 This unit is unsurveyable due to a large collection of large woody debris (LWD).
- 3196 0100.00 LDA #21 contains 4 pieces of LWD and measures 3' high x 15' wide x 3' long with water flowing through and no visible gaps. Sediment retention ranges from silt to large cobble and measures 10' wide x 10' long x 3' deep. Fish were observed above the LDA.
- 3214 0102.00 LDA #22 contains 8 pieces of LWD and measures 7' high x 25' wide x 30' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 20' wide x 20' long x 4' deep. Fish were observed above the LDA.
- 3323 0107.00 LDA #23 contains 5 pieces of LWD and measures 5' high x 19' wide x 13' long with water flowing through and no visible gaps. Sediment retention ranges from sand to large cobble and measures 13' wide x 30' long x 2' deep. Fish were observed above the LDA.
- 3469 0111.00 LDA #24 contains 12 pieces of LWD and measures 8' high x 15' wide x 55' long with water flowing through and no visible gaps. Sediment retention ranges from silt to large cobble and measures 10' wide x 30' long x 2' deep.
- 3565 0114.00 LDA #25 contains 7 pieces of LWD and measures 6' high x 20' wide x 40' long with water flowing through and visible gaps. Sediment retention ranges from silt to small cobble and measures 6' wide x 20' long x 4' deep. Fish were observed above the LDA.
- 3692 0118.00 LDA #26 contains 4 pieces of LWD and measures 4' high x 14' wide x 20' long with water flowing through and no visible gaps. Fish were observed above the LDA.
- 3820 0122.00 Tributary #02, located on the right bank, is flowing and contributes approximately 20% to the downstream flow of Dunn Creek. The temperature downstream of the confluence was 52 degrees Fahrenheit, the temperature of the tributary was 52 degrees Fahrenheit, and the temperature upstream of the confluence was 52 degrees Fahrenheit. The slope of the tributary is 3%, there is a culvert, and the tributary is accessible to fish though no salmonids were observed in the 50 feet explored. The tributary's culvert is constructed of corrugated metal pipe and measures 3' high x 3' wide x 35' long with a plunge height of 1' and a max depth of 0.4'. It is a possible barrier to juvenile and adult salmonids.

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3855	0124.00	Bridge #01 is a flatcar bridge measuring 13' wide x 5' tall x 20' long and is constructed of metal and wood.
3972	0127.00	LDA #27 contains 2 pieces of LWD and measures 4' high x 15' wide x 9' long with water flowing through and visible gaps. Sediment retention ranges from sand to small cobble and measures 12' wide x 20' long x 2' deep. Fish were observed above the LDA.
4073	0129.00	LDA #28 contains 4 pieces of LWD and measures 7' high x 20' wide x 23' long with water flowing through and no visible gaps. Sediment retention ranges from sand to small cobble and measures 6' wide x 15' long x 2' deep. Fish were observed above the LDA.
4258	0134.00	Tributary #03, located on the left bank, is flowing and contributes approximately 30% to the downstream flow of Dunn Creek. 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 52 degrees Fahrenheit. The slope of the tributary is 2% is accessible to fish. Salmonids were observed.
4719	0139.00	Begin Reach 2, an E4 channel type.
5044	0151.00	This unit is unsurveyable due to a large collection of LWD.
5091	0154.00	LDA #29 contains 2 pieces of LWD and measures 4' high x 9' wide x 18' long with water flowing through and no visible gaps. Fish were observed above the LDA.
5182	0157.00	LDA #30 contains 4 pieces of LWD and measures 4' high x 5' wide x 20' long with water flowing through and no visible gaps. Sediment retention ranges from sand to gravel and measures 9' wide x 20' long x 2' deep. Fish were observed above the LDA.
5340	0162.00	There was a one 1+ salmonid observed.
5456	0166.00	LDA #31 contains 4 pieces of LWD and measures 6' high x 10' wide x 6' long with water flowing through and no visible gaps. This LDA serves as a possible barrier to adult salmonids.
5535	0170.00	The first 5 feet of this unit are dry.
5658	0174.00	LDA #32 contains 3 pieces of LWD and measures 4' high x 8' wide x 6' long with water flowing through and no visible gaps. Sediment retention ranges from silt to gravel and measures 4' wide x 7' long x 2'

## Dunn Creek

deep. This LDA serves as a possible barrier to both juvenile and adult salmonids.

- |      |         |  |
|------|---------|--|
| 6854 | 0190.00 | LDA #33 contains 3 pieces of LWD and measures 5' high x 12' wide x 20' long with visible gaps and no water flowing through. Sediment retention ranges from sand to small cobble and measures 10' wide x 20' long x 4' deep. This LDA serves as a possible barrier to both juvenile and adult salmonids. LDA #34 contains 2 pieces of LWD and measures 5' high x 9' wide x 7' long with no visible gaps and no water flowing through. Sediment retention ranges from sand to small cobble and measures 10' wide x 20' long x 4' deep. This LDA serves as a possible barrier to both juvenile and adult salmonids. |
| 7437 | 0197.00 | Tributary #04, located on the right bank, is flowing and contributes approximately 1% to the downstream flow of Dunn Creek. 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 52 degrees Fahrenheit. The slope of the tributary is 5% is not accessible to fish. No salmonids were observed in the 50 feet explored.  |
| 7458 | 0199.00 | LDA #35 contains 9 pieces of LWD and measures 6' high x 12' wide x 26' long with no visible gaps and no water flowing through. Sediment retention ranges from sand to small cobble and measures 12' wide x 20' long x 3' deep. This LDA serves as a possible barrier to both juvenile and adult salmonids.   |
| 7855 | 0205.00 | End of survey due to degrading habitat.  |

## 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.

## Dunn 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: Dunn Creek

LLID: 1238149397927 Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE Legal Description: T22NR18WS01 Latitude: 39:47:34.0N Longitude: 123:48:54.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
1	0	CULVERT	0.5	100	100	1.3									
9	1	DRY	4.3	129	1162	14.6	3.0	0.0							
70	9	FLATWATER	33.5	55	3856	48.4	6.4	0.3	0.6	229	16011	61	4280		7
8	0	NOSURVEY	3.8	28	224	2.8									
82	82	POOL	39.2	20	1659	20.8	9.5	0.6	1.3	204	16720	196	15902	144	35
39	5	RIFFLE	18.7	25	958	12.0	5.2	0.2	0.3	110	4302	20	797		23
<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>		
209	97				7959					37034			20978		

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

Stream Name: Dunn Creek

LLID: 1238149397927 Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE Legal Description: T22NR18WS01 Latitude: 39:47:34.0N Longitude: 123:48:54.0W

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 (%)
39	5	LGR	18.7	25	958	12.0	5	0.2	0.5	110	4302	20	797		23	89
1	1	GLD	0.5	27	27	0.3	6	0.4	0.5	154	154	62	62		5	90
25	2	RUN	12.0	40	993	12.5	5	0.4	0.8	168	4208	60	1505		8	93
44	6	SRN	21.1	64	2836	35.6	7	0.2	0.8	261	11499	61	2702		7	91
80	80	MCP	38.3	20	1600	20.1	10	0.6	3	204	16359	198	15802	145	35	92
1	1	STP	0.5	38	38	0.5	5			162	162				60	95
1	1	LSL	0.5	21	21	0.3	10	0.3	1	200	200	100	100	60	5	95
9	1	DRY	4.3	129	1162	14.6	3	0.0		0	0					95
1	0	CUL	0.5	100	100	1.3										
8	0	NS	3.8	28	224	2.8										95

Total Units  
209

Total Units Fully Measured  
97

Total Length (ft.)  
7959

Total Area (sq.ft.)  
36883

Total Volume (cu.ft.)  
20966

**Table 3 - Summary of Pool Types**

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

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
81	81	MAIN	99	20	1638	99	9.5	0.6	204	16521	145	11631	35
1	1	SCOUR	1	21	21	1	10.0	0.3	200	200	60	60	5

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
82	82	1659	16720	11690

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

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

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
80	MCP	99	26	33	45	56	8	10	1	1	0	0
1	LSL	1	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
81	26	32	46	57	8	10	1	1	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

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

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Dry Units: 9

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

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
39	4	LGR	0	35	12	5	15	30	0	3	0
39	4	TOTAL RIFFLE	0	35	12	5	15	30	0	3	0
1	1	GLD	30	0	0	0	35	0	0	0	35
25	2	RUN	8	68	0	0	25	0	0	0	0
44	7	SRN	2	31	33	13	23	0	0	0	0
70	10	TOTAL FLAT	6	36	22	8	24	0	0	0	4
80	80	MCP	5	40	35	11	6	0	0	3	0
1	1	STP	0	45	50	0	0	0	5	0	0
1	1	LSL	0	5	95	0	0	0	0	0	0
82	82	TOTAL POOL	5	39	36	11	6	0	0	3	0
1	0	CUL									
8	0	NS									
209	96	TOTAL	5	39	34	10	8	1	0	2	0

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

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Dry Units: 9

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

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
39	5	LGR	0	0	20	80	0	0	0
1	1	GLD	0	0	100	0	0	0	0
25	2	RUN	0	0	50	50	0	0	0
44	6	SRN	0	17	67	17	0	0	0
80	80	MCP	10	51	33	5	0	1	0
1	1	STP	0	0	100	0	0	0	0
1	1	LSL	0	0	100	0	0	0	0

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

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

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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
92	79	21	0	94	94

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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: Dunn Creek LLID: 1238149397927 Drainage: Rockport  
 Survey Dates: 9/2/2008 to 9/9/2008 Survey Length (ft.): 7959 Main Channel (ft.): 7855 Side Channel (ft.): 104  
 Confluence Location: Quad: HALES GROVE Legal Description: T22NR18WS01 Latitude: 39:47:34.0N Longitude: 123:48:54.0W

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

**STREAM REACH: 1**

Channel Type: B4	Canopy Density (%): 91.1	Pools by Stream Length (%): 29.0
Reach Length (ft.): 4625	Coniferous Component (%): 74.4	Pool Frequency (%): 40.8
Riffle/Flatwater Mean Width (ft.): 6.8	Hardwood Component (%): 25.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 84
Range (ft.): 8 to 33	Vegetative Cover (%): 93.7	2 to 2.9 Feet Deep: 14
Mean (ft.): 17	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 2
Std. Dev.: 7	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 37	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 52 - 58 Air (F): 52 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 33
Dry Channel (ft): 5	Riffles: 3	
	Pools: 10	
	Flat: 3	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 5 Gravel: 81 Sm Cobble: 11 Lg Cobble: 4 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 77.2 2. 21.1 3. 0.0 4. 0.0 5. 1.8		

**STREAM REACH: 2**

Channel Type: E4	Canopy Density (%): 93.4	Pools by Stream Length (%): 8.9
Reach Length (ft.): 3230	Coniferous Component (%): 91.1	Pool Frequency (%): 35.8
Riffle/Flatwater Mean Width (ft.): 4.0	Hardwood Component (%): 8.9	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100
Range (ft.): 7 to 9	Vegetative Cover (%): 95.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 8	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 (%): 24	Mean Max Residual Pool Depth (ft.): 1.0
Water (F): 52 - 54 Air (F): 48 - 58	LWD per 100 ft.:	Mean Pool Shelter Rating: 39
Dry Channel (ft): 1157	Riffles: 0	
	Pools: 10	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 91 Sm Cobble: 9 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 95.5 2. 4.5 3. 0.0 4. 0.0 5. 0.0		



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

Stream Name: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

Latitude: 39:47:34.0N

Longitude: 123:48:54.0W

**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	24	16	20.6
Sand / Silt / Clay	73	81	79.4

**Mean Percentage of Dominant Stream Bank Vegetation**

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	1	5	3.1
Hardwood Trees	17	22	20.1
Coniferous Trees	79	70	76.8
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 1

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

StreamName: Dunn Creek

LLID: 1238149397927

Drainage: Rockport

Survey Dates: 9/2/2008 to 9/9/2008

Confluence Location: Quad: HALES GROVE

Legal Description: T22NR18WS01

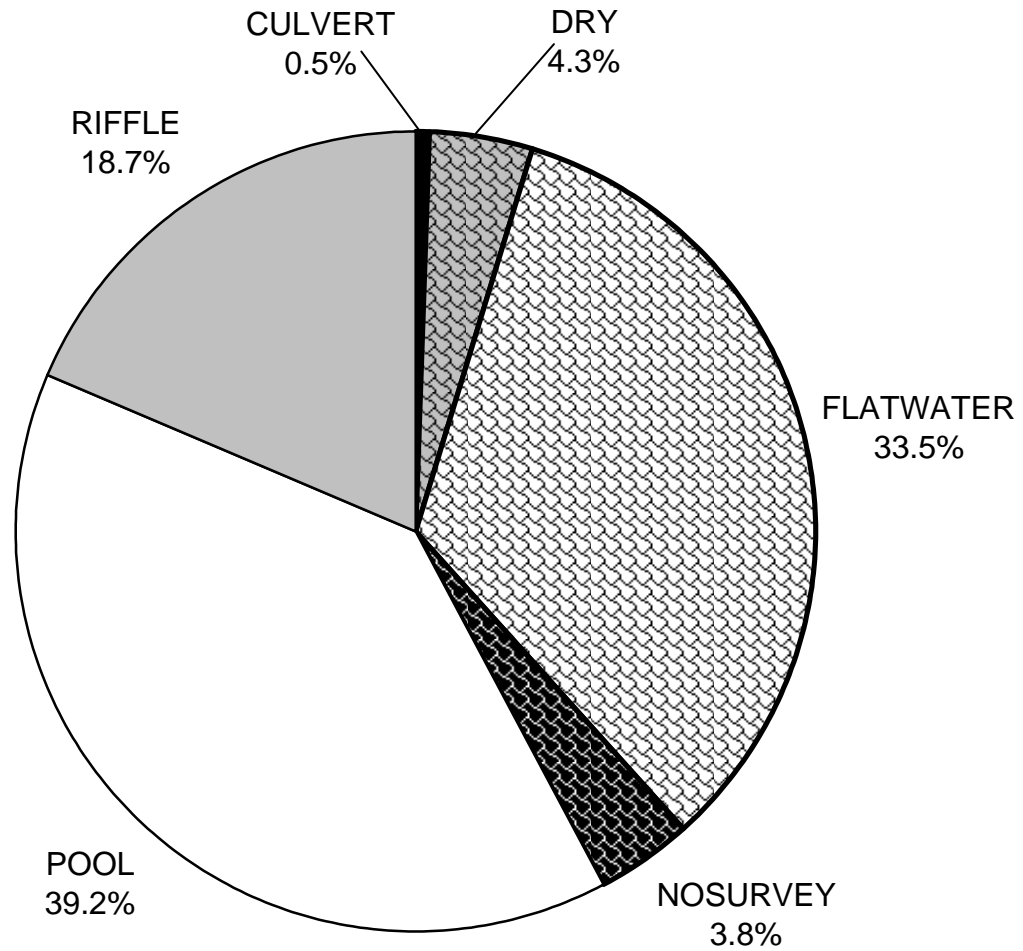
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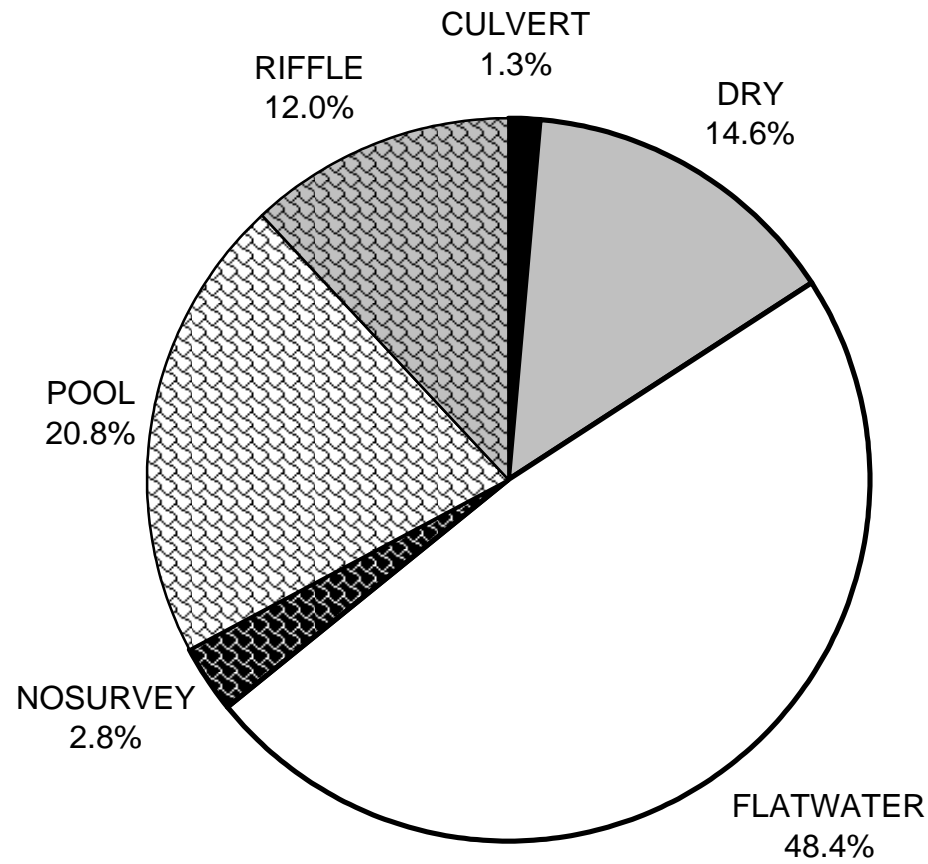
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	6	5
SMALL WOODY DEBRIS (%)	35	36	39
LARGE WOODY DEBRIS (%)	12	22	36
ROOT MASS (%)	5	8	11
TERRESTRIAL VEGETATION (%)	15	24	6
AQUATIC VEGETATION (%)	30	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	3	0	3
BEDROCK LEDGES (%)	0	4	0

# DUNN CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

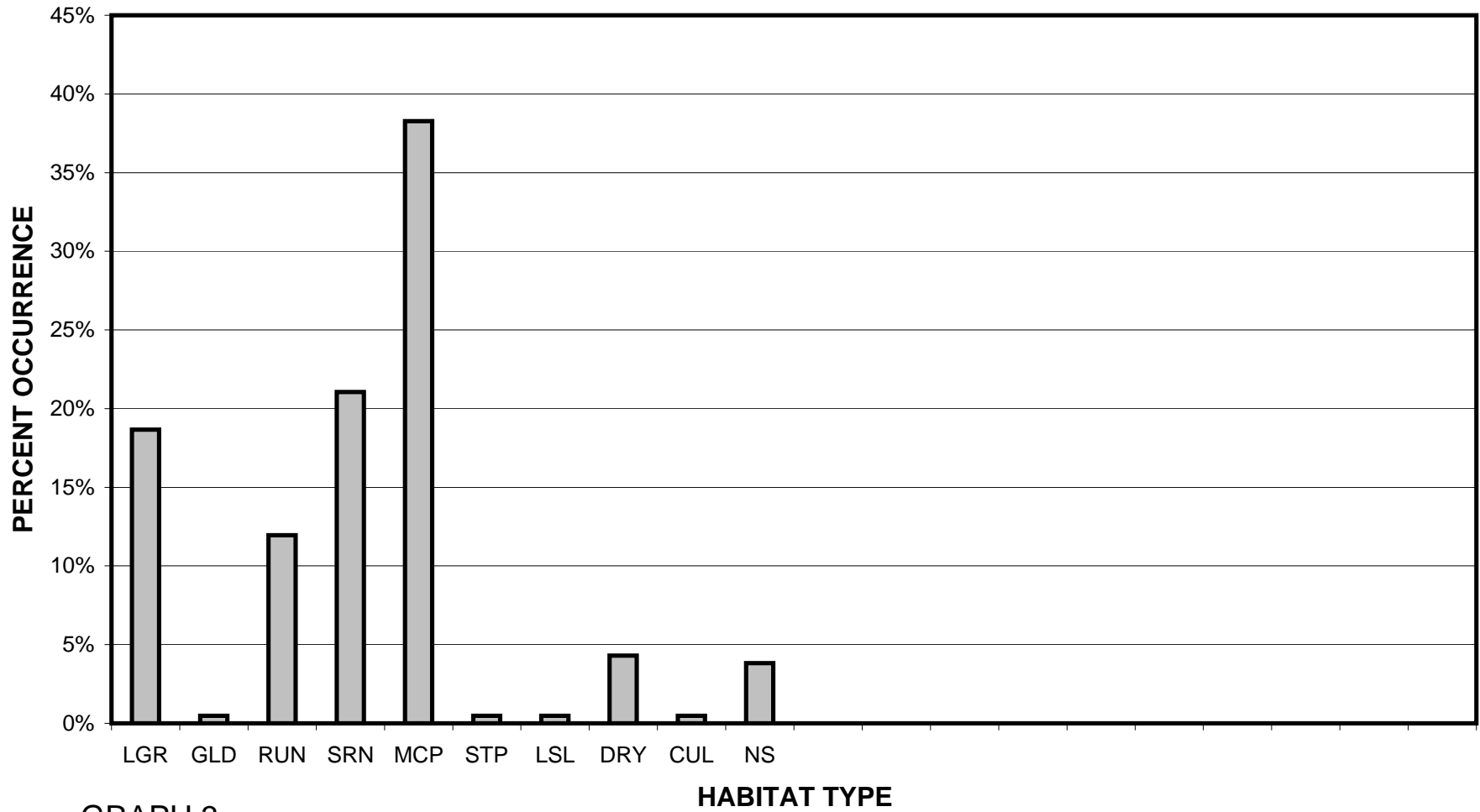
# DUNN CREEK 2008 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

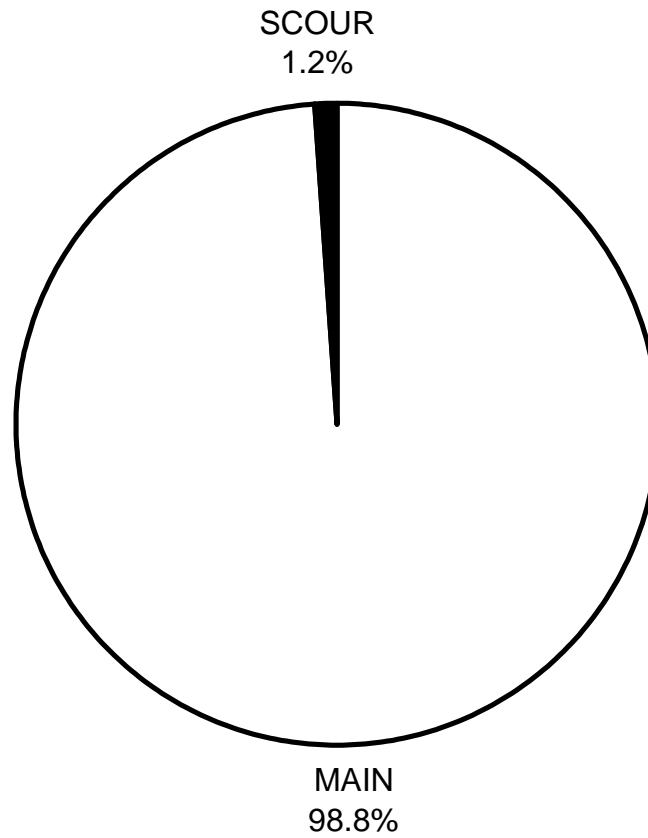
# DUNN CREEK 2008

## HABITAT TYPES BY PERCENT OCCURRENCE



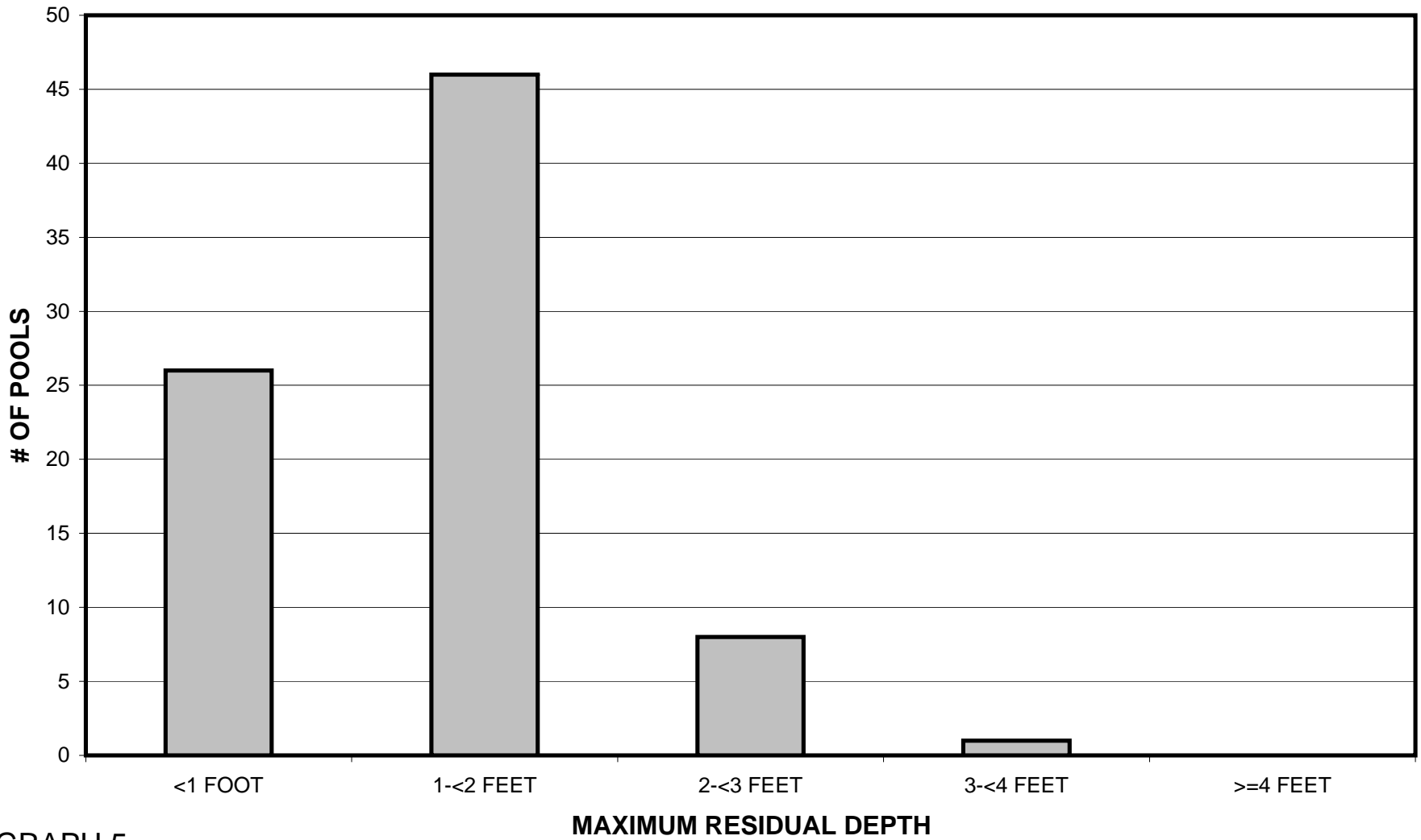
GRAPH 3

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



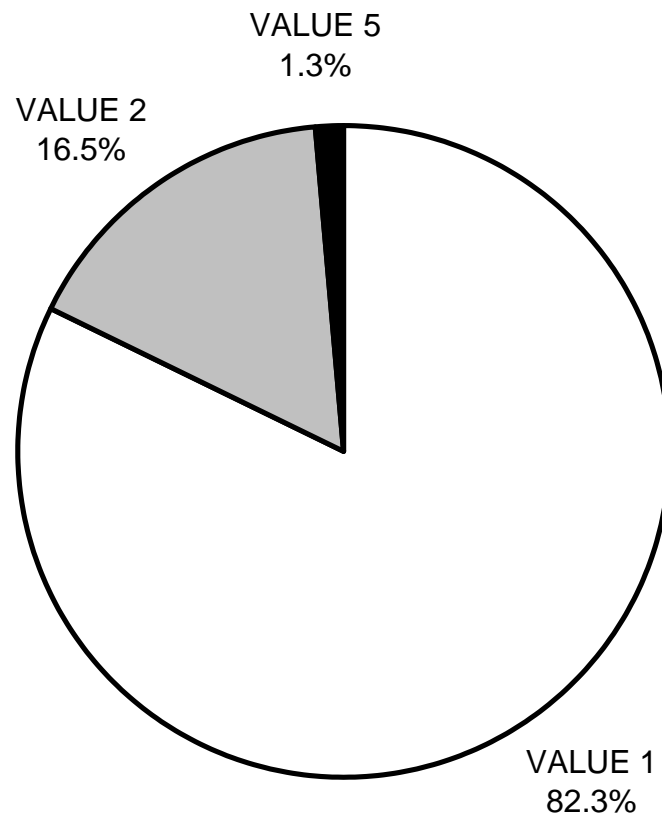
GRAPH 4

# DUNN CREEK 2008 MAXIMUM DEPTH IN POOLS



GRAPH 5

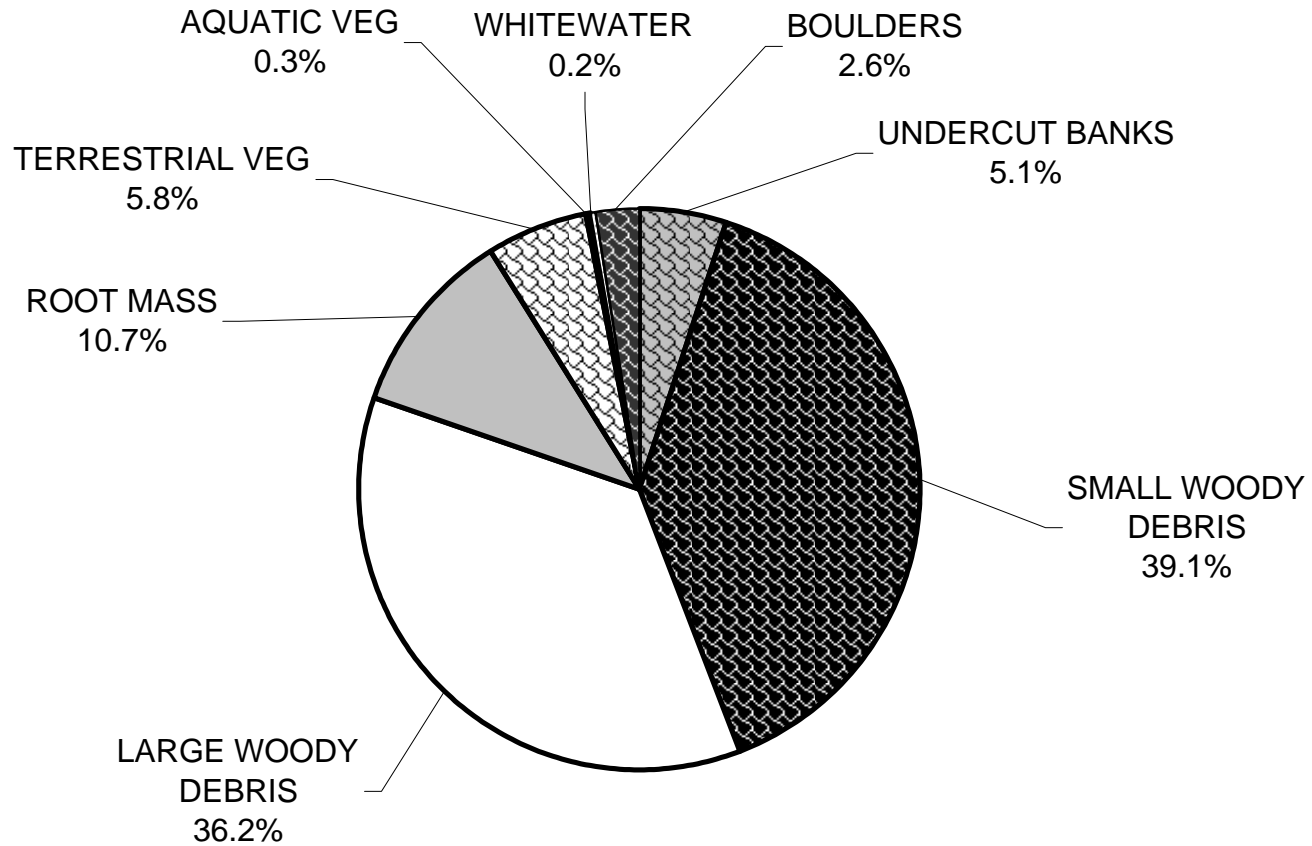
# DUNN CREEK 2008 PERCENT EMBEDDEDNESS



GRAPH 6



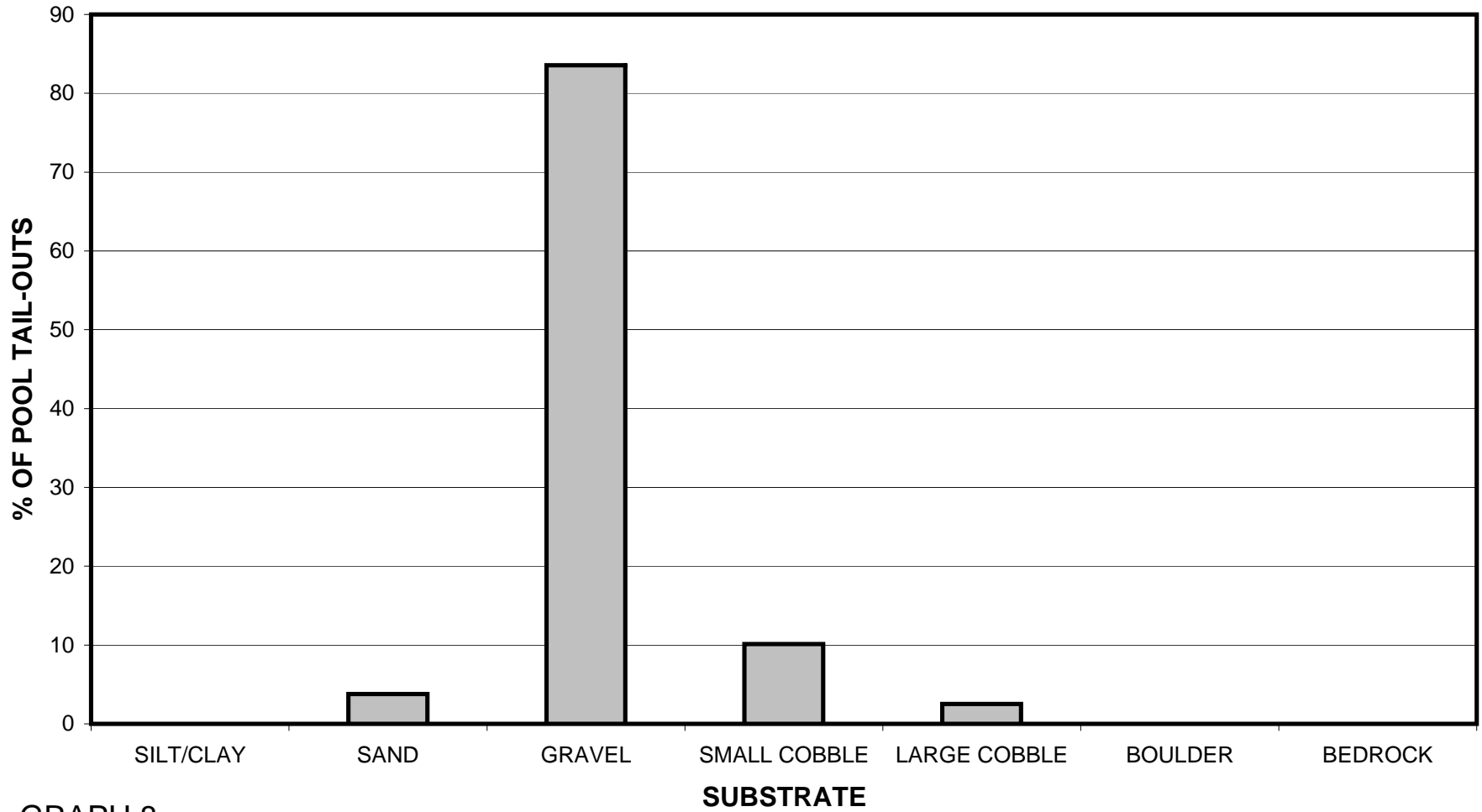
# DUNN CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

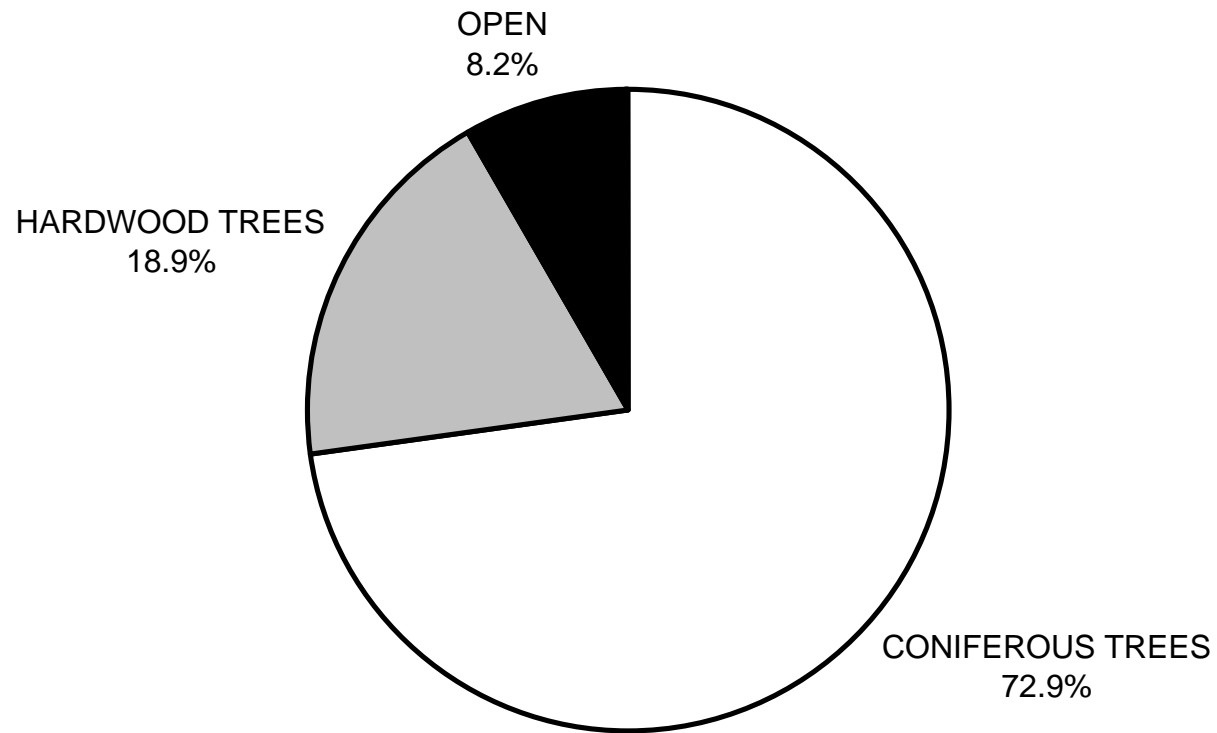
# DUNN CREEK 2008

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



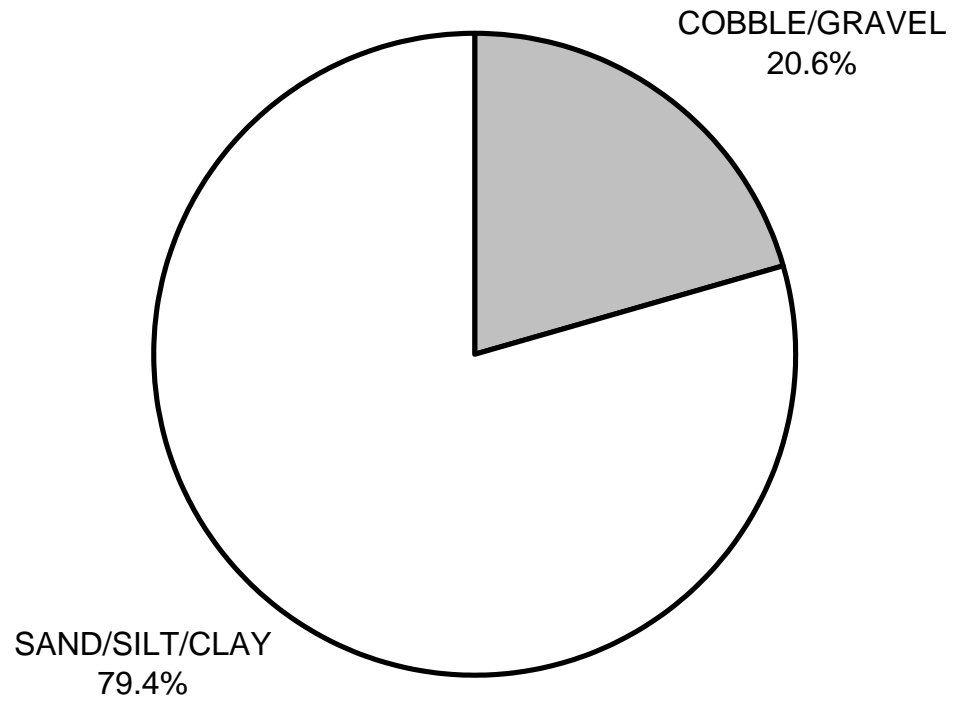
GRAPH 8

# DUNN CREEK 2008 MEAN PERCENT CANOPY



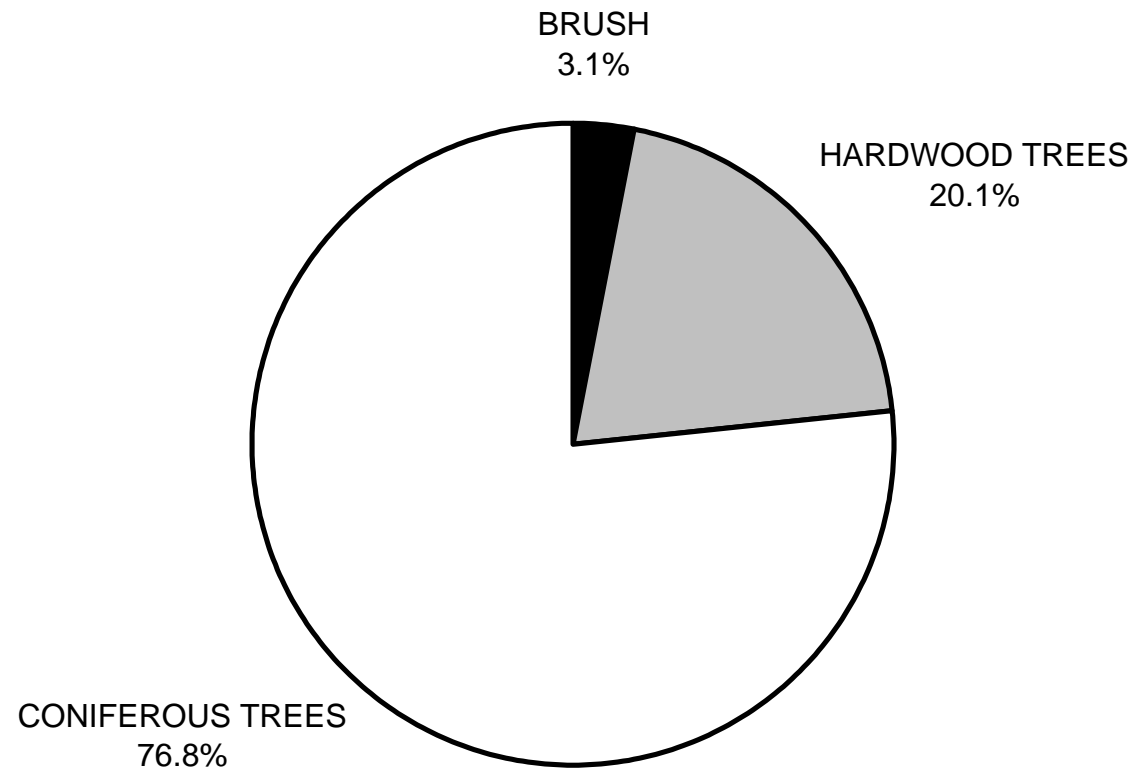
GRAPH 9

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



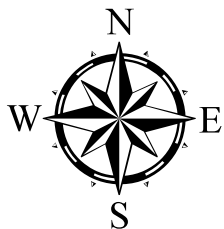
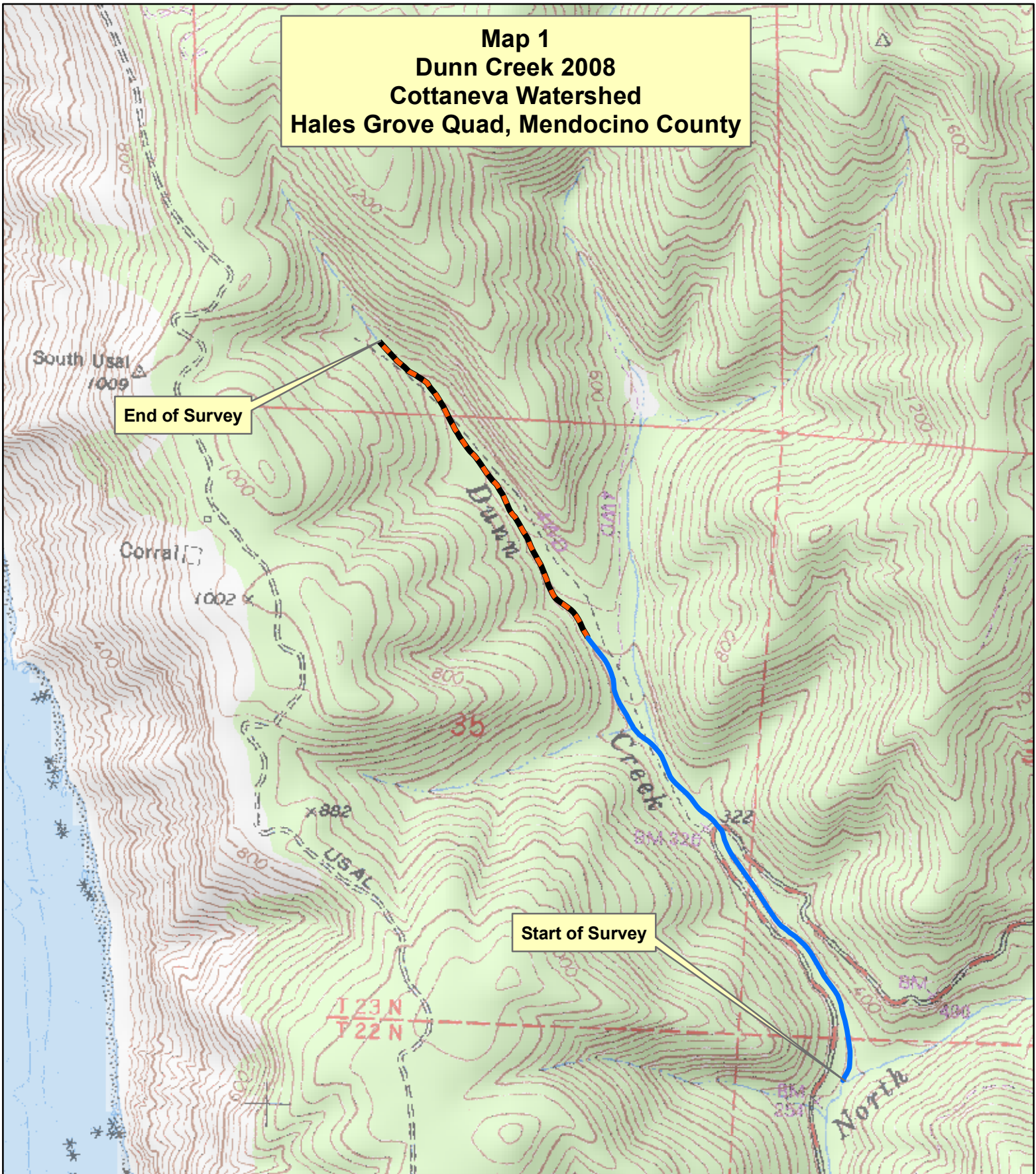
GRAPH 10

**DUNN CREEK 2008**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**





GRAPH 11

**Map 1  
Dunn Creek 2008  
Cottaneva Watershed  
Hales Grove Quad, Mendocino County**



**Legend**

-  Reach 1, B4 Channel Type
-  Reach 2, E4 Channel Type

