

STREAM INVENTORY REPORT

James Creek

INTRODUCTION

A stream inventory was conducted from August 23 to August 31, 2010 on James Creek. The survey began at the confluence with North Fork Big River and extended upstream 4.1 miles.

The James 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 James 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

James Creek is a tributary to North Fork Big River, tributary to Big River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). James Creek's legal description at the confluence with North Fork Big River is T17N R15W S11. Its location is 39.3478 north latitude and 123.5126 west longitude, LLID number 1235115393476. James Creek is a second order stream and has approximately 3.75 miles of blue line stream according to the USGS Comptche 7.5 minute quadrangle. James Creek drains a watershed of approximately 6.9 square miles. Elevations range from about 400 feet at the mouth of the creek to 1450 feet in the headwater area. Mixed conifer forest dominates the watershed. The watershed is primarily owned by Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via Highway 20 approximately 13.9 miles west of Highway 101.

METHODS

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

SAMPLING STRATEGY

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

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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 James 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". James 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 James 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 James 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 James 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 James 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 James Creek. In addition, underwater observations were made at ten 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 2.0.19, 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 James Creek include:

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

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 23 to August 31, 2010, was conducted by P. Scott and B. Williams (WSP). The total length of the stream surveyed was 21,844 feet with an additional 47 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.62 cfs on August 31, 2010.

James Creek is a F4 channel type for the entire 21,891 feet of the stream surveyed. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 62 degrees Fahrenheit. Air temperatures ranged from 57 to 81 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% pool units, 36% riffle units, 27% flatwater units, 1% culvert units, and 1% no survey units (Graph 1). Based on total length of Level II habitat types there were 39% flatwater units, 33% riffle units, 25% pool units, 2% no survey due to marsh units, and 1% culvert units (Graph 2).

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 32%; mid-channel pool units, 32%; and step run units, 18% (Graph 3). Based on percent total length, step run units made up 33%, low gradient riffle units 31%, and mid-channel pool units 22%.

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A total of 141 pools were identified (Table 3). Main channel pools were the most frequently encountered at 89% (Graph 4), and comprised 88% 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. Fifty-six of the 141 pools (40%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 141 pool tail-outs measured, 58 had a value of 1 (41.1%); 44 had a value of 2 (31.2%); 17 had a value of 3 (12.1%); 9 had a value of 4 (6.4%); 13 had a value of 5 (9.2%) (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 11, flatwater habitat types had a mean shelter rating of 17, and pool habitats had a mean shelter rating of 26 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 27. Scour pools had a mean shelter rating of 16 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 68% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 18% of the pool tail-outs.

The mean percent canopy density for the surveyed length of James Creek was 91%. Nine percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 52% and 48%, respectively. Graph 9 describes the mean percent canopy in James Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 85%. The mean percent left bank vegetated was 85%. The dominant elements composing the structure of the stream banks consisted of 49% cobble/gravel, 28% sand/silt/clay, 19% bedrock, and 4% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 54% of the units surveyed. Additionally, 46% of the units surveyed had deciduous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at ten sites for species composition and distribution in James Creek on September 20, 2010. Water temperatures taken during the survey period of

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1200 to 1400 ranged from 55 to 57 degrees Fahrenheit. Air temperature was 64 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG), and B. Leonard (WSP).

In reach 1, which comprised the entire 21,844 feet of stream, starting approximately 773 feet from the confluence with North Fork Big River and continuing upstream 14,141 feet, ten sites were sampled. The reach sites yielded 51 young-of-the-year steelhead/rainbow trout (SH/RT), 7 age 1+ SH/RT, 1 age 2+ SH/RT, 7 coho salmon and 10 sculpin.

The following chart displays the information yielded from these sites:

2010 James Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
F4 Channel Type									
09/20/10	1	012	4.2	773	4	0	0	1	0
	2	013	4.2	812	2	1	0	3	0
	3	032	4.2	1,937	9	0	0	2	0
	4	034	4.2	2,109	4	1	0	0	0
	5	036	4.2	2,205	7	0	0	0	0
	6	037	4.2	2,239	8	1	0	1	0
	7	040	4.2	2,369	7	2	0	0	0
	8	041	4.2	2,401	2	0	0	0	0
	9	043	4.2	2,416	7	1	0	0	0
	10	261	4.3	14,914	1	1	1	0	0

DISCUSSION

James Creek is an F4 channel type for the entire 21,844 feet of the stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days August 23 to August 31, 2010 ranged from 54 to 62 degrees Fahrenheit. Air temperatures ranged from 57 to 81 degrees Fahrenheit. This is a suitable water temperature range for salmonids. 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.

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Flatwater habitat types comprised 39% of the total length of this survey, riffles 33%, and pools 25%. Fifty-six of the 141 (40%) pools had 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.

One hundred-two of the 141 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-six of the pool tail-outs had embeddedness ratings of 3 or 4. Thirteen 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 James Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred twenty-two 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 is 26. The shelter rating in the flatwater habitats is 17. 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 James Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 91%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 85% and 85%, 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) James 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 series of boulder/bedrock jumps at 2,298' appears to be a barrier to coho salmon. Options for a fish passage project to provide unimpeded fish passage should be explored.

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- 4) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 5) Increase woody cover in the pools and flatwater habitat units. Adding high quality complexity with woody cover in the pools is desirable.
- 6) There are several log debris accumulations starting at 16,585' from the confluence on James Creek that are retaining large quantities of fine sediment and impeding fish passage. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

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 Big River. The channel is an F4 for the entire 21,470 feet of the survey. The first unit is within an 18' high x 14' wide x 75' long corrugated metal pipe culvert with a concrete base. The culvert has a slope of 2.4%, there is no plunge at the outlet and it is in good condition. It is not a barrier to salmonids.
231	0004.00	Highway 20 crosses the channel. The crossing is a 9' high x 25' wide x 62' long corrugated metal arch culvert.
2298	0039.00	A bedrock and boulder section of the channel is a possible barrier to salmonids. There are two jumps, both are 4.5' high. The first has a 3' deep pool below it; the second has a 1.5' deep pool below it.
4476	0077.00	Log debris accumulation (LDA) #01 contains 17 pieces of large woody debris (LWD) and measures 5' high x 35' wide x 20' long. The LDA is not retaining sediment. Fish are present above the LDA.
6415	0115.00	A road crosses the channel. The crossing is a 9' high x 25' wide x 55' long corrugated metal pipe culvert with a concrete base. The culvert has a slope of less than 4%; there is no plunge at the outlet. The culvert is in good condition. It is probably not a barrier to salmonids.
6871	0121.00	Tributary #01 enters on the right bank. The water temperature downstream and upstream of the tributary is 58 degrees Fahrenheit; the water temperature of the tributary is 57 degrees Fahrenheit. The slope of

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		the tributary is 13%. The tributary is not accessible to salmonids due to a 5' high jump into a 6" diameter culvert at the mouth of the tributary.
11632	0207.00	A landslide on the left bank is contributing sediment ranging in size from gravel to boulders.
11842	0212.00	LDA #02 measures 9' high x 30' wide x 25' long. Water flows through it and there are visible gaps in the LDA. The LDA is not retaining sediment. Fish are present above the LDA.
15040	0263.00	North Fork James Creek (Tributary #02) enters on the right bank. It contributes to approximately 50% of James Creek's flow. The water temperature downstream and upstream of the tributary is 58 degrees Fahrenheit; the water temperature of the tributary is 57 degrees Fahrenheit. For more information, see the 2010 North Fork James Creek Stream Habitat Inventory Report.
16585	0299.00	LDA #03 contains 11 pieces of LWD and measures 7' high x 23' wide x 16' long. Water flows through it and there are visible gaps in the LDA. The LDA is not retaining sediment. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
16910	0303.00	LDA #04 measures 6' high x 31' wide x 13' long. Water does not flow through the LDA; the flow is subsurface above it. There are no visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 20' wide x 10' long x 3' deep. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
17426	0314.00	There is a 2.5' high plunge.
17674	0325.00	LDA #05 contains 10 pieces of LWD and measures 11' high x 45' wide x 26' long. Water flows through it and there are visible gaps in the LDA. The LDA is not retaining sediment. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
17836	0332.00	LDA #06 contains six pieces of LWD and measures 7' high x 13' wide x 16' long. Water does not flow through it and there are no visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 12' wide x 10' long x 7' deep. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
17948	0334.00	Tributary #03 enters on the right bank. It contributes to approximately 5% of James Creek's flow. The water temperature downstream and upstream of the tributary is 54 degrees Fahrenheit; the water temperature of the tributary is 55 degrees Fahrenheit. The slope of the tributary is 25%, making the tributary inaccessible to salmonids.

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18541	0342.00	LDA #07 contains seven pieces of LWD and measures 5' high x 23' wide x 30' long. Water does not flow through it and there are visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 25' wide x 40' long x 3' deep. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
18596	0344.00	Dry tributary on the left bank.
18690	0346.00	LDA #08 contains 10 pieces of LWD and measures 5' high x 30' wide x 33' long. Water flows through it and there are visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 25' wide x 16' long x 1' deep. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA. Left bank seep.
19754	0363.00	Dry tributary on the right bank.
19942	0366.00	Dry tributary on the left bank.
20656	0380.00	Tributary #04 enters on the right bank. It contributes to approximately 15% of James Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 59 degrees Fahrenheit. The slope of the tributary is 1%. The tributary is inaccessible to salmonids due to a 6' high plunge at the mouth.
20723	0382.00	Start of marsh. The marsh extends 450 upstream.
21844	0391.00	End of survey. Above the marsh the habitat available to salmonids is diminished. The flow is intermittent and silt/clay dominates the substrate. Much of the substrate is covered with algae. The channel is overgrown with brush and trees, making it difficult to survey.

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: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
2	0	CULVERT	0.5	81	162	0.7									
1	0	DRY	0.3	10	10	0.0									
104	8	FLATWATER	26.5	81	8454	38.6	9.0	0.6	1.1	536	55734	327	34020		17
3	0	NO SURVEY	0.8	30	89	0.4									
1	0	MARSH	0.3	450	450	2.1									
141	141	POOL	36.0	39	5567	25.4	11.6	1.1	2.0	474	66819	763	107580	614	26
140	11	RIFFLE	35.7	51	7159	32.7	8.4	0.3	0.6	347	48535	161	20529		11
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
392	160				21891						171089		162129		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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 (%)
125	7	LGR	31.9	54	6738	30.8	9	0.4	1.6	482	60196	219	27361		6	92
13	2	HGR	3.3	29	380	1.7	10	0.3	0.4	137	1780	31	408		13	74
1	1	CAS	0.3	29	29	0.1	5			109	109				60	82
1	1	BRS	0.3	12	12	0.1	5	0.3	0.5	60	60	18	18		0	93
1	1	POW	0.3	28	28	0.1	6	0.6	1.4	143	143	86	86		50	100
33	2	RUN	8.4	40	1308	6.0	11	0.7	1.3	402	13276	265	8740		15	78
70	5	SRN	17.9	102	7118	32.5	9	0.6	1.3	668	46757	400	28022		11	85
124	124	MCP	31.6	39	4844	22.1	12	1.1	5	475	58858	769	95344	617	27	91
1	1	CCP	0.3	26	26	0.1	21	2.2	2.8	519	519	1297	1297	1141	10	78
1	1	STP	0.3	46	46	0.2	13	1.5	3.6	538	538	1076	1076	807	30	97
4	4	CRP	1.0	48	191	0.9	9	0.7	2.1	476	1905	381	1525	273	24	91
1	1	LSR	0.3	37	37	0.2	10	0.7	2.2	352	352	316	316	246	30	97
8	8	LSBk	2.0	51	411	1.9	11	1.5	5.4	573	4583	992	7933	834	12	92
2	2	PLP	0.5	6	12	0.1	6	1.1	1.9	33	65	45	89	34	10	96
1	0	DRY	0.3	10	10	0.0										
2	0	CUL	0.5	81	162	0.7										
3	0	NS	0.8	30	89	0.4										
1	0	MARSH	0.3	450	450	2.1										

Total Units
392

Total Units Fully Measured
160

Total Length (ft.)
21891

Total Area (sq.ft.)
189139

Total Volume (cu.ft.)
172215

Table 3 - Summary of Pool Types

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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
126	126	MAIN	89	39	4916	88	11.8	1.1	476	59915	622	78428	27
15	15	SCOUR	11	43	651	12	9.5	1.2	460	6905	538	8077	16

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
141	141	5567	66819	86505

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

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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
124	MCP	88	3	2	73	59	36	29	9	7	3	2
1	CCP	1	0	0	0	0	1	100	0	0	0	0
1	STP	1	0	0	0	0	0	0	1	100	0	0
4	CRP	3	1	25	2	50	1	25	0	0	0	0
1	LSR	1	0	0	0	0	1	100	0	0	0	0
8	LSBk	6	0	0	4	50	2	25	1	13	1	13
2	PLP	1	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
141			4	3	81	57	41	29	11	8	4	3

Mean Maximum Residual Pool Depth (ft.): 2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Dry Units: 1

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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
125	7	LGR	0	18	18	0	0	0	3	50	10
13	2	HGR	0	90	0	0	0	0	0	10	0
1	1	CAS	0	0	0	0	0	0	60	15	25
1	1	BRS	0	0	0	0	0	0	0	0	0
140	11	TOTAL RIFFLE	0	29	11	0	0	0	14	35	11
1	1	POW	0	10	50	0	0	0	0	40	0
33	2	RUN	0	0	0	0	0	0	0	50	50
70	5	SRN	18	29	12	0	0	0	0	23	18
104	8	TOTAL FLAT	11	19	14	0	0	0	0	32	24
124	124	MCP	22	23	25	0	1	0	0	15	14
1	1	CCP	35	15	0	0	0	0	15	35	0
1	1	STP	0	0	0	0	0	0	0	0	100
4	4	CRP	89	10	1	0	0	0	0	0	0
1	1	LSR	0	20	70	0	0	0	0	10	0
8	8	LSBk	0	6	1	0	0	0	0	1	93
2	2	PLP	0	50	0	0	0	0	50	0	0
141	141	TOTAL POOL	22	22	23	0	1	0	1	13	18
2	0	CUL									
3	0	NS									
1	0	MAR									
392	160	TOTAL	20	22	22	0	0	0	2	15	18

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Dry Units: 1

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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
125	7	LGR	0	0	71	29	0	0	0
13	2	HGR	0	0	0	50	0	0	50
1	1	CAS	0	0	0	0	0	0	100
1	1	BRS	0	0	0	0	0	0	100
1	1	POW	0	0	100	0	0	0	0
33	2	RUN	0	0	50	50	0	0	0
70	5	SRN	0	0	100	0	0	0	0
124	124	MCP	5	0	73	19	0	0	2
1	1	CCP	0	0	100	0	0	0	0
1	1	STP	0	0	0	0	0	0	100
4	4	CRP	0	0	75	25	0	0	0
1	1	LSR	0	0	100	0	0	0	0
8	8	LSBk	0	0	75	25	0	0	0
2	2	PLP	50	0	0	50	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
91	48	52	0	85	85

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.

Stream Name:	James Creek	LLID:	1235115393476	Drainage:	Big River		
Survey Dates:	8/23/2010 to 8/31/2010	Survey Length (ft.):	21891	Main Channel (ft.):	21844	Side Channel (ft.):	47
Confluence Location:	Quad: BURBECK	Legal Description:	T17NR15WS11	Latitude:	39:20:51.0N	Longitude:	123:30:41.0W

STREAM REACH: 1									
Channel Type: F4			Canopy Density (%): 91.0				Pools by Stream Length (%): 25.4		
Reach Length (ft.): 21844			Coniferous Component (%): 48.2				Pool Frequency (%): 36.0		
Riffle/Flatwater Mean Width (ft.): 8.6			Hardwood Component (%): 51.8				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Coniferous Trees				< 2 Feet Deep: 60		
Range (ft.): 9 to 38			Vegetative Cover (%): 84.8				2 to 2.9 Feet Deep: 29		
Mean (ft.): 20			Dominant Shelter: Small Woody Debris				3 to 3.9 Feet Deep: 8		
Std. Dev.: 5			Dominant Bank Substrate Type: Cobble/Gravel				>= 4 Feet Deep: 3		
Base Flow (cfs.): 0.6			Occurrence of LWD (%): 21				Mean Max Residual Pool Depth (ft.): 2.0		
Water (F): 54 - 62			Air (F): 57 - 81		LWD per 100 ft.:		Mean Pool Shelter Rating: 26		
Dry Channel (ft): 10			Riffles: 2						
			Pools: 5						
			Flat: 2						
Pool Tail Substrate (%):			Silt/Clay: 1	Sand: 0	Gravel: 68	Sm Cobble: 18	Lg Cobble: 4	Boulder: 0	Bedrock: 8
Embeddedness Values (%):			1. 41.1	2. 31.2	3. 12.1	4. 6.4	5. 9.2		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

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	29	32	19.1
Boulder	3	9	3.8
Cobble / Gravel	79	79	49.4
Sand / Silt / Clay	49	40	27.8

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	0	0.0
Brush	0	0	0.0
Hardwood Trees	72	74	45.6
Coniferous Trees	88	86	54.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

2

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

StreamName: James Creek

LLID: 1235115393476

Drainage: Big River

Survey Dates: 8/23/2010 to 8/31/2010

Confluence Location: Quad: BURBECK

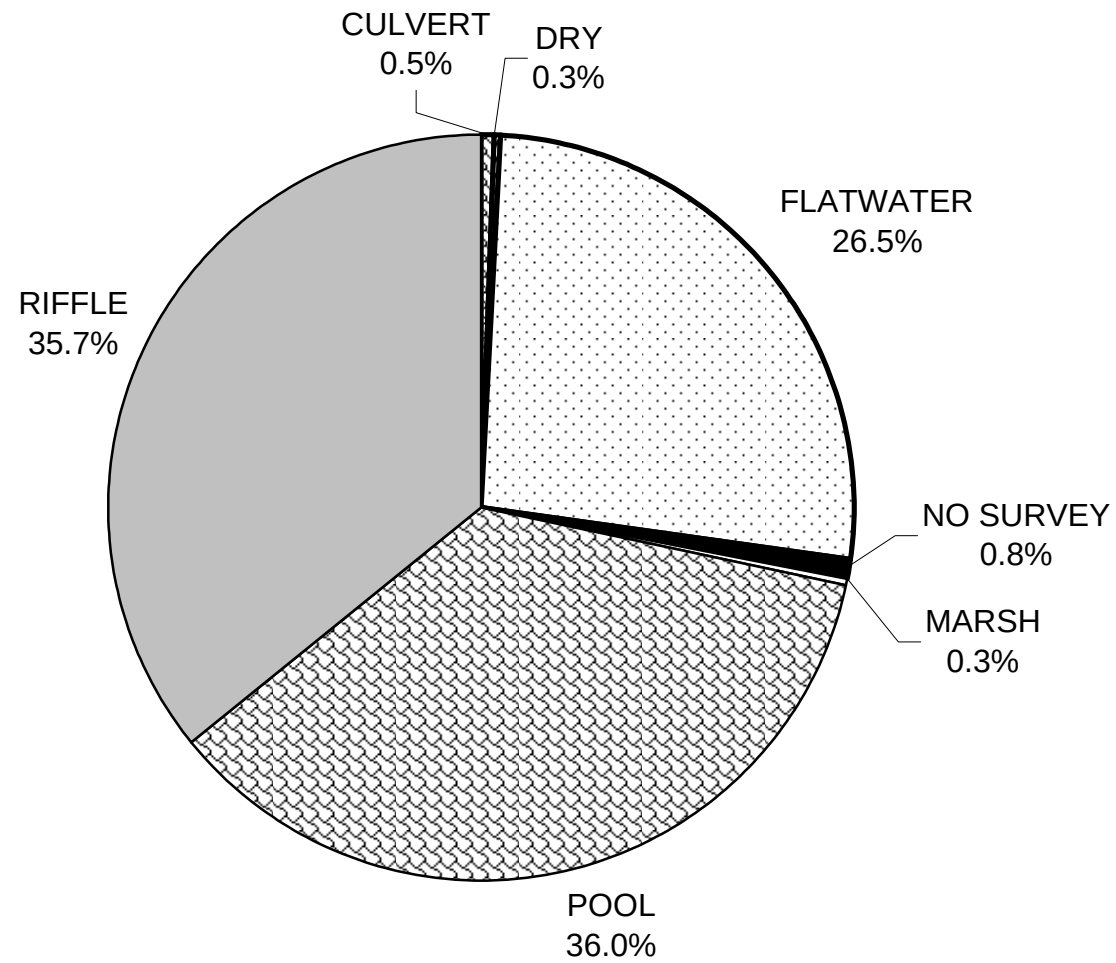
Legal Description: T17NR15WS11

Latitude: 39:20:51.0N

Longitude: 123:30:41.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	11	22
SMALL WOODY DEBRIS (%)	29	19	22
LARGE WOODY DEBRIS (%)	11	14	23
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	0	0	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	14	0	1
BOULDERS (%)	35	32	13
BEDROCK LEDGES (%)	11	24	18

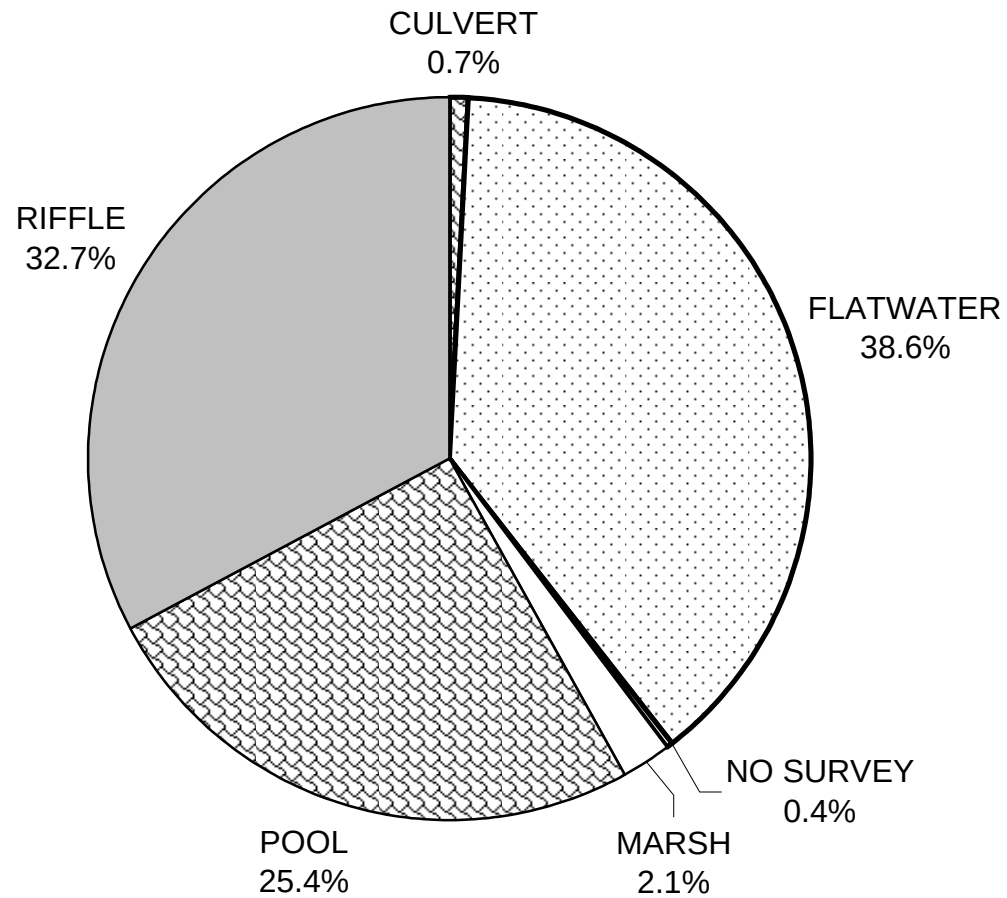
JAMES CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

JAMES CREEK 2010

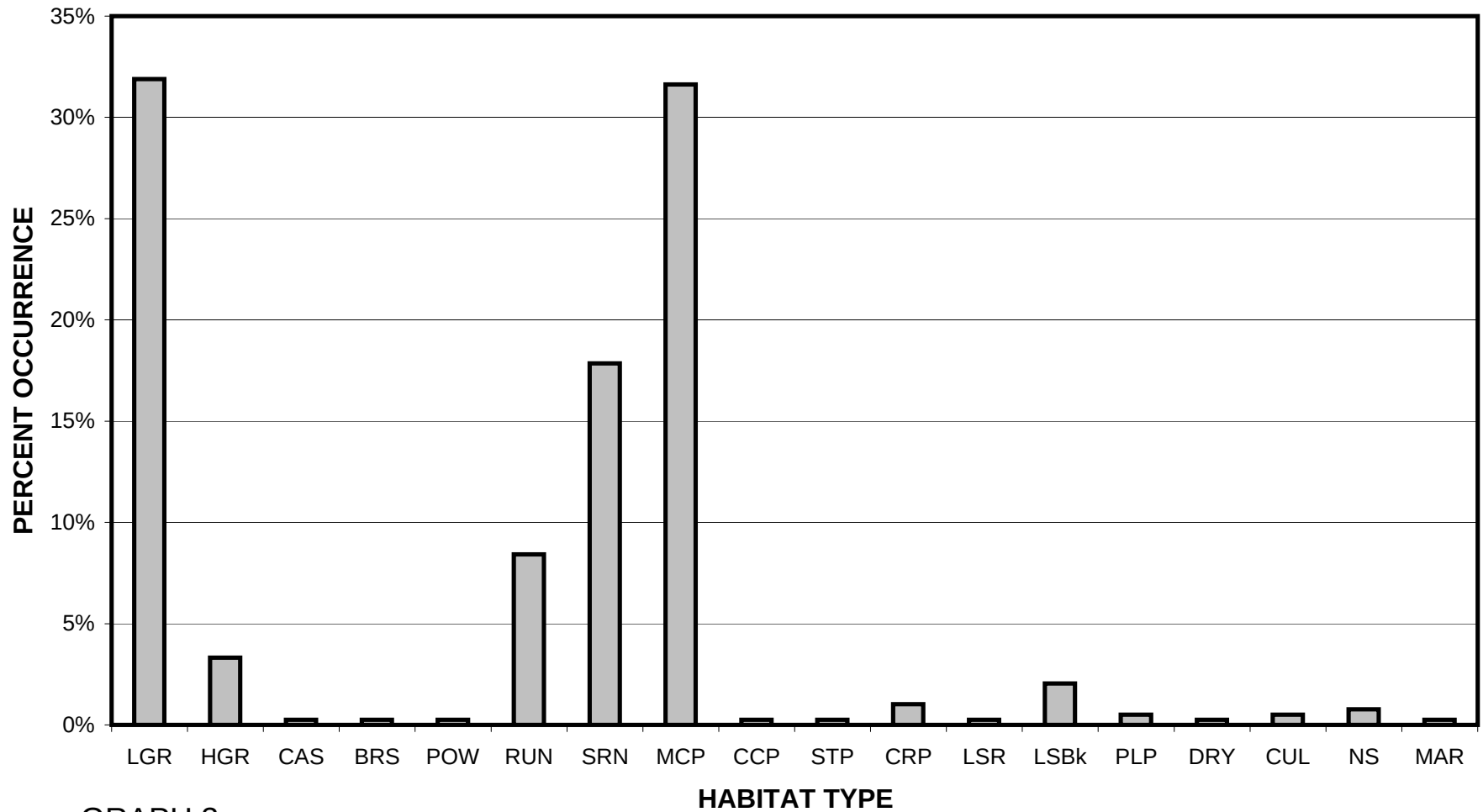
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

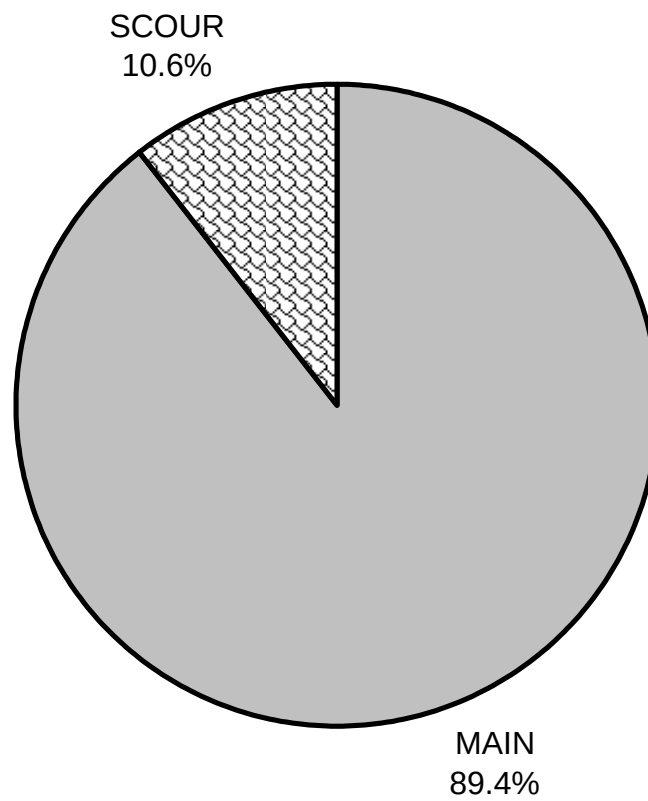
JAMES CREEK 2010

HABITAT TYPES BY PERCENT OCCURRENCE



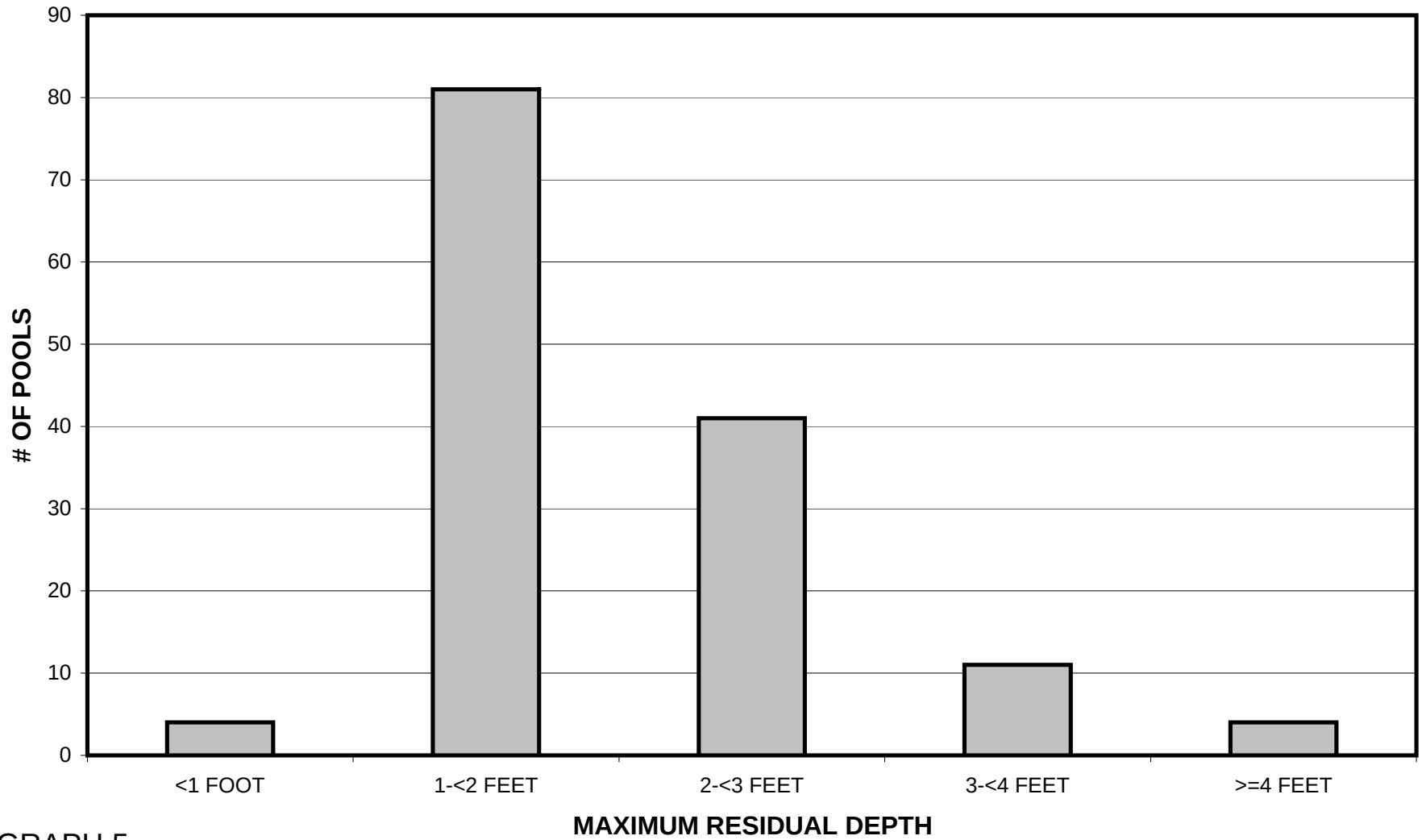
GRAPH 3

**JAMES CREEK 2010
POOL TYPES BY PERCENT OCCURRENCE**



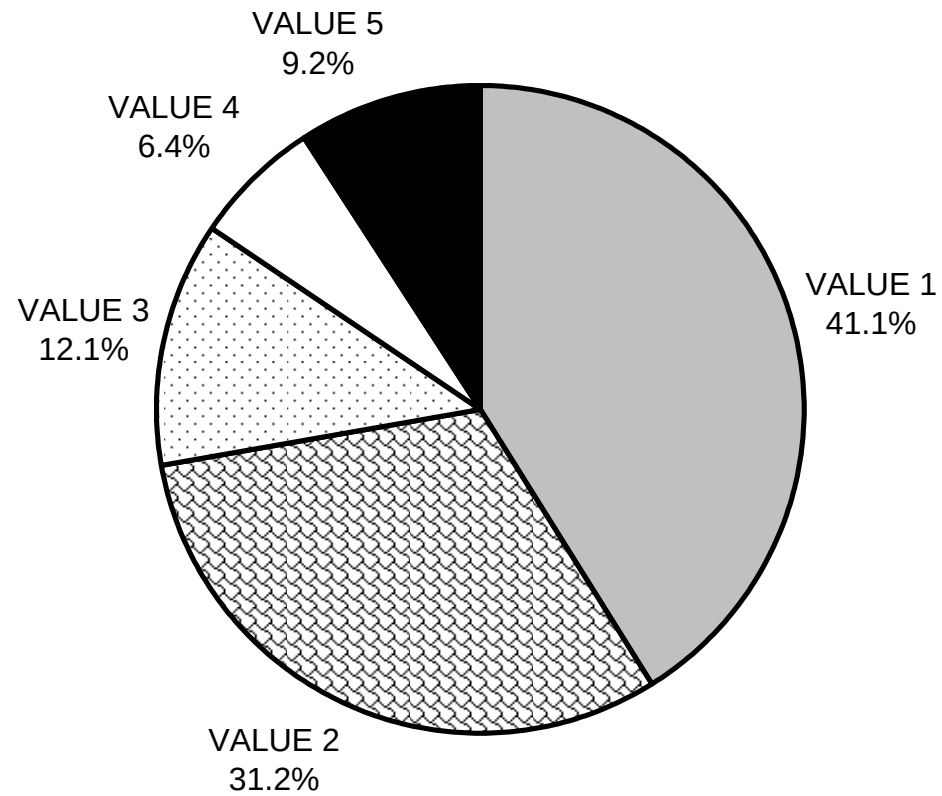
GRAPH 4

JAMES CREEK 2010 MAXIMUM DEPTH IN POOLS



GRAPH 5

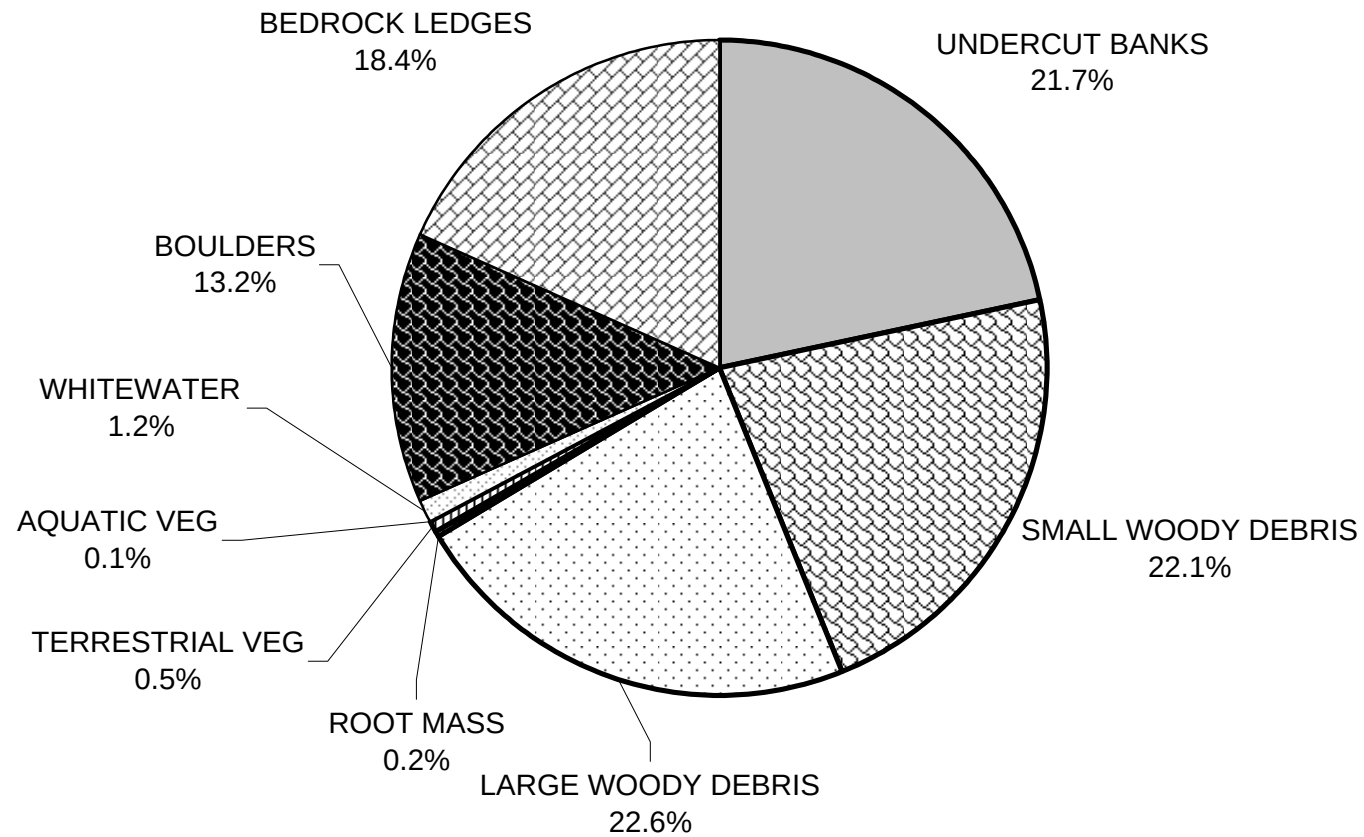
JAMES CREEK 2010 PERCENT EMBEDDEDNESS



GRAPH 6

JAMES CREEK 2010

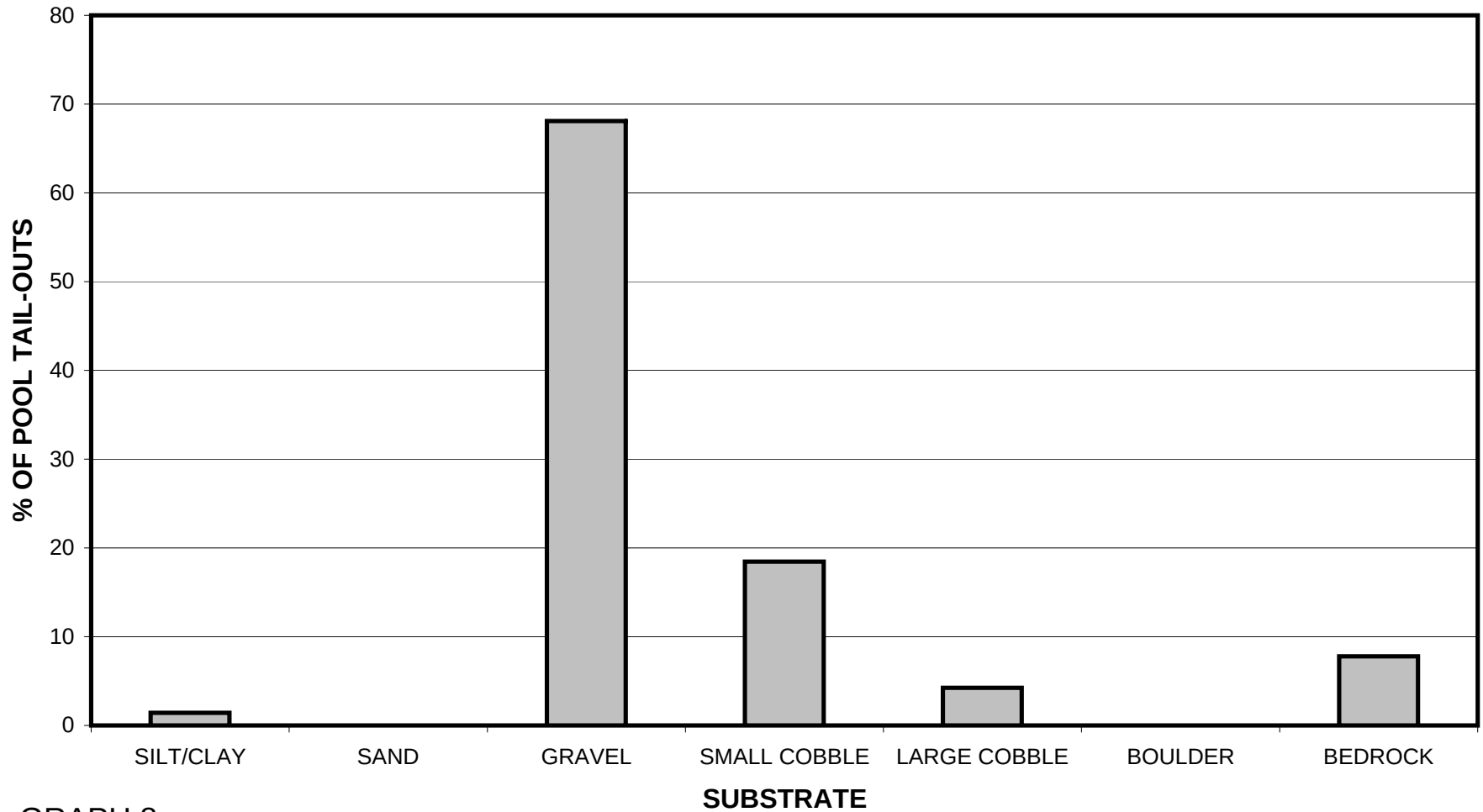
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

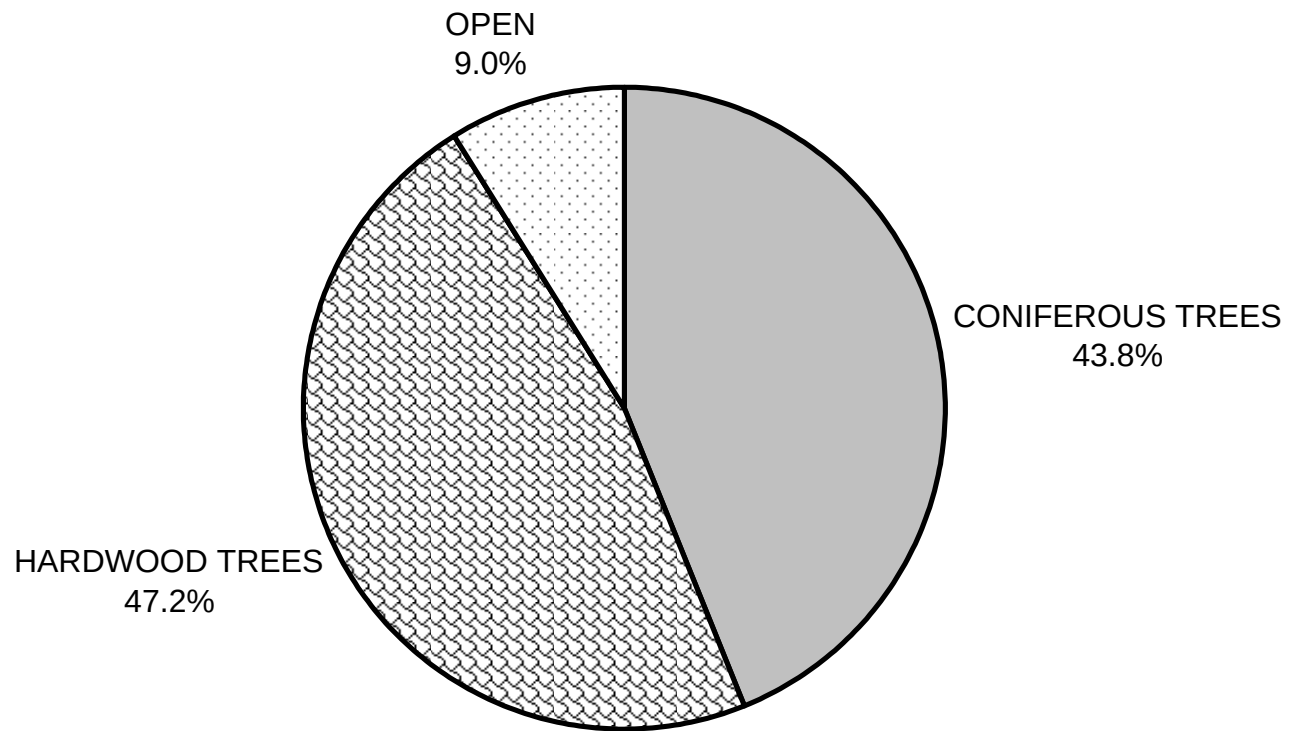
JAMES CREEK 2010

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



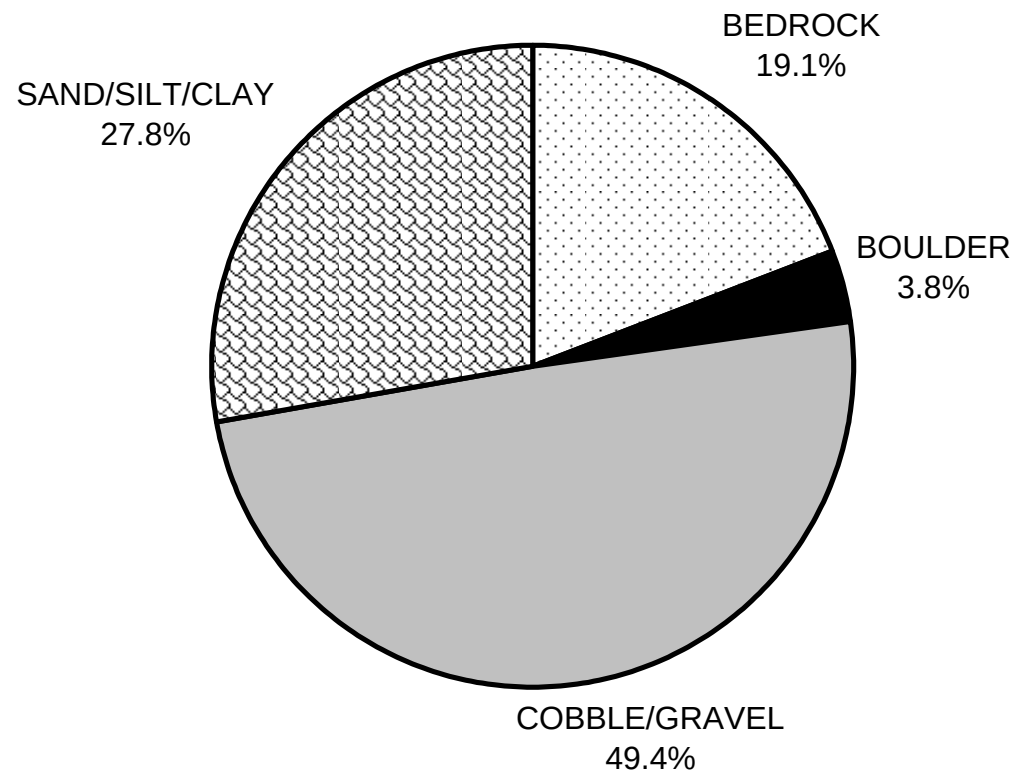
GRAPH 8

JAMES CREEK 2010 MEAN PERCENT CANOPY



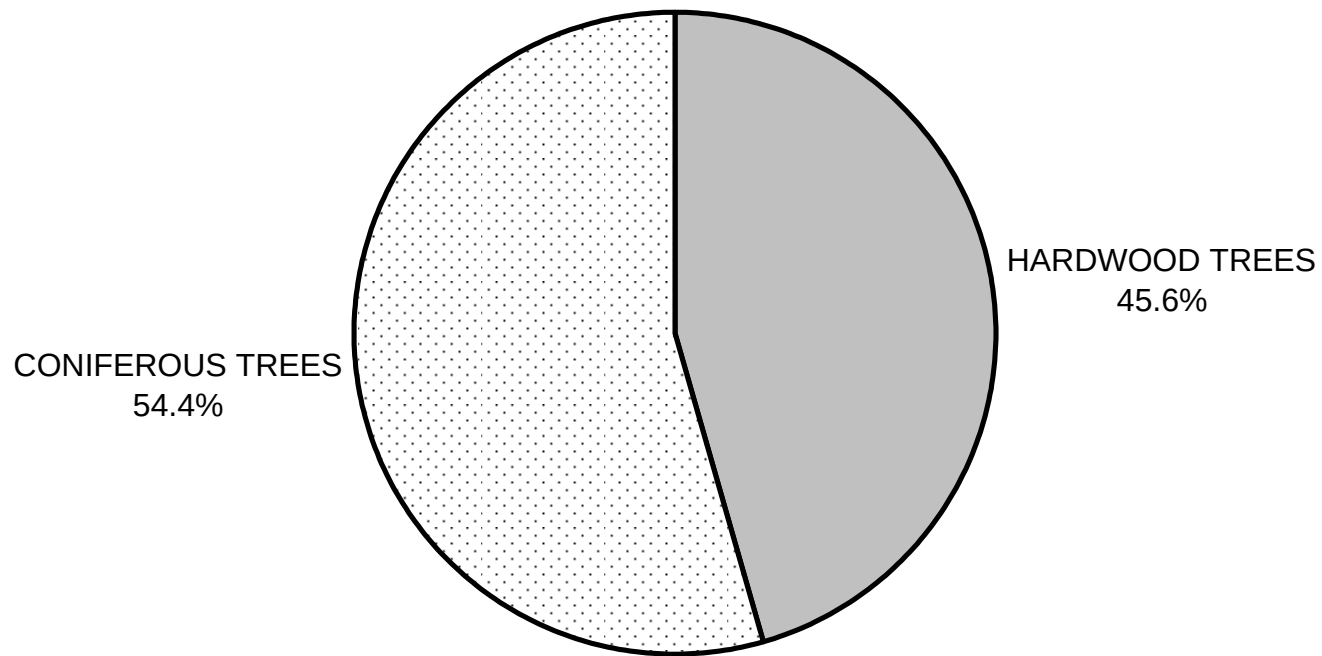
GRAPH 9

**JAMES CREEK 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH**



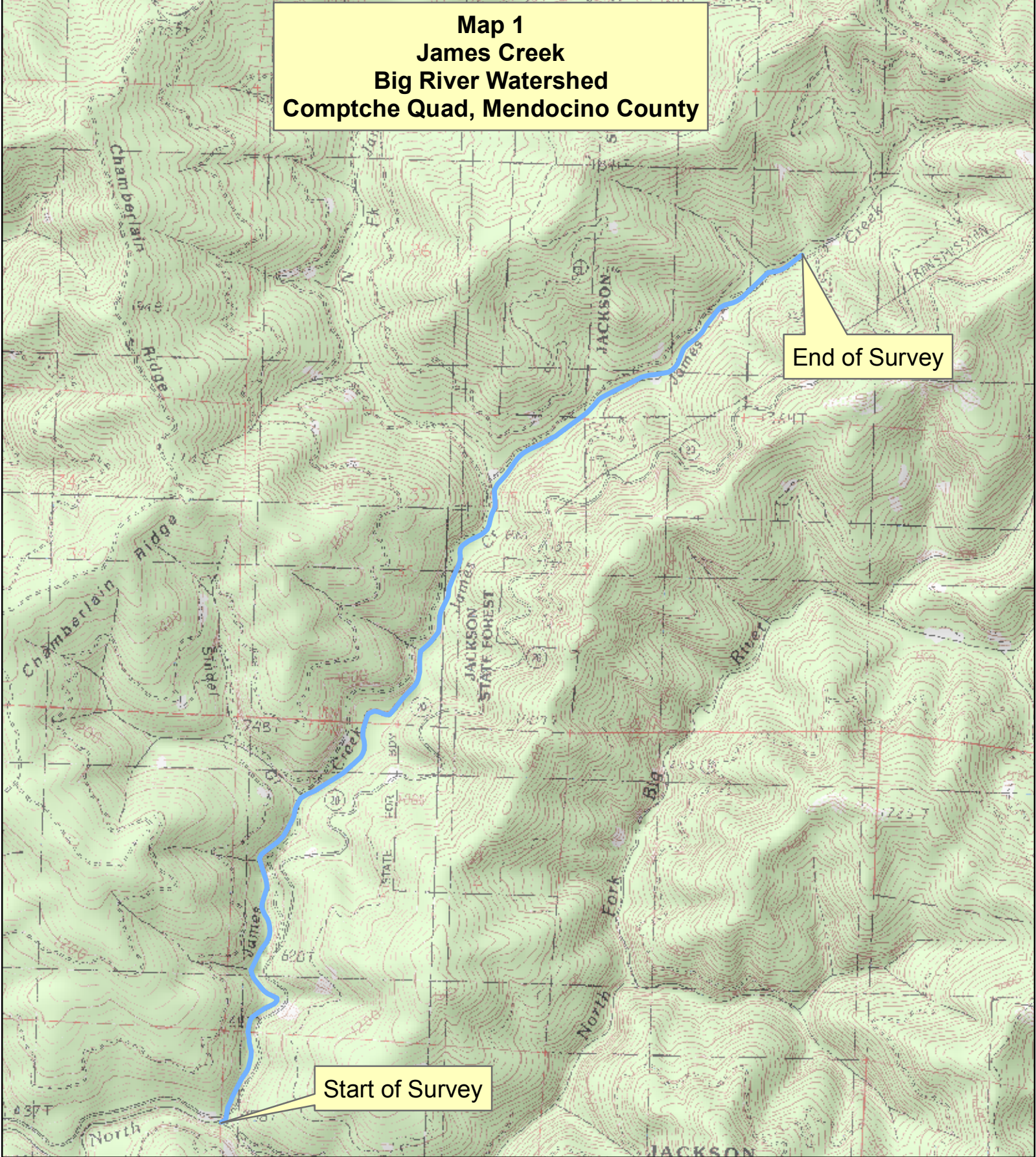
GRAPH 10

**JAMES CREEK 2010
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

Map 1
James Creek
Big River Watershed
Comptche Quad, Mendocino County



End of Survey

Start of Survey

Legend

— Reach 1, F4 Channel Type

0 1,500 3,000 Feet

