STREAM INVENTORY REPORT

Cummings Creek

INTRODUCTION

A stream inventory was conducted from June 19, 2006 to June 28, 2006 on Cummings Creek. The survey began at the confluence with Van Duzen River and extended upstream 3.1 miles.

The Cummings 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 Cummings Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

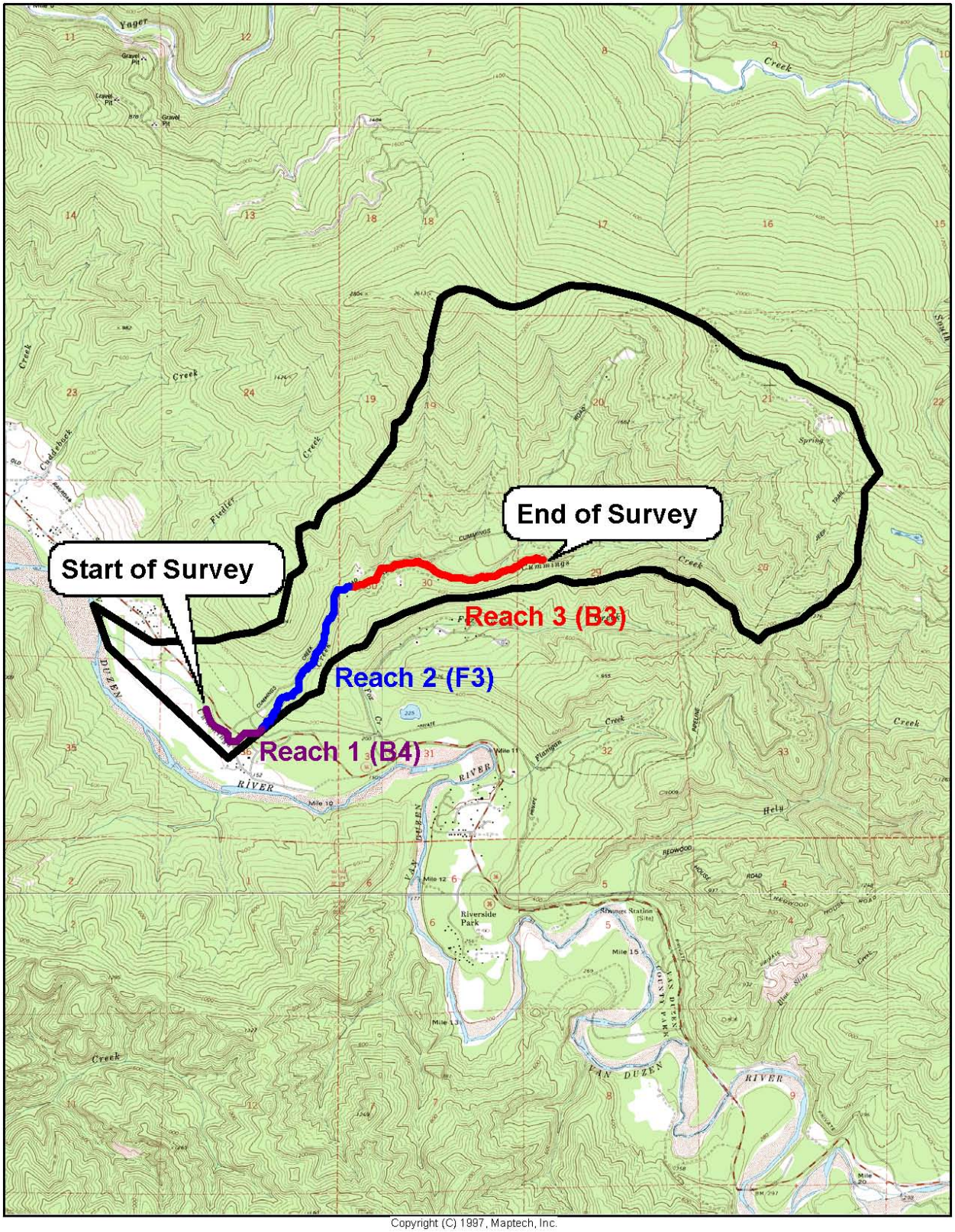
WATERSHED OVERVIEW

Cummings Creek is a tributary to Van Duzen River, tributary to Pacific Ocean, located in Humboldt County, California (Map 1). Cummings Creek's legal description at the confluence with Van Duzen River is T02N R01E S26. Its location is 40°31'25" north latitude and 124°01'52" west longitude, LLID number 1240310405236. Cummings Creek is a first order stream and has approximately 3.26 miles of blue line stream according to the USGS Hydesville 7.5 minute quadrangle. Cummings Creek drains a watershed of approximately 4.97 square miles. Elevations range from about 124 feet at the mouth of the creek to 1,750 feet in the headwater areas (average elevation of headwaters, not highest point). Redwood forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production and residential use. Vehicle access exists via Cummings Creek Road, which is approximately half a mile east of Carlotta on Highway 36.

METHODS

The habitat inventory conducted in Cummings Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and 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 three-person team.

Cummings Creek



SAMPLING STRATEGY

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

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

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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Cummings Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence

Cummings Creek

- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of June 19, 2006 to June 28, 2006, was conducted by C. Pollastrini, S. McSmith, and I. Mikus (WSP). The total length of the stream surveyed was 16,239 feet with an additional 656 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.66 cfs on July 12, 2006.

Cummings Creek is a C4 channel type for 2,561 feet of the stream surveyed (Reach 1), an F4 channel type for 6,274 feet of the stream surveyed (Reach 2), and a B3 channel type for 7,404 feet of the stream surveyed (Reach 3).

C4 channels are meandering point-bar riffle/pool alluvial channels with broad well defined floodplain on low gradients and gravel-dominant substrates. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B3 channels are moderately entrenched, have a moderate gradient, and are riffle dominated with infrequently spaced pools. They have a very stable plan and profile, as well as stable banks and cobble-dominated substrate.

Water temperatures taken during the survey period ranged from 54 to 59 degrees Fahrenheit. Air temperatures ranged from 53 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42.4% pool units, 34.1% riffle units, 22.1% flatwater units, and 1.5% no survey units (Graph 1). Based on total length of Level II habitat types there were 36.7% flatwater units, 32.3% riffle units, 28.8% pool units and 2.2% no survey units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 36% mid-channel pool units, 28% low gradient riffle units, and 14% step run units (Graph 3). The most frequent habitat types based on percent total length were 28.1% step run units, 26.1% low gradient riffle units, and 25.1% mid-channel pool units.

A total of 144 pools were identified (Table 3). Main-channel were the most frequently encountered, at 89.6% (Graph 4), and comprised 93% 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. Forty-six of the 142 pools (32%) sampled for pool depth had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 137 pool tail-outs measured, 13 had a value of 1 (9.2%); 31 had a value of 2 (23.2%); 37 had a value of 3 (26.8%); 54 had a value of 4 (39.4%); 2 had a value of 5 (1.4%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 16, flatwater habitat types had a mean shelter rating of 12 , and pool habitats had a mean shelter rating of 47 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 44 and scour pools had a mean shelter rating of 69 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Cummings Creek. Graph 7 describes the pool cover in Cummings 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. A gravel substrate was dominant in 57% of pool tail-outs and small cobble was dominant in 19% of pool tail-outs.

The mean percent canopy density for the surveyed length of Cummings Creek was 88%. Twelve percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 55 % and 45%, respectively. Graph 9 describes the mean percent canopy in Cummings Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 1.1% bedrock, 1.1% boulder, 1.7% cobble/gravel, 96.1% sand/silt/clay, (Graph 10). Hardwood trees were the dominant vegetation type observed in 60.1% of the units surveyed. Additionally, 34.9% of the units surveyed had coniferous trees as the dominant vegetation type, and 5.0% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Eleven sites were electrofished for species composition and distribution in Cummings Creek on October 25, 2006. Water temperature taken during the electrofishing period (10:00 – 15:50) was

Cummings Creek

51 degrees Fahrenheit. Air temperature was 57 degrees Fahrenheit. The sites were sampled by - Paul Divine (DFG), S. McSmith, T. Fisher, and R. Marsh (WSP).

In reach one, which comprised the first 2,561 feet of stream, no sites were sampled because the reach was entirely dry.

In reach two, nine sites were sampled starting approximately 3,006 feet from the confluence with the Van Duzen River and continuing upstream 5,542 feet. The reach sites yielded 99 young-of-the-year steelhead/rainbow trout (SH/RT), 40 age 1+ SH/RT, and 4 age 2+ SH/RT.

In reach three, two sites were sampled starting approximately 9,292 feet from the confluence with the Van Duzen River and continuing upstream 1,415 feet. The reach sites yielded 5 young-of-the-year SH/RT, 8 age 1+ SH/RT, and 1 age 2+ SH/RT.

The following chart displays the information yielded from these sites:

2006 Cummings Creek E-fish Observations.

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 2: F4 Channel Type									
10/25/06	1	51	4.2	3006	0	0	5	3	1
10/25/06	2	56	4.2	3202	0	0	17	10	0
10/25/06	3	71	4.2	3893	0	0	4	1	0
10/25/06	4	83	4.2	4497	0	0	11	1	0
10/25/06	5	122,124	4.2	6506	0	0	15	5	1
10/25/06	6	134	4.2	6897	0	0	9	3	0
10/25/06	7	147	4.2	7696	0	0	10	3	1
10/25/06	8	161	4.4	8197	0	0	18	12	0
10/25/06	9	165	4.4	8468	0	0	10	2	1
Reach 3: B3 Channel Type									
10/25/06	10	178	4.2	9292	0	0	4	6	0
10/25/06	11	195	4.2	10677	0	0	1	2	1

Cummings Creek

DISCUSSION

Cummings Creek is a C4 channel type for the first 2,561 feet of stream surveyed, an F4 channel type for the next 6,274 feet and a B3 channel type for the remaining 7,404 feet. The suitability of C4, F4, and B3 channel types for fish habitat improvement structures is as follows: A C4 channel type is good for bank-placed boulders and is fair for plunge weirs, single and opposing wing deflectors, channel constrictors, and for log cover. An F4 channel type is good for bank-placed boulders and fair for plunge weirs, single and opposing wing deflectors, channel constrictors, and log cover. Additionally, it is poor for boulder clusters. A B3 channel type is excellent for plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing deflectors, as well as for log cover.

The water temperatures recorded on the survey days June 19, 2006 to June 28, 2006, ranged from 54 to 59 degrees Fahrenheit. Air temperatures ranged from 53 to 70 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any further 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 36.7% of the total length of this survey, riffles 32.3%, and pools 29%. The pools are relatively shallow, with only 46 of the 142 (32%) pools having a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

Forty-four of the 137 pool tail-outs measured had embeddedness ratings of 1 or 2. Ninety-one of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Cummings Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred and seven of the 141 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 47. The shelter rating in the flatwater habitats was 12. 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 Cummings 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.

Cummings Creek

The mean percent canopy density for the stream was 88%. Reach 1 had a canopy density of 81.7%, Reach 2 had a canopy density of 89%, and Reach 3 had a canopy density of 87.9%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 97% and 99%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Cummings Creek should be managed as an anadromous, natural production stream.

2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with woody cover in the pools is desirable.

4) Where feasible, design and engineer pool enhancement structures to increase the number or deepen existing pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.

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	Begin survey at fence above confluence with Van Duzen River; Channel type is C4.
1493	0024.00	Bridge #1, Highway 36; concrete; 40' long x 16' wide x 9 ' high
2545	0039.00	Channel type change to F4

Cummings Creek

2679	0041.01	Log debris accumulation (LDA) #1, 5' high x 32' wide x 10' long; composed of approximately 10 pieces of large woody debris (LWD); water flows through with no visible gaps and sediment is retained 32' wide x 25' long x 2.5' deep; fish observed above LDA.
2836	0045.00	Plunge 1.8' high
3120	0053.00	CCC site 3,565
3464	0059.01	CCC site 3,135 Plunge 2.5' high
3793	0069.00	CCC site 2,725
3967	0071.00	LDA # 2, 8.5' high x 20' wide x 15' long; approximately 7 pieces of LWD; water flows through with visible gaps and sediment is retained, 18' wide x 150' long x 2.5' deep.
4422	0080.00	Left bank erosion contributing sediment
5610	0103.01	LDA # 3, 5' high x 26' wide x 10' long; 10 pieces LWD; water flows through with no visible gaps, sediment retention is 10' wide x 30' long x 3.5' deep
5938	0111.00	CCC site 730'
6765	0129.00	Begin interpretative trail Bridge # 2, Cummings Creek Road.; metal flatcar; 12' wide x 14' high x 56' long; both banks rip-rapped.
6826	0130.00	Digger logs
6971	0134.00	Weir
7297	0139.00	Right bank erosion, 100' long x 35' high, seven large downed redwoods
7400	0140.00	LDA # 4; 7' high x 30' wide x 15' long; approximately 8 pieces of LWD; water flows through with visible gaps and no sediment retention.
7819	0148.00	Right bank erosion 50' long x 35' high
7934	0152.00	LDA #5; 8' high x 20' wide x 20' long; approximately 9 pieces of LWD; water flows through with no visible gaps and no sediment retention.

Cummings Creek

7954	0153.00	Right bank erosion
8115	0157.00	LDA #6; 5' high x 25' wide; approximately 5 pieces of LWD wood; water flows through with no visible gaps and sediment retention is 10' wide x 8' long x 2' deep
8183	0159.00	Two digger logs
8519	0164.00	Tributary #1 enters right bank; water temperature of the tributary was 53º F; accessible to fish and checked up tributary 50'; no fish observed.
8623	0166.00	Bridge #3, Cummings Creek Road.; metal flatcar bridge, 53' long x 13.5' wide x 12.5' high
8835	0168.00	Channel type change to B3 Bridge #4, private road off Cummings Creek Road.; metal flatcar; 30' long x 9' wide x 8.5' high
9395	0179.00	Tributary #2 enters left bank; water temperature of the tributary was 54º F; not accessible to fish
9446	0180.00	Bridge #5, private road off Cummings Creek Road; metal flatcar bridge, 38' long x 10' wide x 5.8' high
9913	0182.00	Tributary #3 enters right bank; water temperature of the tributary was 56º F; accessible to fish but no fish observed; LLID #1239998405267
10584	0193.00	Young of the year salmonids observed
10656	0194.00	Left bank erosion, 50' long x 20' high
10751	0195.00	Channel type change to B3
11321	0206.03	Right bank seep
11502	0209.01	Tributary #4 enters right bank; water temperature of the tributary was 55º F; accessible to fish but no fish observed; LLID #1239952405270
11719	0217.00	LDA #7, 3' high x 18' wide x 10' long; approximately 8 pieces of LWD; water flows through with visible gaps and no sediment retention; fish observed above LDA; enough gaps to let fish pass plus a side channel

Cummings Creek

11817	0219.00	LDA #8; 11' high x 75' wide x 15' long; approximately 20 pieces of LWD; water flows through with no visible gaps and sediment retention is 60' wide x 100' long x 4' deep; fish observed above LDA
12344	0225.00	Right bank seep/dry tributary
13276	0242.00	LDA #9; 7' high x 80' wide x 20' long; approximately 20 pieces of LWD; water flows through with visible gaps and no sediment retention; fish observed above LDA
13369	0244.00	Right bank seep
13462	0247.00	LDA #10; 35' long x 25' high
13497	0248.00	Right bank erosion LDA #10; 8' high x 35' wide x 7' long; approximately 9 pieces of LWD; water flows through with visible gaps and sediment retention; fish observed above LDA
13598	0252.00	LDA #11; 8’ high x 49' wide x 15' long; approximately 11 pieces of LWD; water flows through with visible gaps and sediment retention is 25' wide x 40' long x 6' deep; fish observed above LDA
13701	0256.00	LDA #12; 7' high x 40' wide x 23' long; approximately 30 pieces of LWD; water flows through with no visible gaps and no sediment retention; fish observed above LDA
13992	0261.00	Tributary #5 enters from right bank; water temperature of the tributary was 56^{o} F; not accessible to fish.
14234	0270.00	LDA #13; 3.5' high x 23' wide x 2' long; approximately 4 pieces of LWD; water flows through with visible gaps and sediment retention is 10' wide x 15' long x 3' deep; fish observed above LDA
15090	0292.00	LDA #14; 25' high x 60' wide x 20' long; approximately 5 pieces of LWD; water flows through with visible gaps and no sediment retention; fish observed above LDA
15236	0293.00	Channel highly braided amidst LWD: no distinct side channel, extensive LDA #15; 9' high x 75' wide x 106' long; approximately 12 pieces of LWD; water flows through with visible gaps and sediment retention; fish observed above
15342	0294.00	One LDA after another

Cummings Creek

15710	0304.00	Young of the year salmonid observed
15759	0306.00	LDA #16; 5' high x16' wide x 10' long; approximately 5 pieces of LWD; water flows through with no visible gaps and sediment retention; no fish observed above LDA; possible barrier to adult and juvenile salmonids
15780	0307.00	LDA #17
15950	0312.00	Dry right bank tributary
15964	0313.00	Multiple LDA's
16085	0319.00	Left bank vertical clay wall LDA #18; 11' high x 37' wide x 9' long; approximately 13 pieces of LWD; water flows through with no visible gaps, sediment retention; fish observed above LDA (only 1+); possible barrier to adult and juvenile salmon
16278	0322.00	End of survey due to multiple LDA's.

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.

Cummings 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: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0

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
75	15	FLATWATER	22.1	83	6203	36.7	9.3	0.4	0.9	668	50115	269	20169		12
5	0	NOSURVEY	1.5	73	367	2.2									
144	144	POOL	42.4	34	4872	28.8	12.2	0.8	1.8	416	59864	488	69339	367	47
116	18	RIFFLE	34.1	47	5453.5	32.3	9.2	0.3	0.6	262	30371	102	11883		16

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
340	177	16895.5	140350	101391

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
96	11	LGR	28.2	46	4410	26.1	8	0.3	1	246	23642	91	8775		12	84
20	7	HGR	5.9	52	1044	6.2	11	0.4	1.1	286	5725	120	2395		21	87
6	2	GLD	1.8	102	612	3.6	12	0.3	0.9	1923	11540	577	3462		15	72
22	7	RUN	6.5	38	843	5.0	8	0.4	1.5	295	6479	133	2922		6	91
47	6	SRN	13.8	101	4748	28.1	10	0.5	1.2	686	32233	325	15277		18	89
121	121	MCP	35.6	35	4240	25.1	12	0.8	5.2	428	51802	506	60251	377	45	87
2	2	CCP	0.6	24	48	0.3	8	0.7	2.2	204	408	251	502	164	40	88
6	6	STP	1.8	42	255	1.5	13	0.7	2.3	521	3126	452	2714	337	35	96
1	1	LSR	0.3	62	62	0.4	11	0.1	1.4	682	682	205	205	68	0	88
14	14	PLP	4.1	19	267	1.6	14	1.0	3.9	275	3847	405	5668	345	74	93
5	0	NS	1.5	73	367	2.2										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
340	177	16895.5	139484	102171

Table 3 - Summary of Pool Types

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

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
129	129	MAIN	90	35	4543	93	12.0	0.8	429	55336	371	47172	44
15	15	SCOUR	10	22	329	7	13.5	0.9	302	4529	326	4897	69

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
144	144	4872	59864	52069

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

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

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
119	MCP	84	13	11	66	55	32	27	7	6	1	1
2	CCP	1	1	50	0	0	1	50	0	0	0	0
6	STP	4	1	17	4	67	1	17	0	0	0	0
1	LSR	1	0	0	1	100	0	0	0	0	0	0
14	PLP	10	1	7	9	64	3	21	1	7	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
142	16	11	80	56	37	26	8	6	1	1

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006 Dry Units: 0

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
96	11	LGR	0	8	0	0	18	4	2	31	0
20	7	HGR	0	11	3	0	0	0	19	67	0
116	18	TOTAL RIFFLE	0	9	1	0	11	2	9	45	0
6	2	GLD	0	0	0	0	100	0	0	0	0
22	7	RUN	14	19	14	10	0	0	0	0	0
47	6	SRN	18	8	6	18	17	3	0	14	0
75	15	TOTAL FLAT	14	12	9	12	20	1	0	6	0
121	121	MCP	13	20	30	18	2	1	0	10	0
2	2	CCP	23	5	0	23	0	0	0	50	0
6	6	STP	4	19	48	3	0	0	3	23	0
1	1	LSR	0	0	0	0	0	0	0	0	0
14	14	PLP	10	17	37	16	0	0	9	11	0
144	144	TOTAL POOL	13	19	31	17	2	1	1	11	0
5	0	NS									
340	177	TOTAL	12	18	26	15	5	1	2	14	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006 Dry Units: 0

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
96	11	LGR	0	0	9	73	18	0	0
20	7	HGR	0	0	0	14	57	29	0
6	3	GLD	0	0	100	0	0	0	0
22	7	RUN	0	0	57	43	0	0	0
47	7	SRN	0	0	43	57	0	0	0
121	121	MCP	50	9	23	12	5	1	0
2	2	CCP	0	0	0	50	0	50	0
6	6	STP	33	0	33	17	17	0	0
1	1	LSR	0	0	0	100	0	0	0
14	14	PLP	36	7	29	21	0	7	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
88	45	55	0	97	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: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006 Survey Length (ft.): 16895.5 Main Channel (ft.): 16239.5 Side Channel (ft.): 656

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: C4
Reach Length (ft.): 2561.5
Riffle/Flatwater Mean Width (ft.): 9.1
BFW:
Range (ft.): 0 to 27
Mean (ft.): 19
Std. Dev.: 10
Base Flow (cfs.): 0.7
Water (F): 56 - 59 Air (F): 59 - 68
Dry Channel (ft): 0

Canopy Density (%): 82.4
Coniferous Component (%): 45.6
Hardwood Component (%): 54.4
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 100.0
Dominant Shelter: Terrestrial Veg.
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 11
LWD per 100 ft.:
Riffles: 0
Pools: 3
Flat: 0

Pools by Stream Length (%): 27.1
Pool Frequency (%): 35.9
Residual Pool Depth (%):
< 2 Feet Deep: 57
2 to 2.9 Feet Deep: 43
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.8
Mean Pool Shelter Rating: 26

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 7 Gravel: 86 Sm Cobble: 7 Lg Cobble: 0 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 14.3 2. 28.6 3. 35.7 4. 21.4 5. 0.0

STREAM REACH: 2

Channel Type: F4
Reach Length (ft.): 6274
Riffle/Flatwater Mean Width (ft.): 7.4
BFW:
Range (ft.): 19 to 97
Mean (ft.): 26
Std. Dev.: 15
Base Flow (cfs.): 0.7
Water (F): 56 - 59 Air (F): 53 - 70
Dry Channel (ft): 0

Canopy Density (%): 89.2
Coniferous Component (%): 41.0
Hardwood Component (%): 59.0
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 97.5
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 33
LWD per 100 ft.:
Riffles: 3
Pools: 7
Flat: 2

Pools by Stream Length (%): 37.6
Pool Frequency (%): 50.4
Residual Pool Depth (%):
< 2 Feet Deep: 63
2 to 2.9 Feet Deep: 28
3 to 3.9 Feet Deep: 9
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.9
Mean Pool Shelter Rating: 49

Pool Tail Substrate (%): Silt/Clay: 1 Sand: 4 Gravel: 58 Sm Cobble: 27 Lg Cobble: 9 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 10.3 2. 26.5 3. 25.0 4. 36.8 5. 1.5

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B3
Reach Length (ft.): 7404
Riffle/Flatwater Mean Width (ft.): 10.1
BFW:
Range (ft.): 15 to 239
Mean (ft.): 21
Std. Dev.: 18
Base Flow (cfs.): 0.7
Water (F): 54 - 59 Air (F): 57 - 68
Dry Channel (ft): 0

Canopy Density (%): 88.2
Coniferous Component (%): 49.7
Hardwood Component (%): 50.3
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 97.6
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 24
LWD per 100 ft.:
Riffles: 4
Pools: 13
Flat: 4

Pools by Stream Length (%): 21.8
Pool Frequency (%): 37.0
Residual Pool Depth (%):
< 2 Feet Deep: 75
2 to 2.9 Feet Deep: 20
3 to 3.9 Feet Deep: 3
>= 4 Feet Deep: 2
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 50

Pool Tail Substrate (%): Silt/Clay: 2 Sand: 2 Gravel: 48 Sm Cobble: 13 Lg Cobble: 18 Boulder: 17 Bedrock: 0
Embeddedness Values (%): 1. 6.7 2. 18.3 3. 26.7 4. 46.7 5. 1.7

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

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	4	1.1
Boulder	4	0	1.1
Cobble / Gravel	4	2	1.7
Sand / Silt / Clay	171	173	96.1

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	4	14	5.0
Hardwood Trees	116	99	60.1
Coniferous Trees	59	66	34.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

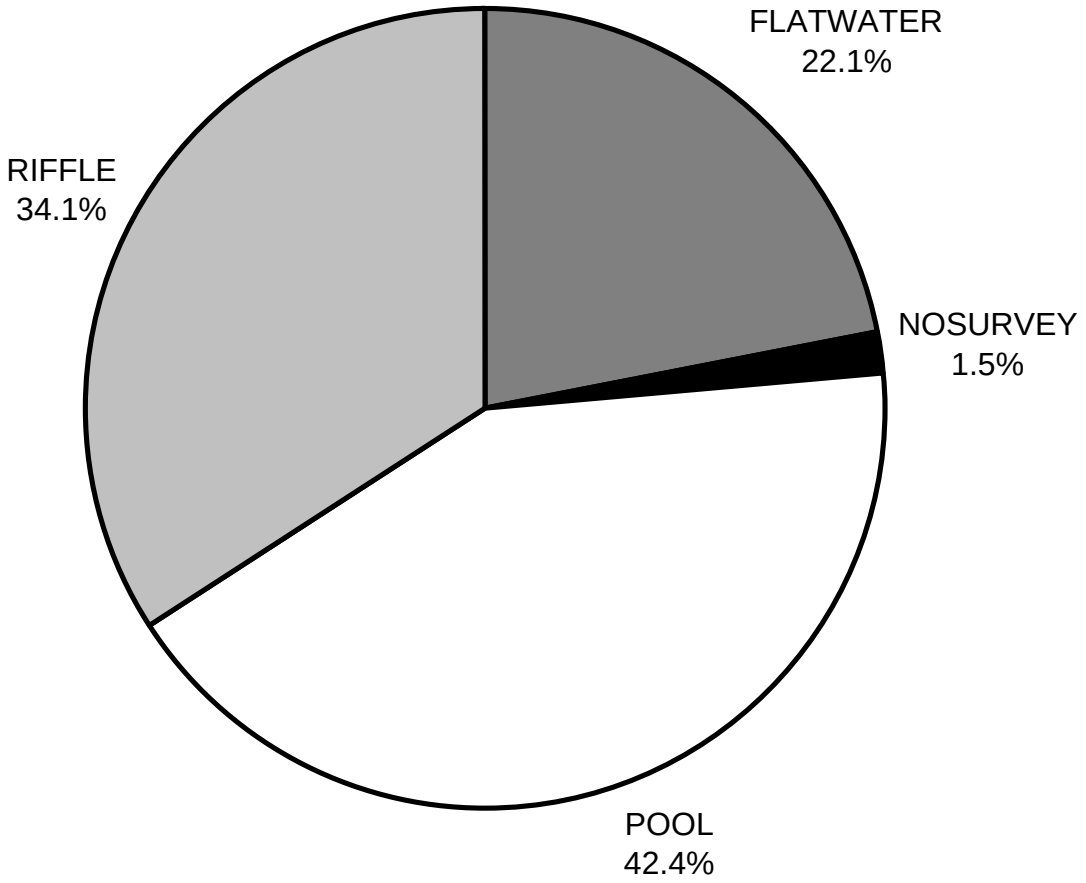
StreamName: Cummings Creek LLID: 1240310405236 Drainage: Van Duzen River

Survey Dates: 6/19/2006 to 6/28/2006

Confluence Location: Quad: HYDESVILLE Legal Description: T02NR01ES26 Latitude: 40:31:25.0N Longitude: 124:01:52.0W

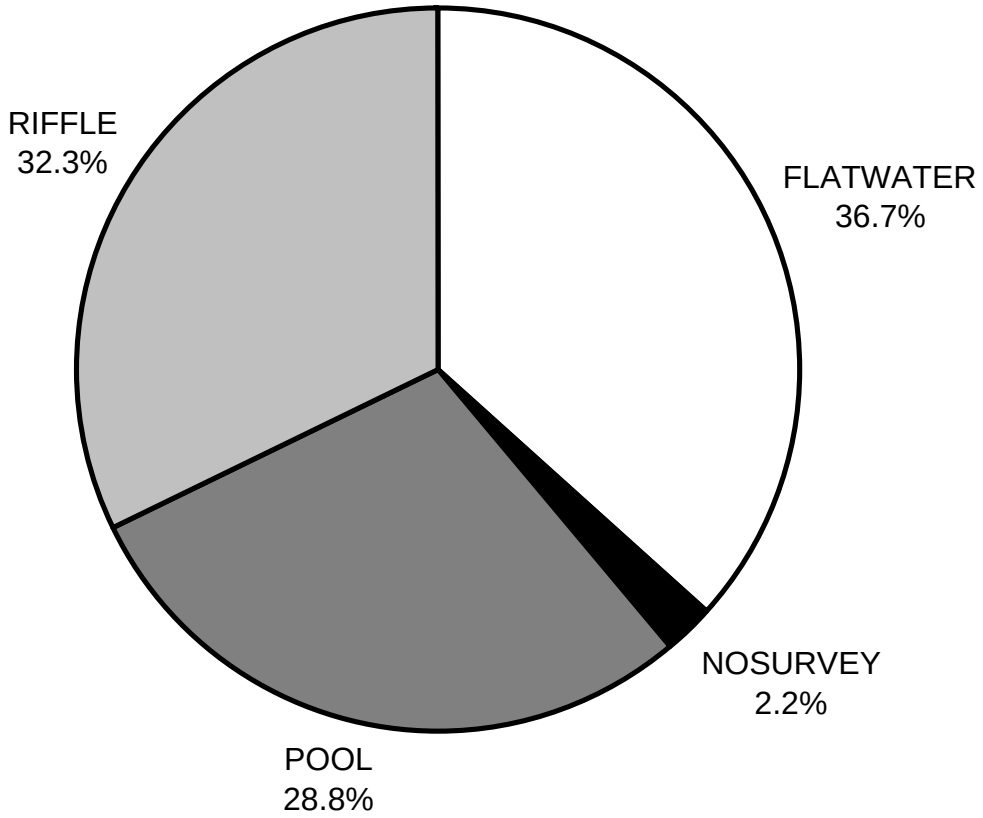
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	14	13
SMALL WOODY DEBRIS (%)	9	12	19
LARGE WOODY DEBRIS (%)	1	9	31
ROOT MASS (%)	0	12	17
TERRESTRIAL VEGETATION (%)	11	20	2
AQUATIC VEGETATION (%)	2	1	1
WHITEWATER (%)	9	0	1
BOULDERS (%)	45	6	11
BEDROCK LEDGES (%)	0	0	0

CUMMINGS CREEK 2006
HABITAT TYPES BY PERCENT OCCURRENCE



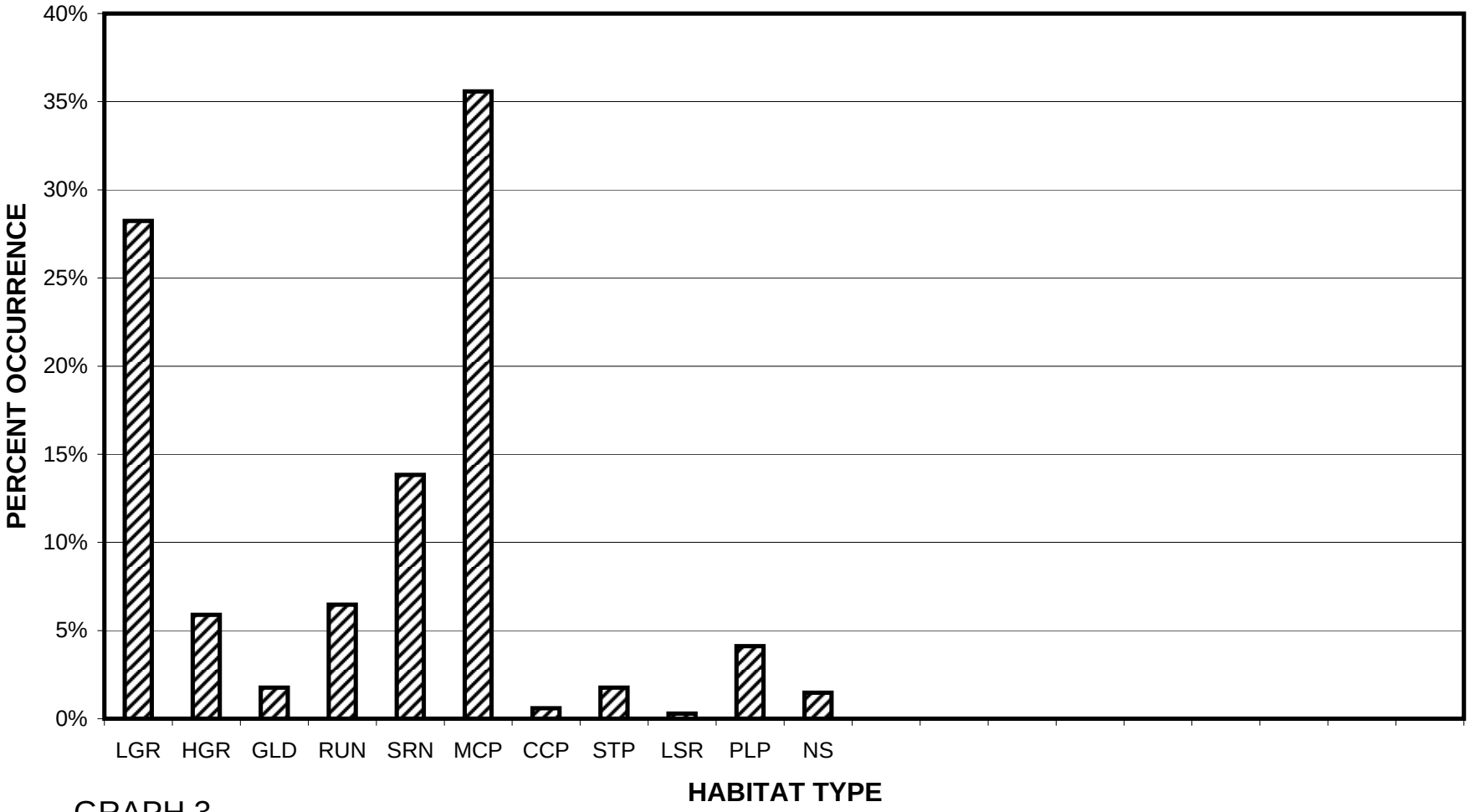
GRAPH 1

CUMMINGS CREEK 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH



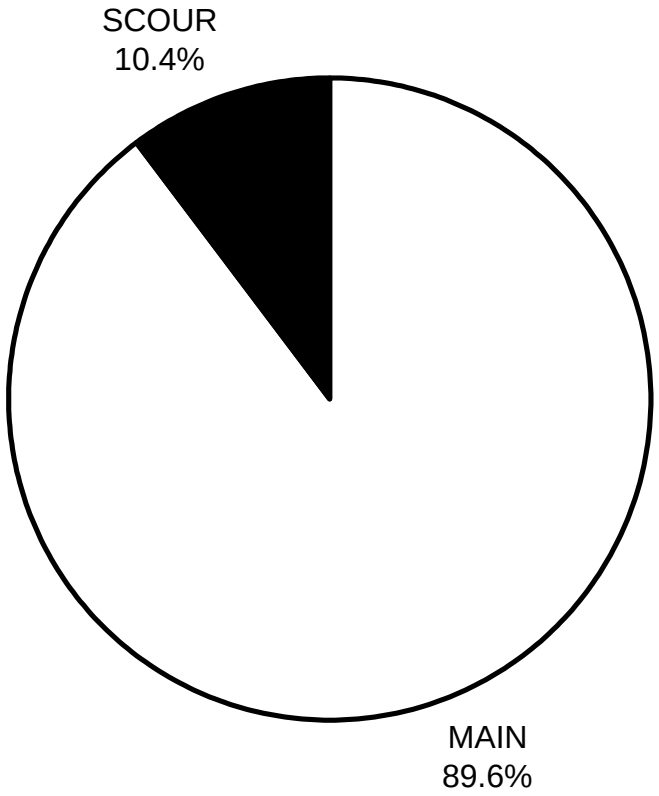
GRAPH 2

CUMMINGS CREEK 2006
HABITAT TYPES BY PERCENT OCCURRENCE



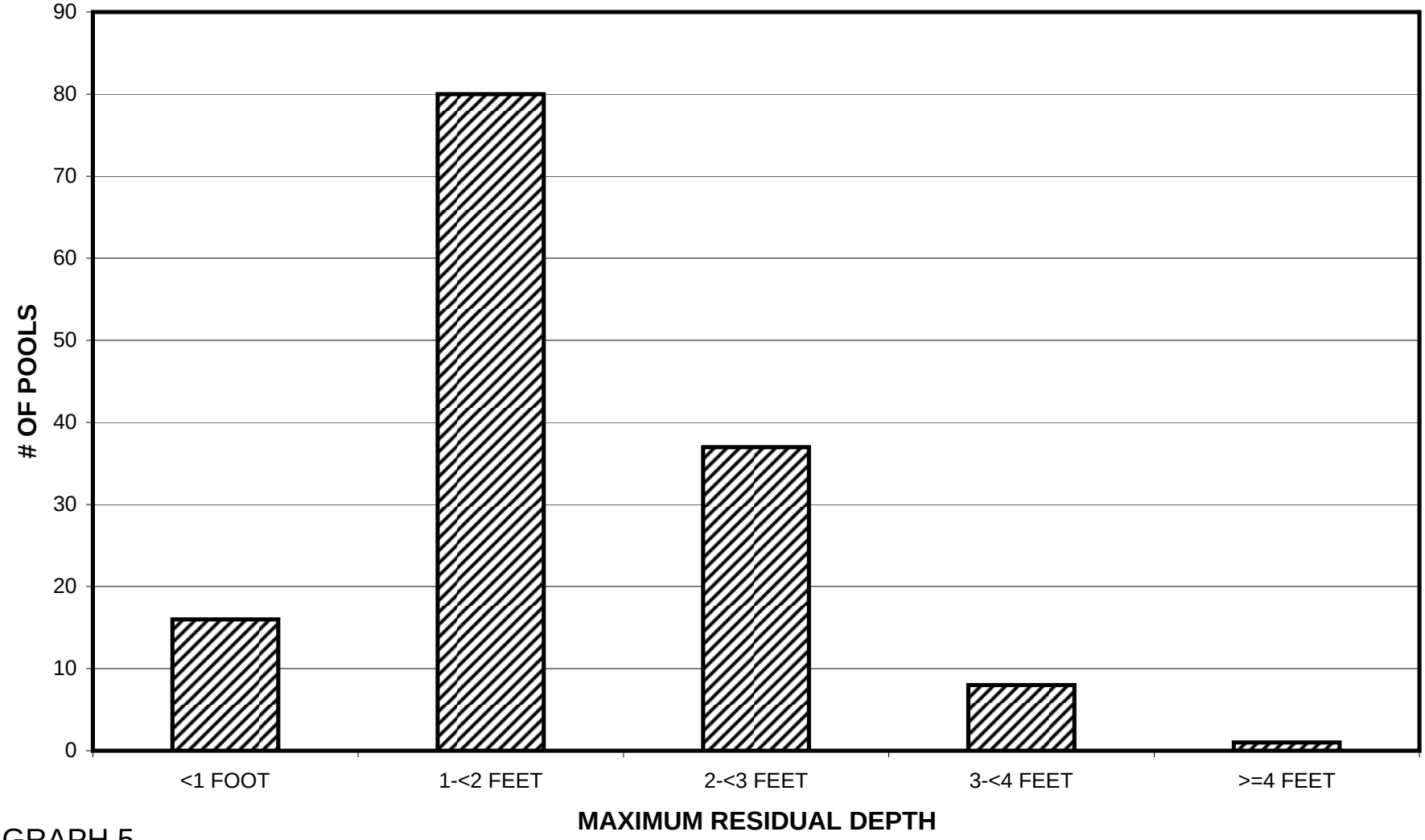
GRAPH 3

CUMMINGS CREEK 2006
POOL TYPES BY PERCENT OCCURRENCE



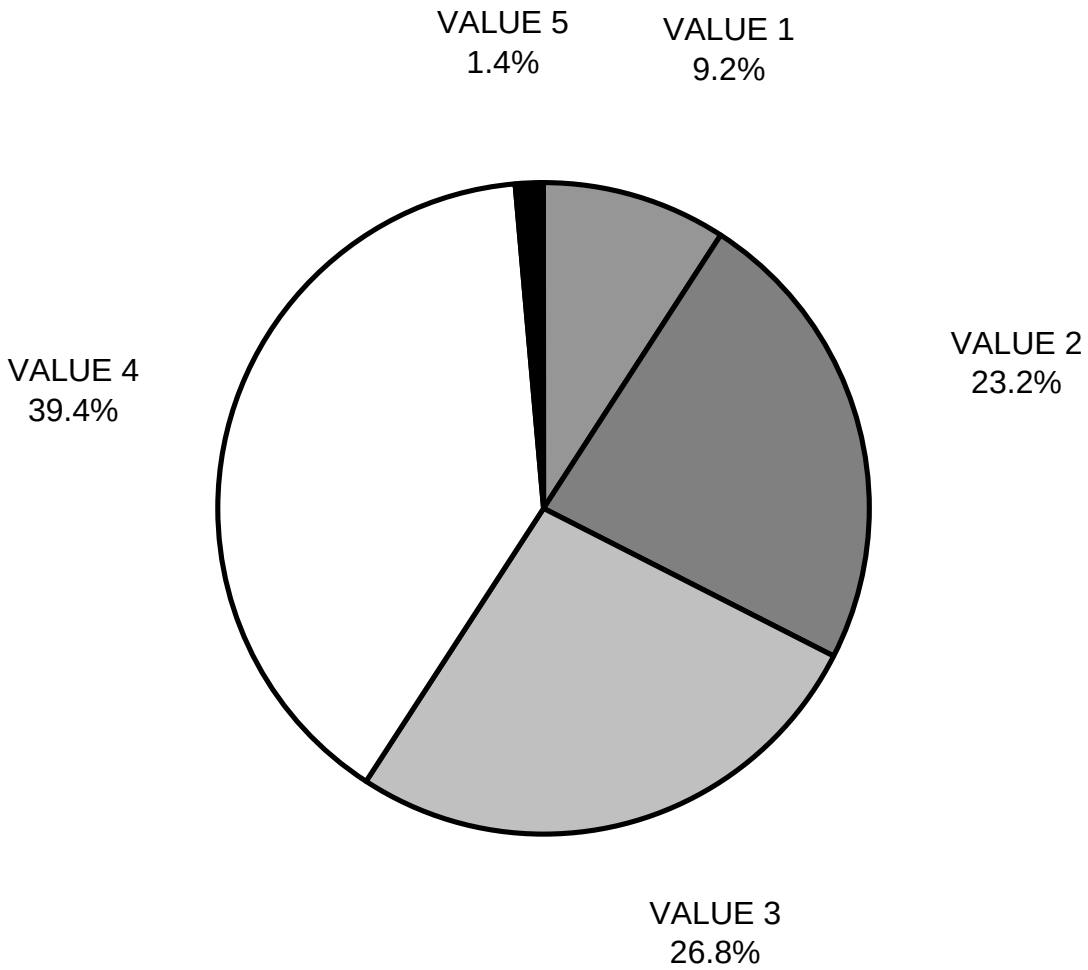
GRAPH 4

CUMMINGS CREEK 2006
MAXIMUM DEPTH IN POOLS



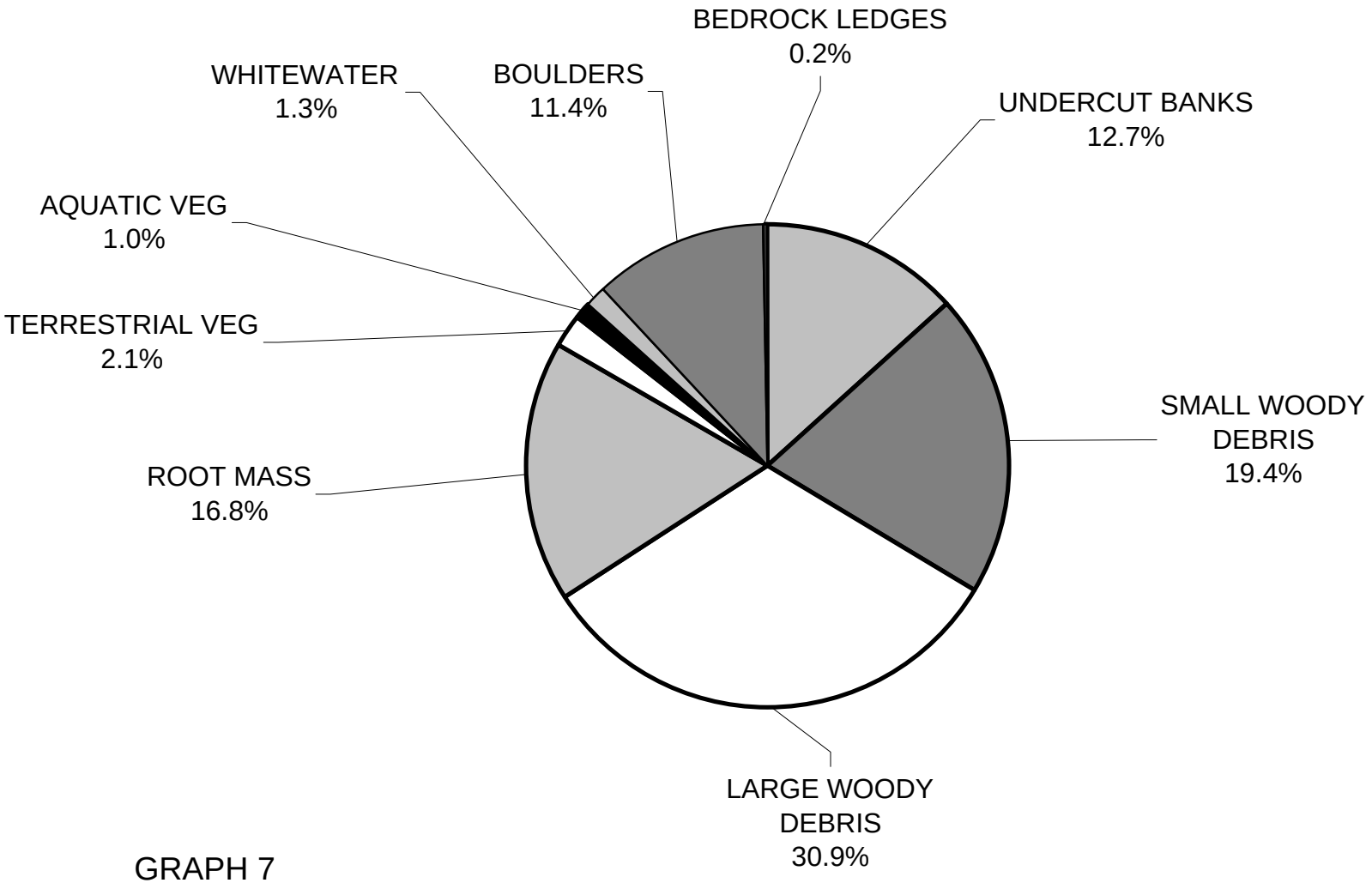
GRAPH 5

CUMMINGS CREEK 2006
PERCENT EMBEDDEDNESS



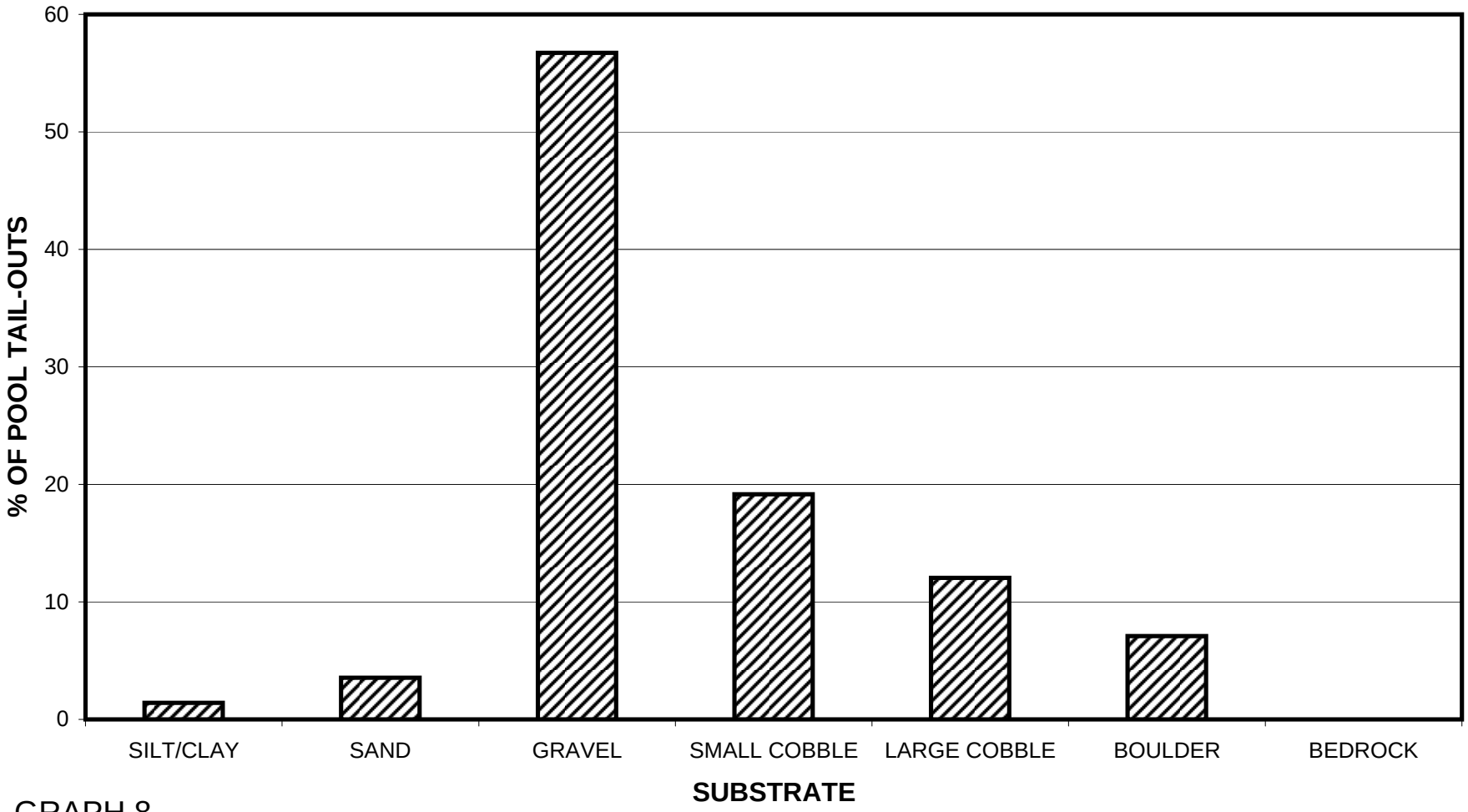
GRAPH 6

CUMMINGS CREEK 2006
MEAN PERCENT COVER TYPES IN POOLS



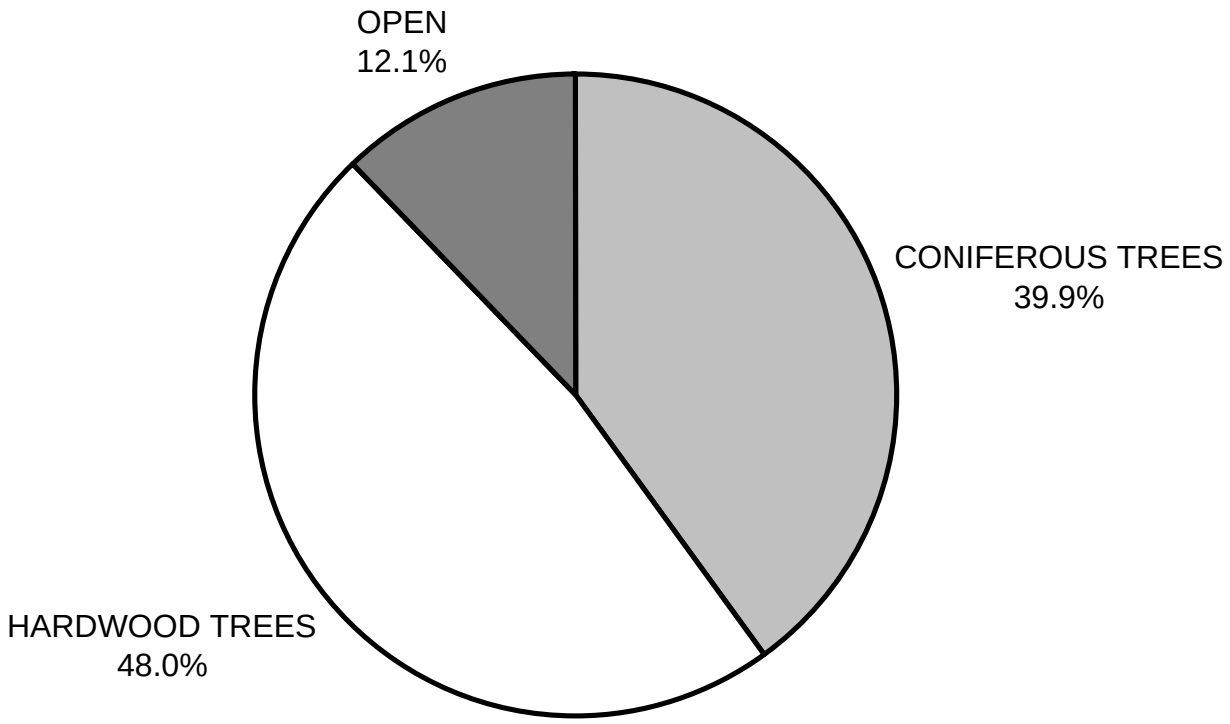
GRAPH 7

CUMMINGS CREEK 2006
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



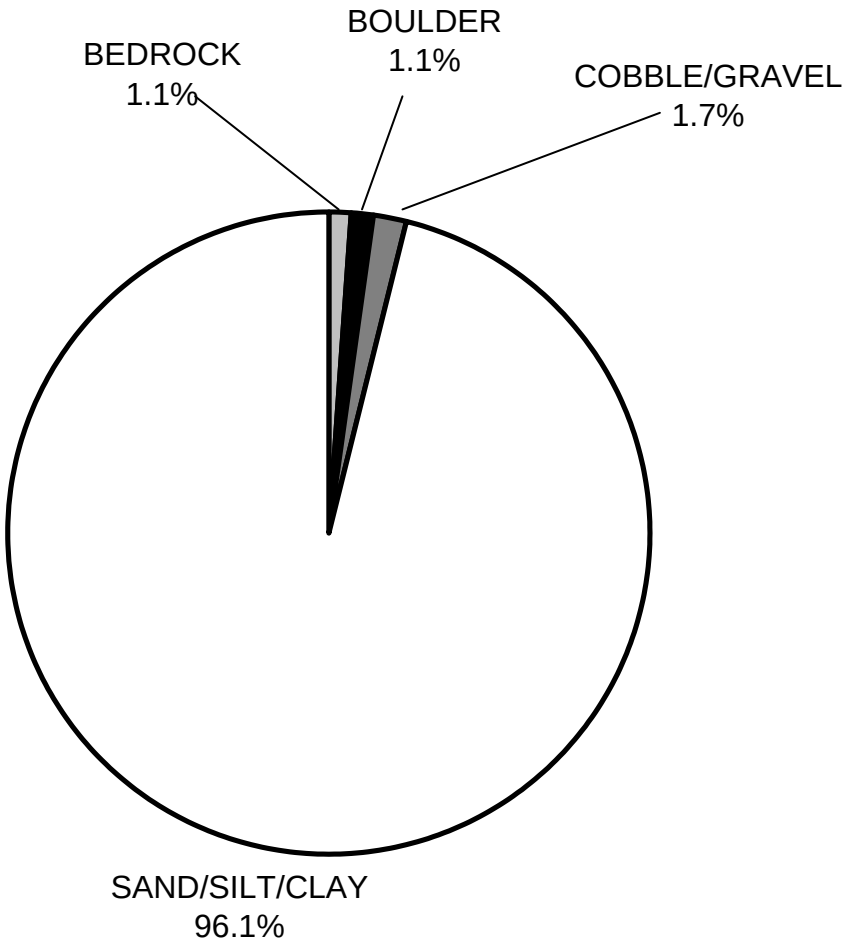
GRAPH 8

CUMMINGS CREEK 2006
MEAN PERCENT CANOPY



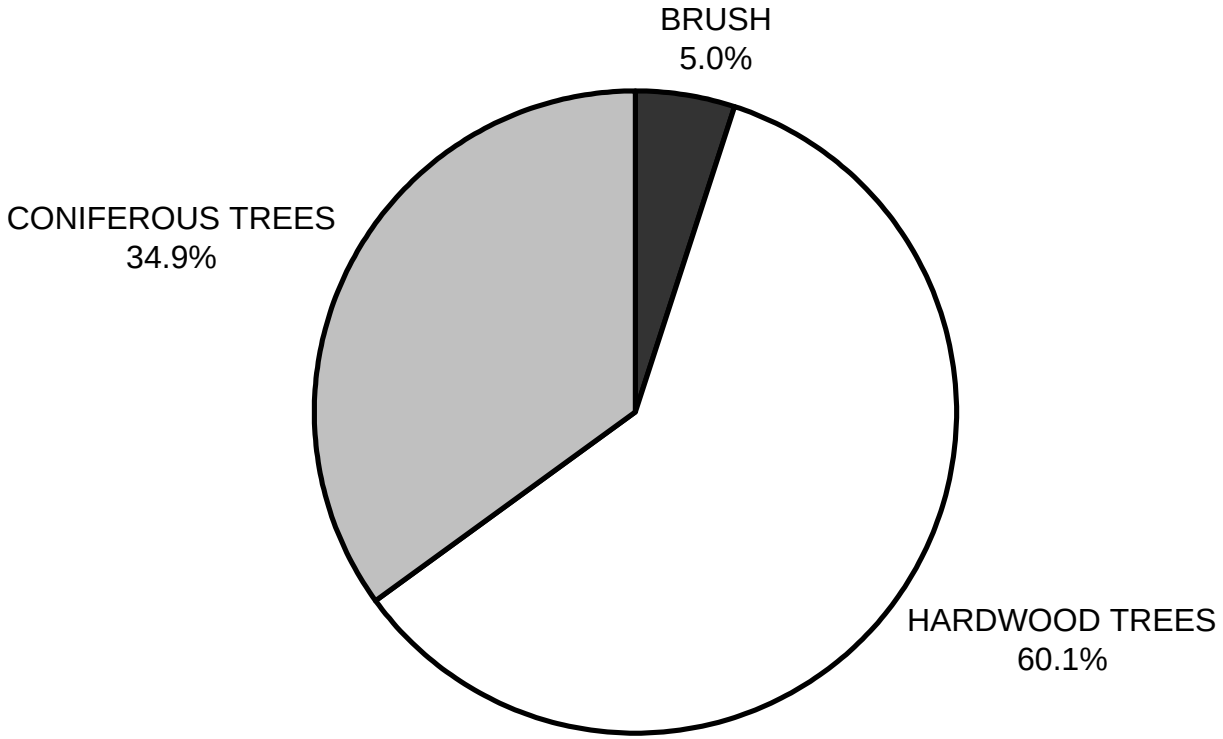
GRAPH 9

CUMMINGS CREEK 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

CUMMINGS CREEK 2006
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11