STREAM INVENTORY REPORT

Stitz Creek

INTRODUCTION

A stream inventory was conducted July 29, 2010 on Stitz Creek. The survey began at the confluence with Eel River and extended upstream 0.6 miles.

The Stitz 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 Stitz 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

Stitz Creek is a tributary to Eel River, which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Stitz Creek's legal description at the confluence with Eel River is T01N R01E S15. Its location is 40.4605 north latitude and 124.0535 west longitude, LLID number 1240523404607. Stitz Creek is a first order stream and has approximately 3.3 miles of blue line stream according to the USGS Scotia 7.5 minute quadrangle. Stitz Creek drains a watershed of approximately 4.0 square miles. Elevations range from about 67 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via Highway 101 to Shively Road.

METHODS

The habitat inventory conducted in Stitz 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

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 Stitz 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". Stitz 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 Stitz 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 Stitz Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Stitz 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 Stitz Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

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 Stitz Creek. In addition, underwater observations were made at 11 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 Stitz 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 July 29, 2010, was conducted by S. McSmith (DFG), C. Saeland (CCC) and B. Williams (WSP). The total length of the stream surveyed was 3,257 feet with an additional 145 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.52 cfs on July 29, 2010.

Stitz Creek is a G2 channel type for 3,257 feet of the stream surveyed. G2 channels are entrenched "gully" step-pool channels on moderate gradients with low width /depth ratios and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 56 to 72 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 31% riffle units, 24% flatwater units, 4% no survey units, 1% culvert units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 31% flatwater units, 32% riffle units, 27% pool units, 4% culvert units, 3% dry units, and 3% no survey units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 31%; low gradient riffle units, 24%; and run units 12% (Graph 3). Based on percent total length, low gradient riffle units made up 27%, mid-channel pool units 24%, and step run units 20%.

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A total of 31 pools were identified (Table 3). Main channel pools were the most frequently encountered at 81% (Graph 4), and comprised 87% 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. Ten of the 31 pools (32%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 31 pool tail-outs measured, 2 had a value of 2 (6.5%); 13 had a value of 3 (41.9%); 9 had a value of 4 (29%); 7 had a value of 5 (22.6%) (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 17, flatwater habitat types had a mean shelter rating of 20, and pool habitats had a mean shelter rating of 19 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 22. Main channel pools had a mean shelter rating of 18 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 61% of the pool tail-outs. Large cobble was the next most frequently observed dominant substrate type and occurred in 16% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Stitz Creek was 82%. Eighteen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 57% and 43%, respectively. Graph 9 describes the mean percent canopy in Stitz Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 95% sand/silt/clay and 5% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 43.4% of the units surveyed. Additionally, 42.1% of the units surveyed had deciduous trees as the dominant vegetation type, and 14.5% had brush as the dominant vegetation type (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 11 sites for species composition and distribution in Stitz Creek on August 2, 2010. The sites were sampled by S. McSmith (DFG), and B. Williams (WSP).

The reach sites yielded 18 young-of-the-year steelhead/rainbow trout (SH/RT), 8 age 1+ SH/RT, 2 age 2+ SH/RT, 25 unidentified salmonids, 50 stickleback, 75 California roach, and 4 Sacramento pikeminnow.

The following chart displays the information yielded from these sites:

2010 Stitz Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
G2 Channel Type									
08/12/10	1	002	Pool	213	11	0	0	0	0
	2	016	Pool	775	0	0	0	0	0
	3	030	Pool	1,273	0	1	0	0	0
	4	037	Pool	1,592	0	0	0	0	0
	5	046	Pool	2,006	3	0	0	0	0
	6	049	Pool	2,081	0	0	1	0	0
	7	052	Pool	2,177	0	2	0	0	0
	8	061	Pool	2,513	2	2	0	0	0
	9	074	Pool	3,140	0	1	1	0	0
	10	076	Pool	3,213	2	2	0	0	0
	11	Above survey	Pool		0	0	0	0	0

DISCUSSION

Stitz Creek is a G2 channel type for the entire 3,257 feet of stream surveyed. The suitability of G2 channel types for fish habitat improvement structures is as follows: G2 channel types are fair for log cover.

The water temperatures recorded on the survey days July 29, 2010, ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 56 to 72 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.

Flatwater habitat types comprised 31% of the total length of this survey, riffles 32%, and pools 27%. Ten of the 31 (32%) 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.

Two of the 31 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-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 Stitz Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Twenty-one of the 31 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 19. The shelter rating in the flatwater habitats is 20. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Stitz Creek. Large woody debris is the dominant cover type in pools followed by boulders. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 82%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 98% and 99%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Stitz 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) Conduct a fish passage assessment of the Shively Road stream crossing at 1291 feet. Develop alternatives for improving fish passage.

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

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 survey at confluence with the Eel River flood plain.
121	0002.00	Bridge #01 is 75' high x 50' wide x 150' long. It is a railroad trellis consisting of concrete footings and heavy timber.
213	0003.00	Log debris accumulation (LDA) #01 contains 9 pieces of large woody debris (LWD) and measures 4.5' high x 46' wide x 20' long. Water flows over and there are no visible gaps. Retained sediment ranges from fines to boulder and measures 47' wide x 100' long x 4 deep. The Eel River may back flood in the winter providing access. Fish are present above the LDA. There is a 4.3' log plunge.
412	0007.00	There is a 3.9' log plunge. The creek is heavily populated with aquatic snails.
745	0016.00	There is a 3.7' boulder plunge.
887	0020.00	Salmonids and rough skinned newts have been observed throughout the survey.
1247	0030.00	There is an 11' boulder/LWD/concrete plunge from a concrete apron. It is the downstream end of the Shively Road culvert.
1273	0031.00	This is the concrete apron to the Shively Road culvert.

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1291	0032.00	Culvert #01 is the Shively Road crossing, and is 8.5' high (bottom 1' is flat concrete, giving 7.5' of clearance) x 7.8' wide x 120' long. It is composed of a single culvert, and is made of corrugated metal with a flat concrete bottom. The culvert's diameter was 8', its plunge height is 3.7', and it has a maximum depth of 0.8' within 5' of the outlet. The condition is good. The culvert, in addition to the apron and approach to the apron, is a probable barrier to salmonids. The pool leading to the culvert has a maximum depth of 2.5', then there is an 11' jump through LWD and boulders, followed by a flat concrete apron having a maximum depth of 0.8' with a 3.7' jump into the culvert.
1576	0036.02	Log debris accumulation (LDA) #02 contains 16 pieces of large woody debris (LWD) and measures 7.2' high x 38.8' wide x 12.4' long. Water does not flow through and there are no visible gaps. There is no retained sediment.
1576	0037.00	There is a 2.9' log plunge.
1592	0038.00	Log debris accumulation (LDA) #3 contains 11 pieces of large woody debris (LWD) and measures 3.9' high x 16.3' wide x 11.4' long. Water flows over and there are visible gaps. Retained sediment ranges from fines to gravel and measures 15' wide x 50' long x 4' deep. Fish are present above the LDA.
1657	0040.00	Log debris accumulation (LDA) #04 contains 15 pieces of large woody debris (LWD) and measures 8.4' high x 32.6' wide x 31' long. Water flows under and there are visible gaps. Retained sediment ranges from fines to gravel and measures 50' wide x 50' long x 3' deep. Fish are present above the LDA.
2177	0053.00	Log debris accumulation (LDA) #05 contains 7 pieces of large woody debris (LWD) and measures 8' high x 48' wide x 14' long. Water flows through and there are visible gaps. There is no sediment being retained. Fish are present above the LDA.
2254	0055.00	Log debris accumulation (LDA) #06 contains 16 pieces of large woody debris (LWD) and measures 9' high x 26' wide x 46' long. Water flows under and there are no visible gaps. Retained sediment ranges from sand to large cobble and measures 25' wide x 75' long x 3' deep. Fish are present above the LDA.
3052	0072.00	The left bank is cut 10' high x 20' long and it is contributing silt to large cobble. There is a seep on the right bank.
3213	0077.00	Log debris accumulation (LDA) #07 contains 50+ pieces of large woody debris (LWD) and measures 21' high x 32' wide x 84' long. Water flows

		over and there are no visible gaps. Retained sediment ranges from sand to large cobble and measures 32' wide x 200' long x 33' deep. Fish are present above the LDA. Redwoods are living in the center of the LDA. There is a pool at a height of 11' though it is not flowing. The creek plunges from 21'.
3239	0078.00	The LDA continues upstream 80' further. At 150' upstream from the top of the LDA, 8 1+ salmonids were observed in 1 pool and YOY were in pools within the 150'.
3257	0078.00	End of 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: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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
1	0	CULVERT	1.3	120	120	3.5									
1	0	DRY	1.3	117	117	3.4									
19	2	FLATWATER	23.8	56	1059	31.1	8.5	0.7	1.0	449	8535	314	5974		20
3	0	NOSURVEY	3.8	34	103	3.0									
31	31	POOL	38.8	30	924	27.2	14.1	0.9	1.5	374	11609	459	14238	331	19
25	5	RIFFLE	31.3	43	1079	31.7	8.6	0.5	0.8	184	4604	87	2167		17

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
80	38	3402	24747	22379

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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 (%)
19	3	LGR	23.8	48	903	26.5	9	0.4	0.9	214	4067	87	1661		18	83
5	1	HGR	6.3	32	158	4.6	9	0.8	1	149	745	119	596		30	93
1	1	BRS	1.3	18	18	0.5	7	0.4	0.8	130	130	52	52		0	40
10	1	RUN	12.5	36	364	10.7	9	0.7	0.9	380	3802	266	2661		10	79
9	1	SRN	11.3	77	695	20.4	8	0.7	1	518	4664	363	3265		30	96
25	25	MCP	31.3	32	800	23.5	11	0.9	2.4	354	8845	451	11284	322	18	84
1	1	LSL	1.3	13	13	0.4	26	0.5	1.2	304	304	274	274	152	10	60
5	5	PLP	6.3	22	111	3.3	26	0.9	2.3	492	2460	536	2680	414	25	77
1	0	DRY	1.3	117	117	3.4										
1	0	CUL	1.3	120	120	3.5										
3	0	NS	3.8	34	103	3.0										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
80	38	3402	25016	22473

Table 3 - Summary of Pool Types

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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
25	25	MAIN	81	32	800	87	11.3	0.9	354	8845	322	8049	18
6	6	SCOUR	19	21	124	13	25.9	0.8	461	2764	370	2222	23

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
31	31	924	11609	10271

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

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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
25	MCP	81	5	20	12	48	8	32	0	0	0	0
1	LSL	3	0	0	1	100	0	0	0	0	0	0
5	PLP	16	0	0	3	60	2	40	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
31	5	16	16	52	10	32	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010 Dry Units: 1

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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
19	3	LGR	0	0	0	0	0	0	0	100	0
5	1	HGR	0	0	0	0	0	0	0	100	0
1	1	BRS	0	0	0	0	0	0	0	0	0
25	5	TOTAL RIFFLE	0	0	0	0	0	0	0	100	0
10	1	RUN	0	0	0	0	0	0	0	100	0
9	1	SRN	0	0	30	0	0	0	0	70	0
19	2	TOTAL FLAT	0	0	15	0	0	0	0	85	0
25	25	MCP	1	1	34	16	8	0	1	39	0
1	1	LSL	0	0	50	0	0	0	0	50	0
5	5	PLP	0	5	48	5	15	0	23	5	0
31	31	TOTAL POOL	1	2	37	13	9	0	4	34	0
1	0	CUL									
3	0	NS									
80	38	TOTAL	1	2	31	11	7	0	3	46	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010 Dry Units: 1

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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
19	3	LGR	0	0	67	0	33	0	0
5	1	HGR	0	100	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	100
10	1	RUN	0	100	0	0	0	0	0
9	1	SRN	0	0	100	0	0	0	0
25	25	MCP	12	44	40	4	0	0	0
1	1	LSL	0	0	100	0	0	0	0
5	5	PLP	20	20	60	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
82	43	57	0	98	99

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

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010 Survey Length (ft.): 3402 Main Channel (ft.): 3257 Side Channel (ft.): 145

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G2
Reach Length (ft.): 3257
Riffle/Flatwater Mean Width (ft.): 8.5
BFW:
Range (ft.): 22 to 42
Mean (ft.): 29
Std. Dev.: 6
Base Flow (cfs.): 0.5
Water (F): 56 - 60 Air (F): 56 - 72
Dry Channel (ft): 117

Canopy Density (%): 81.8
Coniferous Component (%): 42.8
Hardwood Component (%): 57.2
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 98.6
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 26
LWD per 100 ft.:
Riffles: 5
Pools: 5
Flat: 4

Pools by Stream Length (%): 27.2
Pool Frequency (%): 38.8
Residual Pool Depth (%):
< 2 Feet Deep: 68
2 to 2.9 Feet Deep: 32
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.5
Mean Pool Shelter Rating: 19

Pool Tail Substrate (%): Silt/Clay: 3 Sand: 3 Gravel: 61 Sm Cobble: 6 Lg Cobble: 16 Boulder: 10 Bedrock: 0

Embeddedness Values (%): 1. 0.0 2. 6.5 3. 41.9 4. 29.0 5. 22.6

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

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	2	2	5.3
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	36	36	94.7

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	5	6	14.5
Hardwood Trees	20	12	42.1
Coniferous Trees	13	20	43.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 4

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

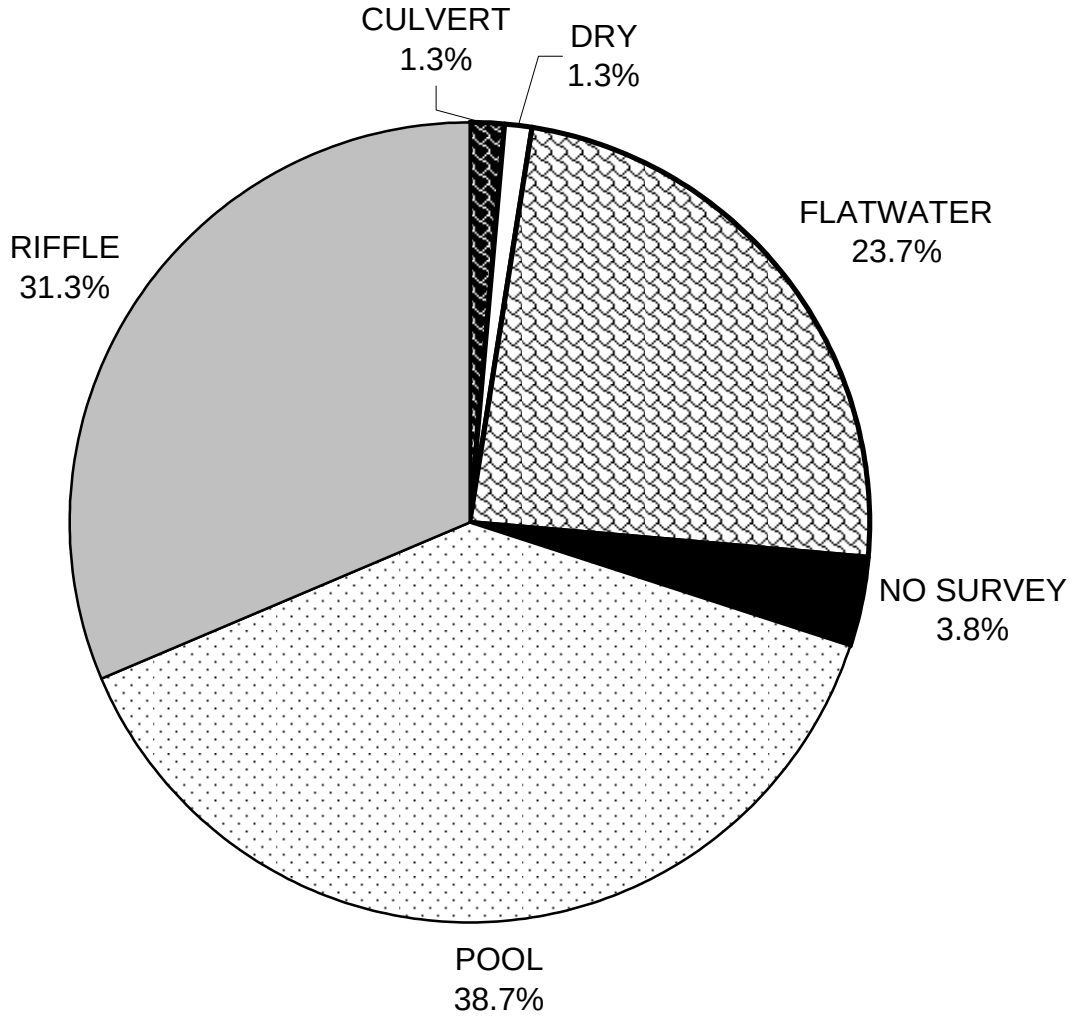
StreamName: Stitz Creek LLID: 1240523404607 Drainage: Eel River - Lower

Survey Dates: 7/29/2010 to 7/29/2010

Confluence Location: Quad: SCOTIA Legal Description: T01NR01ES15 Latitude: 40:27:39.0N Longitude: 124:03:08.0W

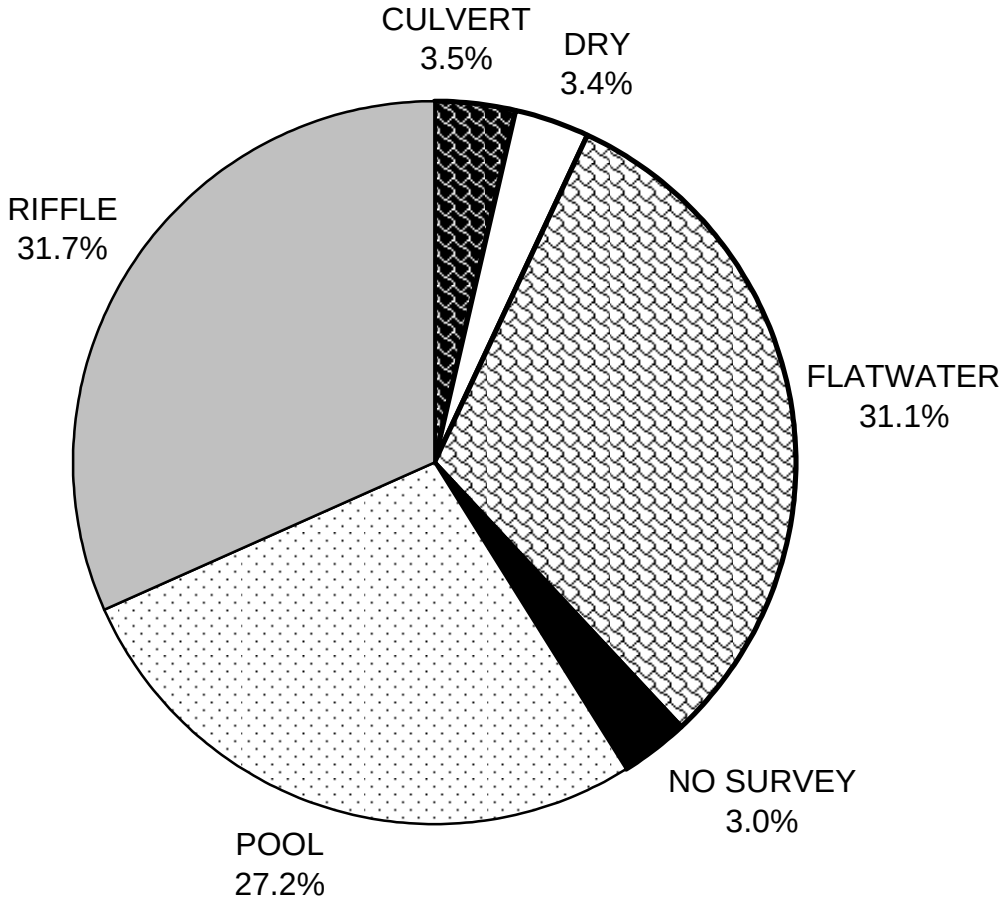
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	1
SMALL WOODY DEBRIS (%)	0	0	2
LARGE WOODY DEBRIS (%)	0	15	37
ROOT MASS (%)	0	0	13
TERRESTRIAL VEGETATION (%)	0	0	9
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	4
BOULDERS (%)	100	85	34
BEDROCK LEDGES (%)	0	0	0

STITZ CREEK 2010
HABITAT TYPES BY PERCENT OCCURRENCE



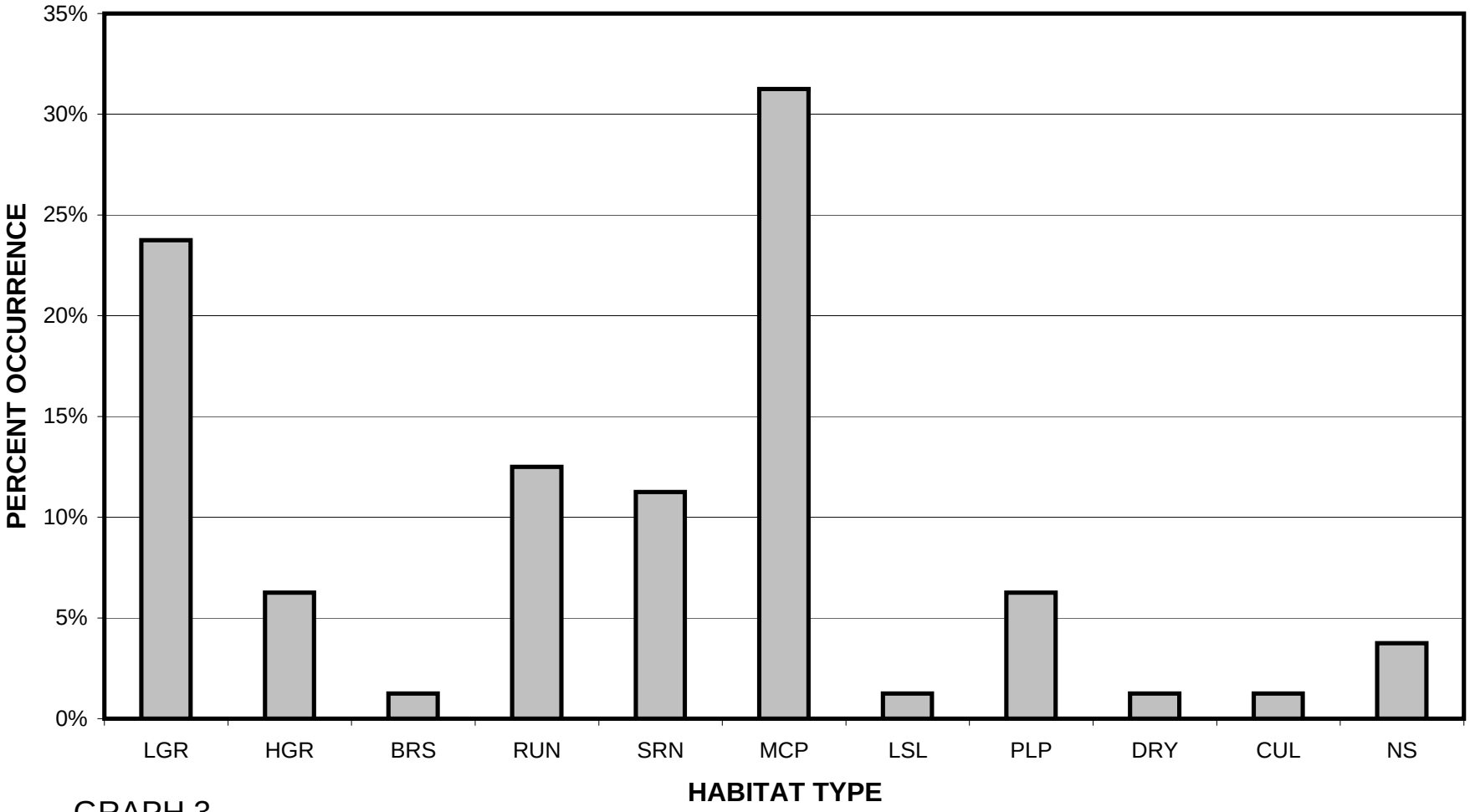
GRAPH 1

STITZ CREEK 2010
HABITAT TYPES BY PERCENT TOTAL LENGTH



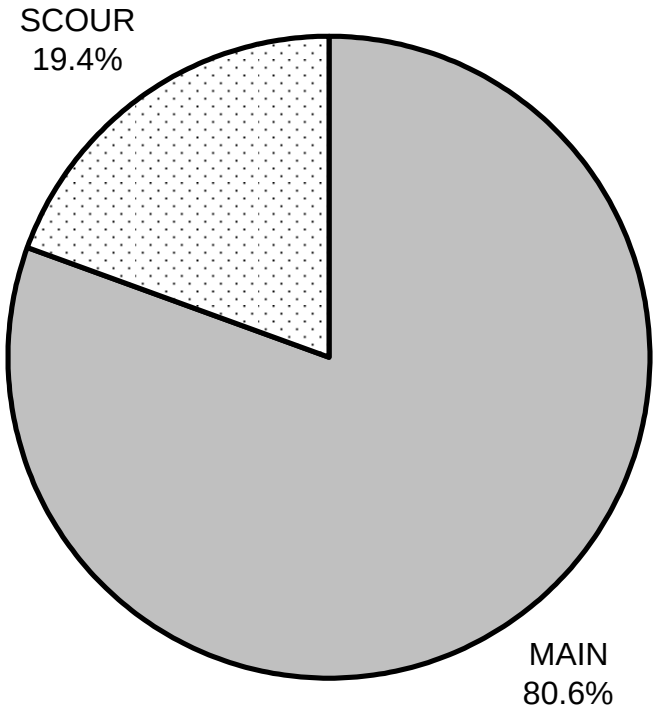
GRAPH 2

STITZ CREEK 2010
HABITAT TYPES BY PERCENT OCCURRENCE



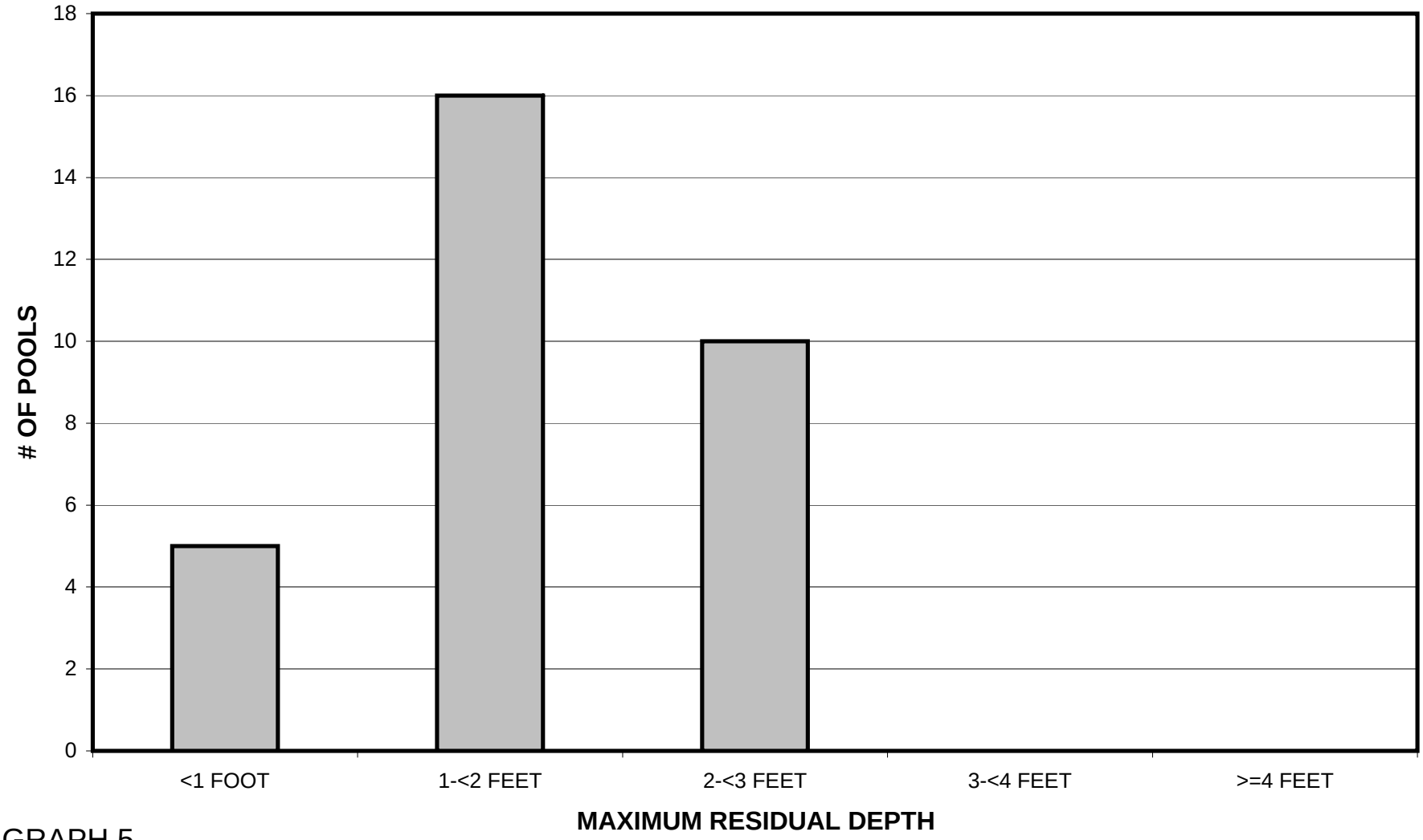
GRAPH 3

STITZ CREEK 2010
POOL TYPES BY PERCENT OCCURRENCE



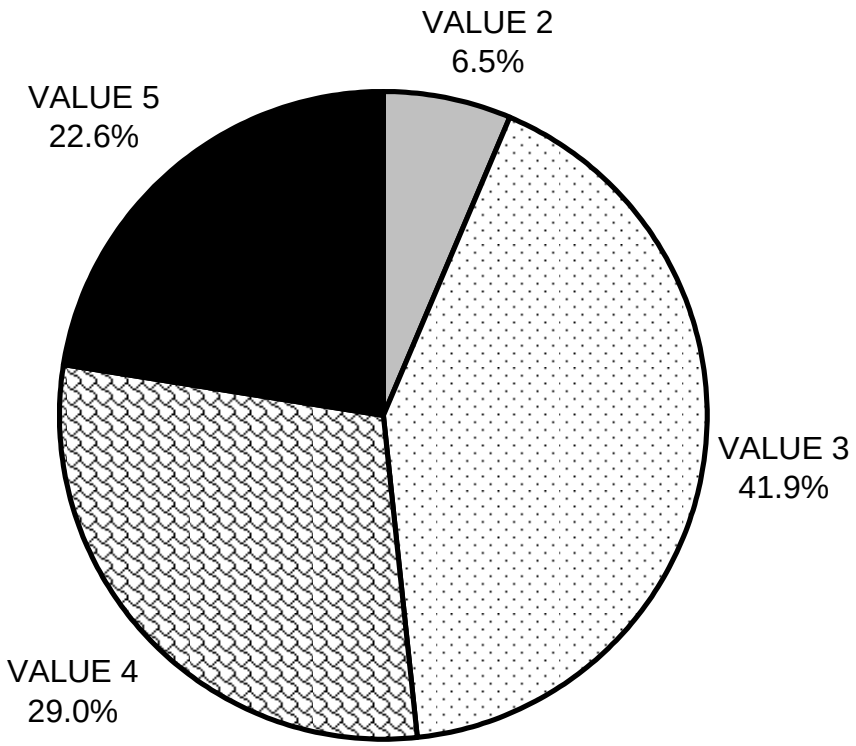
GRAPH 4

STITZ CREEK 2010
MAXIMUM DEPTH IN POOLS



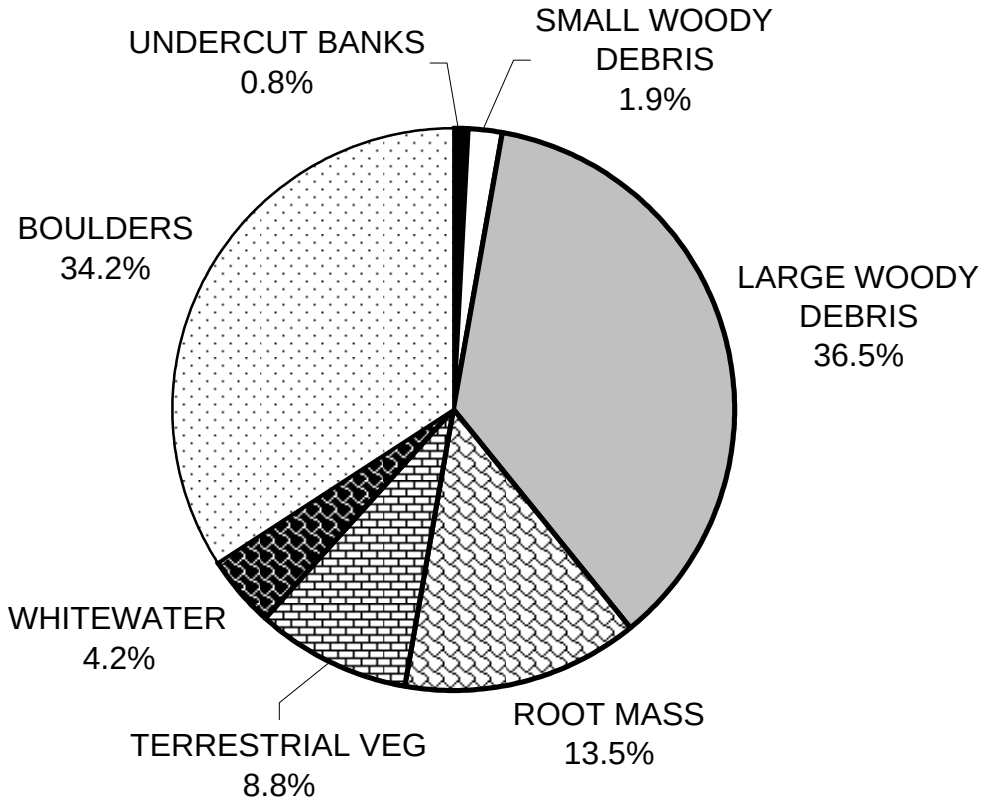
GRAPH 5

STITZ CREEK 2010
PERCENT EMBEDDEDNESS



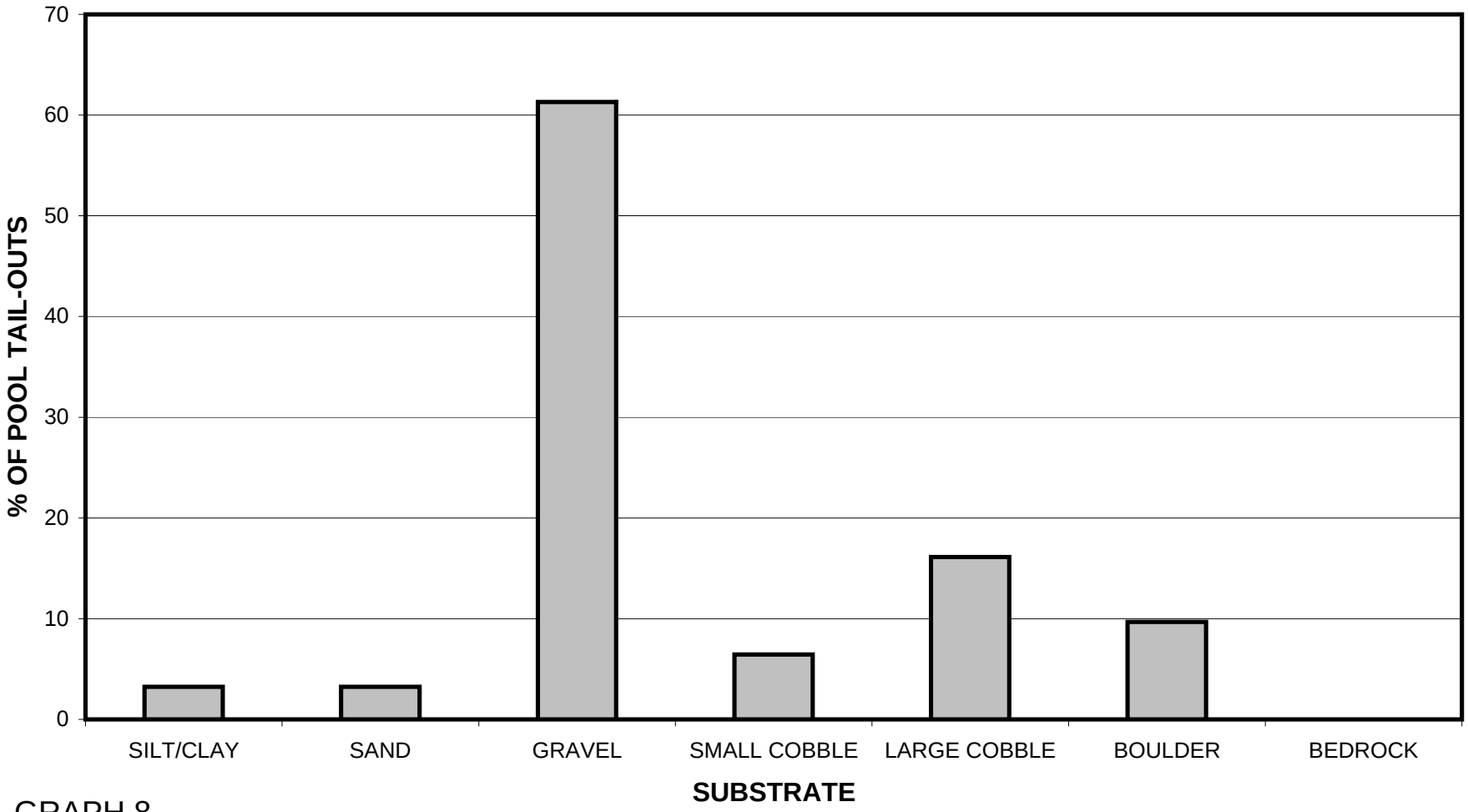
GRAPH 6

STITZ CREEK 2010
MEAN PERCENT COVER TYPES IN POOLS



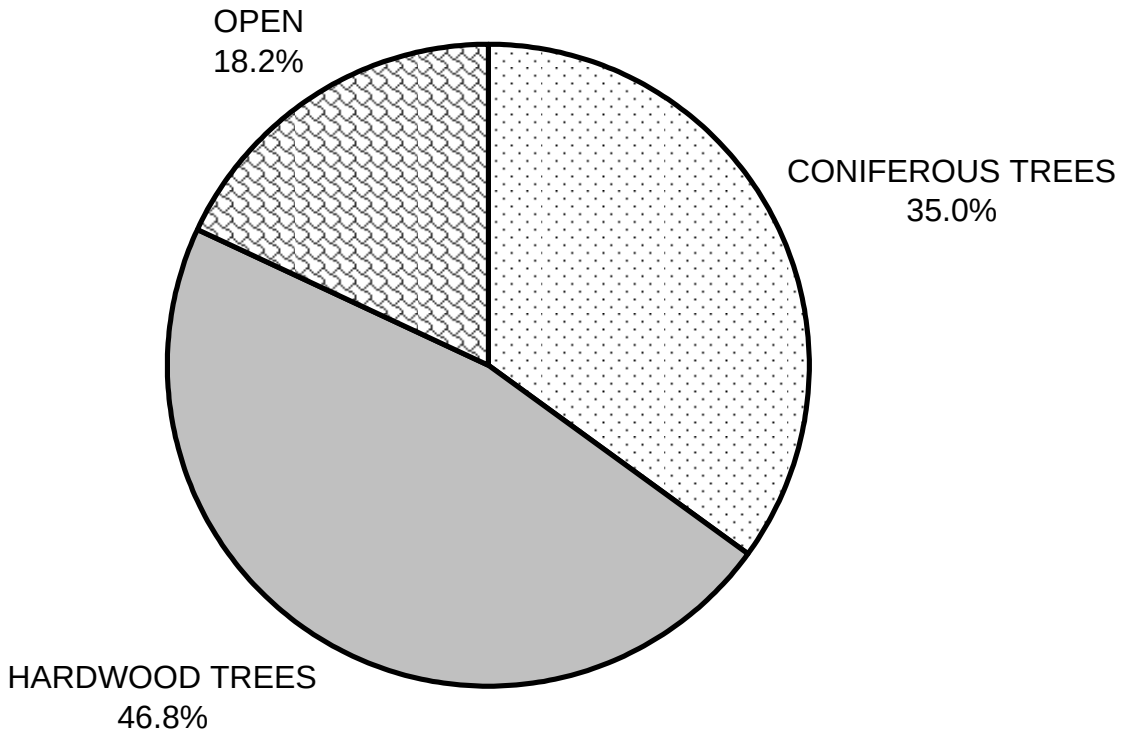
GRAPH 7

STITZ CREEK 2010
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



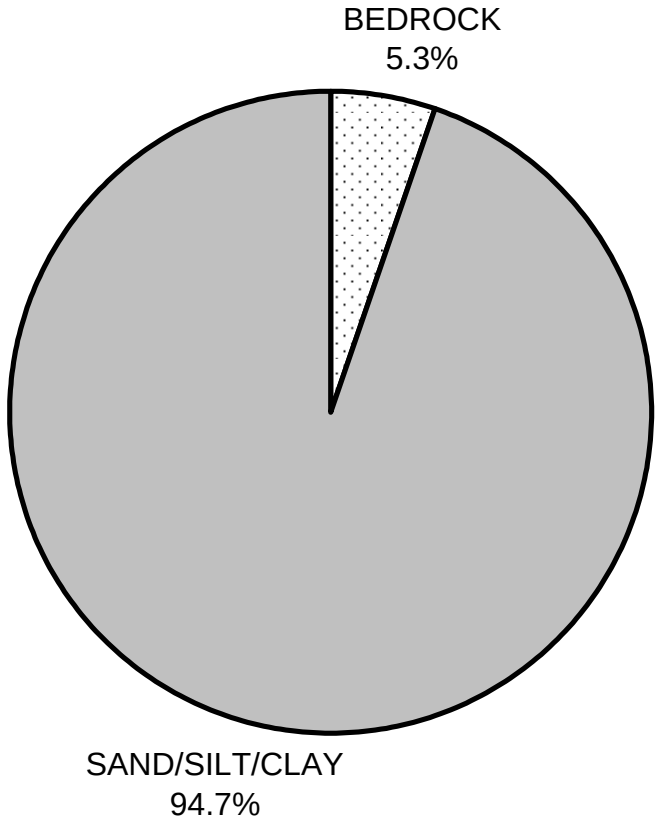
GRAPH 8

STITZ CREEK 2010
MEAN PERCENT CANOPY



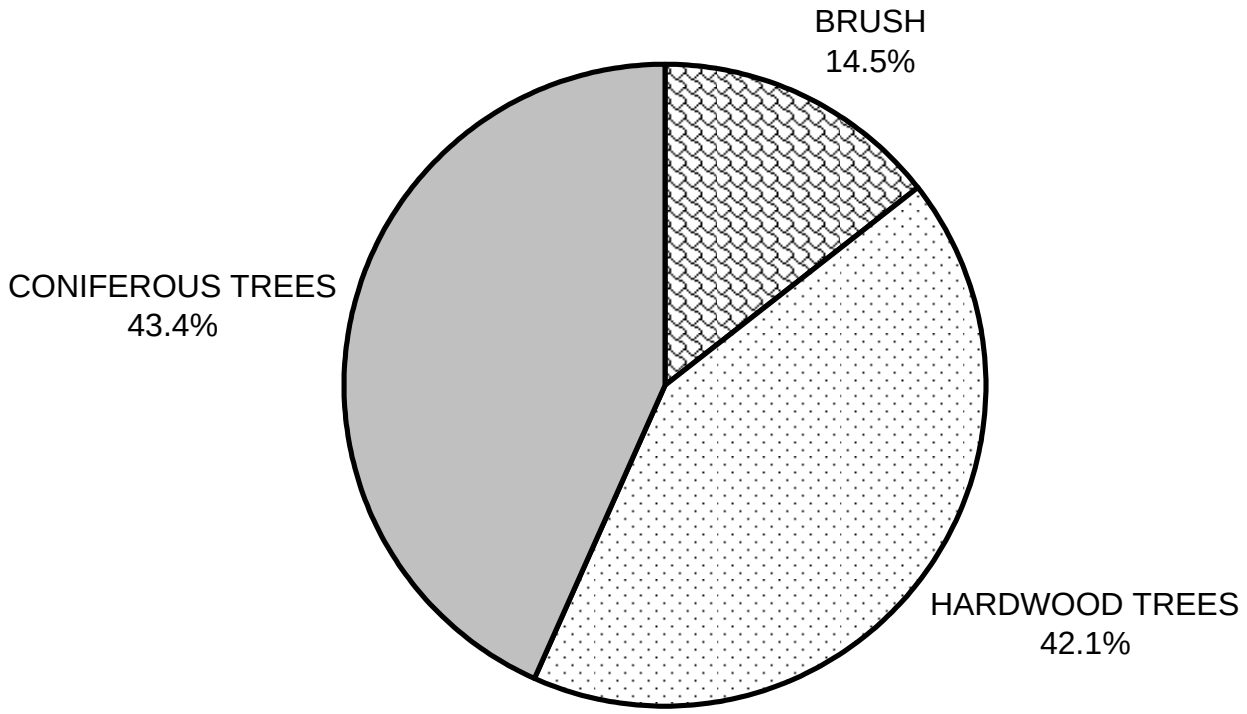
GRAPH 9

STITZ CREEK 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

STITZ CREEK 2010
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11