

STREAM INVENTORY REPORT

Jordan Creek

INTRODUCTION

A stream inventory was conducted from August 2 to August 4, 2010 on Jordan Creek. The survey began at the confluence with Eel River and extended upstream 2.1 miles.

The Jordan 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 Jordan 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

Jordan Creek is a tributary to Eel River, which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Jordan Creek's legal description at the confluence with Eel River is T01N R01E S26. Its location is 40.4452 north latitude and 124.0359 west longitude, LLID number 1240347404454. Jordan Creek is a second order stream and has approximately 5.6 miles of blue line stream according to the USGS Scotia 7.5 minute quadrangle. Jordan Creek drains a watershed of approximately 9.7 square miles. Elevations range from about 66 feet at the mouth of the creek to 2,100 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Highway 101.

METHODS

The habitat inventory conducted in Jordan 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 embeddedness. Habitat unit types encountered for the first time are measured for all the

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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 Jordan 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". Jordan Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Jordan Creek, embeddedness was

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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 Jordan 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 Jordan 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 Jordan 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 Jordan 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)
- 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 Jordan 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 2 to August 4, 2010, was conducted by, Anna Glasgow (WSP), Isaac Mikus and Sean McSmith (DFG). The total length of the stream surveyed was 10,835 feet with an additional 123 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.7 cfs on August 3, 2010.

Jordan Creek is a B4 channel type for 7,010 feet of the stream surveyed (Reach 1), and an A2 channel type for 3,825 feet of the stream surveyed (Reach 2). B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates. A2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 64 degrees Fahrenheit. Air temperatures ranged from 55 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% riffle units, 38% pool units, 19% flatwater units, 2% no survey units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 58% riffle units, 24% pool units, 16% flatwater units, 1% dry units, and 1% no survey units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 34%; high gradient riffle units, 22%; and low gradient

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riffle units, 19% (Graph 3). Based on percent total length, low gradient riffle units made up 32%, high gradient riffle units 26%, and mid-channel pool units 22%.

A total of 106 pools were identified (Table 3). Main channel pools were the most frequently encountered at 92% (Graph 4), and comprised 93% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Sixteen of the 106 pools (15%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 106 pool tail-outs measured, 10 had a value of 1 (9.4%); 47 had a value of 2 (44.3%); 33 had a value of 3 (31.1%); 9 had a value of 4 (8.5%); 7 had a value of 5 (6.6%) (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 10, flatwater habitat types had a mean shelter rating of 16, and pool habitats had a mean shelter rating of 17 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 34. Main channel pools had a mean shelter rating of 16 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Jordan Creek. Graph 7 describes the pool cover in Jordan Creek. Boulders 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 35% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 31% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Jordan Creek was 86%. Fourteen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 77% and 23%, respectively. Graph 9 describes the mean percent canopy in Jordan Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 96%. The mean percent left bank vegetated was 96%. The dominant elements composing the structure of the stream banks consisted of 64% cobble/gravel, 26% boulder, 7% sand/silt/clay, 3% bedrock (Graph 10). Deciduous trees were the dominant vegetation type observed in 73% of the units surveyed. Additionally, 19% of the units surveyed had coniferous trees as the dominant vegetation type, and 6% had grass 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 Jordan Creek on October 18, 2010. Water temperatures taken during the survey period of 1032 to 1153 ranged from 53 to 54 degrees Fahrenheit. Air temperatures ranged from 55 to 57 degrees Fahrenheit. The sites were sampled by I. Mikus (DFG), and A. Glasgow (WSP).

The reach sites yielded 145 young-of-the-year steelhead/rainbow trout (SH/RT), 14 age 1+ SH/RT, and 10 age 2+ SH/RT.

The following chart displays the information yielded from these sites:

2010 Jordan Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: B4 Channel Type									
10/18/10	1	028	Pool	1875	14	2	0	0	0
	2	030	Pool	1949	15	1	1	0	0
	3	036	Pool	2125	14	1	1	0	0
	4	039	Pool	2460	14	0	1	0	0
	5	069	Pool	3786	8	0	0	0	0
	6	071	Pool	3886	22	2	1	0	0
	7	073	Pool	4018	31	1	2	0	0
	8	075	Pool	4162	6	1	1	0	0
	9	083	Pool	4626	15	1	0	0	0
	10	099	Pool	5256	16	5	2	0	0

DISCUSSION

Jordan Creek is a B4 channel type for the first 7,010 feet of stream surveyed, and an A2 channel type for the remaining 3,825 feet. The suitability of B4 and A2 channel types for fish habitat improvement structures is as follows: B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. A2 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey days August 2 to August 4, 2010, ranged from 54 to 64 degrees Fahrenheit. Air temperatures ranged from 55 to 77 degrees Fahrenheit. Water temperatures in the mid-sixties are marginal for salmonids. To make any conclusions,

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temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 16% of the total length of this survey, riffles 58%, and pools 24%. Sixteen of the 106 (15%) 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 in Reach 1.

Fifty-seven of the 106 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty-two of the pool tail-outs had embeddedness ratings of 3 or 4. Seven 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 Jordan Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Seventy of the 106 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 17. The shelter rating in the flatwater habitats is 16. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Jordan Creek. Boulders 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 86%. Reach 1 had a canopy density of 80%, Reach 2 had a canopy density of 93%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 96% and 96%, 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) Jordan Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are marginal 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) In Reach 1 the B4 channel type, 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 boulders. Adding high quality complexity with woody cover in the pools is desirable.
- 5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 6) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the 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 confluence with the Eel River.
1113	0018.00	Bridge #01 is the Elinor Road memorial bridge and it is no longer in use. It is 27' high x 34' wide x 77' long. It is a made of concrete. The right bank has crumbled and is undermining the bridge footings. The left bank is exposed due to the presence of the bridge.
1751	0027.00	Bridge #02 is Highway 101 northbound, and is 42' high x 35' wide x 46' long. It is a concrete bridge. The bridge in much longer than 46', however the length measured that of bankfull width.
2021	0033.00	Bridge #03 is Highway 101 southbound, and is 40' high x 40' wide x 88' long. It is a concrete bridge.
2438	0039.00	The right bank is sliding contributing sediment ranging in size from silt to cobble. It measures 30' long x 15' high.
3256	0055.00	The right bank is steep and bare for 100' long x 30' high. It is contributing sediment ranging in size from silt to cobble.

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3786	0070.00	There is a seep on the left bank.
3982	0073.00	The right bank is steep and exposed for 50' long x 25' high. It is contributing sediment ranging in size from silt to cobble.
4322	0080.00	There is flow gauging station at the top of this unit. It is currently not in the water.
4412	0082.00	There is a tagged rootwad with number #339 on it.
5340	0103.00	There is left bank erosion that measures 50' long x 20' high. It is contributing sediment ranging from silt to cobble.
5611	0112.00	Tributary #01 enters on the left bank. It contributes to approximately 5% of Jordan Creek's flow. The water temperature downstream of the tributary is 57 degrees Fahrenheit, the water temperature of the tributary is 56 degrees Fahrenheit, and the water temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is 3% and fish are observed in the 150 feet explored.
5862	0118.00	There is a landslide that is 30' long x 80' high. It is contributing sediment ranging in size from silt to cobble.
5914	0120.00	Tributary #02 enters on the left bank. It contributes to approximately 3% of Jordan Creek's flow. The water temperature downstream of the tributary is 53 degrees Fahrenheit, the water temperature of the tributary is 56 degrees Fahrenheit, and the water temperature upstream of the confluence is 56 degrees Fahrenheit. The slope of the tributary is 20% and fish are not observed in the 50 feet explored.
6017	0124.00	There is a 4' log plunge.
6262	0133.00	Log debris accumulation (LDA) #01 contains 30+ pieces of large woody debris (LWD) and measures 9' high x 100' wide x 23' long. Water flows through visible gaps. Retained sediment ranges from sand to cobble and measures 40' wide x 30' long x 4' deep. Fish are present above the LDA. The debris accumulation splits the creek into 3 separate channels.
6853	0149.00	LDA #02 contains 13 pieces of LWD and measures 5' high x 31' wide x 15' long. Water flows through it and there are visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 20' wide x 50' long x 3' deep. Fish are present above the LDA.
6885	0150.00	Log debris accumulation (LDA) #02 contains 13 pieces of large woody debris (LWD) and measures 5' high x 31' wide x 15' long. Water flows through and there visible gaps. Retained sediment ranges from silt to

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		gravel and measures 20' wide x 50' long x 3' deep. Fish are present above the LDA.
7010	0154.00	The channel type changed from B4 to A2.
7367	0164.00	Tributary #03 enters on the left bank. It contributes to approximately 7% of Jordan Creek's flow. The water temperature downstream and upstream of the tributary is 57 degrees Fahrenheit; the water temperature of the tributary is 56 degrees Fahrenheit. The slope of the tributary is 4%. Salmonids were observed in the tributary.
7463	0166.00	There is a 2.3' high plunge.
8077	0179.00	LDA #03 contains 11 pieces of LWD and measures 8' high x 45' wide x 15' 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. A landslide on the left bank measuring 150' long x 80' high is contributing sediment ranging in size from silt to cobble to the channel.
8819	0207.00	There is a 4' high boulder plunge.
8840	0208.00	A tributary on the right bank is nearly dry.
8937	0210.00	A slump on the right bank measuring 200' long x 30' high is contributing sediment ranging in size from silt to gravel.
9048	0215.00	There is a 4' high boulder plunge. A tributary on the right bank is nearly dry.
9092	0217.00	There is a 3.5' high log plunge.
9110	0218.00	LDA #04 contains 15 pieces of LWD and measures 8' high x 32' wide x 11' long. Water flows through it and there no visible gaps in the LDA. The LDA is not retaining sediment. Fish are present above the LDA.
9141	0220.00	A landslide on the left bank is 50' long x 20' high is contributing sediment ranging in size from silt to cobble to the channel.
9191	0222.00	There is a debris accumulation.
9726	0240.00	A 5' high log-boulder plunge is a possible barrier to salmonids.
9826	0244.00	LDA #05 contains four pieces of LWD and measures 9' high x 38' wide x 7' long. Water does not flow through the LDA; the flow is subsurface upstream. There are no visible gaps in the LDA. Retained sediment

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ranges from sand to gravel and measures 30' wide x 30' long x 6' deep. Fish are present above the LDA.

9890	0249.00	A landslide on the left bank measuring 50' high x 50' long is contributing sediment ranging in size from silt to gravel.
9968	0251.00	There is a 5' high boulder plunge with no jump pool below it.
10417	0264.00	There is a 2.5' high boulder plunge.
10632	0269.00	There is a 2.5' high boulder plunge.
10704	0272.00	Tributary #04 enters on the right bank. It contributes to approximately 30% of Jordan 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 6%. The tributary is accessible to salmonids, but no fish were observed.
10788	0273.00	There is a 4' high plunge onto boulders.
10820	0275.00	An erosion site on the left bank measuring 15' high x 40' long is contributing sediment ranging in size from silt to sand.
10835	0275.00	End of survey due to time constraints.

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: Jordan Creek LLID: 1240347404454 Drainage: Eel River - Lower
Survey Dates: 8/2/2010 to 8/4/2010
Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES26 Latitude: 40:26:43.0N Longitude: 124:02:05.0W

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
3	0	DRY	1.1	48	145	1.3									
52	7	FLATWATER	18.6	34	1754	16.0	10.3	0.5	1.0	329	17099	151	7843		16
5	0	NOSURVEY	1.8	14	71	0.6									
106	106	POOL	37.9	25	2682	24.5	14.1	0.4	1.4	345	36518	296	31417	157	17
114	12	RIFFLE	40.7	55	6306	57.5	12.5	0.4	0.9	389	44289	172	19572		10
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
280	125				10958					97907			58832		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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 (%)
52	6	LGR	18.6	67	3496	31.9	11	0.3	1.3	376	19577	128	6681		9	49
62	6	HGR	22.1	45	2810	25.6	14	0.5	1.4	401	24832	215	13323		11	82
39	4	RUN	13.9	27	1061	9.7	9	0.5	1.3	217	8457	93	3614		15	85
13	3	SRN	4.6	53	693	6.3	12	0.5	1.5	478	6216	228	2969		18	79
94	94	MCP	33.6	26	2427	22.1	14	0.4	3.7	351	32977	295	27752	155	15	89
3	3	STP	1.1	26	79	0.7	16	0.5	1.8	361	1084	361	1082	202	32	96
1	1	LSL	0.4	11	11	0.1	18	0.1	0.7	188	188	75	75	19	5	90
1	1	LSBo	0.4	32	32	0.3	25	0.4	1.6	520	520	416	416	208	15	74
7	7	PLP	2.5	19	133	1.2	15	0.7	3.6	250	1749	299	2092	186	41	96
3	0	DRY	1.1	48	145	1.3										
5	0	NS	1.8	14	71	0.6										

Total Units
280

Total Units Fully Measured
125

Total Length (ft.)
10958

Total Area (sq.ft.)
95601

Total Volume (cu.ft.)
58004

Table 3 - Summary of Pool Types

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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
97	97	MAIN	92	26	2506	93	13.9	0.4	351	34061	156	14686	16
9	9	SCOUR	8	20	176	7	16.2	0.6	273	2458	170	1526	34
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
106	106				2682				36518			16212	

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

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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
94	MCP	89	23	24	59	63	10	11	2	2	0	0
3	STP	3	0	0	3	100	0	0	0	0	0	0
1	LSL	1	1	100	0	0	0	0	0	0	0	0
1	LSBo	1	0	0	1	100	0	0	0	0	0	0
7	PLP	7	1	14	2	29	3	43	1	14	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
106	25	24	65	61	13	12	3	3	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Dry Units: 3

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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
52	6	LGR	0	0	0	0	0	4	1	95	0
62	6	HGR	0	5	0	0	0	3	8	83	0
114	12	TOTAL RIFFLE	0	3	0	0	0	4	6	88	0
39	4	RUN	0	1	0	8	0	0	8	84	0
13	3	SRN	0	0	0	0	0	0	7	93	0
52	7	TOTAL FLAT	0	1	0	5	0	0	7	87	0
94	94	MCP	0	5	17	1	3	0	11	62	1
3	3	STP	0	0	0	0	0	0	30	70	0
1	1	LSL	0	0	0	0	0	0	0	100	0
1	1	LSBo	0	0	60	0	0	0	15	25	0
7	7	PLP	0	0	9	0	0	0	29	62	0
106	106	TOTAL POOL	0	5	16	1	2	0	13	62	1
5	0	NS									
280	125	TOTAL	0	4	14	1	2	1	12	66	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Dry Units: 3

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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
52	6	LGR	0	0	33	33	33	0	0
62	6	HGR	0	0	0	0	67	33	0
39	4	RUN	0	0	50	0	25	25	0
13	3	SRN	0	0	67	0	0	33	0
94	94	MCP	0	4	71	3	2	19	0
3	3	STP	0	0	67	0	0	33	0
1	1	LSL	0	0	100	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
7	7	PLP	0	0	29	14	0	57	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
86	23	77	1	96	96

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: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Survey Length (ft.): 10958

Main Channel (ft.): 10835

Side Channel (ft.): 123

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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

Channel Type: B4

Canopy Density (%): 80.4

Pools by Stream Length (%): 21.8

Reach Length (ft.): 7010

Coniferous Component (%): 27.9

Pool Frequency (%): 32.9

Riffle/Flatwater Mean Width (ft.): 12.5

Hardwood Component (%): 72.1

Residual Pool Depth (%):

BFW:

Dominant Bank Vegetation: Hardwood Trees

< 2 Feet Deep: 92

Range (ft.): 19 to 91

Vegetative Cover (%): 94.4

2 to 2.9 Feet Deep: 6

Mean (ft.): 38

Dominant Shelter: Boulders

3 to 3.9 Feet Deep: 2

Std. Dev.: 19

Dominant Bank Substrate Type: Cobble/Gravel

>= 4 Feet Deep: 0

Base Flow (cfs.): 1.7

Occurrence of LWD (%): 8

Mean Max Residual Pool Depth (ft.): 1.2

Water (F): 55 - 64 Air (F): 58 - 77

LWD per 100 ft.:

Mean Pool Shelter Rating: 17

Dry Channel (ft): 132

Riffles: 2

Pools: 5

Flat: 2

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 29 Sm Cobble: 33 Lg Cobble: 31 Boulder: 8 Bedrock: 0

Embeddedness Values (%): 1. 7.7 2. 59.6 3. 23.1 4. 7.7 5. 1.9

STREAM REACH: 2

Channel Type: A2

Canopy Density (%): 92.9

Pools by Stream Length (%): 29.5

Reach Length (ft.): 3825

Coniferous Component (%): 16.8

Pool Frequency (%): 44.3

Riffle/Flatwater Mean Width (ft.): 9.8

Hardwood Component (%): 83.3

Residual Pool Depth (%):

BFW:

Dominant Bank Vegetation: Hardwood Trees

< 2 Feet Deep: 78

Range (ft.): 19 to 37

Vegetative Cover (%): 98.3

2 to 2.9 Feet Deep: 19

Mean (ft.): 28

Dominant Shelter: Boulders

3 to 3.9 Feet Deep: 4

Std. Dev.: 4

Dominant Bank Substrate Type: Boulder

>= 4 Feet Deep: 0

Base Flow (cfs.): 1.7

Occurrence of LWD (%): 16

Mean Max Residual Pool Depth (ft.): 1.6

Water (F): 54 - 57 Air (F): 55 - 77

LWD per 100 ft.:

Mean Pool Shelter Rating: 17

Dry Channel (ft): 13

Riffles: 5

Pools: 9

Flat: 6

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 2 Gravel: 41 Sm Cobble: 30 Lg Cobble: 13 Boulder: 15 Bedrock: 0

Embeddedness Values (%): 1. 11.1 2. 29.6 3. 38.9 4. 9.3 5. 11.1

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

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	1	2.8
Boulder	26	39	26.0
Cobble / Gravel	87	74	64.4
Sand / Silt / Clay	6	11	6.8

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	7	9	6.4
Brush	4	1	2.0
Hardwood Trees	91	91	72.8
Coniferous Trees	23	24	18.8
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: Jordan Creek

LLID: 1240347404454

Drainage: Eel River - Lower

Survey Dates: 8/2/2010 to 8/4/2010

Confluence Location: Quad: SCOTIA

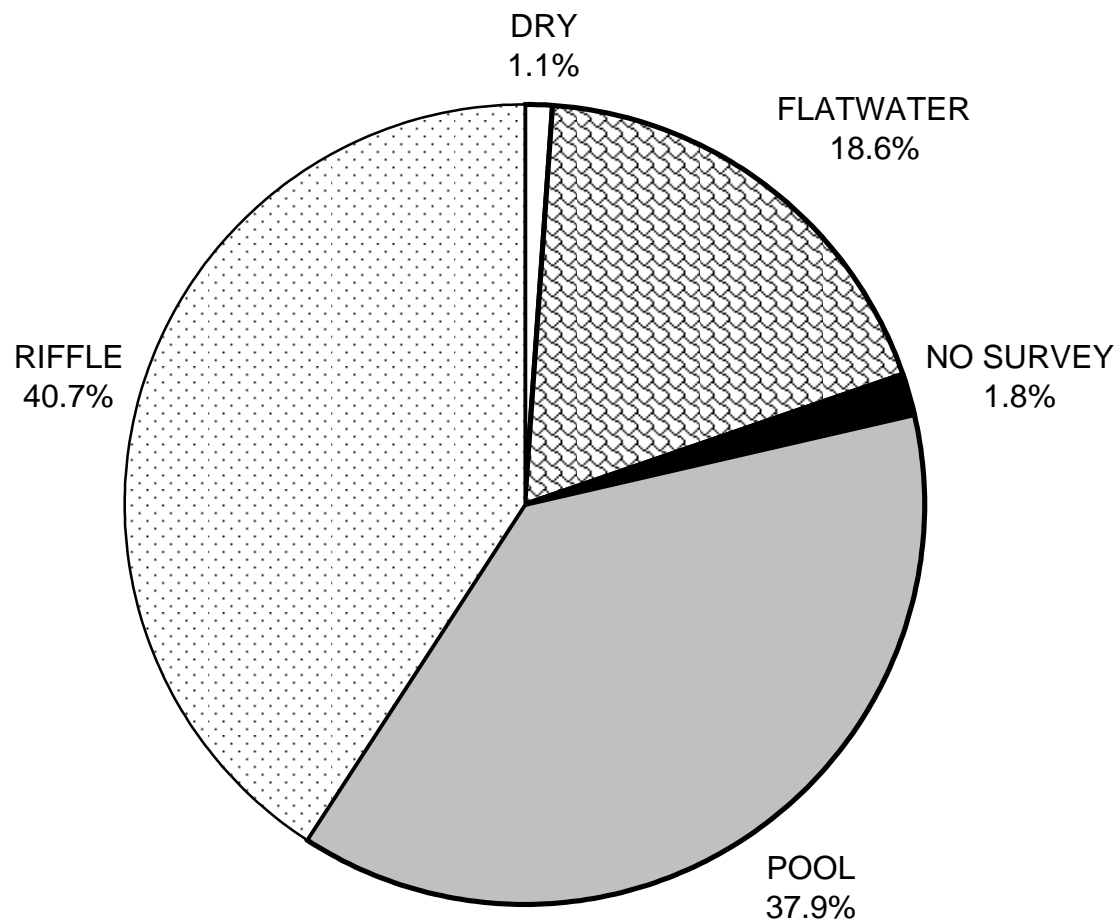
Legal Description: T01NR01ES26

Latitude: 40:26:43.0N

Longitude: 124:02:05.0W

	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	0
SMALL WOODY DEBRIS (%)	3	1	5
LARGE WOODY DEBRIS (%)	0	0	16
ROOT MASS (%)	0	5	1
TERRESTRIAL VEGETATION (%)	0	0	2
AQUATIC VEGETATION (%)	3	0	0
WHITEWATER (%)	6	7	13
BOULDERS (%)	88	87	62
BEDROCK LEDGES (%)	0	0	1

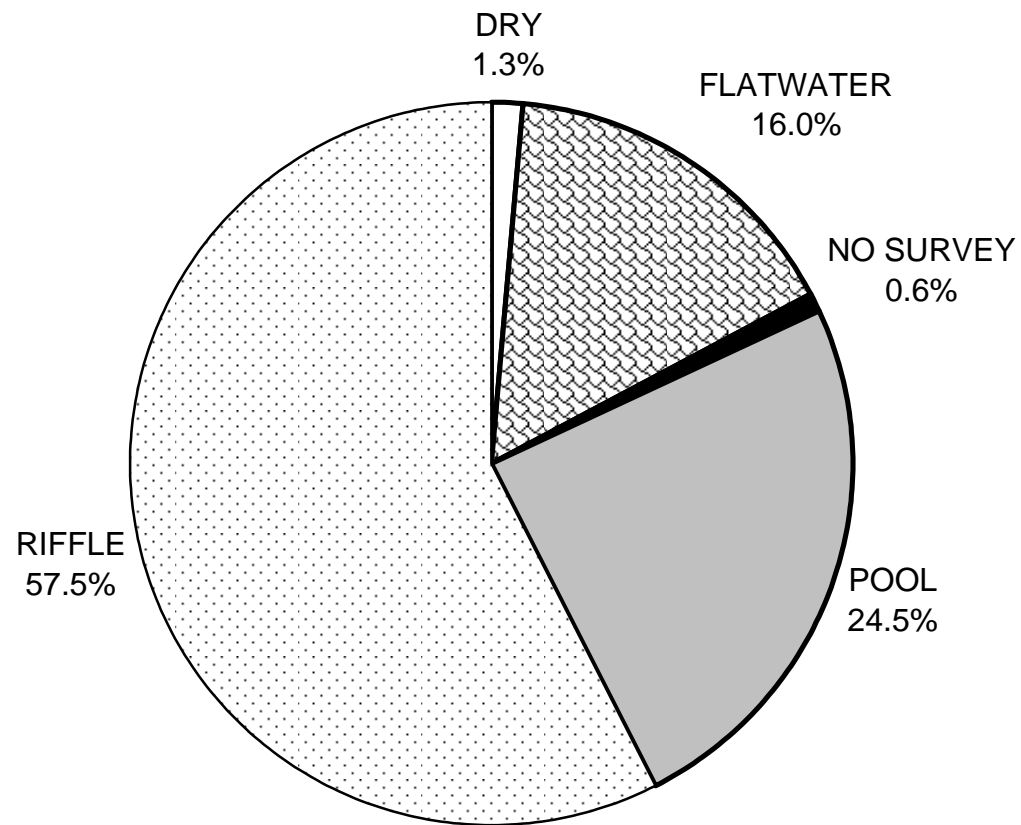
JORDAN CREEK 2010 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

JORDAN CREEK 2010

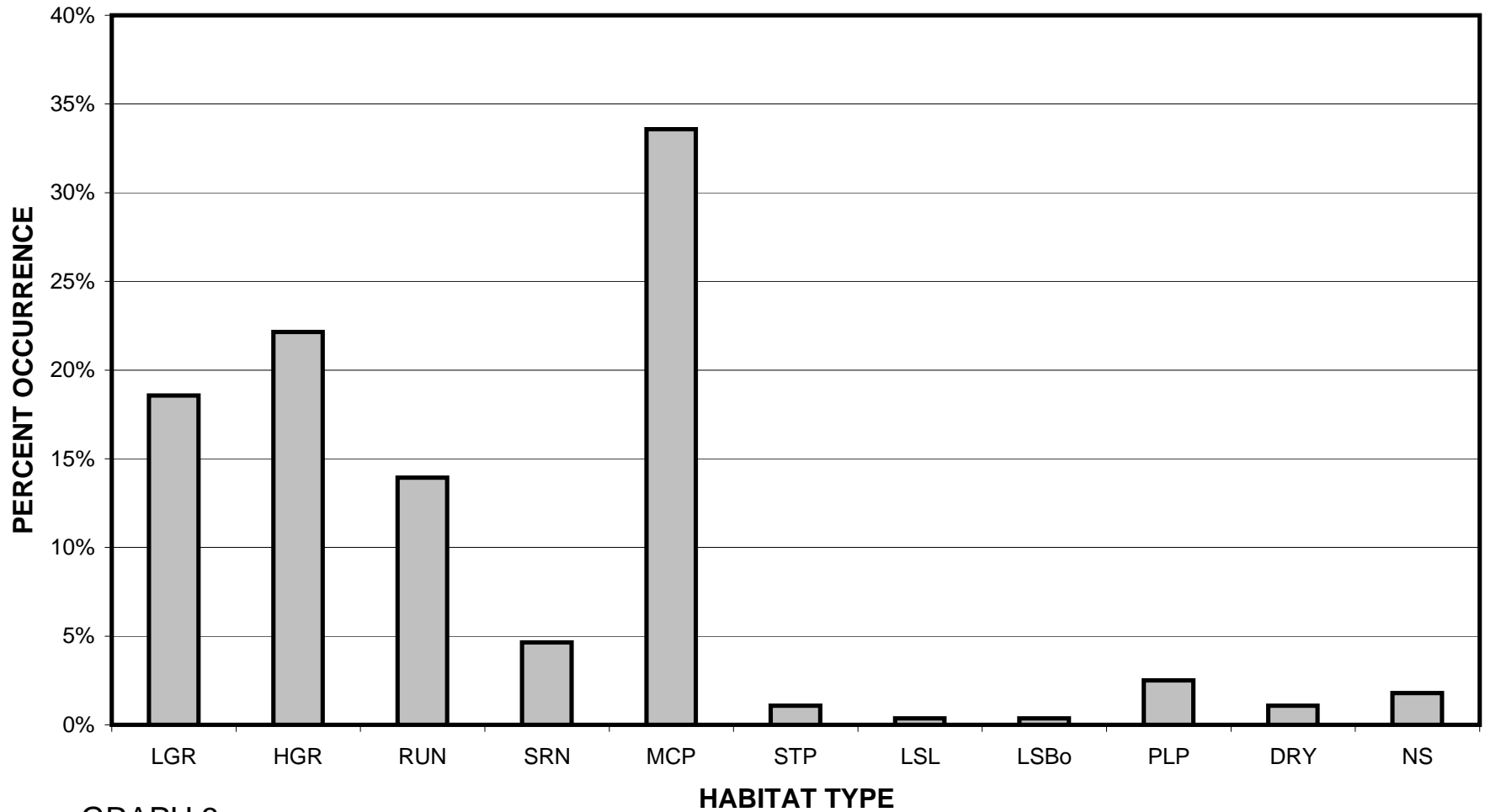
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

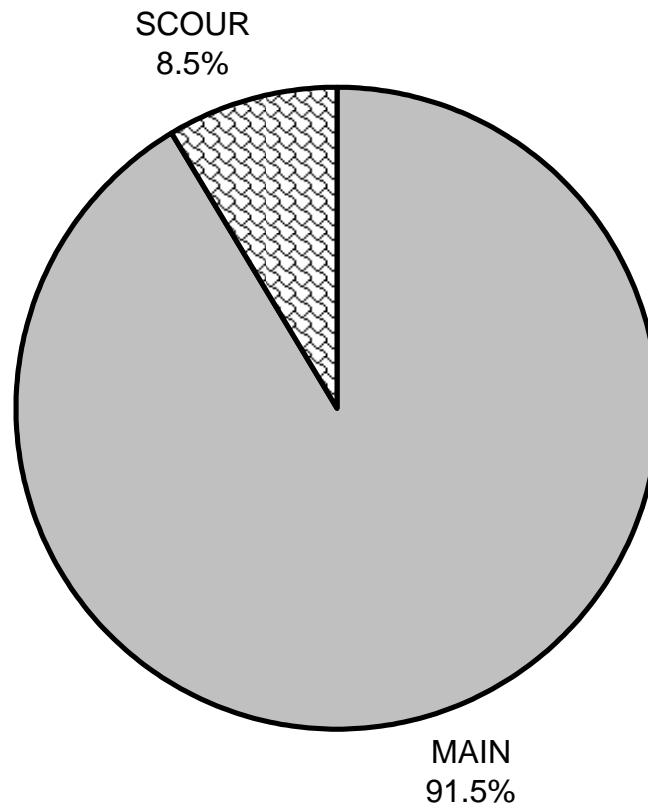
JORDAN CREEK 2010

HABITAT TYPES BY PERCENT OCCURRENCE



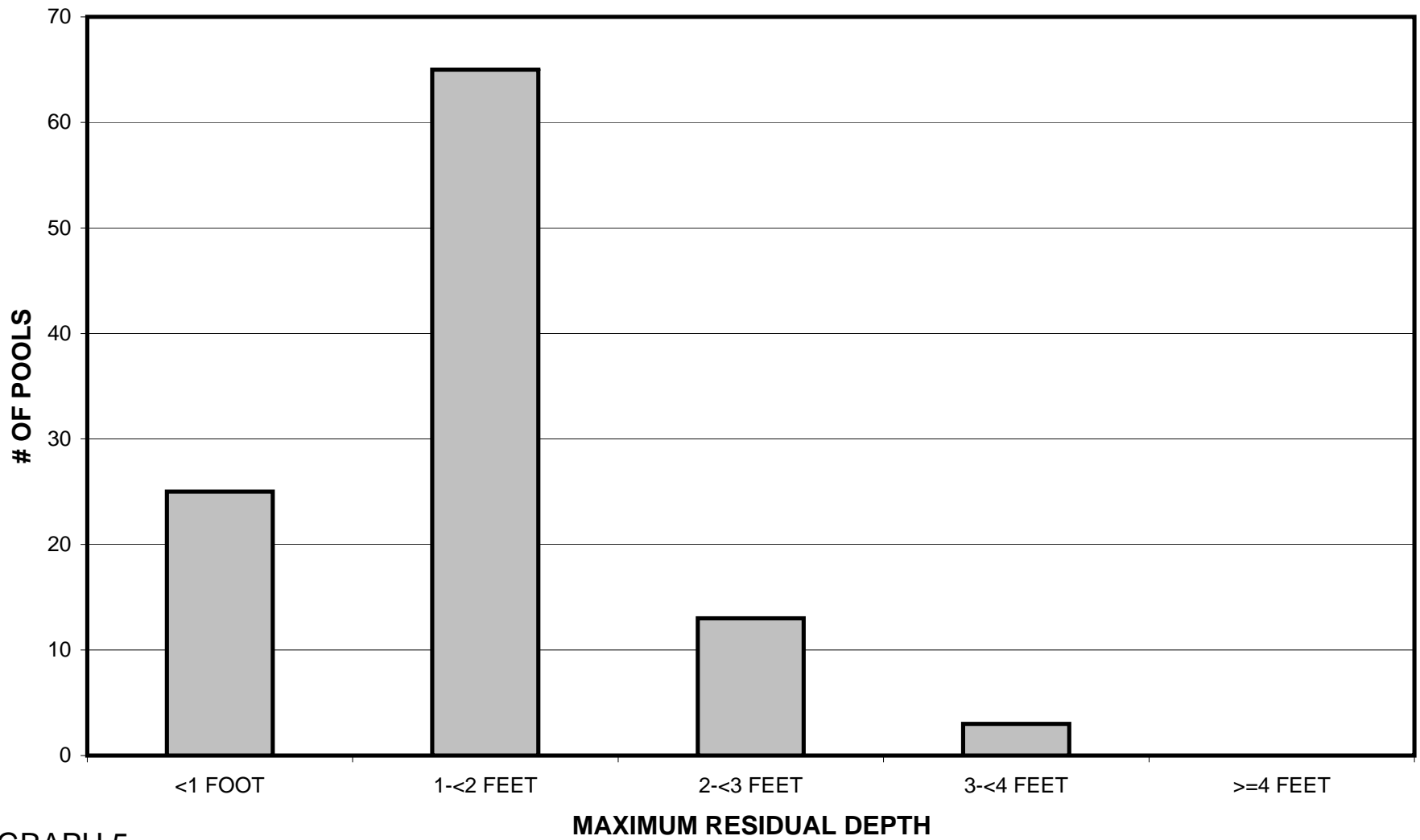
GRAPH 3

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



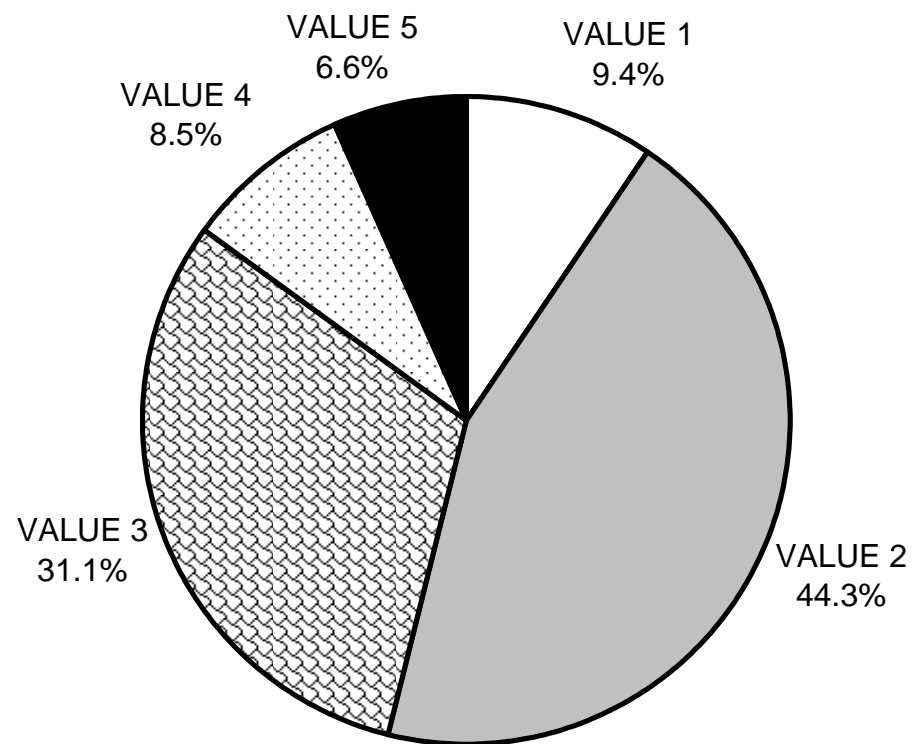
GRAPH 4

JORDAN CREEK 2010 MAXIMUM DEPTH IN POOLS



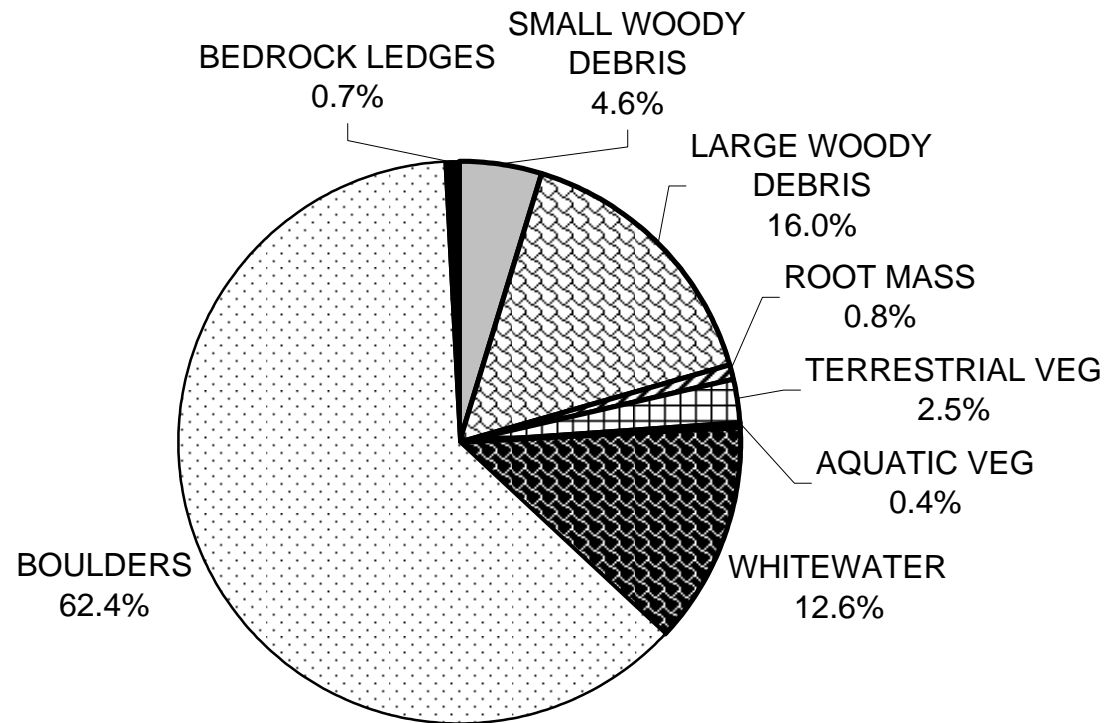
GRAPH 5

JORDAN CREEK 2010 PERCENT EMBEDDEDNESS



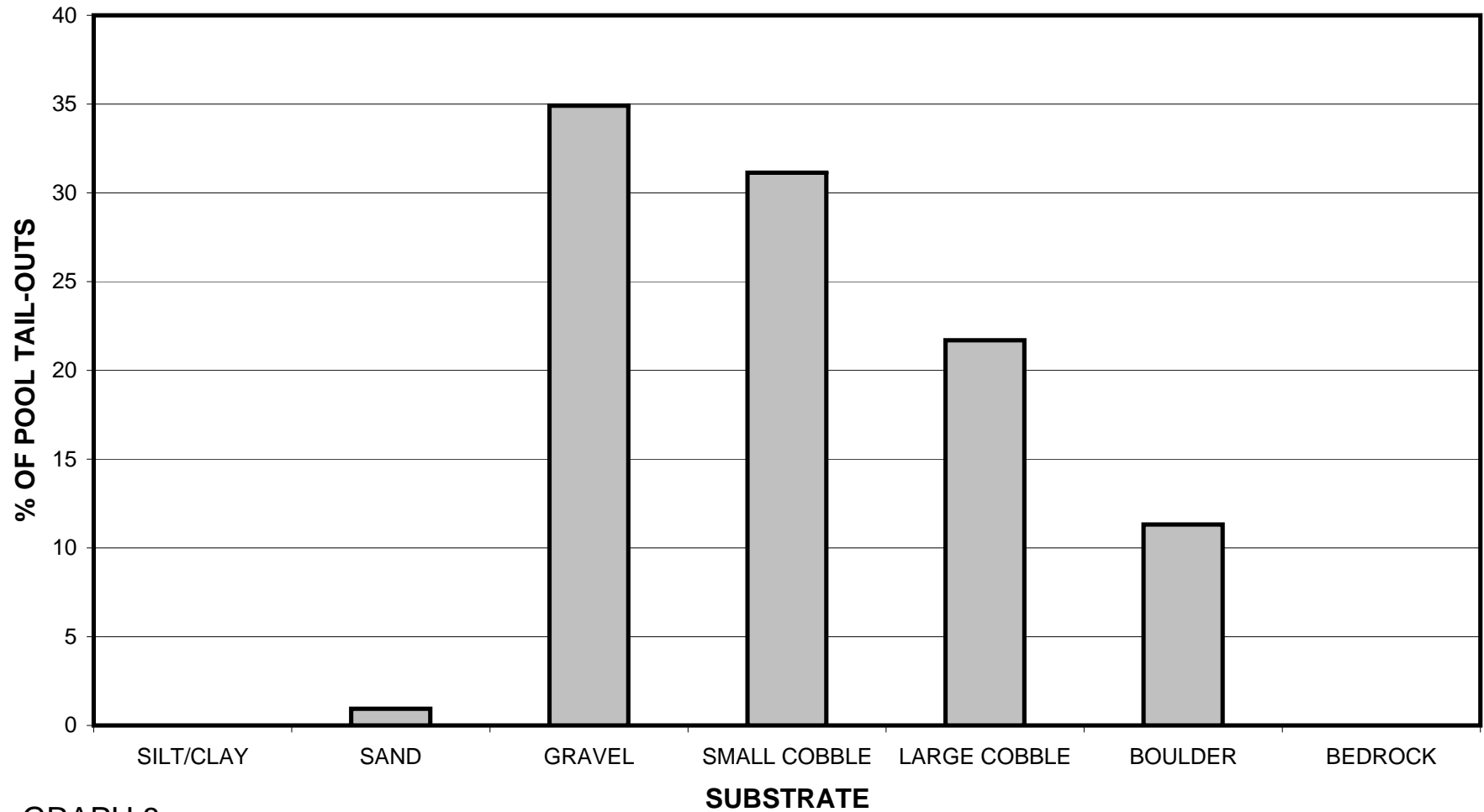
GRAPH 6

JORDAN CREEK 2010 MEAN PERCENT COVER TYPES IN POOLS



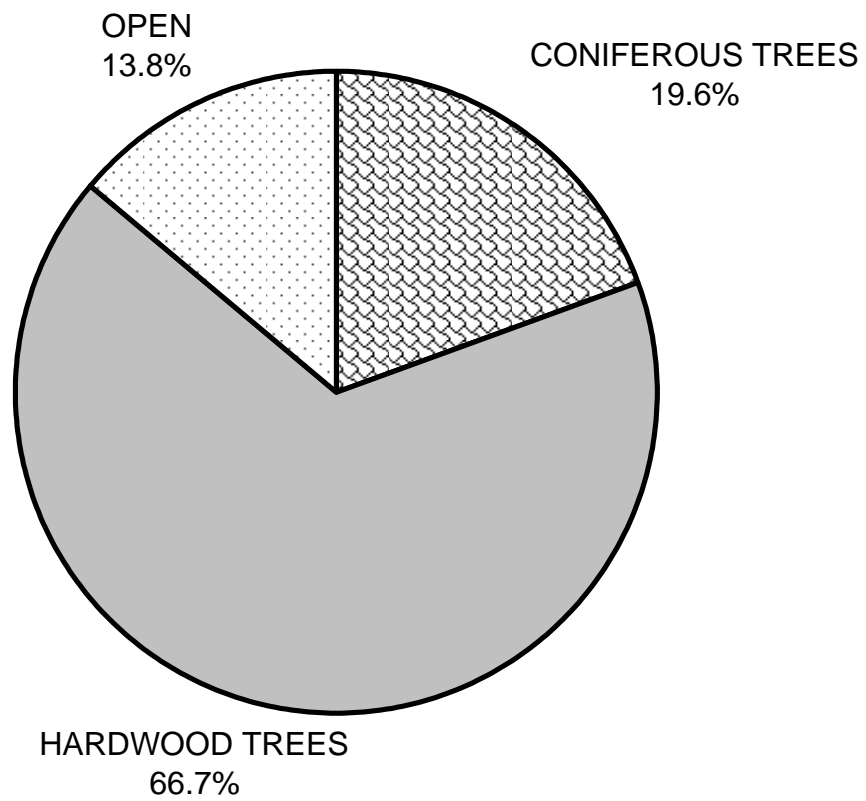
GRAPH 7

JORDAN CREEK 2010 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



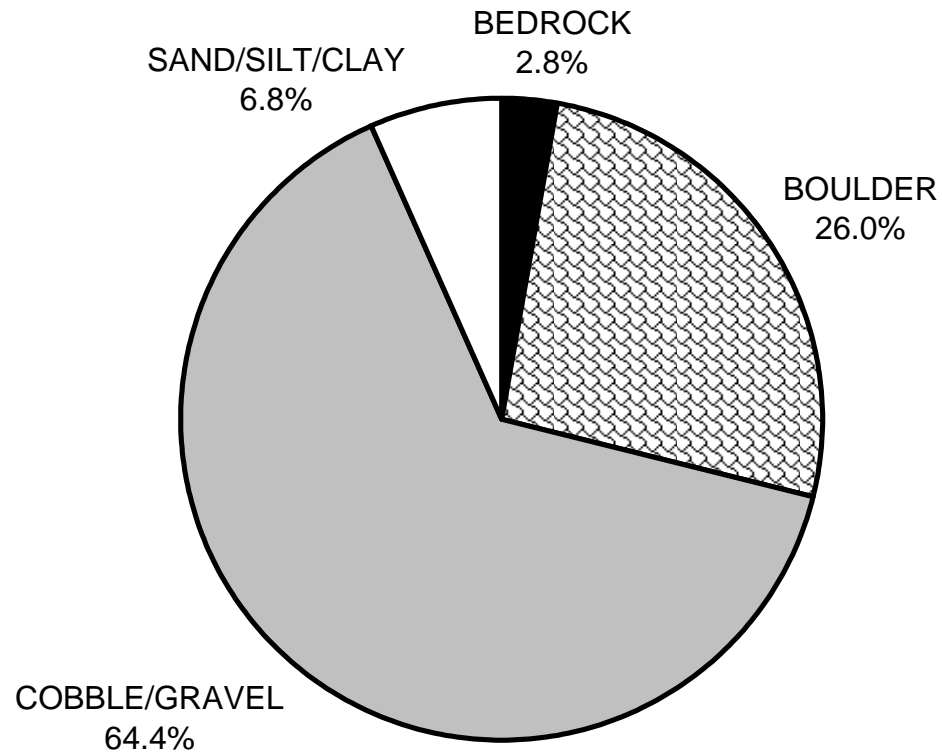
GRAPH 8

JORDAN CREEK 2010 MEAN PERCENT CANOPY



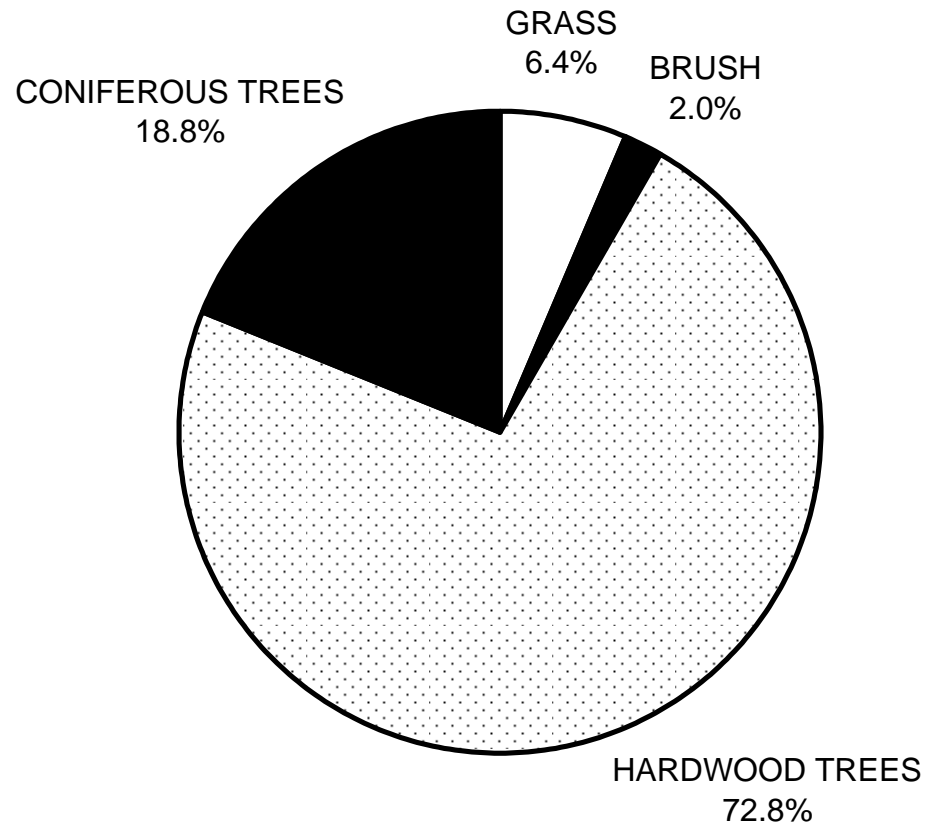
GRAPH 9

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



GRAPH 10

JORDAN CREEK 2010 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Jordan Creek
Eel Watershed
Scotia Quad, Humboldt County

Start of Survey

End of Survey

Barkdull
Prairie

Harrow
Springs



Legend

- Reach 1, B4 Channel Type
- Reach 2, A2 Channel Type

0 2,500 Feet

