

STREAM INVENTORY REPORT

North Fork James Creek

INTRODUCTION

A stream inventory was conducted from August 10 to August 18, 2010 on North Fork James Creek. The survey began at the confluence with James Creek and extended upstream 2.7 miles.

The North Fork 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 North Fork 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

North Fork James Creek is a tributary to James Creek, tributary to North Fork Big River, tributary to Big River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). North Fork James Creek's legal description at the confluence with James Creek is T18N R15W S35. Its location is 39.3758 north latitude and 123.4985 west longitude, LLID number 1234974393758. North Fork James Creek is a first order stream and has approximately 2.8 miles of blue line stream according to the USGS Burbeck 7.5 minute quadrangle. North Fork James Creek drains a watershed of approximately 2.9 square miles. Elevations range from about 710 feet at the mouth of the creek to 1,300 feet in the headwater areas. 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.

METHODS

The habitat inventory conducted in North Fork 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

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

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in North Fork 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". North Fork 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 North Fork 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 North Fork 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 North Fork 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 North Fork James Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were

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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.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in North Fork James Creek. In addition, underwater observations were made at 10 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)

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- 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 North Fork 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 10 to August 18, 2010, was conducted by I. Mikus and S. McSmith (DFG). The total length of the stream surveyed was 14,236 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.45 cfs on August 10, 2010.

North Fork James Creek is an F4 channel type for the entire 14,236 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 57 degrees Fahrenheit. Air temperatures ranged from 53 to 74 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 32% flatwater units, 26% riffle units, and 2% no survey units (Graph 1). Based on total length of Level II habitat types there were 43% flatwater units, 31% pool units, 23% riffle units, 1% culvert units, 1% no survey units, and 1% no survey due to marsh units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 33%; low gradient riffle units, 23%; and run

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units, 18% (Graph 3). Based on percent total length, mid-channel pool units made up 27%, step run units 27%, and low gradient riffle units 21%.

A total of 143 pools were identified (Table 3). Main channel pools were the most frequently encountered at 92% (Graph 4), and comprised 95% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-four of the 143 pools (24%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 143 pool tail-outs measured, 8 had a value of 1 (5.6%); 13 had a value of 2 (9.1%); 32 had a value of 3 (22.4%); 71 had a value of 4 (49.7%); 19 had a value of 5 (13.3%) (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 1, flatwater habitat types had a mean shelter rating of 2, and pool habitats had a mean shelter rating of 13 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 18. Main channel pools had a mean shelter rating of 12 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in North Fork James Creek. Graph 7 describes the pool cover in North Fork James Creek. Undercut banks are the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 75% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 11% of the pool tail-outs.

The mean percent canopy density for the surveyed length of North Fork James Creek was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 48% and 52%, respectively. Graph 9 describes the mean percent canopy in North Fork James Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 94%. The mean percent left bank vegetated was 95%. The dominant elements composing the structure of the stream banks consisted of 86% sand/silt/clay, 8% cobble/gravel, and 5% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 51% of the units surveyed. Additionally, 35% of the units surveyed had deciduous trees as the dominant vegetation type, and 12% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 10 sites for species composition and distribution in North Fork James Creek on August 18, 2010. Water temperature taken during the survey period of 1440 to 1535 was 55 degrees Fahrenheit. Air temperatures ranged from 63 to 73 degrees Fahrenheit. The sites were sampled by I. Mikus and S. McSmith (DFG).

Eleven sites were sampled in North Fork James Creek from the confluence with James Creek to 2,563 feet. The reach sites yielded 28 young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), 12 age 1+ SH/RT, 6 age 2+, and 24 sculpin.

The following chart displays the information yielded from these sites:

2010 North Fork 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									
08/18/10	1	005	4.2	280	1	1	1	0	0
	2	007	4.2	450	5	3	2	0	0
	3	015	4.2	798	0	1	1	0	0
	4	028	4.2	1,237	1	1	0	0	0
	5	031	4.2	1,368	3	0	0	0	0
	6	037	4.2	1,614	9	1	0	0	0
	7	039	4.2	1,685	1	2	0	0	0
	8	045	4.2	1,949	1	0	0	0	0
	9	053	4.2	2,336	5	1	1	0	0
	10	058	4.2	2,563	1	1	1	0	0

DISCUSSION

North Fork James Creek is an F4 channel type for the entire 14,236 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 10 to August 18, 2010, ranged from 54 to 57 degrees Fahrenheit. Air temperatures ranged from 53 to 74 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 43% of the total length of this survey, riffles 23%, and pools 31%. Thirty-four of the 143 (24%) 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.

Twenty-one of the 143 pool tail-outs measured had embeddedness ratings of 1 or 2. One hundred three of the pool tail-outs had embeddedness ratings of 3 or 4. Nineteen 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 North Fork James Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred twenty-three of the 143 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 13. The shelter rating in the flatwater habitats is 2. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by undercut banks in North Fork James Creek. Undercut banks are the dominant cover type in pools followed by large woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 94%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 94% and 95%, 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) North Fork 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.

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- 3) 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.
- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from undercut banks. Adding high quality complexity with woody cover in the pools is desirable.
- 5) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

COMMENTS AND LANDMARKS

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

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with James Creek. The channel is an F4. A road crosses the channel. The crossing is a 12' high x 12' wide x 45' long corrugated metal pipe culvert. The culvert has a slope of five percent. The plunge height at the outlet is 2' with a maximum depth of 3.1' within 5' of the outlet. The culvert is in good condition. There is a 10' long concrete apron with baffles at the outlet of the culvert. It is possible barrier to salmonids.
2881	0066.00	Dry right bank tributary is seeping water.
3029	0069.00	Log debris accumulation (LDA) #01 contains 15 pieces of large woody debris (LWD) and measures 5.2' high x 26' wide x 25' long. Water flows through it and there are visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 10' wide x 40' long x 3' deep. Fish are present above the LDA.
3838	0091.00	Tributary #01 enters on the right bank. It contributes to approximately 8% of North Fork James Creek's flow. The water temperature downstream of the tributary is 56 degrees Fahrenheit, the water temperature of the tributary is 55 degrees Fahrenheit, and the water temperature upstream of the confluence is 57 degrees Fahrenheit. The slope of the tributary is approximately 25%, making it inaccessible to salmonids.

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3865	0092.00	A landslide on the right bank measures 30' high x 40' long; it is contributing fines sediment and sand to the channel.
4088	0102.00	LDA #02 contains 21 pieces of LWD and measures 8' high x 33' wide x 9' long. Water flows through it and there are no visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 7' wide x 20' long x 2' deep. Fish are present above the LDA.
4333	0110.00	There is a 2.5' high boulder plunge.
4447	0114.00	LDA #03 contains 13 pieces of LWD and measures 7' high x 15' wide x 5' long. Water flows through it and there are no visible gaps in the LDA. Retained sediment ranges from silt to cobble and measures 10' wide x 50' long x 2' deep. Fish are present above the LDA.
5307	0133.00	LDA #04 contains seven pieces of LWD and measures 6.3' high x 24' wide x 6.5' long. Water flows through it and there are no visible gaps in the LDA. The LDA is not retaining sediment. Fish are present above the LDA.
5326	0135.00	Tributary #02 enters on the right bank. It contributes to approximately 7% of North Fork James Creek's flow. The water temperature downstream of the tributary is 56 degrees Fahrenheit, the water temperature of the tributary is 56 degrees Fahrenheit, and the water temperature upstream of the confluence is 55 degrees Fahrenheit. The slope of the tributary is approximately 4%. The tributary is accessible to salmonids, but no fish were observed. The channel is choked with brush 150' upstream from the confluence with North Fork James Creek.
5664	0147.00	LDA #05 contains eight pieces of LWD and measures 8' high x 23' wide x 11' long. Water flows through it and there are visible gaps in the LDA. The retained sediment measures 10' wide x 30' long x 2.5' deep. Fish are present above the LDA.
5908	0154.00	There is a 2.8' high plunge.
5918	0155.00	The creek is becoming marsh-like. Equisetum lines both banks. The channel begins to fluctuate between an F and a C type.
6680	0178.00	Dry tributary on the left bank.
8004	0216.00	Right bank seep. The temperature of the water is 53 degrees Fahrenheit.
8145	0221.00	Tributary #03 enters on the right bank. It contributes to approximately 10% of North Fork James Creek's flow. The water temperature downstream and upstream of the tributary is 56 degrees Fahrenheit; the

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water temperature of the tributary is 55 degrees Fahrenheit. The slope of the tributary is approximately 4%. The tributary is inaccessible to salmonids due to a perched culvert 70' upstream from the confluence with North Fork James Creek. The flow goes subsurface beneath a rootwad.

8892	0234.00	Left bank tributary emerges from underground and is not accessible to fish.
9063	0238.00	Tributary #04 enters on the right bank. It contributes to approximately 5% of North Fork James Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 55 degrees Fahrenheit. The tributary is accessible to salmonids, but no fish were observed.
9764	0252.00	Road on the right bank.
10285	0269.00	Road on left bank.
10377	0271.00	A road crosses the channel. The crossing is a 2.7' high x 7.5' wide x 30' long corrugated metal pipe arch culvert. There is no plunge at the outlet. The culvert is in good condition.
10407	0272.00	Tributary #05 enters on the left bank. It contributes to approximately 10% of North Fork James Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 54 degrees Fahrenheit. The slope of the tributary is approximately 15%. The tributary is inaccessible to salmonids.
10644	0277.00	Tributary #06 enters on the right bank. It contributes to approximately 10% of North Fork James Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 54 degrees Fahrenheit. The slope of the tributary is approximately 6%. The tributary is inaccessible to salmonids due to a perched culvert 50' upstream from the confluence with North Fork James Creek with a 9' high plunge.
11972	0305.00	There is a 3' high plunge.
12176	0311.00	A boulder and wood accumulation is partially impeding fish passage. LDA #06 contains three pieces of LWD and measures 6.5' high x 14' wide x 13' long. Water flows through it and there are visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 8' wide x 60' long x 1.5' deep. Fish are present above the LDA.

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12425	0315.00	Right bank seep. An erosion site on the right bank measuring 30' long x 15' high is contributing sediment ranging in size from silt to gravel.
12464	0317.00	Right bank seep.
12631	0320.00	There is a 1.5' high plunge.
12652	0322.00	Right bank seep. The road on the right bank may be causing right bank tributary to go subsurface.
12707	0324.00	Dry tributary on the right bank.
12780	0326.00	An erosion site on the left bank measuring 50' long x 10' tall is contributing sediment ranging in size from silt to sand.
12859	0329.00	The creek's flow goes subsurface under root mass and silt.
12899	0331.00	A 3.5' high plunge with no jump pool below it is a possible barrier.
12996	0334.00	2.6' high plunge over a log. Dry tributary on the right bank.
13499	0349.00	Dry tributary on the left bank.
13748	0354.00	Dry tributary on the left bank.
13890	0357.00	LDA #07 contains six pieces of LWD and measures 4' high x 21' wide x 17' 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 salmonids. Fish were not observed above the LDA.
14074	0363.00	Tributary #07 enters on the left bank. It contributes to approximately 10% of North Fork James Creek's flow. The water temperature downstream and upstream of the tributary is 55 degrees Fahrenheit; the water temperature of the tributary is 55 degrees Fahrenheit. The slope of the tributary is approximately 15%. The tributary is inaccessible to salmonids.
14236	0368.00	End of survey due to possible end of anadromy. LDA #08 contains 10 pieces of LWD and measures 6.4' high x 23' wide x 37' long. Water does not flow through it; the channel is beneath the LDA. There are no visible gaps in the LDA. The LDA is not retaining sediment. LDA #08 is probably the remains of a bridge crossing and is probably the end of anadromy. No fish have been observed since Habitat Unit # 335. Fish habitat has deteriorated, substrate is dominated by sand and fully embedded gravel under 0.5" in size and pools are infrequent and shallow.

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REFERENCES

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

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

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

CASCADE

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

FLATWATER

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

MAIN CHANNEL POOLS

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

SCOUR POOLS

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

BACKWATER POOLS

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

ADDITIONAL UNIT DESIGNATIONS

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

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

Stream Name: North Fork James Creek

LLID: 1234974393758 Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR15WS35 Latitude: 39:22:33.0N Longitude: 123:29:51.0W

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	42	85	0.6									
1	0	DRY	0.3	16	16	0.1									
117	16	FLATWATER	31.8	52	6093	42.8	5.8	0.4	0.8	291	34103	109	12745		3
7	0	NOSURVEY	1.9	29	205	1.4									
1	0	MARSH	0.3	74	74	0.5									
143	143	POOL	38.9	31	4469	31.4	7.6	0.8	1.7	245	35020	251	35905	206	13
97	12	RIFFLE	26.4	34	3294	23.1	6.3	0.2	0.4	161	15630	32	3107		1
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
368	171				14236					84752			51757		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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 (%)
84	11	LGR	22.8	36	3002	21.1	6	0.2	0.8	158	13236	31	2630		1	94
13	1	HGR	3.5	22	292	2.1	14	0.2	0.5	200	2603	40	521		0	91
1	1	GLD	0.3	55	55	0.4	4	0.6	1.1	220	220	132	132		5	97
65	9	RUN	17.7	35	2250	15.8	6	0.4	1.2	249	16208	105	6806		4	94
51	6	SRN	13.9	74	3788	26.6	6	0.4	1	367	18696	111	5683		0	92
6	6	TRP	1.6	51	307	2.2	4	0.9	2.7	190	1139	179	1072	153	30	91
122	122	MCP	33.2	31	3785	26.6	8	0.8	5	252	30708	264	32216	218	11	95
3	3	STP	0.8	53	159	1.1	7	0.7	2.2	347	1040	315	945	259	3	91
2	2	LSL	0.5	35	70	0.5	14	0.2	1.2	470	940	188	376	70	23	95
1	1	LSR	0.3	13	13	0.1	14	0.2	0.7	155	155	93	93	31	10	80
1	1	LSBk	0.3	45	45	0.3	9	0.5	1.2	405	405	284	284	203	0	97
8	8	PLP	2.2	11	90	0.6	7	1.1	4.4	79	633	115	919	101	21	92
1	0	DRY	0.3	16	16	0.1										
2	0	CUL	0.5	42	85	0.6										
7	0	NS	1.9	29	205	1.4										
1	0	MARSH	0.3	74	74	0.5										

Total Units
368

Total Units Fully Measured
171

Total Length (ft.)
14236

Total Area (sq.ft.)
85982

Total Volume (cu.ft.)
51675

Table 3 - Summary of Pool Types

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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
131	131	MAIN	92	32	4251	95	7.5	0.8	251	32887	216	28299	12
12	12	SCOUR	8	18	218	5	8.9	0.8	178	2132	98	1182	18

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
143	143	4469	35020	29480

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

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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
6	TRP	4	0	0	3	50	3	50	0	0	0	0
122	MCP	85	3	2	91	75	19	16	5	4	4	3
3	STP	2	0	0	2	67	1	33	0	0	0	0
2	LSL	1	0	0	2	100	0	0	0	0	0	0
1	LSR	1	1	100	0	0	0	0	0	0	0	0
1	LSBk	1	0	0	1	100	0	0	0	0	0	0
8	PLP	6	1	13	5	63	1	13	0	0	1	13

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
143	5	3	104	73	24	17	5	3	5	3

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Dry Units: 1

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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
84	11	LGR	0	100	0	0	0	0	0	0	0
13	1	HGR	0	0	0	0	0	0	0	0	0
97	12	TOTAL RIFFLE	0	100	0	0	0	0	0	0	0
1	1	GLD	100	0	0	0	0	0	0	0	0
65	9	RUN	0	22	30	0	48	0	0	0	0
51	6	SRN	0	0	0	0	0	0	0	0	0
117	16	TOTAL FLAT	25	16	23	0	36	0	0	0	0
6	6	TRP	26	3	14	7	51	0	0	0	0
122	122	MCP	42	23	20	2	8	0	0	4	1
3	3	STP	35	15	50	0	0	0	0	0	0
2	2	LSL	0	0	90	0	10	0	0	0	0
1	1	LSR	5	5	0	0	0	0	0	90	0
1	1	LSBk	0	0	0	0	0	0	0	0	0
8	8	PLP	39	13	23	0	0	0	20	6	0
143	143	TOTAL POOL	39	20	22	2	10	0	2	5	1
2	0	CUL									
7	0	NS									
1	0	MAR									
368	171	TOTAL	38	22	21	2	11	0	2	4	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Dry Units: 1

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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
84	11	LGR	0	0	91	9	0	0	0
13	1	HGR	0	0	100	0	0	0	0
1	1	GLD	0	0	100	0	0	0	0
65	9	RUN	11	0	89	0	0	0	0
51	6	SRN	0	17	83	0	0	0	0
6	6	TRP	33	50	17	0	0	0	0
122	122	MCP	6	31	60	1	2	1	0
3	3	STP	0	33	67	0	0	0	0
2	2	LSL	0	0	100	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0
1	1	LSBk	0	0	100	0	0	0	0
8	8	PLP	0	13	63	13	13	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	52	48	0	94	95

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Survey Length (ft.): 14236

Main Channel (ft.): 14236

Side Channel (ft.): 0

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35 Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

Summary of Fish Habitat Elements By Stream Reach**STREAM REACH: 1**

Channel Type: F4

Canopy Density (%): 94.5

Pools by Stream Length (%): 31.4

Reach Length (ft.): 14236

Coniferous Component (%): 51.9

Pool Frequency (%): 38.9

Riffle/Flatwater Mean Width (ft.): 6.0

Hardwood Component (%): 48.1

Residual Pool Depth (%):

BFW:

Dominant Bank Vegetation: Coniferous Trees

< 2 Feet Deep: 76

Range (ft.): 7 to 120

Vegetative Cover (%): 94.3

2 to 2.9 Feet Deep: 17

Mean (ft.): 22

Dominant Shelter: Undercut Banks

3 to 3.9 Feet Deep: 3

Std. Dev.: 25

Dominant Bank Substrate Type: Sand/Silt/Clay

>= 4 Feet Deep: 3

Base Flow (cfs.): 0.5

Occurrence of LWD (%): 13

Mean Max Residual Pool Depth (ft.): 1.7

Water (F): 54 - 57 Air (F): 53 - 74

LWD per 100 ft.:

Mean Pool Shelter Rating: 13

Dry Channel (ft): 16

Riffles: 1

Pools: 3

Flat: 1

Pool Tail Substrate (%): Silt/Clay: 6 Sand: 3 Gravel: 75 Sm Cobble: 11 Lg Cobble: 3 Boulder: 2 Bedrock: 1

Embeddedness Values (%): 1. 5.6 2. 9.1 3. 22.4 4. 49.7 5. 13.3

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

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	8	10	5.3
Boulder	1	0	0.3
Cobble / Gravel	17	12	8.5
Sand / Silt / Clay	145	149	86.0

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	1	0	0.3
Brush	18	23	12.0
Hardwood Trees	53	71	36.3
Coniferous Trees	99	77	51.5
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 4

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

StreamName: North Fork James Creek

LLID: 1234974393758

Drainage: Big River

Survey Dates: 8/10/2010 to 8/18/2010

Confluence Location: Quad: NORTHSPUR

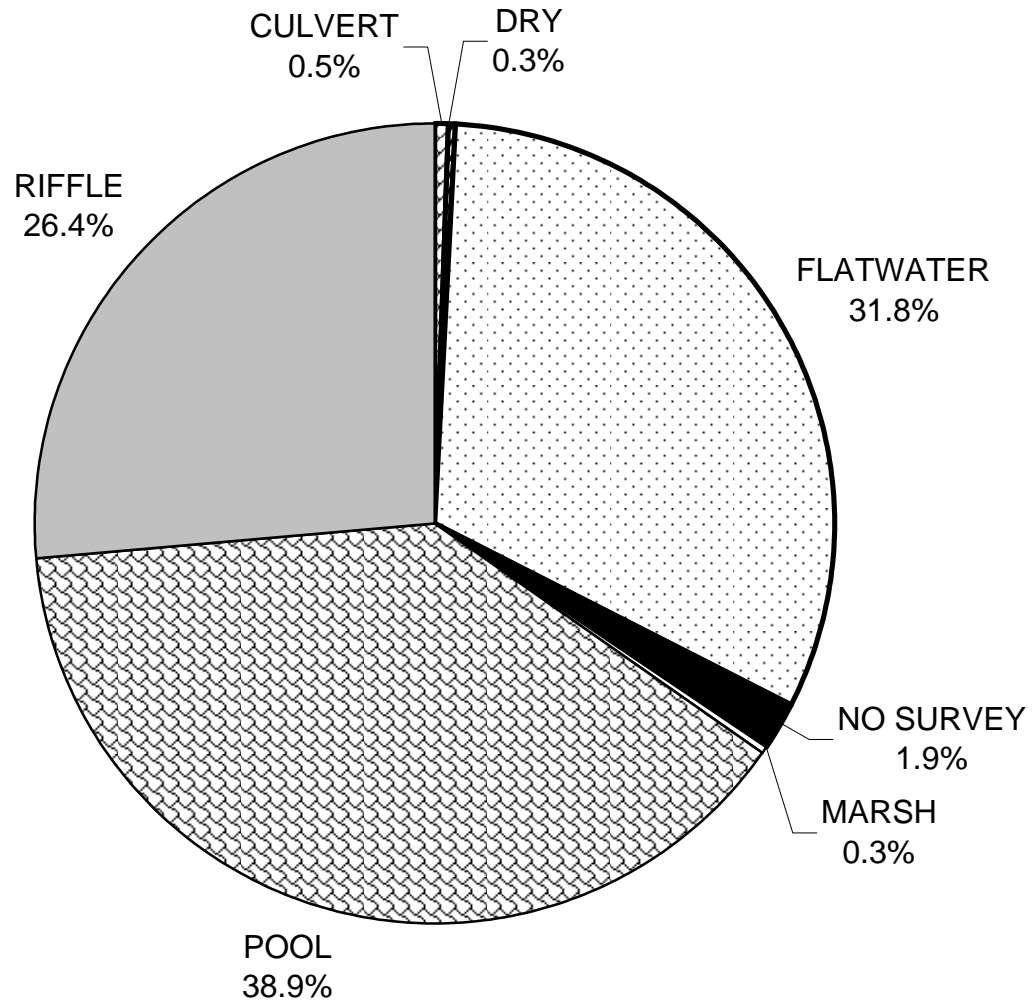
Legal Description: T18NR15WS35

Latitude: 39:22:33.0N

Longitude: 123:29:51.0W

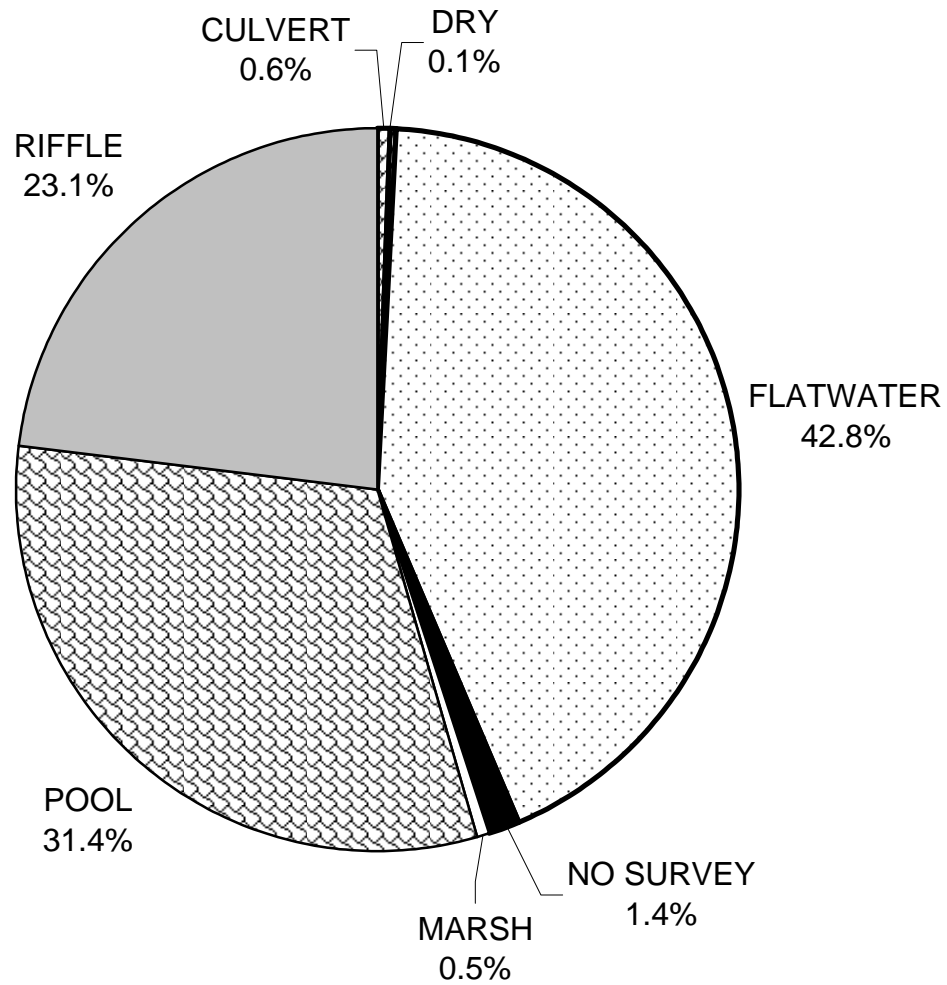
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	25	39
SMALL WOODY DEBRIS (%)	100	16	20
LARGE WOODY DEBRIS (%)	0	23	22
ROOT MASS (%)	0	0	2
TERRESTRIAL VEGETATION (%)	0	36	10
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	2
BOULDERS (%)	0	0	5
BEDROCK LEDGES (%)	0	0	1

NORTH FORK JAMES CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



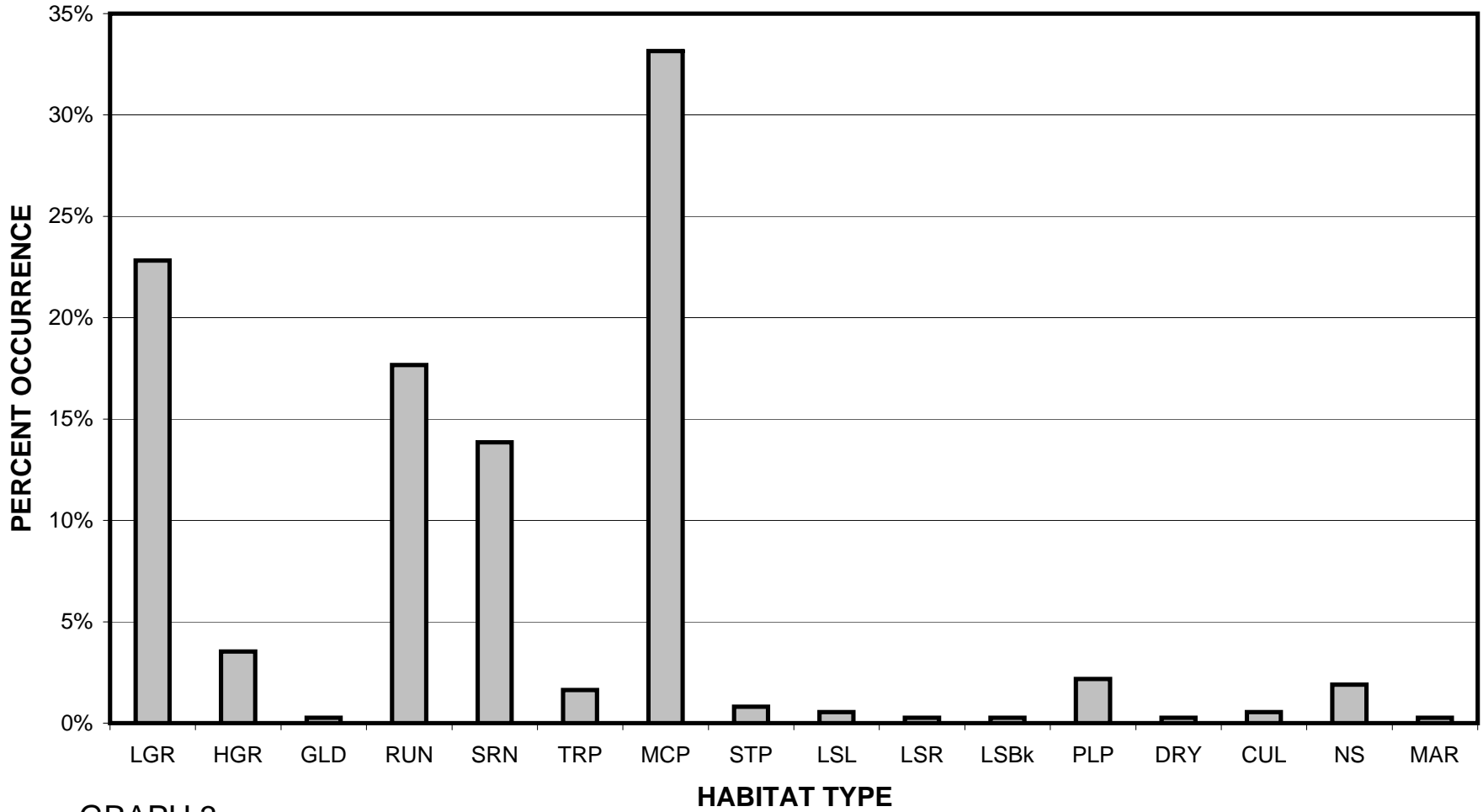
GRAPH 1

NORTH FORK JAMES CREEK 2010 HABITAT TYPES BY PERCENT TOTAL LENGTH



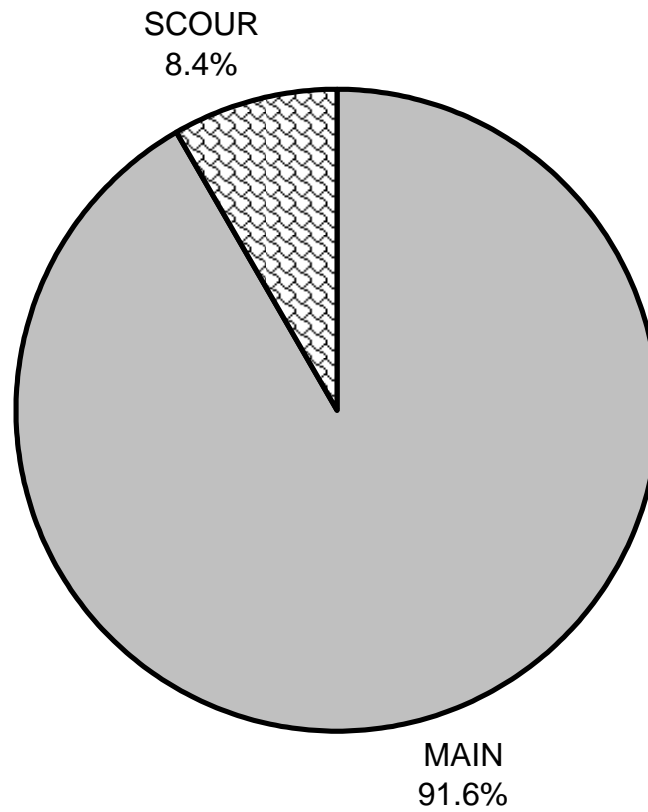
GRAPH 2

NORTH FORK JAMES CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



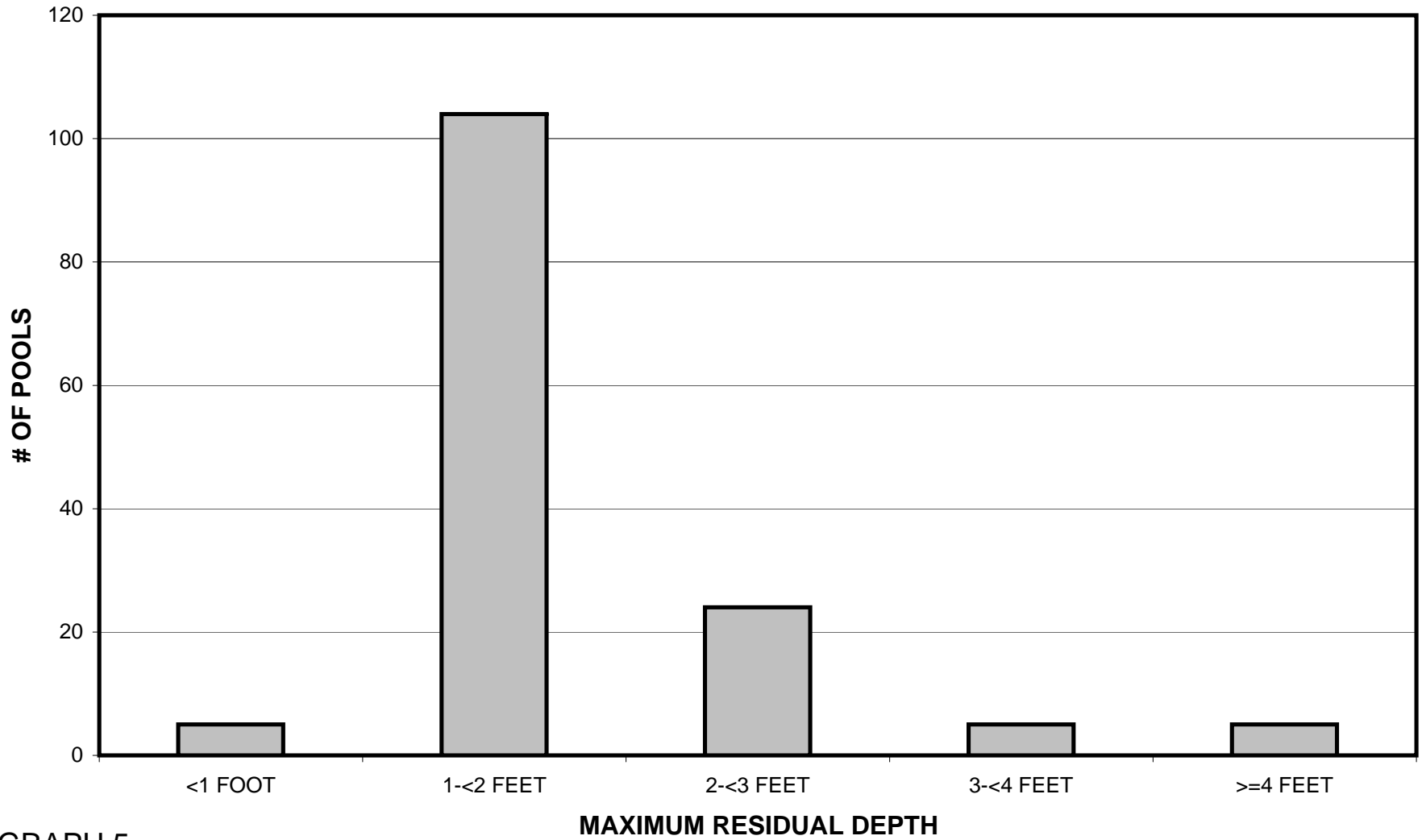
GRAPH 3

NORTH FORK JAMES CREEK 2010 POOL TYPES BY PERCENT OCCURRENCE



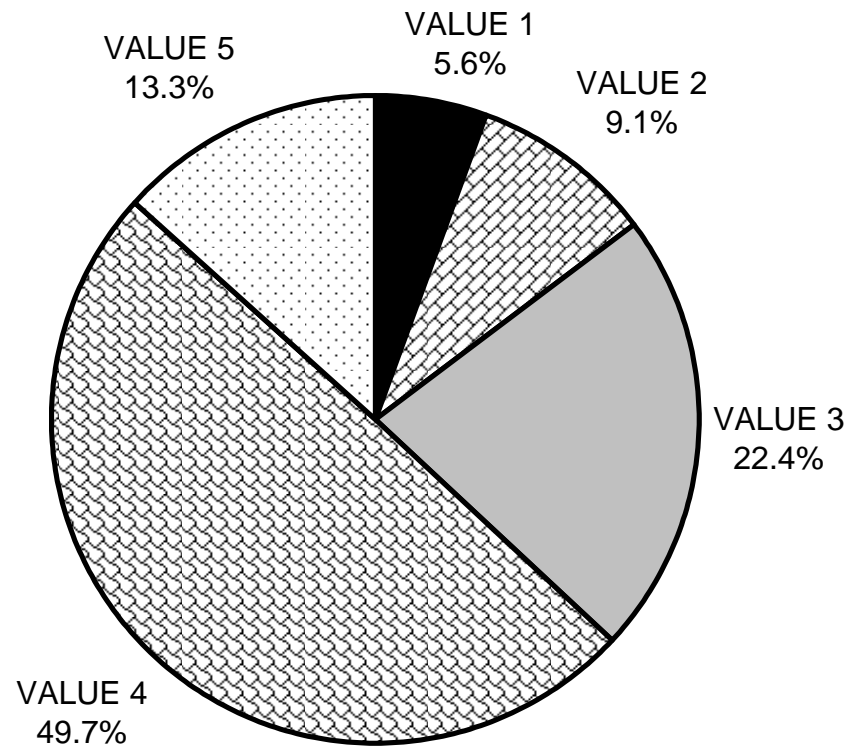
GRAPH 4

NORTH FORK JAMES CREEK 2010 MAXIMUM DEPTH IN POOLS



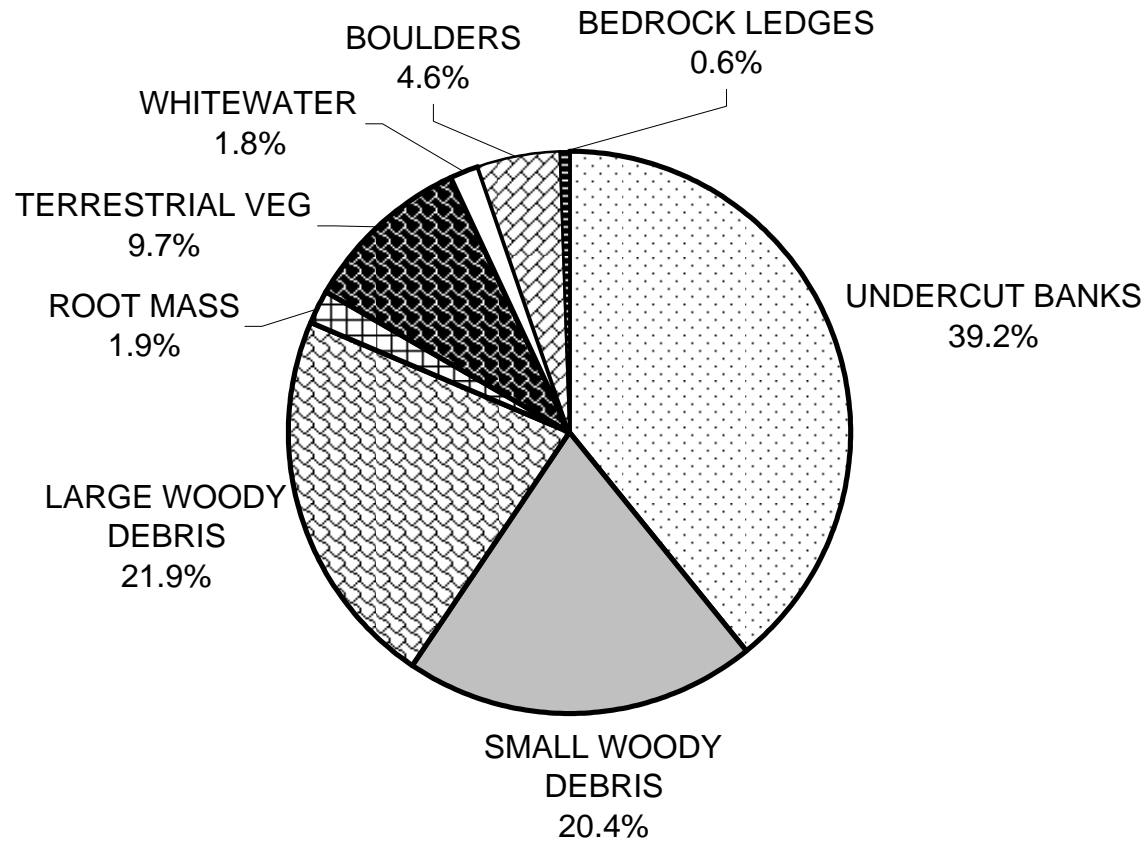
GRAPH 5

NORTH FORK JAMES CREEK 2010 PERCENT EMBEDDEDNESS



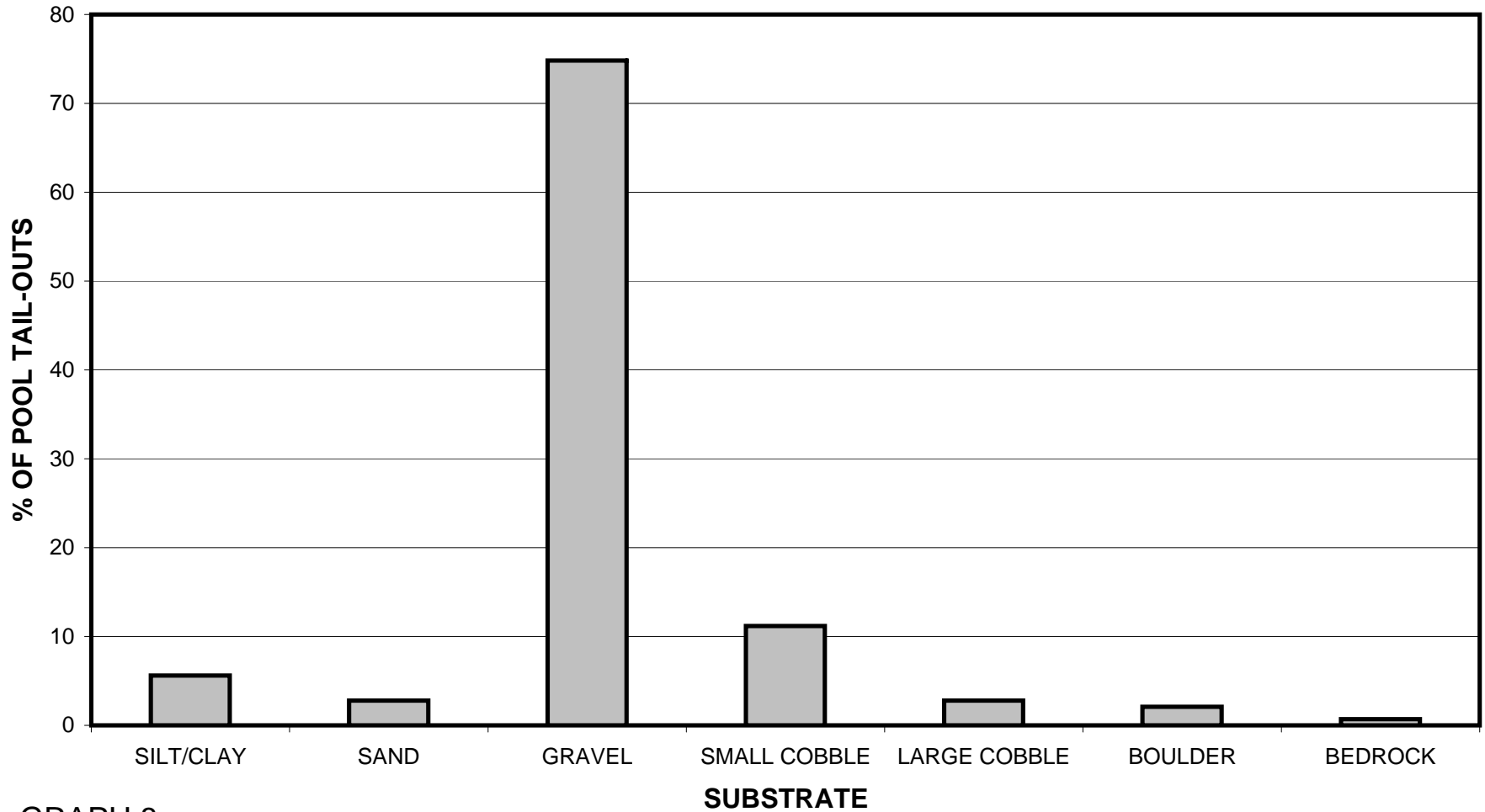
GRAPH 6

NORTH FORK JAMES CREEK 2010 MEAN PERCENT COVER TYPES IN POOLS



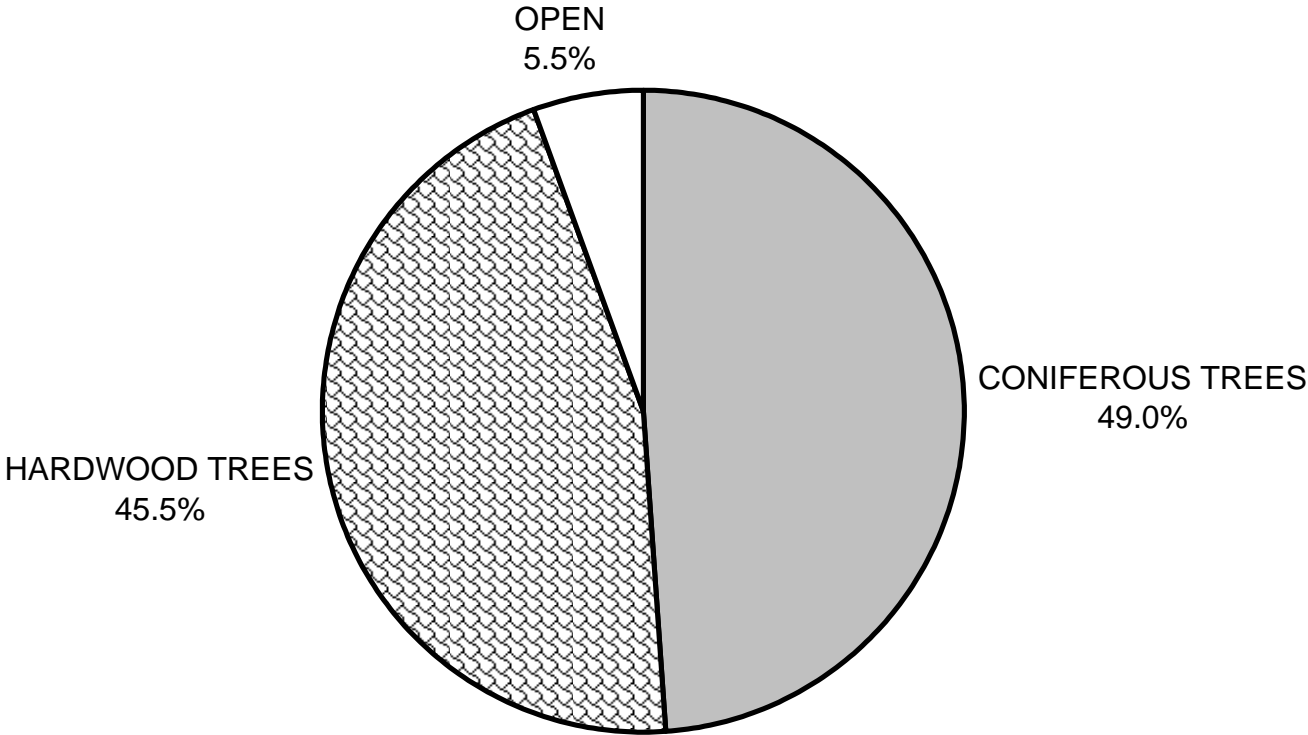
GRAPH 7

NORTH FORK JAMES CREEK 2010 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



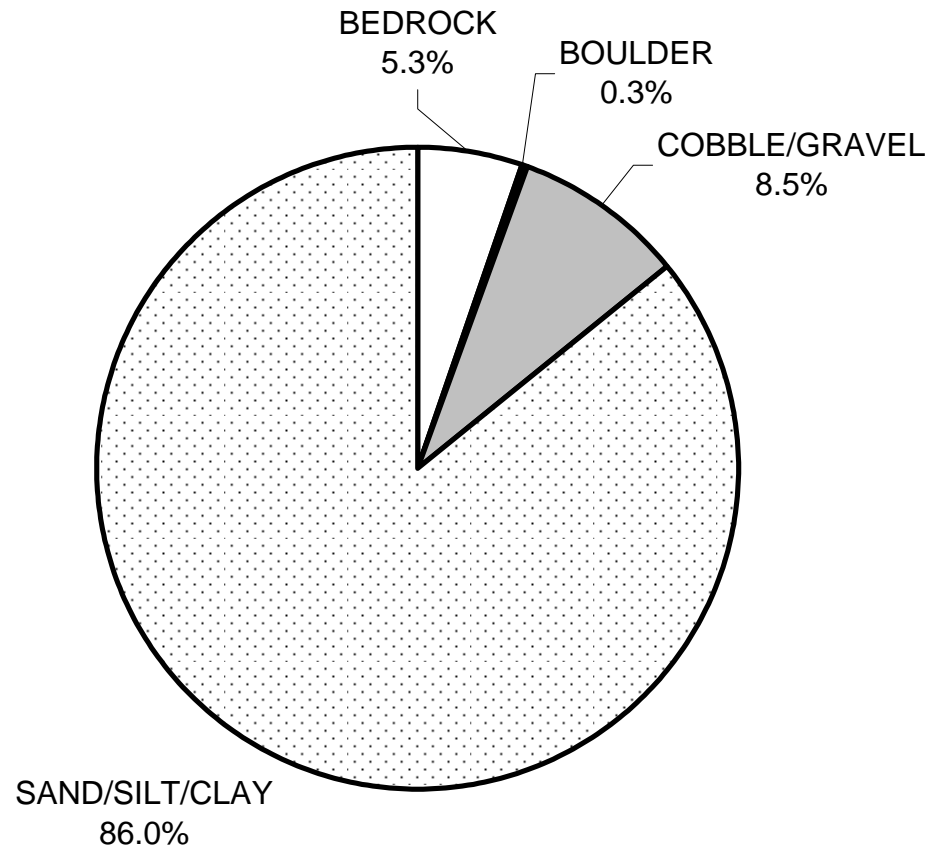
GRAPH 8

**NORTH FORK JAMES CREEK 2010
MEAN PERCENT CANOPY**



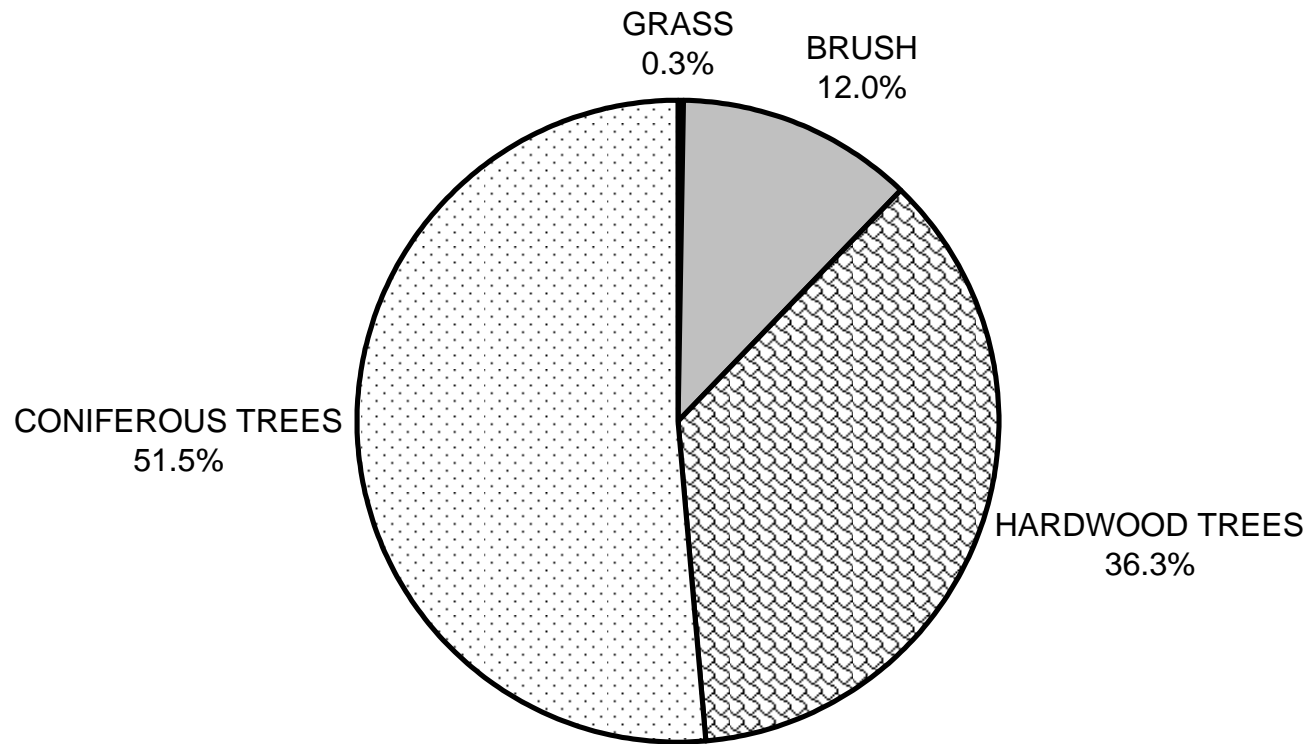
GRAPH 9

NORTH FORK JAMES CREEK 2010 DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

NORTH FORK JAMES CREEK 2010 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

