

STREAM INVENTORY REPORT

Stevens Creek 2006

INTRODUCTION

A stream inventory was conducted from June 5, 2006 to June 7, 2006 on Stevens Creek. The survey began at the confluence with Grizzly Creek and extended upstream 5,131 feet.

The Stevens 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 Stevens 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 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

Stevens Creek is a tributary to Grizzly Creek, tributary to the Van Duzen River, tributary to the Eel River, tributary to the Pacific Ocean, located in Humboldt County, California (Map 1). Stevens Creek's legal description at the confluence with Grizzly Creek is T01N R02E S01. Its location is 40°29'30" north latitude and 123°54'20" west longitude, LLID number 1239055404918. Stevens Creek is a 1st order stream and has approximately 2.53 miles of blue line stream according to the USGS Owl Creek & Redcrest 7.5 minute quadrangle. Stevens Creek drains a watershed of approximately 5.33 square miles. Elevations range from about 400 feet at the mouth of the creek to 1,650 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Highway 36 to a left turn just before Grizzly Creek State Park and then onto Pacific Lumber Company private roads.

METHODS

The habitat inventory conducted in Stevens 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 two-person team.

SAMPLING STRATEGY

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

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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. All pools except step-pools are fully sampled.

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 Stevens 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". Stevens 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 Stevens 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 Stevens 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 Stevens 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 Stevens 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 Stevens Creek. In addition, 6 sites were electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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 Stevens 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 June 5, 2006 to June 7, 2006 was conducted by C. Pollastrini (WSP) and S. McSmith (WSP). The total length of the stream surveyed was 5,131 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.08 cfs on 06/08/06.

Stevens Creek is a F3 channel type for 924 feet of the stream surveyed (Reach 1), and a B3 channel type for 4,207 feet of the stream surveyed (Reach 2).

F3 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and cobble dominant substrates. B3 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and cobble dominant substrates.

Water temperatures taken during the survey period ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 58 to 68 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 32% riffle units, 46% pool units, 20% flatwater units, and 2% no survey units, (Graph 1). Based on total length of Level II habitat types there were 31% riffle units, 38% pool units, 31% flatwater units, and 1% no survey units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were; 44% mid-channel pool units, 31% low gradient riffle units and 11% run units

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(Graph 3). Based on percent total length 37% mid-channel pool units, 30% low gradient riffle units, and 21% step run units.

A total of 43 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 95% (Graph 4), and comprised 96.5% 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. Sixteen of the 43 pools (37%) had a residual depth of two feet or greater (Graph 5). Six of the 43 pools (14%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 43 pool tail-outs measured, 22 had a value of 1 (51.2%); 9 had a value of 2 (20.9%); 9 had a value of 3 (20.9%); 2 had a value of 4 (4.7%); 1 had a value of 5 (2.3%); (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 18, flatwater habitat types had a mean shelter rating of 18, and pool habitats had a mean shelter rating of 49 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 49 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 49% of pool tail-outs and small cobble in 28% of pool tail-outs.

The mean percent canopy density for the surveyed length of Stevens Creek was 81%. Nineteen percent of the canopy was open. The mean percentages of hardwood and coniferous trees were 39% and 61%, respectively. Graph 9 describes the mean percent canopy in Stevens Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 69% sand/silt/clay, 15% bedrock, 13% cobble/gravel and 3% boulder (Graph 10). Deciduous trees are the dominant vegetation type observed in 46% of the units surveyed. Additionally, 32% of the units surveyed had coniferous trees as the dominant vegetation type, and 21% had brush as the dominant vegetation (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Six sites were electrofished for species composition and distribution in Stevens Creek on June 15, 2006. Water temperatures taken during the electrofishing period (9:30am-3:30pm) ranged from 56 to 61 degrees Fahrenheit. The sites were sampled by S. McSmith (WSP), C. Pollastrini (WSP) and T. Tollefson (DFG).

In reach one, which comprised the first 924 feet of stream, two sites were sampled. The reach sites yielded 30 young-of-the-year steelhead/rainbow trout (SH/RT), one age 1+ SH/RT and one Pacific giant salamander.

In reach two, 4 sites were sampled starting approximately 1,000 feet from the confluence and continuing upstream 4,200 feet. The reach sites yielded 38 young-of-the-year SH/RT and 12 age 1+ SH/RT.

Visual observations continued upstream of last electrofishing sample performed within the habitat typed area. One 1+ (SH/RT) was observed in the pool immediately below the LDA which marked end of the survey. Upstream of the LDA a 120 foot stretch consisting of pool, riffle, pool, riffle and run yielded no fish captured or observed. There were over 10 Pacific giant salamanders caught.

The following chart displays the information yielded from these sites:

2006 Stevens Creek e-fish observations

Date	Site #	Hab. Unit #	Hab. Type	Approx. Dist. from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
06/15/06	1	008	4.2	447	0	0	12	1	0
06/15/06	2	013	4.2	775	0	0	18	0	0
Reach 2 B3 Channel Type									
06/15/06	3	018	4.2	993	0	0	10	2	0
06/15/06	4	022	4.2	1095	0	0	16	0	0
06/15/06	5	044	4.2	2414	0	0	11	1	0
06/15/06	6	053	4.2	2736	0	0	1	9	0

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DISCUSSION

Stevens Creek is a F3 channel type for the first 924 feet of stream surveyed and a B3 channel type for the remaining 4,207 feet. The suitability of F3 and B3 channel types for fish habitat improvement structures is as follows: F3 channel types are good for bank-placed boulders, single and opposing wing deflectors, and fair for plunge weirs, boulder clusters, channel constrictors and log cover. B3 channel types are excellent for plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover.

The water temperatures recorded on the survey days June 5, 2006 to June 7, 2006, ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 58 to 68 degrees Fahrenheit. 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 as well as riffle habitat types each comprised 31% of the total length of this survey, and pools 38%. The pools are relatively shallow, with only 16 of the 43 (37%) 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 deepen pool habitat is recommended.

Thirty-one of the 43 pool tail-outs measured had embeddedness ratings of 1 or 2. Eleven 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.

Thirty-three of the 43 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 49. The shelter rating in the flatwater habitats was 18. 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 Stevens Creek. Large woody debris is the dominant cover type in pools followed by boulders. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 81%. Reach 1 had a canopy density of 81.75%, Reach 2 had a canopy density of 80.25%. The percentage of right and left bank covered with vegetation was 93% and 94%, respectively. In general, revegetation projects are considered when canopy density is less than 80%.

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RECOMMENDATIONS

- 1) Stevens 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 depth of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

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 confluence of Grizzly Creek.
818	0014.00	Bridge #1; 17' wide x 33.5' high x 80' long.
890	0016.00	Channel type change to B3.
1298	0026.00	Right bank stabilization structure.
2490	0046.00	Log debris accumulation (LDA) #1; 16' high x 110' wide x 85' long, retaining sediment.
2530	0047.00	Flow largely sub-surface in this unit.
2584	0049.00	One-plus salmonid observed.
3390	0066.00	Left bank seep contributing sediment. Habitat structure.
4198	0080.00	Left bank slide extends approximately 200 yards upslope.
4232	0082.00	LDA #2; 8' high x 29' wide x 27' long retaining sediment.

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- | | | |
|------|---------|---|
| 5130 | 0094.00 | Right bank landslide for nearly entire 1,000 feet.
No salmonids observed above LDA #2. |
| 5131 | 0094.00 | End of survey at LDA #2. Stream was surveyed above LDA for
approximately 1,000 feet. |

REFERENCES

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

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

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

CASCADE

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

FLATWATER

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

MAIN CHANNEL POOLS

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

SCOUR POOLS

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

BACKWATER POOLS

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

ADDITIONAL UNIT DESIGNATIONS

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

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

Stream Name: Stevens Creek

LLID: 1239055404918 Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0

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
19	7	FLATWATER	20.2	82	1567	30.5	9.3	0.6	1.1	984	18705	563	10705		18
2	0	NOSURVEY	2.1	14	28	0.5									
43	43	POOL	45.7	45	1950	38.0	14.4	0.9	1.9	624	26843	951	40878	734	49
30	6	RIFFLE	31.9	53	1586	30.9	10.3	0.4	0.7	365	10951	146	4382		18
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
94	56				5131					56500			55965		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

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 (%)
29	5	LGR	30.9	53	1539	30.0	10	0.4	1	359	10400	144	4162		13	75
1	1	HGR	1.1	47	47	0.9	13	0.4	0.9	397	397	159	159		40	100
10	3	RUN	10.6	48	485	9.5	8	0.5	1.1	286	2863	144	1443		3	81
9	4	SRN	9.6	120	1082	21.1	10	0.6	1.8	1508	13573	878	7900		33	76
41	41	MCP	43.6	46	1881	36.7	15	0.9	4	645	26450	987	40479	765	49	83
2	2	STP	2.1	34	69	1.3	6	0.6	1.6	197	393	199	398	113	50	77
2	0	NS	2.1	14	28	0.5										

Total Units
94

Total Units Fully Measured
56

Total Length (ft.)
5131

Total Area (sq.ft.)
54077

Total Volume (cu.ft.)
54541

Table 3 - Summary of Pool Types

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

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
43	43	MAIN	100	45	1950	100	14.4	0.9	624	26843	734	31582	49

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
43	43	1950	26843	31582

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

Stream Name: Stevens Creek LLID: 1239055404918 Drainage: Van Duzen River
 Survey Dates: 6/5/2006 to 6/7/2006
 Confluence Location: Quad: OWL CREEK Legal Description: T01NR02ES01 Latitude: 40:29:30.0N Longitude: 123:54:20.0W

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
41	MCP	95	6	15	19	46	10	24	3	7	3	7
2	STP	5	0	0	2	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
43	6	14	21	49	10	23	3	7	3	7

Mean Maximum Residual Pool Depth (ft.): 1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Dry Units: 0

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

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
29	5	LGR	0	0	0	0	0	0	16	64	0
1	1	HGR	0	0	0	40	0	0	30	30	0
30	6	TOTAL RIFFLE	0	0	0	7	0	0	18	58	0
10	3	RUN	0	33	0	0	0	0	7	27	0
9	3	SRN	0	0	13	33	0	0	17	30	7
19	6	TOTAL FLAT	0	17	7	17	0	0	12	28	3
41	38	MCP	3	9	44	9	2	0	5	25	2
2	2	STP	30	25	25	0	0	0	5	15	0
43	40	TOTAL POOL	5	10	43	8	2	0	5	24	2
2	0	NS									
94	52	TOTAL	3	9	34	9	1	0	7	29	2

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Dry Units: 0

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

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
29	5	LGR	0	0	0	60	20	20	0
1	1	HGR	0	0	0	0	100	0	0
10	3	RUN	0	67	33	0	0	0	0
9	4	SRN	0	25	25	50	0	0	0
41	41	MCP	29	49	7	5	10	0	0
2	2	STP	0	0	50	0	50	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
81	61	39	0	93	94

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: Stevens Creek LLID: 1239055404918 Drainage: Van Duzen River
 Survey Dates: 6/5/2006 to 6/7/2006 Survey Length (ft.): 5131 Main Channel (ft.): 5131 Side Channel (ft.): 0
 Confluence Location: Quad: OWL CREEK Legal Description: T01NR02ES01 Latitude: 40:29:30.0N Longitude: 123:54:20.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F3	Canopy Density (%): 81.8	Pools by Stream Length (%): 50.7
Reach Length (ft.): 890	Coniferous Component (%): 38.8	Pool Frequency (%): 46.7
Riffle/Flatwater Mean Width (ft.): 11.3	Hardwood Component (%): 61.3	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 86
Range (ft.): 28 to 42	Vegetative Cover (%): 85.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 37	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 14
Std. Dev.: 7	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 1.1	Occurrence of LWD (%): 5	Mean Max Residual Pool Depth (ft.): 1.8
Water (F): 57 - 58 Air (F): 60 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 16
Dry Channel (ft): 0	Riffles: 5	
	Pools: 3	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 29 Sm Cobble: 29 Lg Cobble: 43 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 42.9 2. 14.3 3. 42.9 4. 0.0 5. 0.0		

STREAM REACH: 2

Channel Type: B3	Canopy Density (%): 80.2	Pools by Stream Length (%): 35.3
Reach Length (ft.): 4241	Coniferous Component (%): 66.0	Pool Frequency (%): 45.6
Riffle/Flatwater Mean Width (ft.): 9.1	Hardwood Component (%): 34.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 58
Range (ft.): 28 to 45	Vegetative Cover (%): 96.0	2 to 2.9 Feet Deep: 28
Mean (ft.): 35	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 6
Std. Dev.: 5	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 8
Base Flow (cfs.): 1.1	Occurrence of LWD (%): 40	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 57 - 62 Air (F): 58 - 68	LWD per 100 ft.:	Mean Pool Shelter Rating: 55
Dry Channel (ft): 0	Riffles: 9	
	Pools: 16	
	Flat: 5	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 53 Sm Cobble: 28 Lg Cobble: 17 Boulder: 0 Bedrock: 3		
Embeddedness Values (%): 1. 52.8 2. 22.2 3. 16.7 4. 5.6 5. 2.8		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

Legal Description: T01NR02ES01

Latitude: 40:29:30.0N

Longitude: 123:54:20.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	6	11	15.2
Boulder	2	1	2.7
Cobble / Gravel	8	7	13.4
Sand / Silt / Clay	40	37	68.8

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	1	0.9
Brush	15	9	21.4
Hardwood Trees	22	29	45.5
Coniferous Trees	19	17	32.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Stevens Creek

LLID: 1239055404918

Drainage: Van Duzen River

Survey Dates: 6/5/2006 to 6/7/2006

Confluence Location: Quad: OWL CREEK

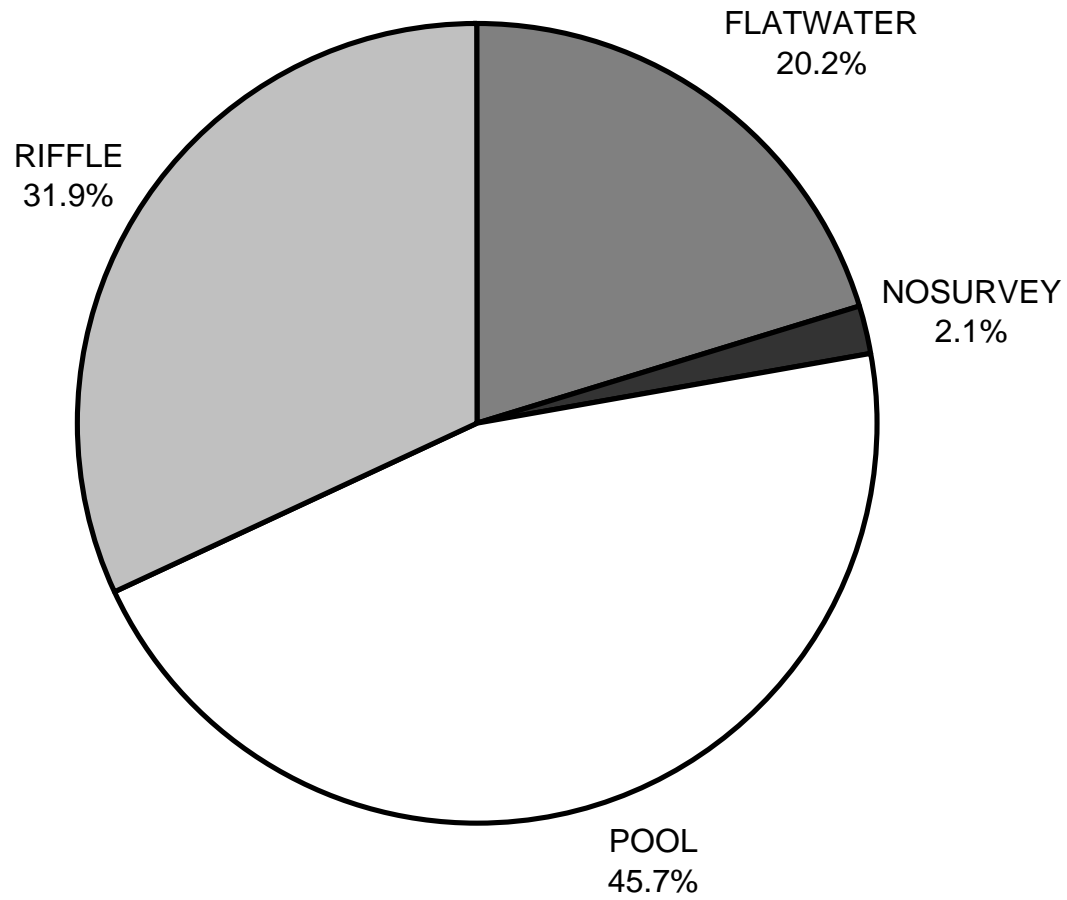
Legal Description: T01NR02ES01

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Longitude: 123:54:20.0W

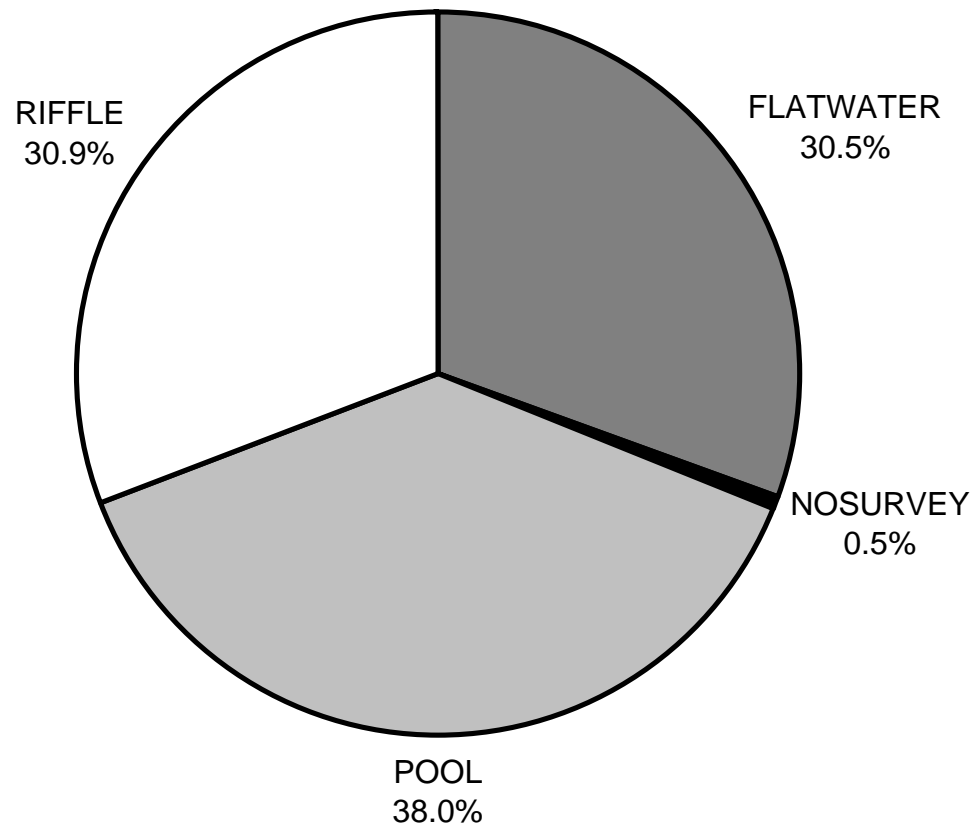
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	5
SMALL WOODY DEBRIS (%)	0	17	10
LARGE WOODY DEBRIS (%)	0	7	43
ROOT MASS (%)	7	17	8
TERRESTRIAL VEGETATION (%)	0	0	2
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	18	12	5
BOULDERS (%)	58	28	24
BEDROCK LEDGES (%)	0	3	2

STEVENS CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



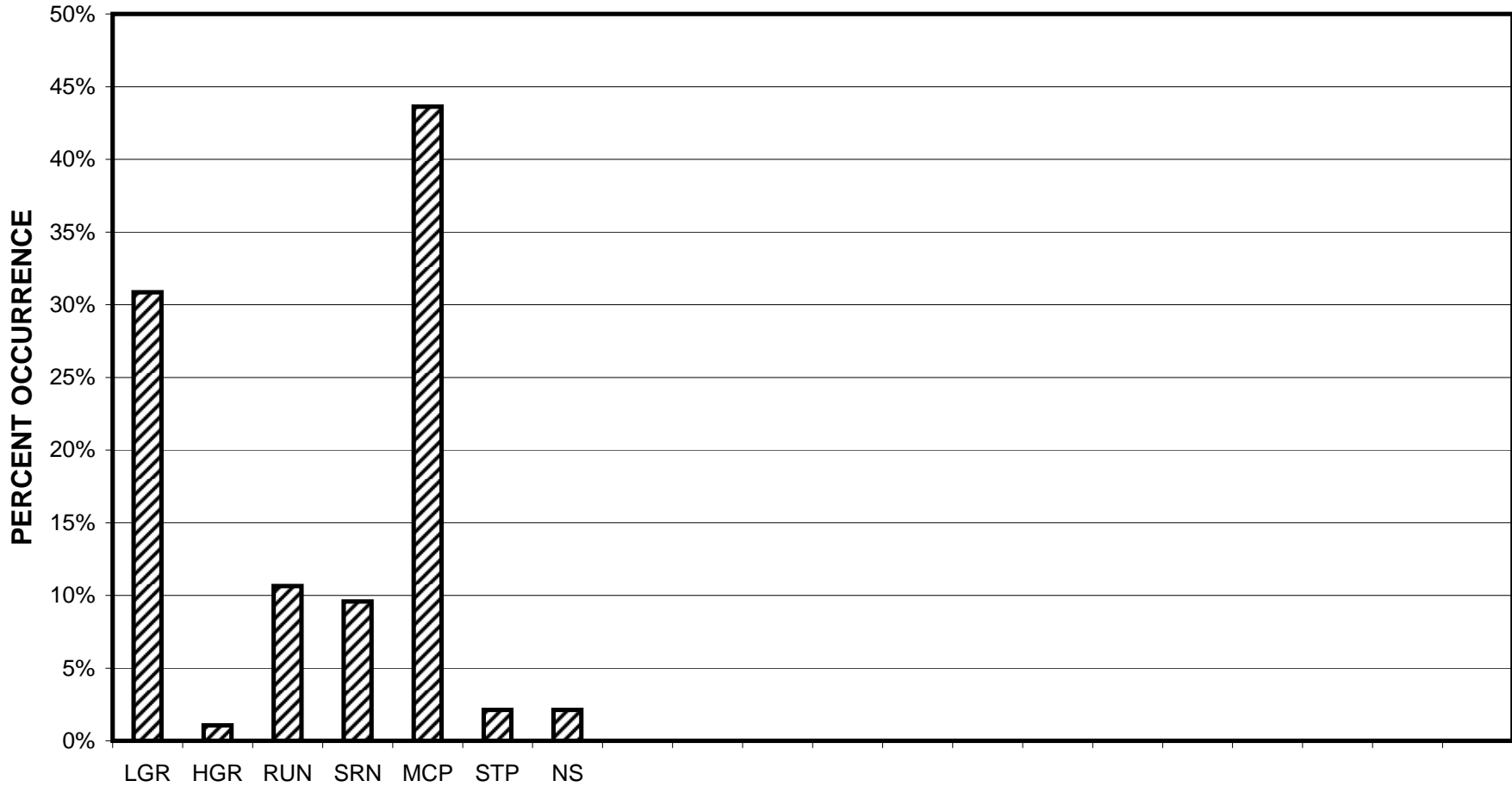
GRAPH 1

**STEVENS CREEK 2006
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

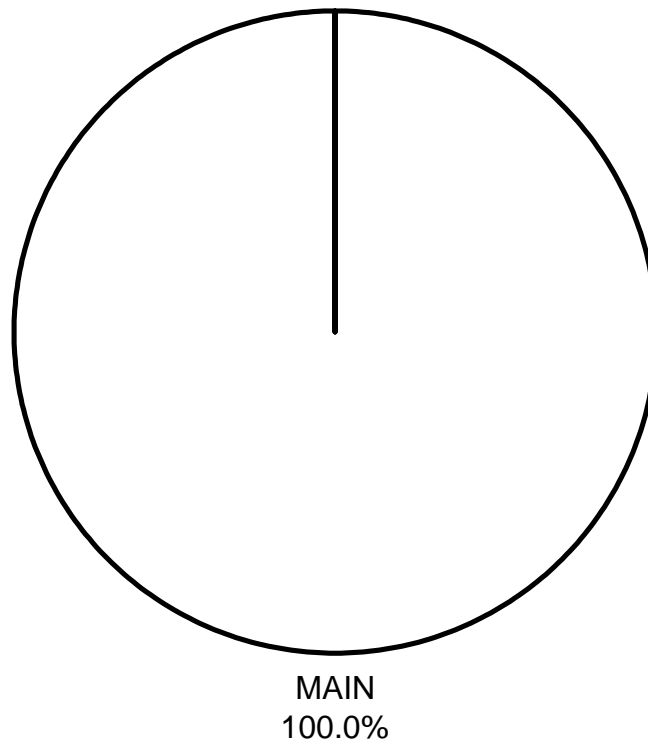
STEVENS CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

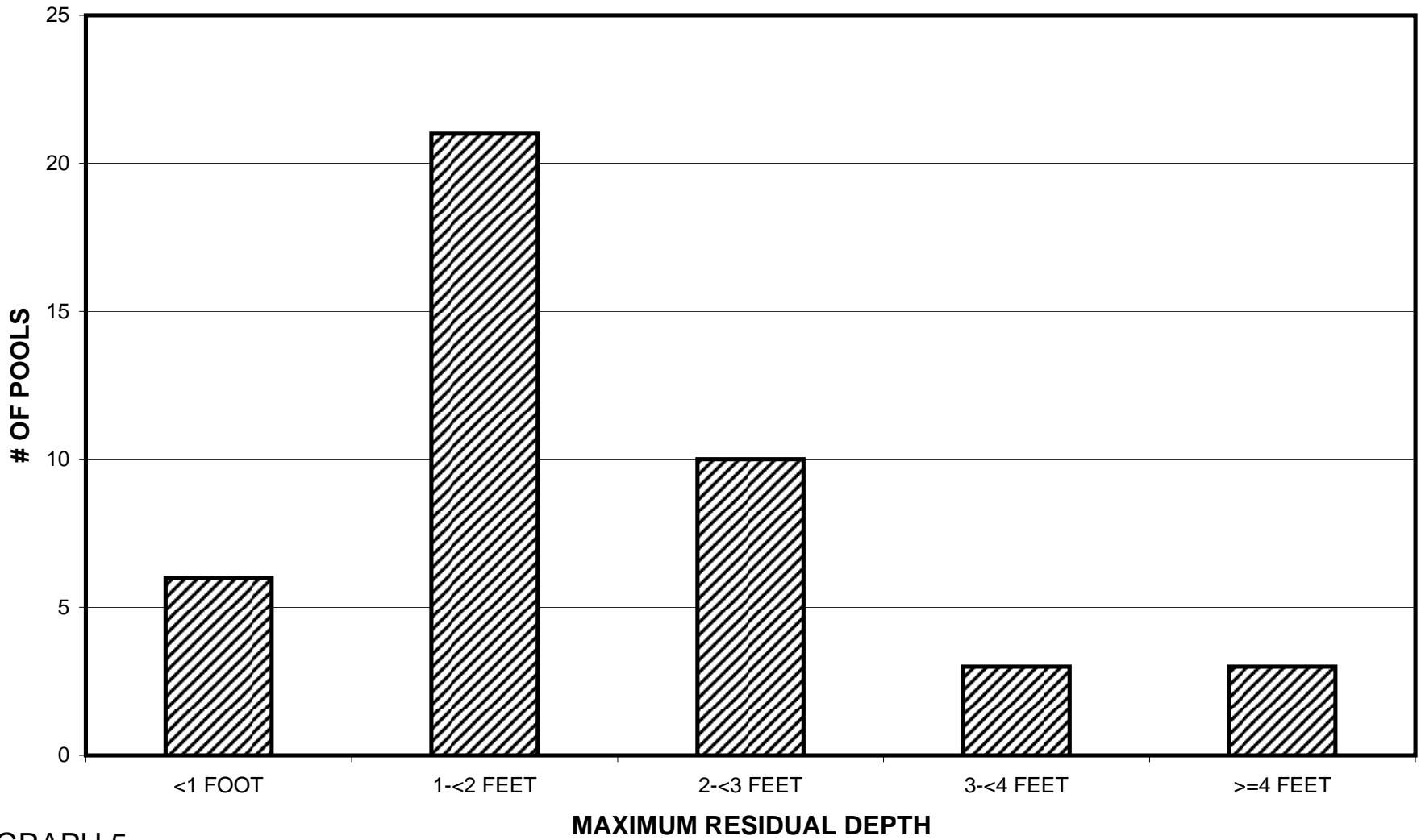
HABITAT TYPE

**STEVENS CREEK 2006
POOL TYPES BY PERCENT OCCURRENCE**



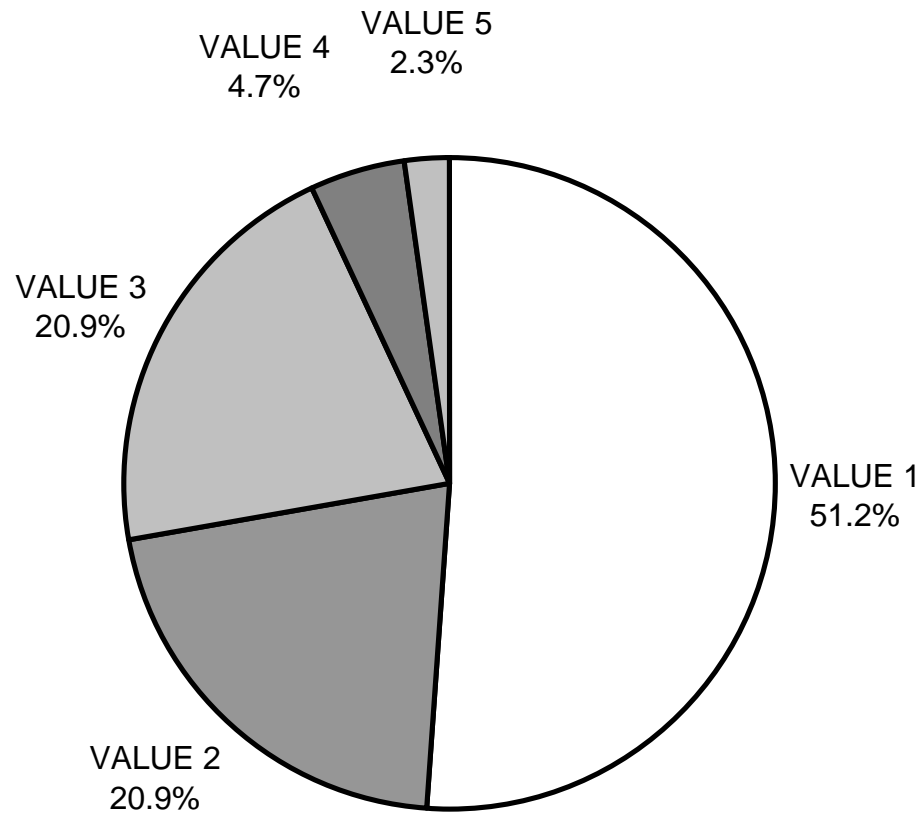
GRAPH 4

STEVENS CREEK 2006 MAXIMUM DEPTH IN POOLS



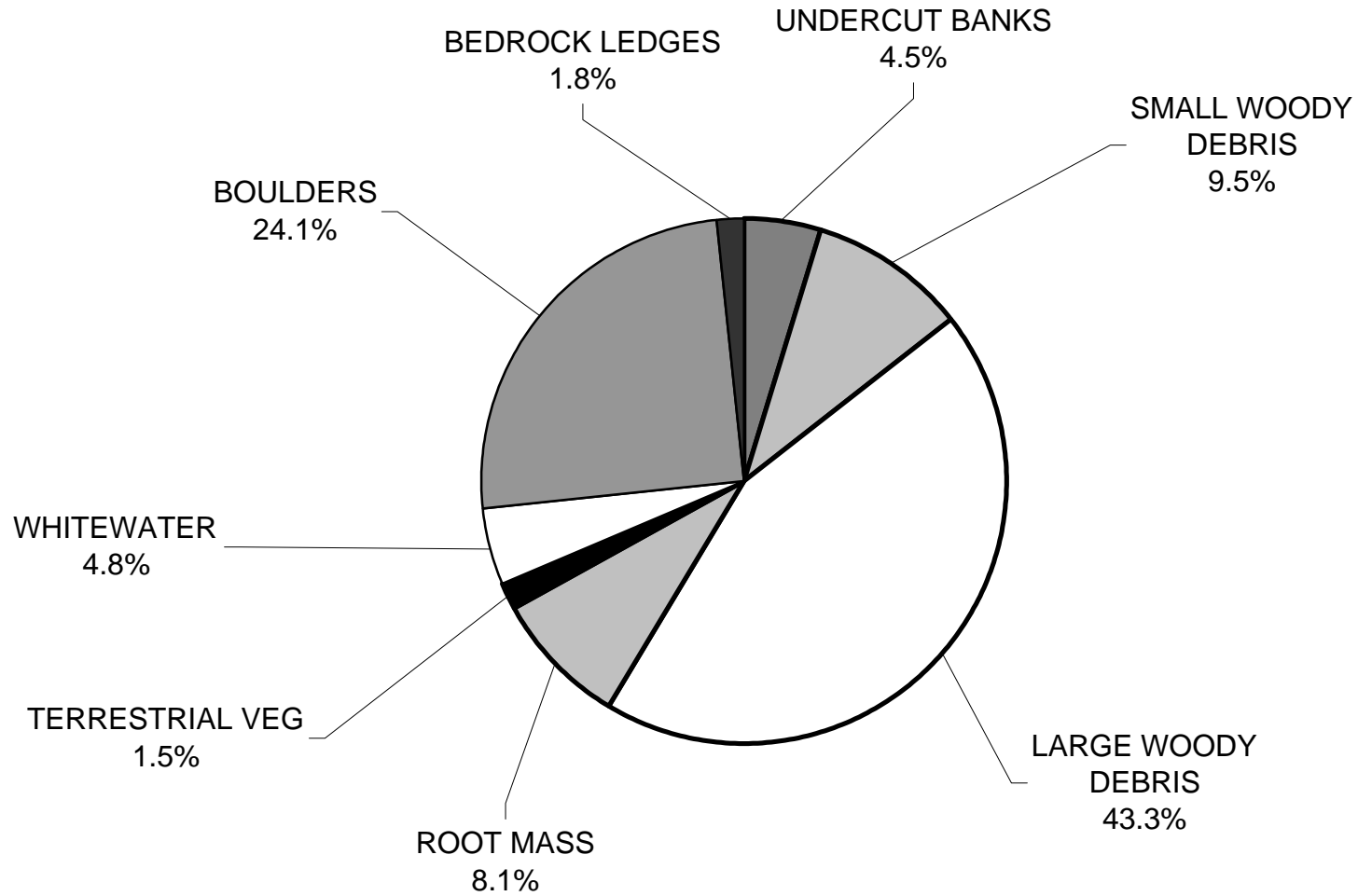
GRAPH 5

STEVENS CREEK 2006 PERCENT EMBEDDEDNESS



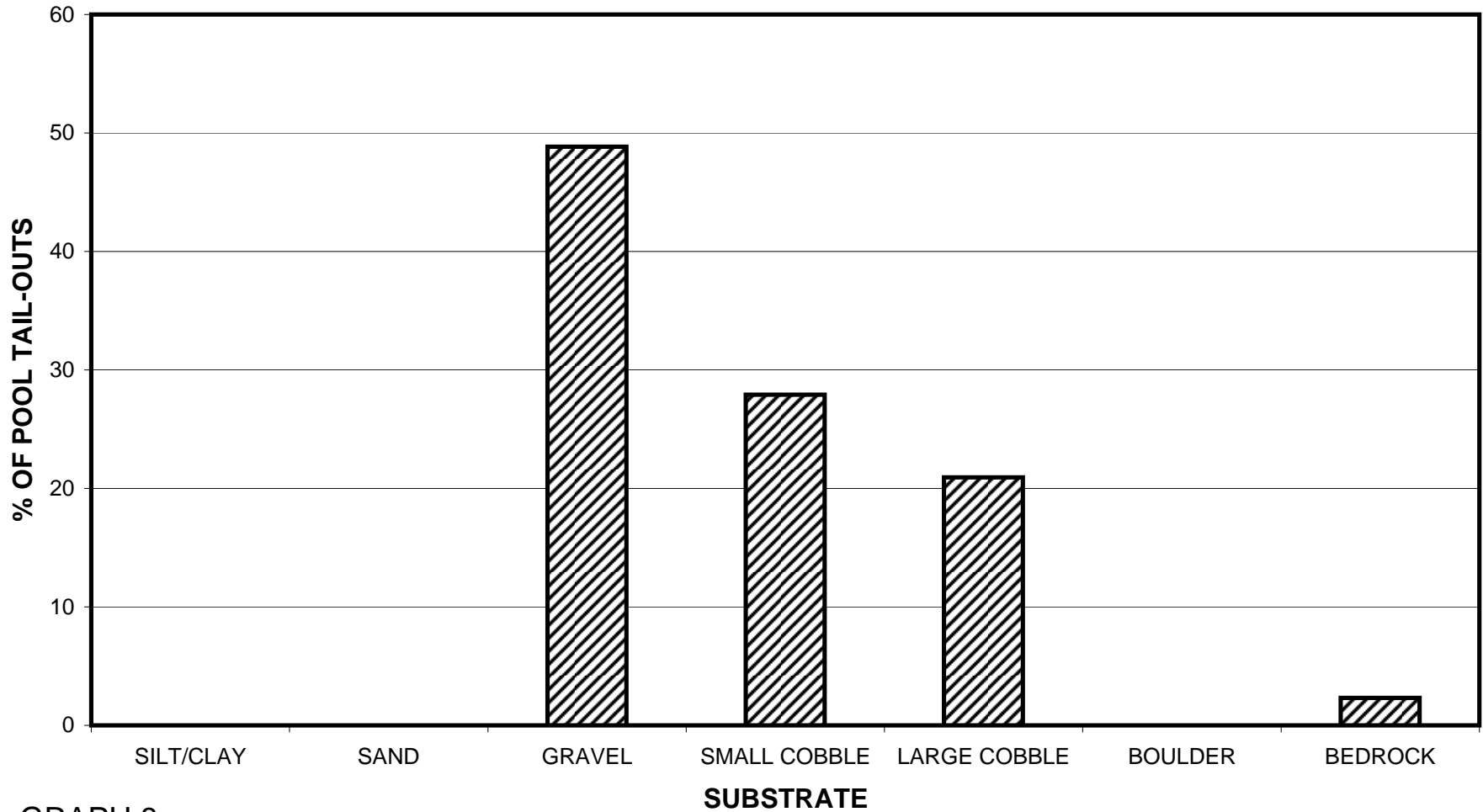
GRAPH 6

STEVENS CREEK 2006 MEAN PERCENT COVER TYPES IN POOLS



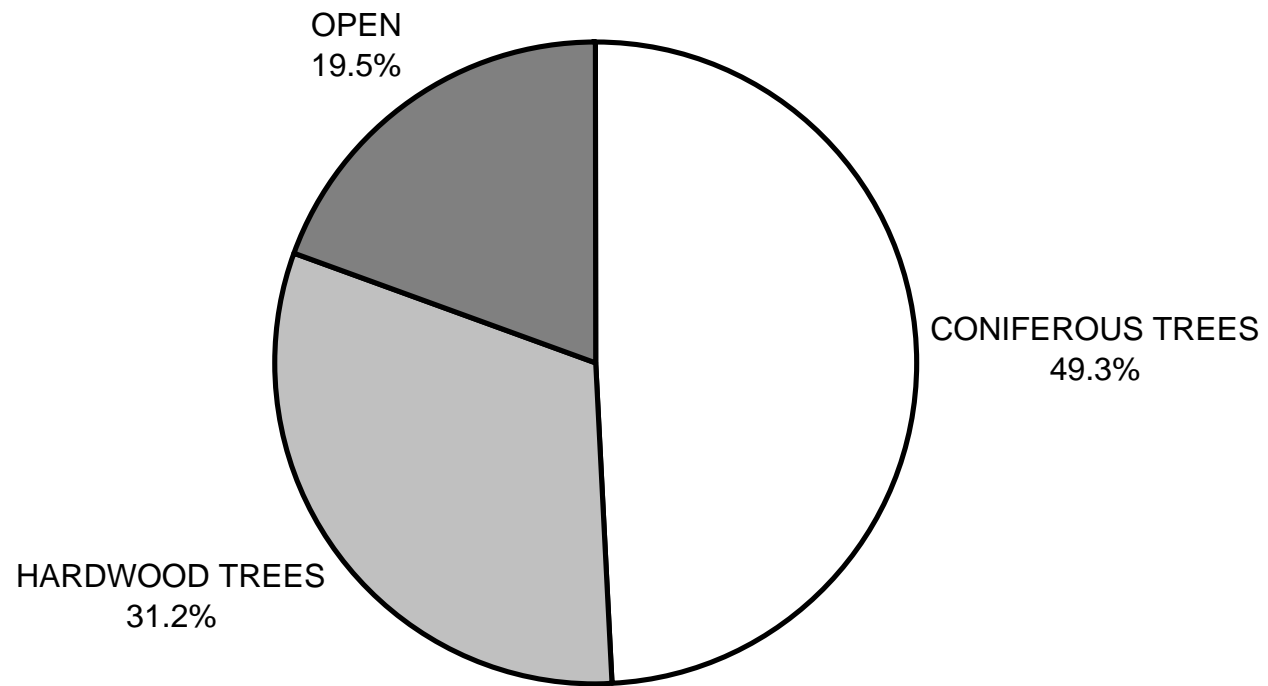
GRAPH 7

STEVENS CREEK 2006 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



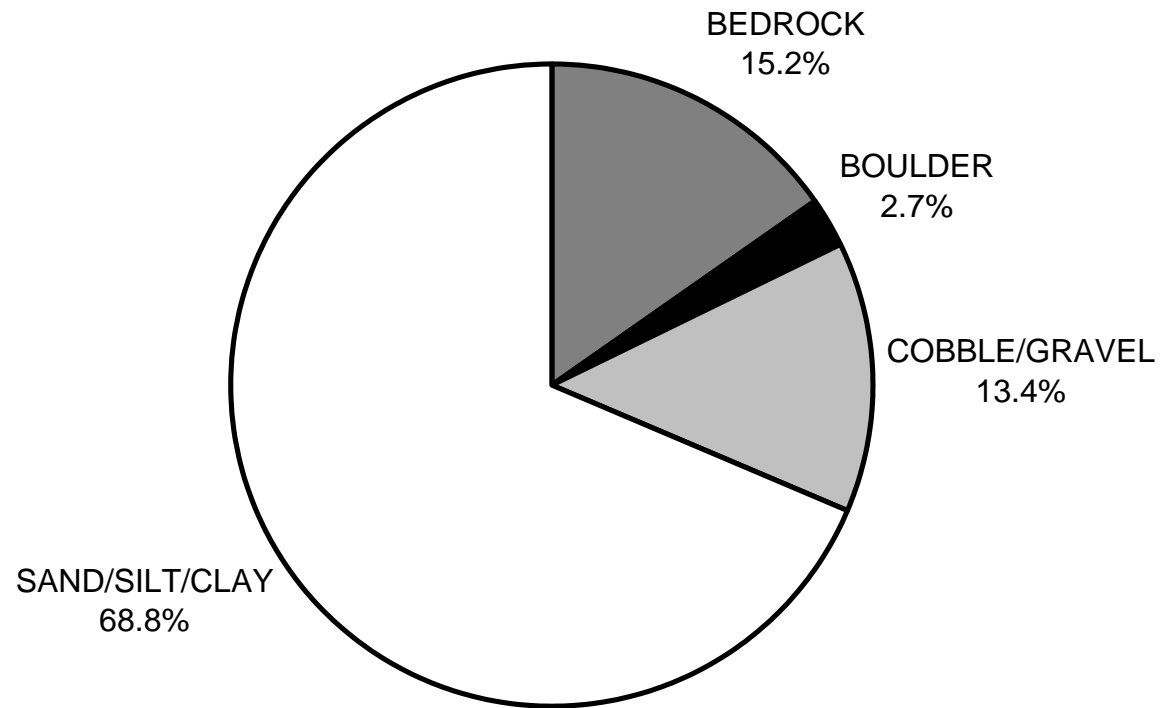
GRAPH 8

STEVENS CREEK 2006 MEAN PERCENT CANOPY



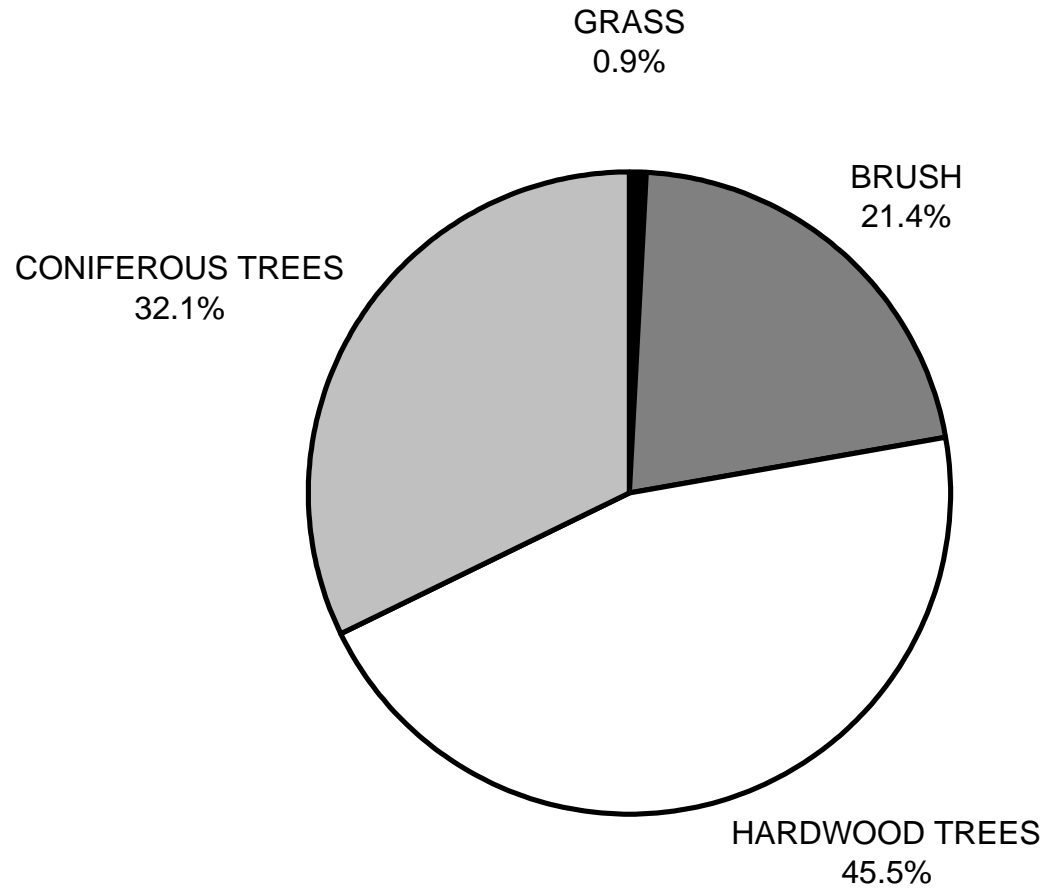
GRAPH 9

**STEVENS CREEK 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH**



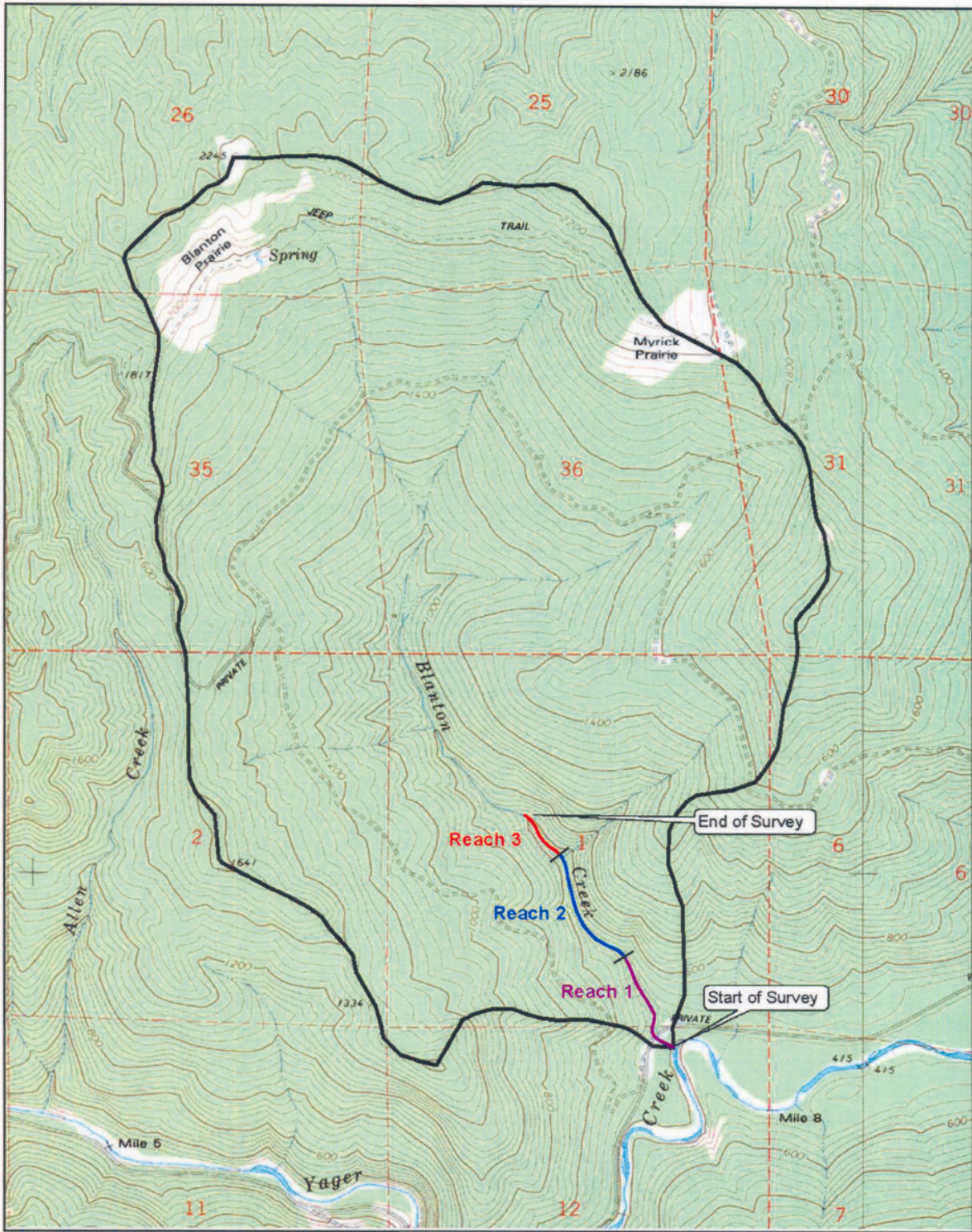
GRAPH 10

**STEVENS CREEK 2006
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Blanton Creek



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