

STREAM INVENTORY REPORT

Little North Fork Albion River

INTRODUCTION

A stream inventory was conducted on October 18, 2011 on Little North Fork Albion River. The survey began at the confluence with the South Fork Albion River and extended upstream 0.4 miles. A stream inventory and report was also completed for one tributary to Little North Fork Albion River.

The Little North Fork River 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 Little North Fork Albion River. 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

Little North Fork Albion River is a tributary to the South Fork Albion River, tributary to Albion River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Little North Fork Albion River's legal description at the confluence with the South Fork Albion River is T16N R16W S21. Its location is 39.2322 degrees north latitude and 123.6467 degrees west longitude, LLID number 1236456392323. Little North Fork Albion River is an intermittent stream according to the USGS Elk 7.5 minute quadrangle. Little North Fork Albion River drains a watershed of approximately 0.9 square miles. Elevations range from about 160 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via a private logging road off Flynn Creek Road.

METHODS

The habitat inventory conducted in Little North Fork Albion River follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The AmeriCorps Watershed Stewards Project (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 Little North Fork Albion River 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". Little North Fork Albion River 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 Little North Fork Albion River, 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 not suitable 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 Little North Fork Albion River, 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 Little North Fork Albion River, 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 Little North Fork Albion River, 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 Little North Fork Albion River. In addition, underwater observations were made at nine 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 Little North Fork Albion River 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 October 18, 2011 was conducted by A. Blessing, R. Spencer, and B. James (WSP). The total length of the stream surveyed was 2,064 feet.

Stream flow was not measured on Little North Fork Albion River.

Little North Fork Albion River is an F4 channel type for 1,615 feet of the stream surveyed (Reach 1) and an A4 channel type for 449 feet of the stream surveyed (Reach 2). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 58 degrees Fahrenheit. Air temperatures ranged from 60 to 62 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% flatwater units, 28% dry units, 28% pool units, and 5% riffle units (Graph 1). Based on total length of Level II habitat types there were 50% flatwater units, 35% dry units, 14% pool units, and 2% riffle units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were dry units, 28%; mid-channel pool units, 26%; and step run units, 23% (Graph 3). Based on percent total length, step run units made up 47%, dry units 35%, and mid-channel pool units 13%.

A total of 11 pools were identified (Table 3). Main channel pools were the most frequently encountered at 91% (Graph 4), and comprised 93% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Two of the 11 pools (18%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 11 pool tail-outs measured, all of them had a value of 1 (100%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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 0, flatwater habitat types had a mean shelter rating of 4, and pool habitats had a mean shelter rating of 28 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 28. Scour pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in Little North Fork Albion River. Graph 7 describes the pool cover in Little North Fork Albion River. Undercut banks are the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 91% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 9% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Little North Fork Albion River was 99%. One percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 16% and 84%, respectively. Graph 9 describes the mean percent canopy in Little North Fork Albion River.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 69% sand/silt/clay and 31% cobble/gravel (Graph 10). Coniferous trees were the dominant vegetation type observed in 72% of the units surveyed. Additionally, 28% of the units surveyed had grass as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at nine sites for species composition and distribution in Little North Fork Albion River on October 24, 2011. The water temperature taken during the sampling period of 1235 hours to 1320 hours was 54 degrees Fahrenheit. Air temperatures ranged from 60 to 61 degrees Fahrenheit. The sites were sampled by I. Mikus and M. Groff (DFG).

In reach 1, which comprised the first 1,615 feet of stream, eight sites were sampled. The reach sites yielded three young-of-the-year steelhead/rainbow trout (SH/RT), six age 1+ SH/RT, and one age 2+ SH/RT.

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In reach 2, one site was sampled starting approximately 2,046 from the confluence with the South Fork Albion River and continuing upstream 18 feet. The reach site yielded no fish.

The following chart displays the information yielded from these sites:

2011 Little North Fork Albion River underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: F4 Channel Type									
10/24/11	1	008	Pool	633	1	2	0	0	0
	2	010	Pool	689	0	0	0	0	0
	3	012	Pool	752	0	0	0	0	0
	4	014	Pool	859	0	1	0	0	0
	5	018	Pool	945	0	0	0	0	0
	6	020	Pool	1,176	1	1	0	0	0
	7	022	Pool	1,524	1	0	0	0	0
	8	026	Pool	1,615	0	2	1	0	0
Reach 2: A4 Channel Type									
	9	039	Pool	2,064	0	0	0	0	0

DISCUSSION

Little North Fork Albion River is an F4 channel type for the first 1,615 feet of stream surveyed and an A4 channel type for the remaining 449 feet. The suitability of F4 and A4 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. A4 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey day October 18, 2011 ranged from 54 to 58 degrees Fahrenheit. Air temperatures ranged from 60 to 62 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 50% of the total length of this survey, riffles 2%, and pools 14%. Two of the 11 (18%) 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, the F4 channel type.

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All of the 11 pool tail-outs measured had embeddedness ratings of 1. None 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.

All of the 11 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 28. The shelter rating in the flatwater habitats is 4. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by undercut banks in Little North Fork Albion River. Undercut banks are the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 99%. Reach 1 had a canopy density of 99%; Reach 2 had a canopy density of 97%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 99% and 100%, respectively.

RECOMMENDATIONS

- 1) Little North Fork Albion River 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) In Reach 1, 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.

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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 the South Fork Albion River. The channel is an F4.
47	0002.00	A logging road crosses the channel. The crossing is a 20' high x 14' wide x 52' long wooden bridge.
733	0012.00	Log debris accumulation (LDA) #01 contains one piece of large woody debris (LWD) and measures 4.5' high x 12' wide x 7.5' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to gravel and measures 4' wide x 10' long x 2' deep. Fish are present above the LDA.
1536	0024.00	LDA #02 contains two pieces of LWD and measures 6.5' high x 18' wide x 6' long. Water flows the LDA and there are no visible gaps in it. Retained sediment ranges from sand to cobble and measures 6' wide x 6' long x 3' deep. Fish are present above the LDA.
1615	0027.00	The channel changes from an F4 to an A4.
1819	0034.00	LDA #03 contains five pieces of LWD and measures 7.5' high x 22' wide x 17' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to cobble and measures 12' wide x 20' long x 4' deep. It is a possible barrier to juvenile and adult salmonids. No fish were observed above the LDA. LDA #04 contains four pieces of LWD and measures 10' high x 20' wide x 4' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to cobble and measures 10' wide x 30' long.
1985	0036.00	Soda Spring Gulch (tributary #01) enters on the left bank. It contributes approximately 50% to Little North Fork Albion River's flow. The water temperature of the tributary is 56 degrees Fahrenheit; the water temperature downstream and upstream of the tributary is 56 degrees Fahrenheit. For more information, see the 2011 Soda Spring Gulch Stream Habitat Inventory Report.
2046	0039.00	LDA #05 contains two pieces of LWD and measures 4' high x 9' wide x 3' long. Water does not flow through the LDA and there are no visible

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gaps in it. Retained sediment ranges from silt to cobble and measures 8' wide x 2' long x 2' deep.

End of survey due to possible end of anadromy. The slope is 17% over 235 feet and the channel consists of a series of plunges, each 5'-6' high, with no jump pools below.

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: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
11	0	DRY	28.2	65	715	34.6									
15	4	FLATWATER	38.5	68	1022	49.5	3.6	0.4	0.7	59	881	21	322		4
11	11	POOL	28.2	26	290	14.1	6.3	0.9	1.6	158	1736	157	1728	142	28
2	1	RIFFLE	5.1	18	37	1.8	4.0	0.1	0.2	40	80	4	8		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
39	16				2064					2696			2058		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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 (%)
1	1	LGR	2.6	25	25	1.2	4	0.1	0.2	40	40	4	4		0	100
1	0	HGR	2.6	12	12	0.6										
6	2	RUN	15.4	9	56	2.7	4	0.4	0.9	38	230	17	101		3	100
9	2	SRN	23.1	107	966	46.8	3	0.4	0.9	79	713	26	234		5	99
10	10	MCP	25.6	27	271	13.1	6	0.9	2.2	162	1622	165	1649	150	29	99
1	1	PLP	2.6	19	19	0.9	6	0.6	1.2	114	114	80	80	68	20	100
11	0	DRY	28.2	65	715	34.6										96

Total Units
39

Total Units Fully Measured
16

Total Length (ft.)
2064

Total Area (sq.ft.)
2718

Total Volume (cu.ft.)
2068

Table 3 - Summary of Pool Types

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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
10	10	MAIN	91	27	271	93	6.3	0.9	162	1622	150	1497	29
1	1	SCOUR	9	19	19	7	6.0	0.6	114	114	68	68	20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
11	11	290	1736	1565

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

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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
10	MCP	91	0	0	8	80	2	20	0	0	0	0
1	PLP	9	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
11	0	0	9	82	2	18	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Dry Units: 11

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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
1	1	LGR	0	0	0	0	0	0	0	0	0
1	0	HGR									
2	1	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
6	2	RUN	0	0	0	0	0	0	0	100	0
9	2	SRN	10	30	60	0	0	0	0	0	0
15	4	TOTAL FLAT	5	15	30	0	0	0	0	50	0
10	10	MCP	29	23	18	21	2	0	0	7	2
1	1	PLP	30	20	50	0	0	0	0	0	0
11	11	TOTAL POOL	29	22	20	19	2	0	0	6	1
39	16	TOTAL	25	21	22	16	2	0	0	13	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Dry Units: 11

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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
1	1	LGR	0	0	100	0	0	0	0
1	0	HGR	0	0	0	0	0	0	0
6	2	RUN	0	50	0	50	0	0	0
9	2	SRN	0	0	50	0	50	0	0
10	10	MCP	10	40	40	0	0	10	0
1	1	PLP	0	100	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
99	84	16	0	99	100

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: Little North Fork Albion River LLID: 1236456392323 Drainage: Albion River
 Survey Dates: 10/18/2011 to 10/18/2011 Survey Length (ft.): 2064 Main Channel (ft.): 2064 Side Channel (ft.): 0
 Confluence Location: Quad: ELK Legal Description: T16NR16WS21 Latitude: 39:13:56.0N Longitude: 123:38:44.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: f4	Canopy Density (%): 99.3	Pools by Stream Length (%): 16.8
Reach Length (ft.): 1615	Coniferous Component (%): 78.9	Pool Frequency (%): 38.5
Riffle/Flatwater Mean Width (ft.): 3.7	Hardwood Component (%): 21.1	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 80
Range (ft.): 8 to 10	Vegetative Cover (%): 99.6	2 to 2.9 Feet Deep: 20
Mean (ft.): 8	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 17	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 54 - 56 Air (F): 60 - 61	LWD per 100 ft.:	Mean Pool Shelter Rating: 30
Dry Channel (ft): 464	Riffles: 0	
	Pools: 4	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 100 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 100.0 2. 0.0 3. 0.0 4. 0.0 5. 0.0		

STREAM REACH: 2

Channel Type: A4	Canopy Density (%): 97.0	Pools by Stream Length (%): 4.0
Reach Length (ft.): 449	Coniferous Component (%): 100.0	Pool Frequency (%): 7.7
Riffle/Flatwater Mean Width (ft.): 3.8	Hardwood Component (%): 0.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100
Range (ft.): 9 to 10	Vegetative Cover (%): 98.8	2 to 2.9 Feet Deep: 0
Mean (ft.): 9	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 23	Mean Max Residual Pool Depth (ft.): 1.7
Water (F): 56 - 58 Air (F): 61 - 62	LWD per 100 ft.:	Mean Pool Shelter Rating: 10
Dry Channel (ft): 251	Riffles:	
	Pools: 17	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 0 Sm Cobble: 100 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 100.0 2. 0.0 3. 0.0 4. 0.0 5. 0.0		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

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	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	4	7	30.6
Sand / Silt / Clay	14	11	69.4

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	4	6	27.8
Brush	0	0	0.0
Hardwood Trees	0	0	0.0
Coniferous Trees	14	12	72.2
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 1

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

StreamName: Little North Fork Albion River

LLID: 1236456392323

Drainage: Albion River

Survey Dates: 10/18/2011 to 10/18/2011

Confluence Location: Quad: ELK

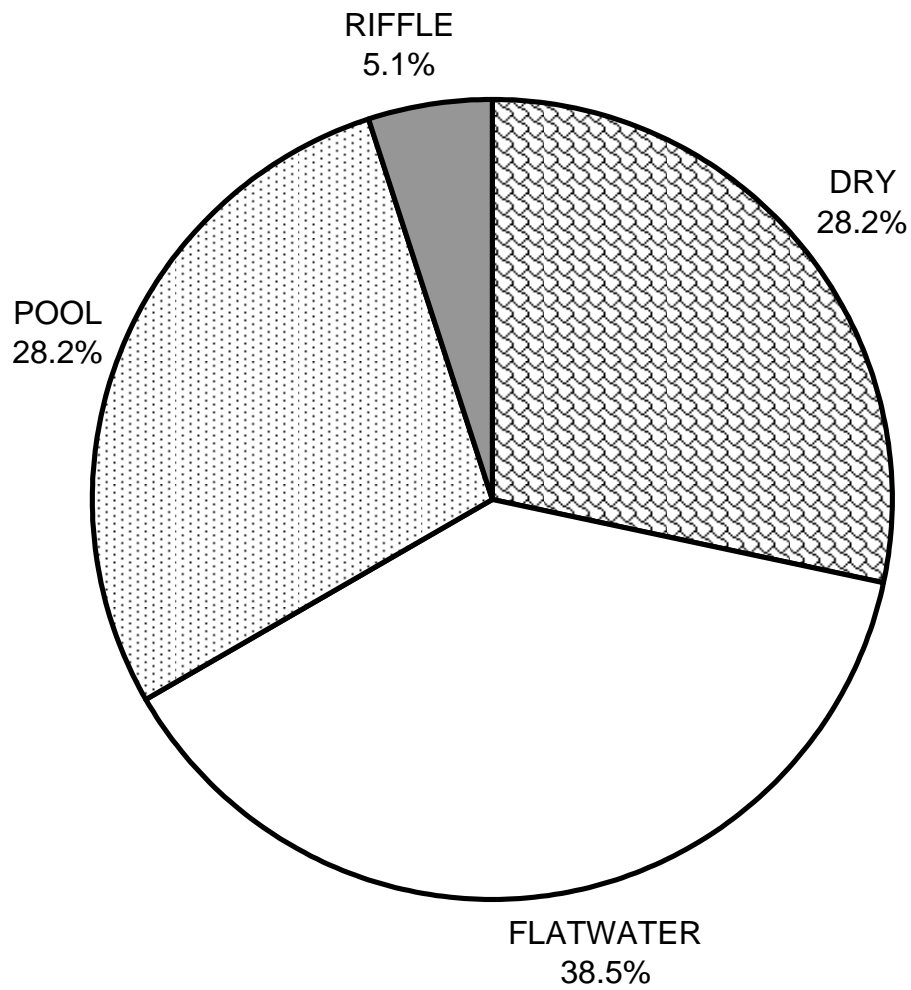
Legal Description: T16NR16WS21

Latitude: 39:13:56.0N

Longitude: 123:38:44.0W

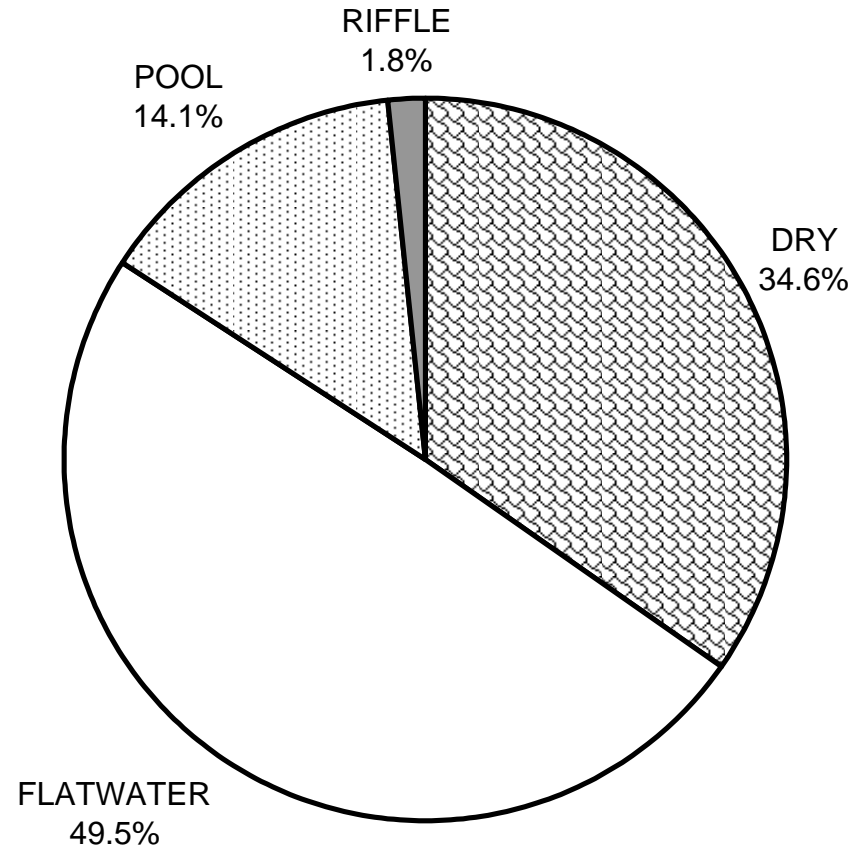
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	5	29
SMALL WOODY DEBRIS (%)	0	15	22
LARGE WOODY DEBRIS (%)	0	30	20
ROOT MASS (%)	0	0	19
TERRESTRIAL VEGETATION (%)	0	0	2
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	50	6
BEDROCK LEDGES (%)	0	0	1

LITTLE NORTH FORK ALBION RIVER 2011 HABITAT TYPES BY PERCENT OCCURRENCE



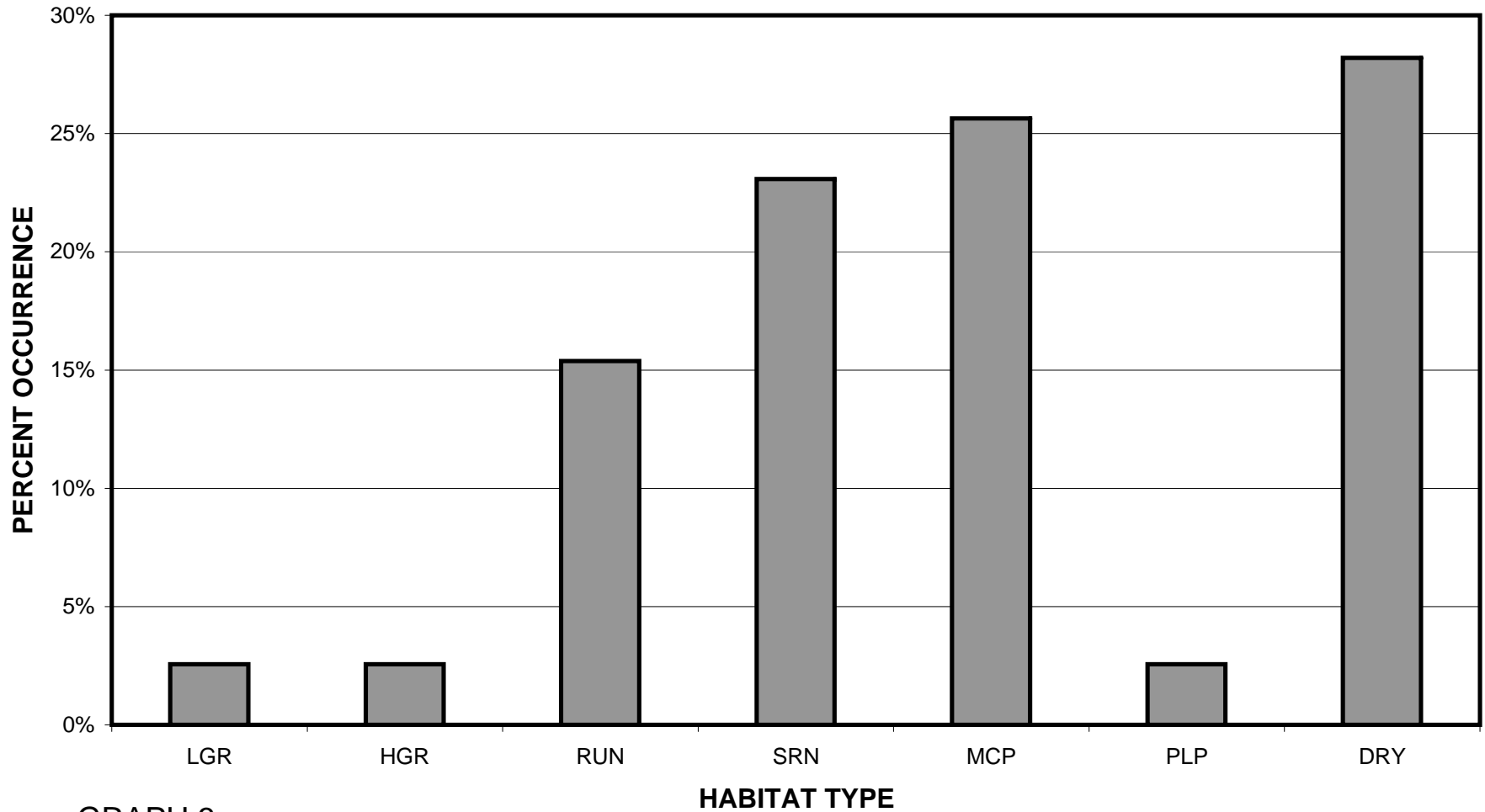
GRAPH 1

LITTLE NORTH FORK ALBION RIVER 2011 HABITAT TYPES BY PERCENT TOTAL LENGTH



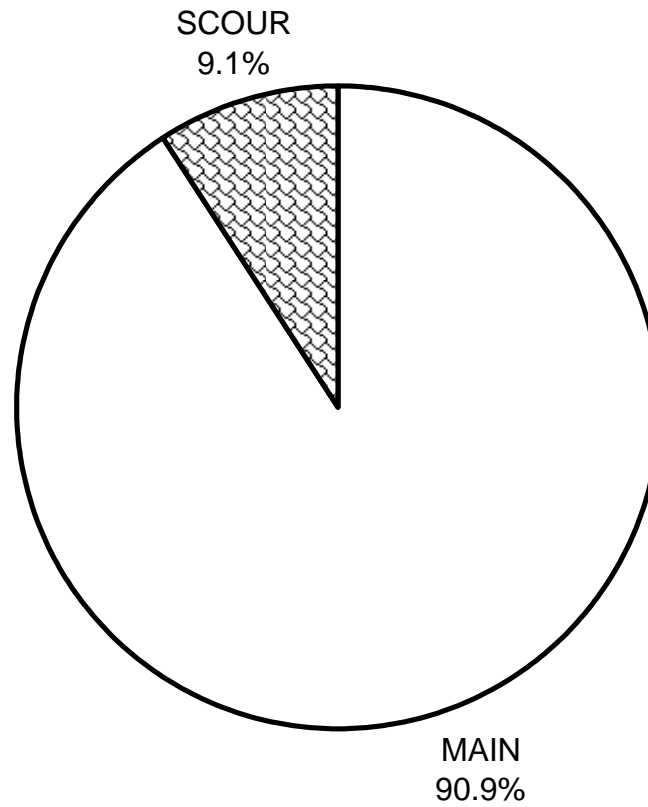
GRAPH 2

LITTLE NORTH FORK ALBION RIVER 2011 HABITAT TYPES BY PERCENT OCCURRENCE



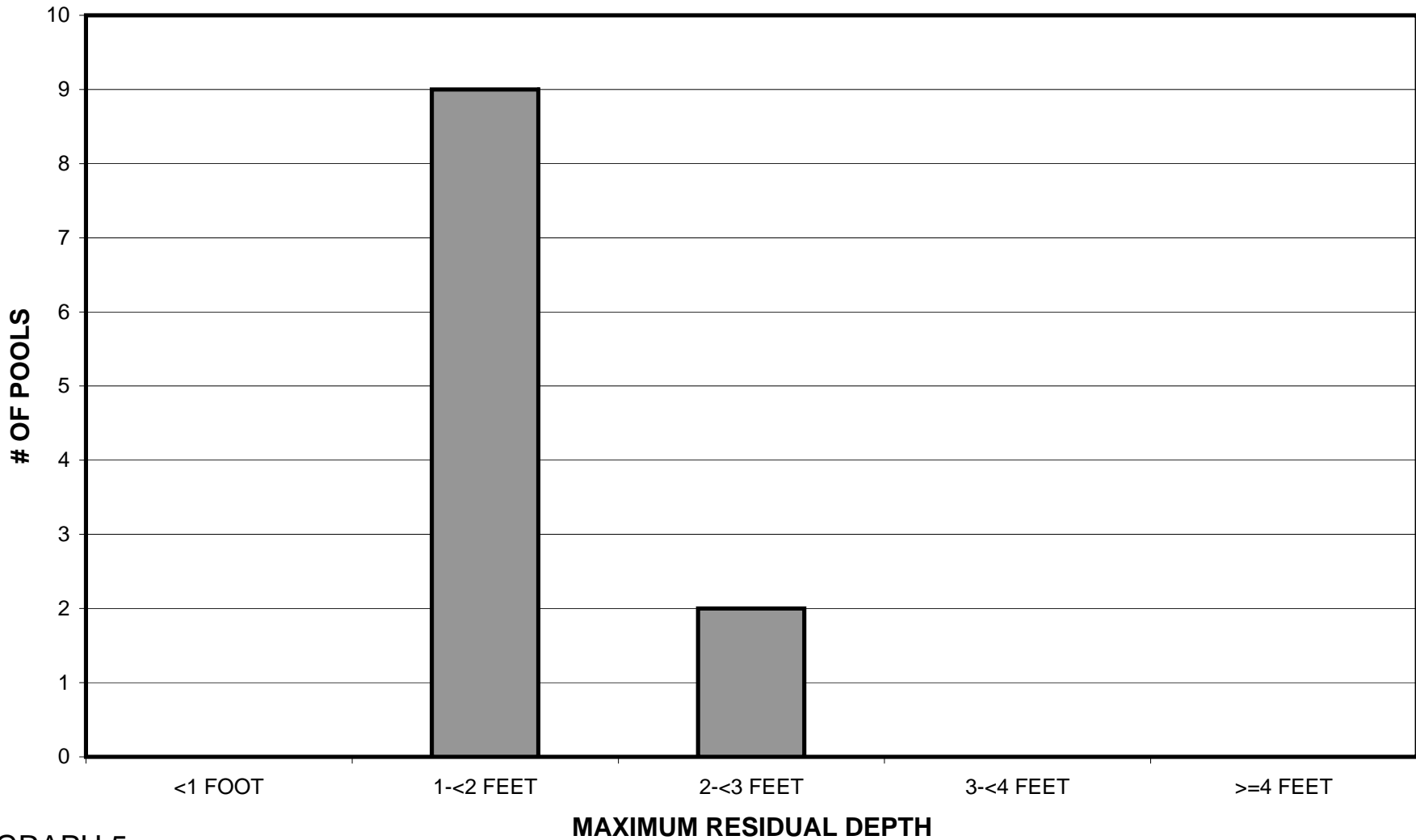
GRAPH 3

LITTLE NORTH FORK ALBION RIVER 2011 POOL TYPES BY PERCENT OCCURRENCE



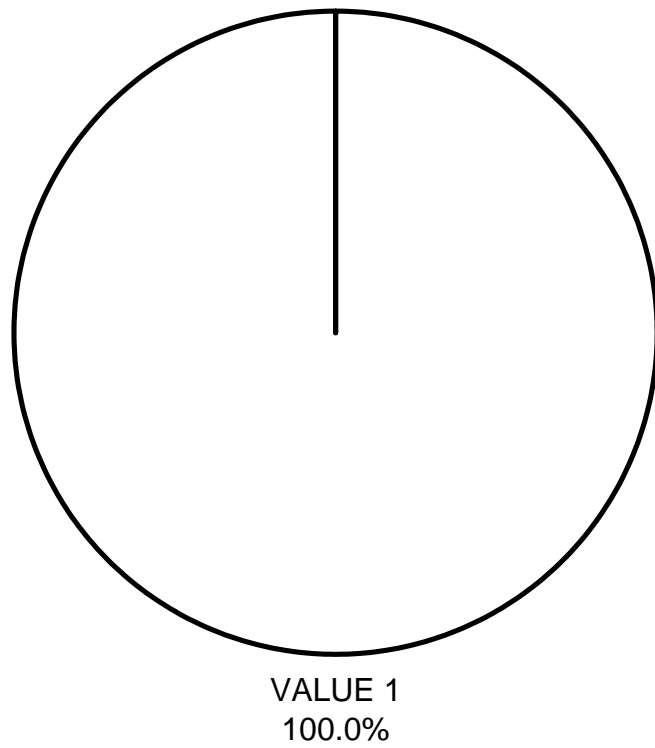
GRAPH 4

LITTLE NORTH FORK ALBION RIVER 2011 MAXIMUM DEPTH IN POOLS



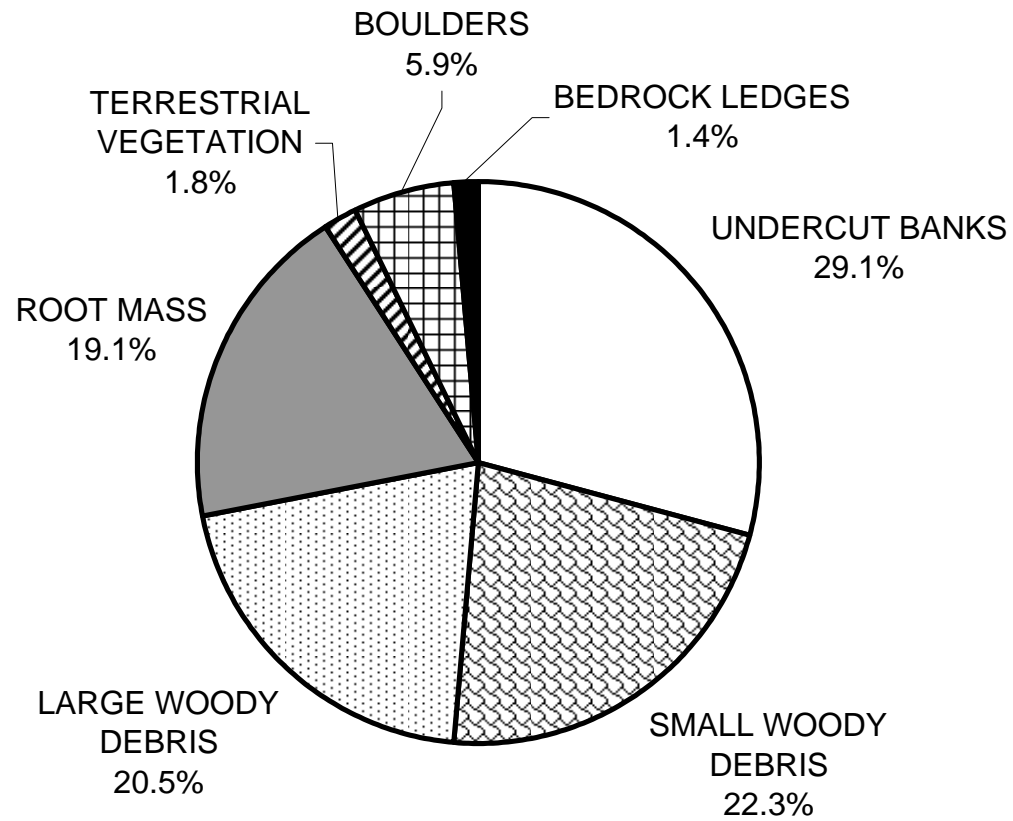
GRAPH 5

**LITTLE NORTH FORK ALBION RIVER 2011
PERCENT EMBEDDEDNESS**



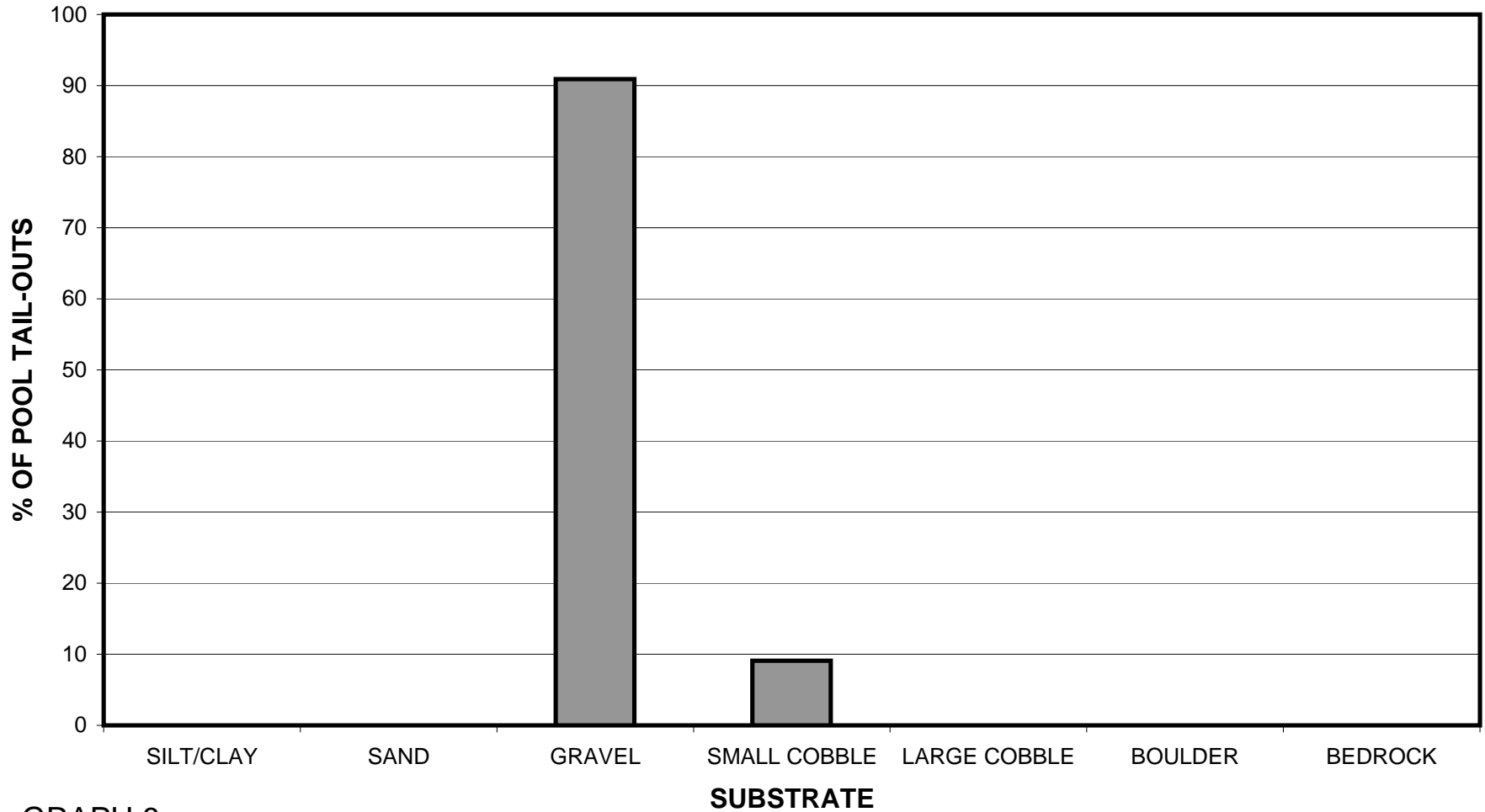
GRAPH 6

LITTLE NORTH FORK ALBION RIVER 2011 MEAN PERCENT COVER TYPES IN POOLS



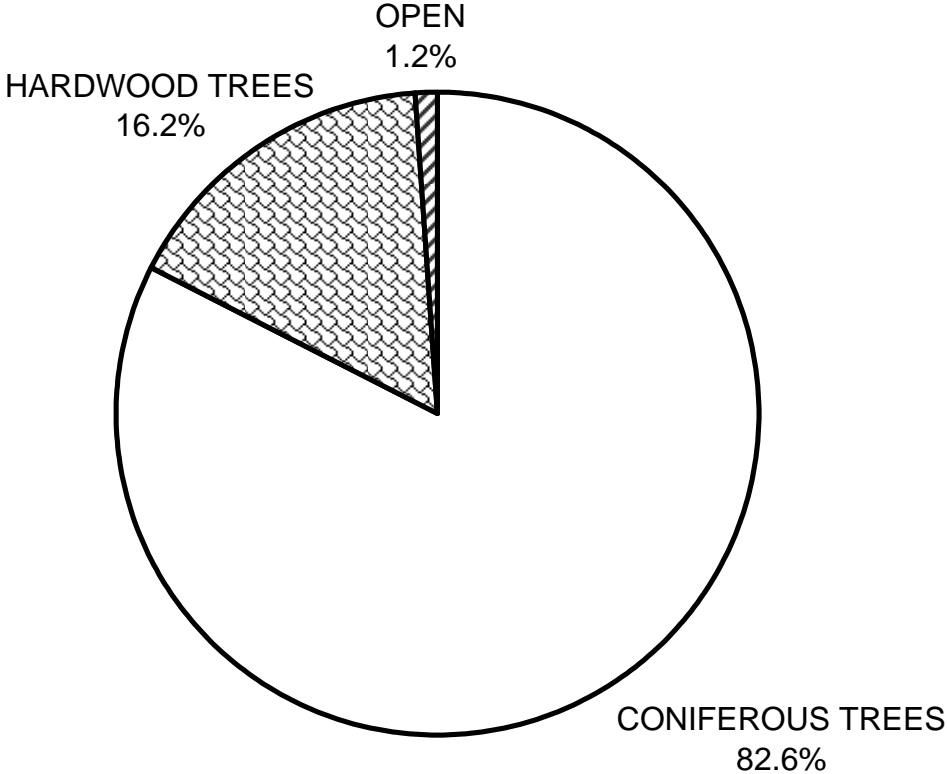
GRAPH 7

LITTLE NORTH FORK ALBION RIVER 2011 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



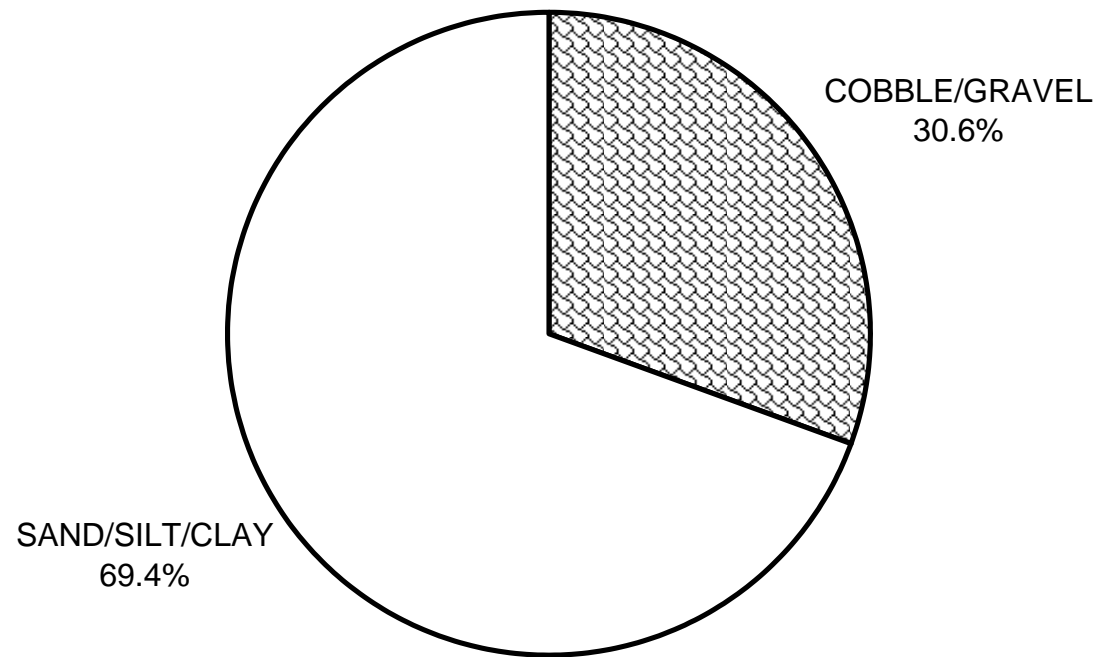
GRAPH 8

**LITTLE NORTH FORK ALBION RIVER 2011
MEAN PERCENT CANOPY**



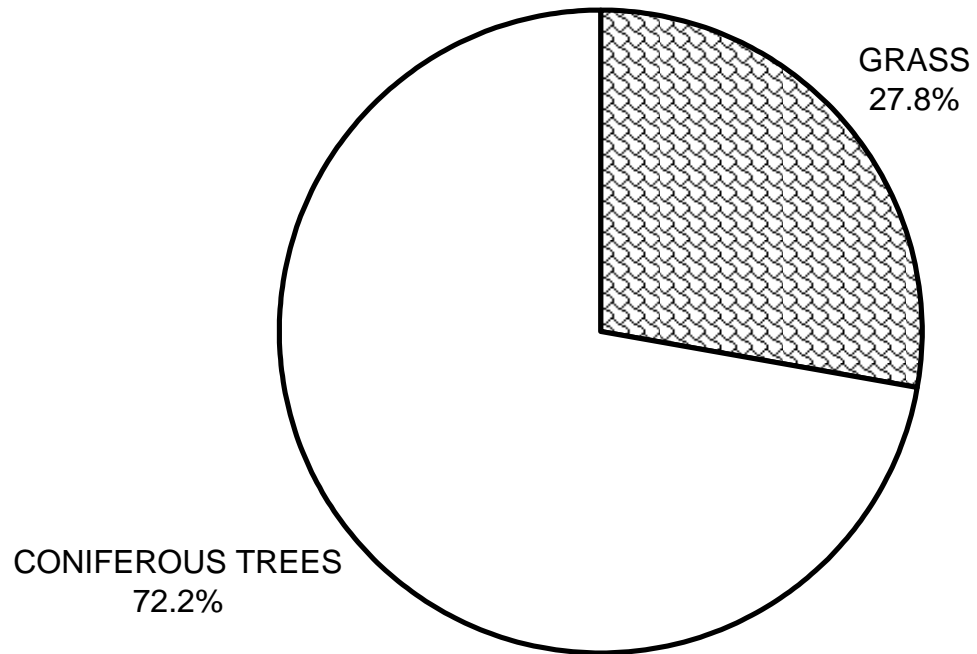
GRAPH 9

**LITTLE NORTH FORK ALBION RIVER 2011
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**LITTLE NORTH FORK ALBION RIVER 2011
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

