



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

“Slaughterhouse Gulch”

INTRODUCTION

A stream inventory was conducted from June 14 to June 15, 2016 on an unnamed tributary to Albion River, commonly known as, and herein after referred to as, Slaughterhouse Gulch. The survey began at the confluence with Albion River and extended upstream 0.4 miles.

The Slaughterhouse Gulch 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 Slaughterhouse Gulch. 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

Slaughterhouse Gulch is a tributary to the Albion River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Slaughterhouse Gulch's legal description at the confluence with Albion River is T16N R17W S14. Its location is 39.2461° north latitude and -123.7183° west longitude, LLID number 1237184392461. Slaughterhouse Gulch is a first order stream and has approximately 0.85 miles of blue line stream according to the USGS Mathison Peak 7.5 minute quadrangle. Slaughterhouse Gulch drains a watershed of approximately 0.3 square miles. Elevations range from about 15 feet at the mouth of the creek to 425 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 1 to Little River Airport Road, south of Mendocino.

METHODS

The habitat inventory conducted in Slaughterhouse Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998). The Watershed Stewards Project (WSP) members and California Department of Fish and Wildlife (CDFW) personnel that conducted the inventory were trained in standardized habitat inventory methods by the CDFW. The 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. Surveyors also take photos to document general habitat conditions (Appendix II).

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 Slaughterhouse Gulch 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 hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Water and air temperatures are measured and recorded at every tenth habitat unit using a hand-held thermometer. Both temperatures are taken in degrees Fahrenheit and the time of the measurement is also recorded. Air temperatures are recorded within one foot of the water surface, while water temperatures are recorded (where possible) in flowing water within the habitat unit.

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". Slaughterhouse Gulch 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 Slaughterhouse Gulch, 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 unsuitable 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. 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 Slaughterhouse Gulch, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. The shelter rating is then calculated by multiplying the qualitative shelter value by the percent of the unit covered. 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 Slaughterhouse Gulch, 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 Slaughterhouse Gulch, 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 Slaughterhouse Gulch. In addition, underwater mask and snorkel 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 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. 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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Slaughterhouse Gulch 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 IN APPENDIX I *

The habitat inventory of June 14 to June 15, 2016, was conducted by Amidia Frederick (WSP) and Brian Starks (CDFW). The total length of the stream surveyed was 1,942 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.168 cfs on June 16, 2016.

Slaughterhouse Gulch is an E4 channel type for 934 feet of the stream surveyed (Reach 1) and an A4 channel type for 1,008 feet of the stream surveyed (Reach 2). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio 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 52° to 57° Fahrenheit. Air temperatures ranged from 54° to 62° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% flatwater units, 34% riffle units, 26% pool units, and 1% unsurveyed marsh units (Graph 1). Based on total length of Level II habitat types there were 52% flatwater units, 19% pool units, 18% riffle units, and 11% unsurveyed marsh units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 31%; step run units, 21%; and mid-channel pool units, 19% (Graph 3). Based on percent total length, the most frequent habitat types were step run units, 39%; low gradient riffle units, 16%; and mid-channel pool units, 16%.

A total of 28 pools were identified (Table 3). Main channel pools were the most frequently encountered at 79% (Graph 4), and comprised 86% 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. None of the 27 pools (0%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 28 pool tail-outs measured, 4 had a value of 1 (14.3%); 1 had a value of 2 (3.6%); 2 had a value of 3 (7.1%); 11 had a value of 4 (39.3%); and 10 had a value of 5 (35.7%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. Additionally, a value of 5 was assigned to tail-outs deemed unsuitable 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 13, flatwater habitat types had a mean shelter rating of 21, and pool habitats had a mean shelter rating of 32 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 35. Main channel pools had a mean shelter rating of 31 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Slaughterhouse Gulch. Graph 7 describes the pool cover in Slaughterhouse Gulch. Small woody debris is the dominant pool cover type followed by undercut banks.

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. A silt/clay substrate type was the next most frequently observed dominant substrate type and occurred in 29% of pool tail-outs.

The mean percent canopy density for the surveyed length of Slaughterhouse Gulch was 99%. One percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 15% and 85%, respectively. Graph 9 describes the mean percent canopy in Slaughterhouse Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 98% sand/silt/clay and 2% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 62% of the units surveyed. Additionally, 25% of the units surveyed had grass as the dominant vegetation type, and 7% had deciduous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A survey team conducted a mask and snorkel survey at 11 sites for species composition and distribution in Slaughterhouse Gulch on October 10, 2016 (Table A). Air and water temperatures taken at 0932 were 52° and 52° Fahrenheit respectively. The sites were sampled by Brian Starks and Maddelyn Harden (CDFW).

In Reach 1, which comprised the first 934 feet of stream, 9 sites were sampled. The reach sites yielded 2 young-of-the-year (YOY) steelhead trout (SH).

In Reach 2, which comprised the following 1,008 feet of stream surveyed, 2 sites were sampled and no salmonids were observed.

During the survey, the upstream-most observation of steelhead occurred at 39.2469° north latitude, -123.7192° west longitude, approximately 1,515 feet upstream from the confluence with Albion River. No coho salmon were observed during the biological inventory.

California Department of Fish and Wildlife

Table A. Summary of results for a fish composition and distribution survey within Slaughterhouse Gulch, October 10, 2016.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	Steelhead Trout			Coho Salmon		Additional Aquatic Species Observed
					YOY	1+	2+	YOY	1+	
Reach 1: E4 Channel Type										
10/13/16	1	ND	Pool	ND	1	0	0	0	0	
	2	ND	Pool	ND	0	0	0	0	0	
	3	ND	Pool	ND	0	0	0	0	0	
	4	ND	Pool	ND	1	0	0	0	0	
	5	ND	Pool	ND	0	0	0	0	0	
	6	ND	Pool	ND	0	0	0	0	0	
	7	ND	Pool	ND	0	0	0	0	0	
	8	ND	Pool	ND	0	0	0	0	0	
	9	ND	Pool	ND	0	0	0	0	0	
Reach 2: A4 Channel Type										
10/13/16	10	61	Pool	1226	0	0	0	0	0	
	11	ND	Pool	ND	0	0	0	0	0	

Abbreviations: ND = No Data

DISCUSSION

Slaughterhouse Gulch is an E4 channel type for the first 934 feet of stream surveyed, and an A4 channel type for the next 1,008 feet. The suitability of E4 and A4 channel types for fish habitat improvement structures is as follows: E4 channels are good for bank-placed boulders and fair for opposing wing-deflectors. A4 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey days June 14 to June 15, 2016 ranged from 52° to 57° Fahrenheit. Air temperatures ranged from 54° to 62° Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 52% of the total length of this survey, riffles 18%, and pools 19%. None of the 27 (0%) pools had a maximum residual depth greater than two 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.

Five of the 28 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirteen of the pool tail-outs had embeddedness ratings of 3 or 4. Ten 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 Slaughterhouse Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighteen of the 28 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 32. The shelter rating in the flatwater habitats is 21. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Slaughterhouse Gulch. Small woody debris is the dominant cover type in pools followed by undercut banks. 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%, and Reach 2 had a canopy density of 98%. The percentage of right and left bank covered with vegetation was 99% and 99%, respectively.

RECOMMENDATIONS

Slaughterhouse Gulch should be managed as an anadromous, natural production stream. Recommendations for potential habitat improvement activities are based on target habitat values suitable for salmonids in California's north coast streams. Considering the results from this stream habitat inventory, factors that affect salmonid productivity and CDFW's professional judgment, the following list prioritizes habitat improvement activities in Slaughterhouse Gulch. Keep in mind, watershed and stream ecosystem processes, land use alterations, changes in land ownership, and other factors could potentially change the order of these recommendations or create the need to remove/add recommendations in the future.

- 1) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from small woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 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 three to five years.

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 in the confluence with the Albion. The area is very marshy and the flow is spread throughout the Albion floodplain. Un-surveyable. Channel type is an E4. Channel type cross-section location is at Habitat Unit (HU) #34.
216	0002.00	Top of marsh.
285	0006.00	Bridge #1 is the crossing for Slaughterhouse Road, and is 5.1' high x 13' wide x 40' long. It is an automobile bridge (made of wood/metal) and is not a barrier to salmonids.
532	0021.00	Very narrow stream. Small trench-like channel.
782	0037.00	There is a 2' plunge into a pool.
887	0044.00	Log debris accumulation (LDA) #1 contains 6 pieces of large woody debris (LWD) and measures 5' high x 5' wide x 10' long. Water does not flow through the LDA and there are no visible gaps in it. There is no retained sediment behind the LDA, only on top of it. Fish were not observed above the LDA. LDA is a possible barrier to salmonids as during high flows, water may flow over the structure. Flow goes subsurface. Sediment occurs on top of the LDA but is not retained behind LDA.
934	0047.00	Bank entrenchment suddenly increases. Channel type changes to a A4 at HU #47. Channel type cross-section location is at HU #54.
1007	0051.00	Velocity barrier possible because there is a 3.5' plunge into a shallow 0.5' deep pool.
1152	0057.00	There is a 2.5' plunge into a 1' deep pool.
1159	0058.00	Channel changes gradient.
1319	0068.00	There is a 1.5' plunge into the pool.
1464	0074.00	There is a side channel on left bank that goes dry after approximately 50'.
1543	0077.00	LDA #2 contains 1 piece of LWD and measures 7' high x 4' wide x 4' long. Water flows through the LDA and there are visible gaps in it.

Retained sediment ranges from silt to gravel and measures 8' wide x 25' long x 2' deep. LDA is a possible barrier to salmonids as only during higher flows will salmonids be able to pass through. There is a small gap where water is plunging through. Fish were not observed above the LDA.

1647	0085.00	Channel becomes more entrenched.
1653	0086.00	There is a 2' plunge.
1768	0097.00	There is a 2' plunge into a pool.
1827	0103.00	There are a series of five plunges.
1933	0108.00	End of survey at HU #108. Starting at HU #103 there are multiple plunges and a steep, narrow step-run that continues for 66'. It is unsuitable for fish passage. The substrate composition of Slaughterhouse Gulch consisted of silt, sand, and clay for the majority of the reach. No fish presence observed at any point during the survey. At HU #108, there is a 4' plunge into a 0.8' deep pool. Beyond HU #108, the channel narrows and deepens with more plunges and barriers. No fish were observed beyond HU #108. HU #103 conditions seem to be caused by an old road and landslide on the right bank. Cumulatively, all of these characteristics prove to be a likely barrier to fish and thus an end to anadromy.

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.

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

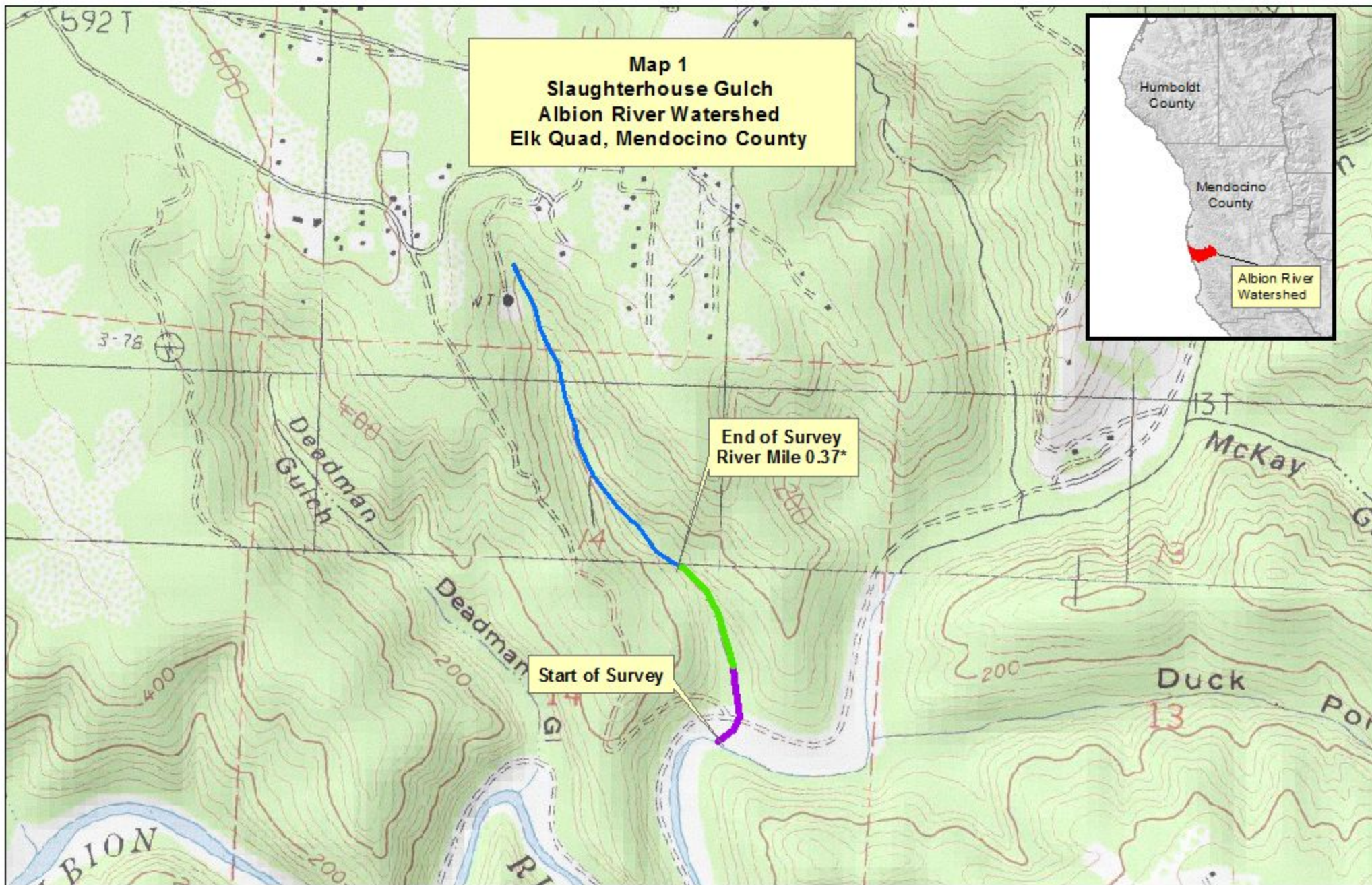
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

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]	



- Reach 1: E4 Channel Type
- Reach 2: A2 Channel Type
- Slaughterhouse Gulch



APPENDIX I

TABLES AND GRAPHS

Stream Name:	1237184392461	LLID:	1237184392461	Drainage:	Albion River
Survey Dates:	6/14/2016 to 6/15/2016				
Confluence Location:	Quad: MATHISON PEAK	Legal Description:	T16NR17WS14	Latitude:	39:14:46.0N
				Longitude:	123:43:06.0

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
42	8	FLATWATER	38.9	24	1004	51.7	3.1	0.5	1.5	83	3467	46	1946		21
1	0	NOSURVEY_	0.9	216	216	11.1									
28	28	POOL	25.9	13	372	19.2	4.0	0.6	1.2	53	1488	44	1237	34	32
37	6	RIFFLE	34.3	9	350	18.0	2.7	0.1	0.4	21	762	2	88		13
Total Units	Total Units Fully Measured				Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)		
108	42				1942						5717		3270		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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 (%)
34	5	LGR	31.5	9	320	16.5	3	0.1	0.5	22	758	3	89		9	97
3	1	HGR	2.8	10	30	1.5	3	0.1	0.6	12	36	1	4		35	100
19	2	RUN	17.6	13	250	12.9	3	0.4	1.2	57	1083	29	547		30	99
23	6	SRN	21.3	33	754	38.8	3	0.6	5	91	2095	52	1200		18	97
1	1	TRP	0.9	13	13	0.7	2	1.1	1.7	26	26	31	31	29	30	100
21	21	MCP	19.4	15	308	15.9	4	0.6	1.8	61	1272	51	1071	39	31	99
1	1	CRP	0.9	8	8	0.4	4	0.7	1.3	32	32	29	29	22	15	100
1	1	LSR	0.9	13	13	0.7	4	0.3	1	52	52	26	26	16	5	100
4	4	PLP	3.7	8	30	1.5	4	0.4	1.3	27	106	20	80	11	48	100
1	0	MAR	0.9	216	216	11.1										

Total Units
108

Total Units Fully Measured
42

Total Length (ft.)
1942

Total Area (sq.ft.)
5460

Total Volume (cu.ft.)
3076

Table 3 - Summary of Pool Types

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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
22	22	MAIN	79	15	321	86	4.0	0.6	59	1298	39	848	31
6	6	SCOUR	21	9	51	14	3.7	0.4	32	190	14	71	35
Total Units 28	Total Units Fully Measured 28				Total Length (ft.) 372					Total Area (sq.ft.) 1488		Total Volume (cu.ft.) 918	

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

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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
1	TRP	4	0	0	1	100	0	0	0	0	0	0
21	MCP	78	3	14	18	86	0	0	0	0	0	0
1	CRP	4	0	0	1	100	0	0	0	0	0	0
1	LSR	4	0	0	1	100	0	0	0	0	0	0
3	PLP	11	1	33	2	67	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
27	4	15	23	85	0	0	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Slaughterhouse Gulch

LLID: 1237140392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Dry Units: 0

Confluence Location:

Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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
34	5	LGR	0	100	0	0	0	0	0	0	0
3	1	HGR	0	100	0	0	0	0	0	0	0
37	6	TOTAL RIFFLE	0	100	0	0	0	0	0	0	0
19	2	RUN	0	0	0	0	100	0	0	0	0
23	6	SRN	4	86	0	0	8	0	2	0	0
42	8	TOTAL FLAT	2	65	0	0	31	0	2	0	0
1	1	TRP	90	0	0	0	0	0	10	0	0
21	20	MCP	24	41	18	0	8	0	9	0	0
1	1	CRP	0	0	0	0	0	0	100	0	0
1	1	LSR	100	0	0	0	0	0	0	0	0
4	4	PLP	18	37	0	0	0	0	40	5	0
28	27	TOTAL POOL	28	35	13	0	5	0	18	1	0
1	0	MAR	0	0	0	0	0	0	0	0	0
108	41	TOTAL	23	44	10	0	9	0	14	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Dry Units: 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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
34	5	LGR	20	0	80	0	0	0	0
3	1	HGR	0	0	100	0	0	0	0
19	1	RUN	100	0	0	0	0	0	0
23	6	SRN	50	17	33	0	0	0	0
1	1	TRP	100	0	0	0	0	0	0
21	21	MCP	86	0	14	0	0	0	0
1	1	CRP	100	0	0	0	0	0	0
1	1	LSR	100	0	0	0	0	0	0
4	4	PLP	75	0	25	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
99	85	15	0	99	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: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Survey Length (ft.): 1942

Main Channel (ft.): 1942

Side Channel (ft.): 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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

Channel Type: E4	Canopy Density (%): 99.3	Pools by Stream Length (%): 28.5
Reach Length (ft.): 934	Coniferous Component (%): 75.7	Pool Frequency (%): 39.1
Riffle/Flatwater Mean Width (ft.): 3.0	Hardwood Component (%): 24.3	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100
Range (ft.): 4 to 5	Vegetative Cover (%): 98.5	2 to 2.9 Feet Deep: 0
Mean (ft.): 4	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 8	Mean Max Residual Pool Depth (ft.): 1.2
Water (F): 53 - 54	Air (F): 55 - 62	LWD per 100 ft.:
Dry Channel (ft): 0	Riffles: 1	Mean Pool Shelter Rating: 32
	Pools: 3	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 44	Sand: 6	Gravel: 50
	Sm Cobble: 0	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 5.6	2. 5.6	3. 0.0
	4. 38.9	5. 50.0

STREAM REACH: 2

Channel Type: A4	Canopy Density (%): 98.4	Pools by Stream Length (%): 10.5
Reach Length (ft.): 1008	Coniferous Component (%): 94.8	Pool Frequency (%): 16.1
Riffle/Flatwater Mean Width (ft.): 2.9	Hardwood Component (%): 5.2	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 100
Range (ft.): 2 to 4	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 0
Mean (ft.): 3	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 10	Mean Max Residual Pool Depth (ft.): 1.2
Water (F): 52 - 57	Air (F): 54 - 59	LWD per 100 ft.:
Dry Channel (ft): 0	Riffles: 3	Mean Pool Shelter Rating: 32
	Pools: 6	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0	Sand: 10	Gravel: 80
	Sm Cobble: 10	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 30.0	2. 0.0	3. 20.0
	4. 40.0	5. 10.0

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1237184392461

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS14

Latitude: 39:14:46.0N

Longitude: 123:43:06.0W

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	1	1	2.4
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	41	41	97.6

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	14	7	25.0
Brush	4	1	6.0
Hardwood Trees	3	3	7.1
Coniferous Trees	21	31	61.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 4

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

Stream Name: Slaughterhouse Gulch

LLID: 1237184392461

Drainage: Albion River

Survey Dates: 6/14/2016 to 6/15/2016

Confluence Location:

Quad: MATHISON PEAK

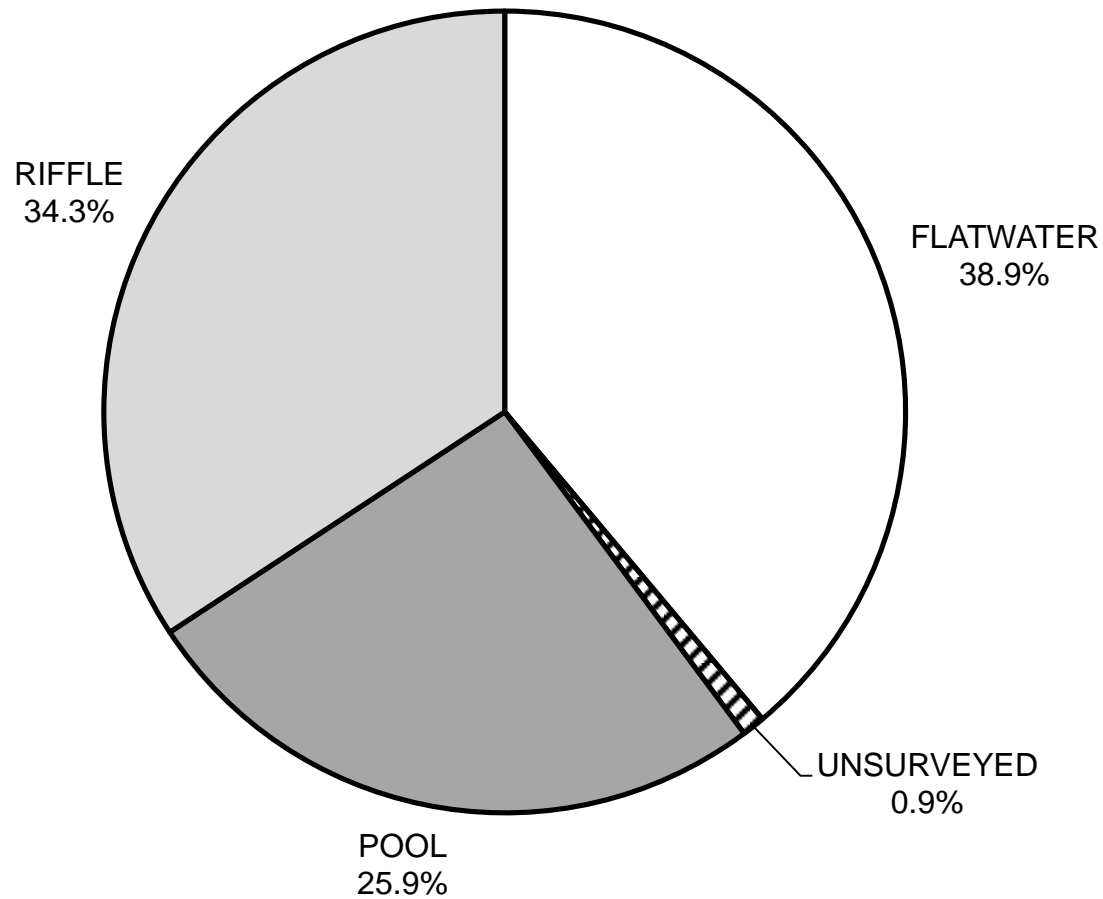
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Longitude: 123:43:06.0W

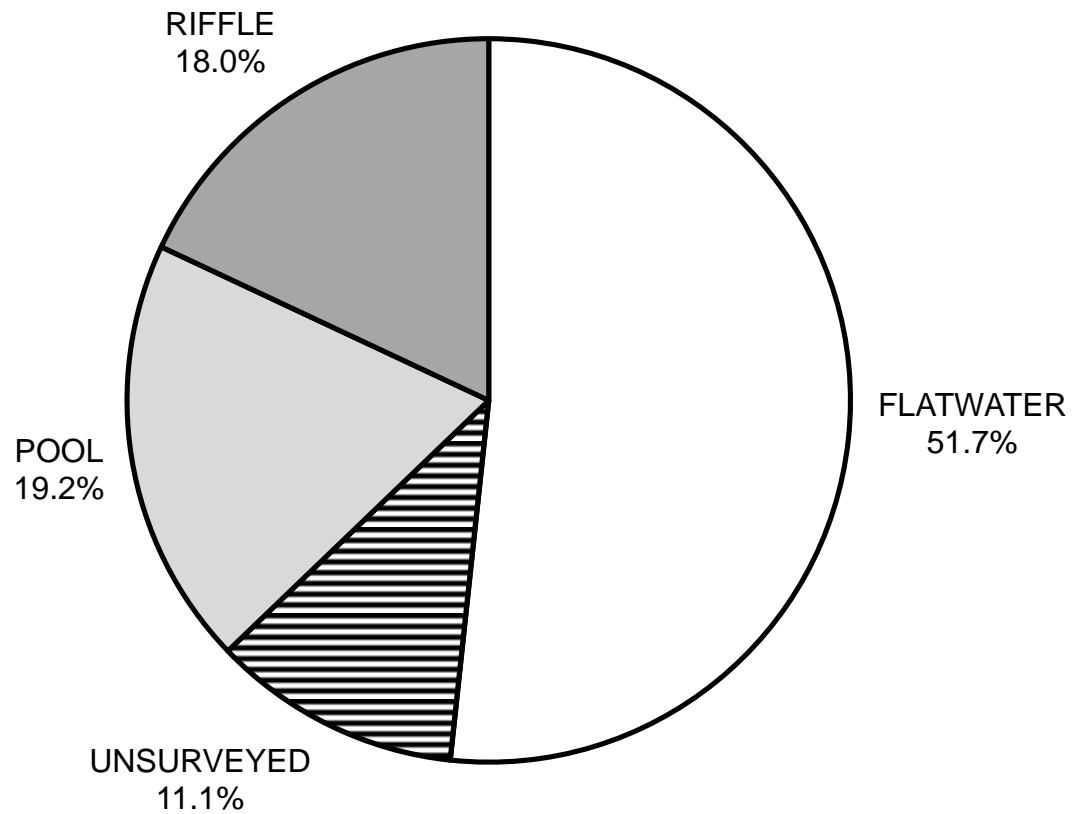
	Riffles	Flatwater	Pools
Undercut Banks (%)	0	2	28
Small Woody Debris (%)	100	63	34
Large Woody Debris (%)	0	0	13
Root Mass (%)	0	0	0
Terrestrial Vegetation (%)	0	33	5
Aquatic Vegetation (%)	0	0	0
Whitewater (%)	0	2	17
Boulders (%)	0	0	3
Bedrock Ledges (%)	0	0	0

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
HABITAT TYPES BY PERCENT OCCURRENCE**



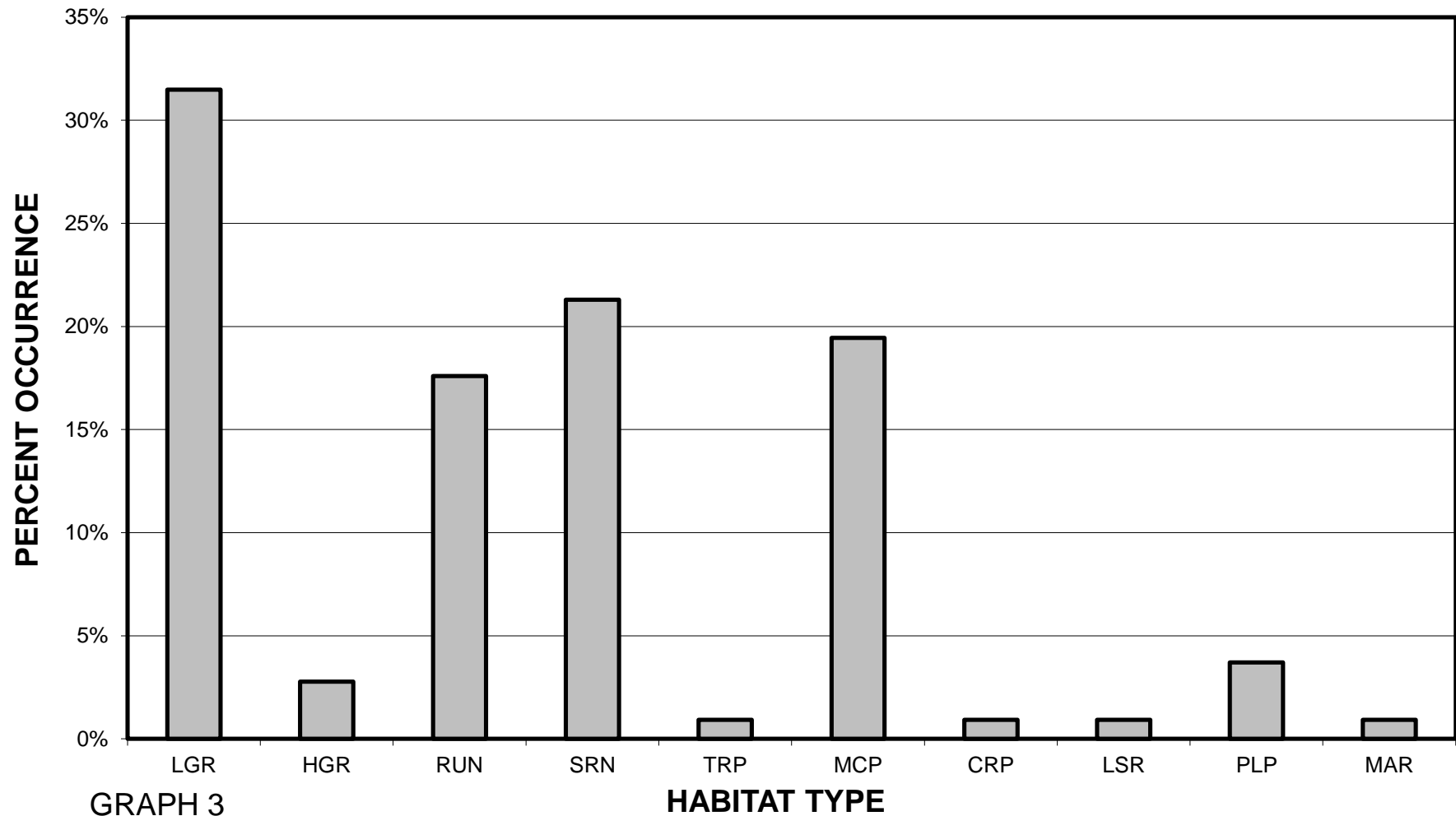
GRAPH 1

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
HABITAT TYPES BY PERCENT TOTAL LENGTH**

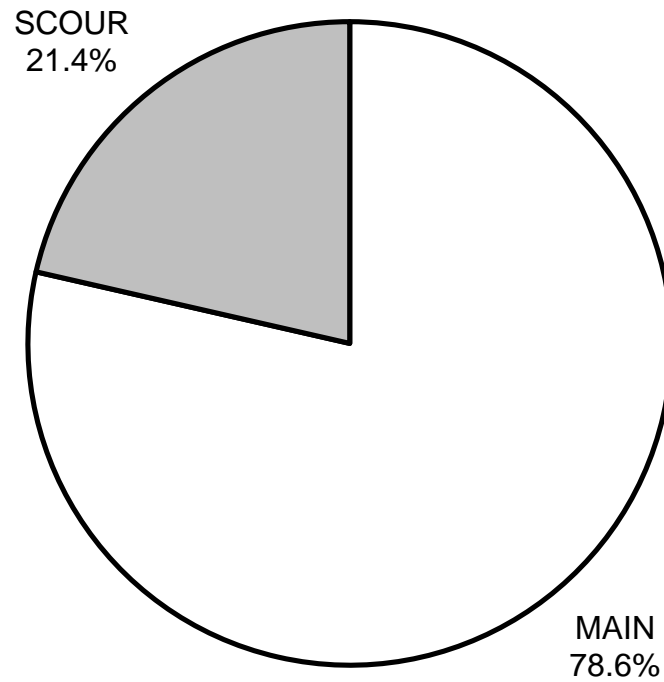


GRAPH 2

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
HABITAT TYPES BY PERCENT OCCURRENCE**

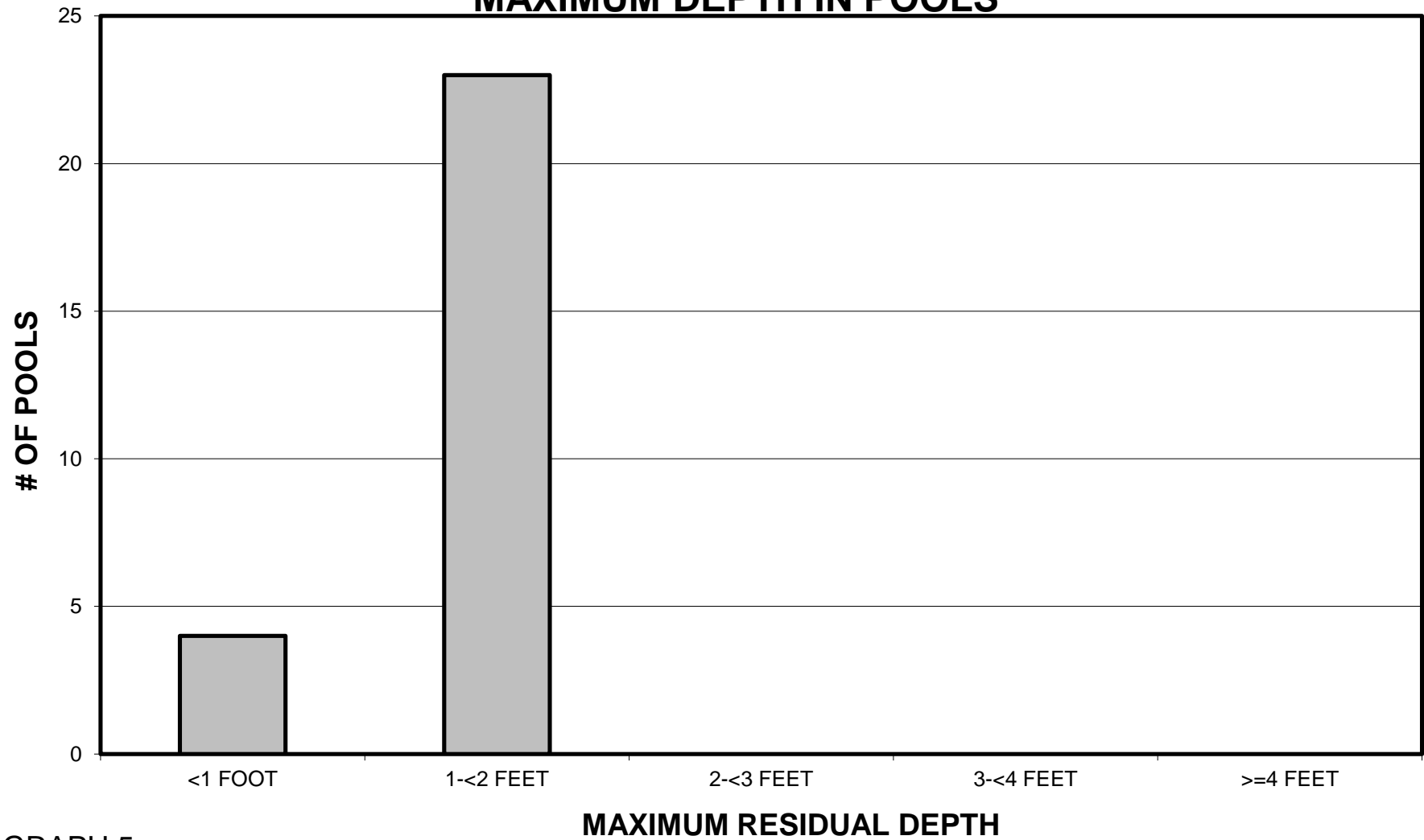


**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
POOL TYPES BY PERCENT OCCURRENCE**



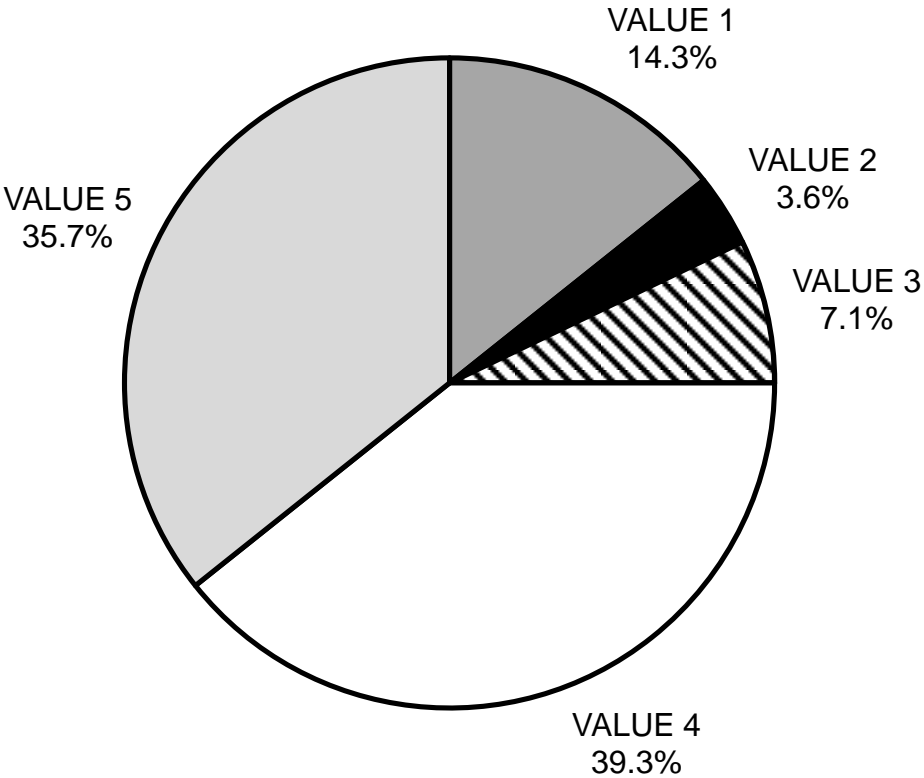
GRAPH 4

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
MAXIMUM DEPTH IN POOLS**



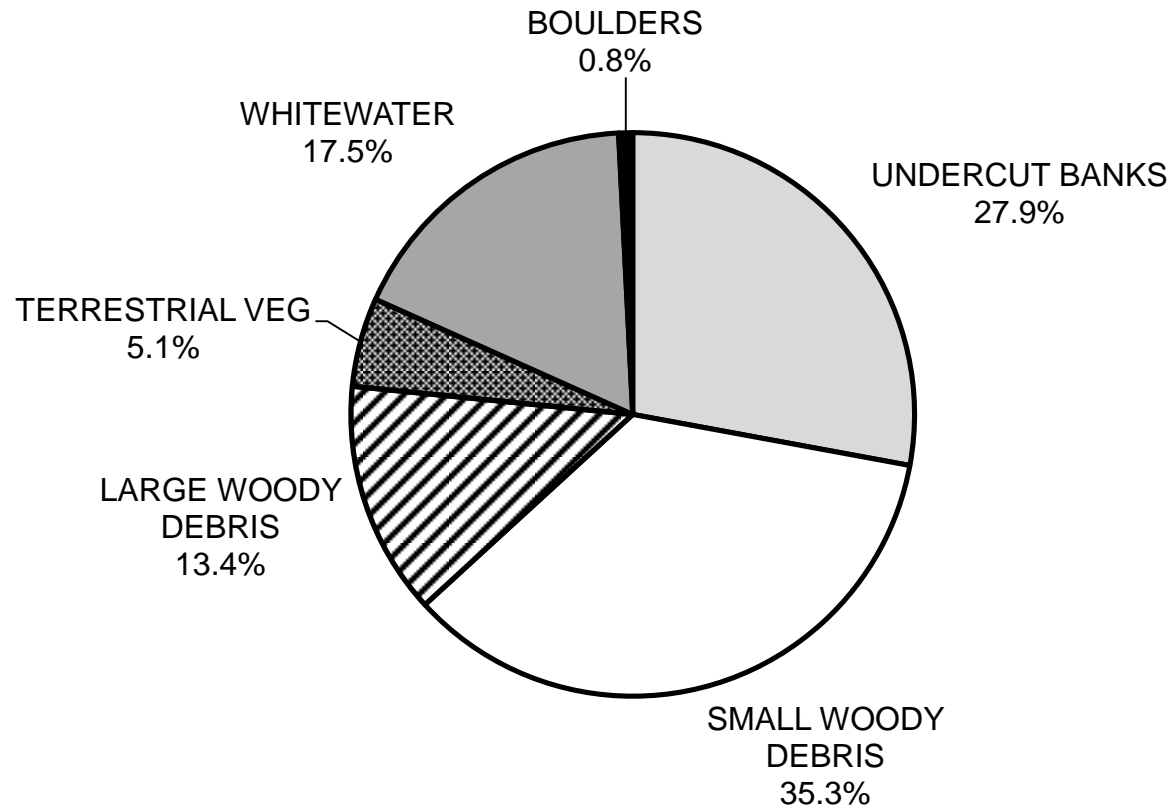
GRAPH 5

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
PERCENT EMBEDDEDNESS**



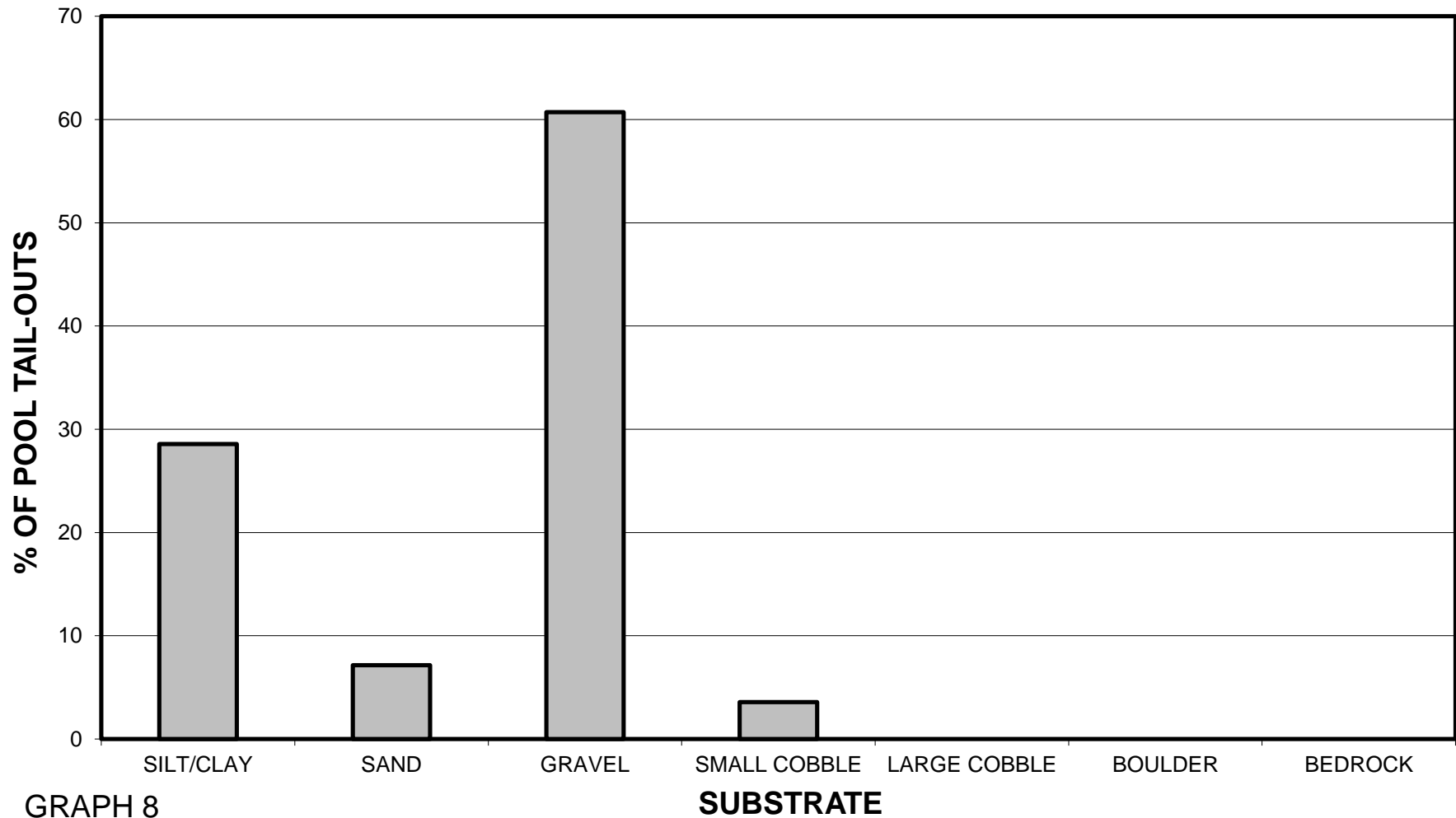
GRAPH 6

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
MEAN PERCENT COVER TYPES IN POOLS**

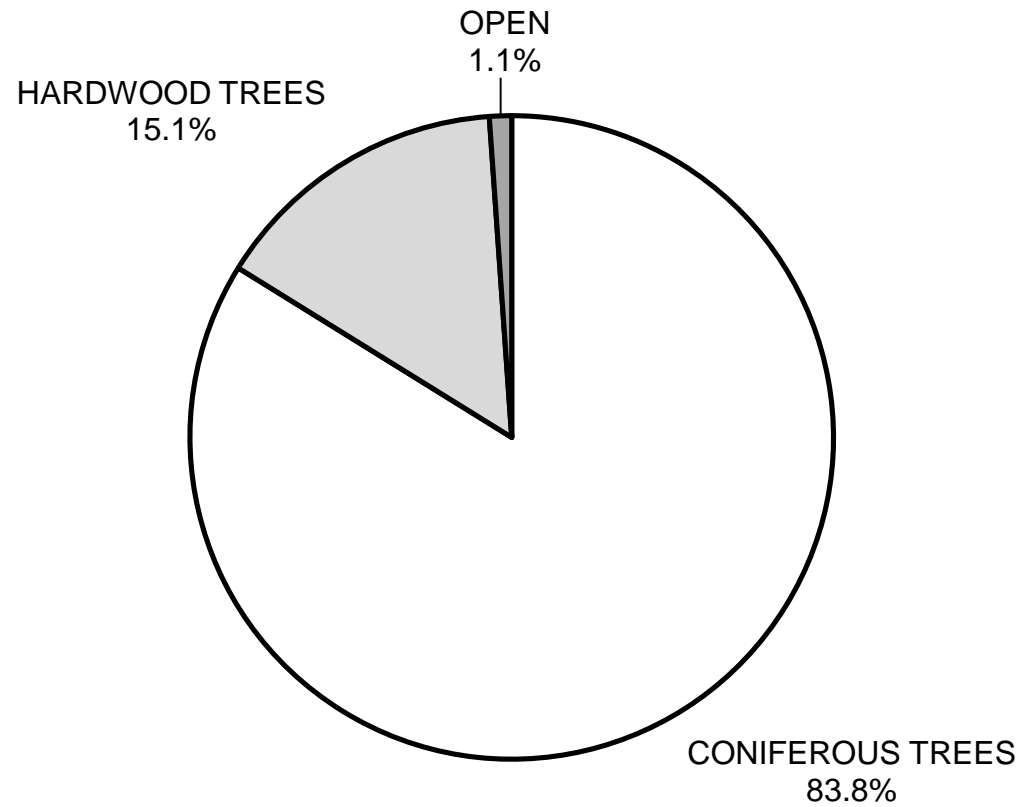


GRAPH 7

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**

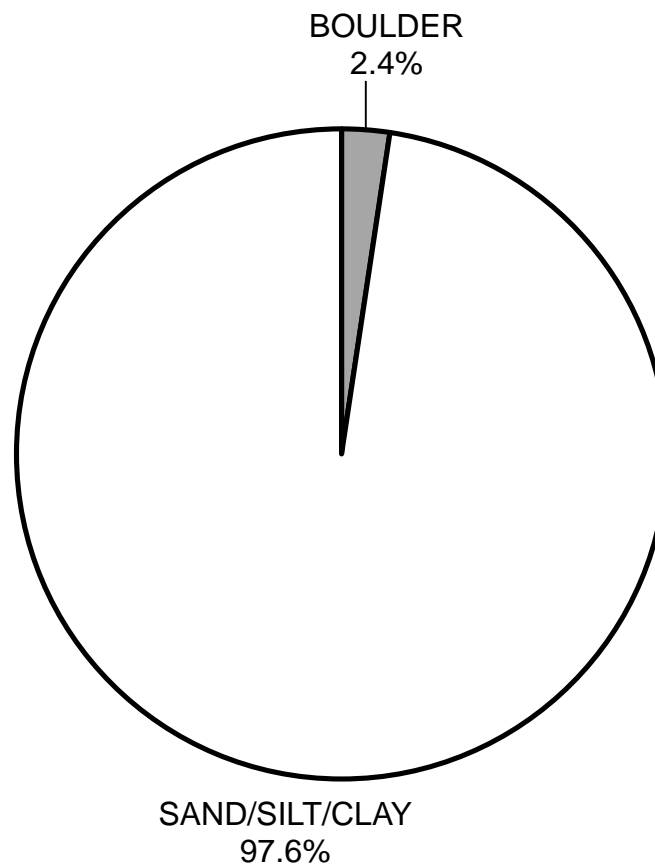


**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
MEAN PERCENT CANOPY**



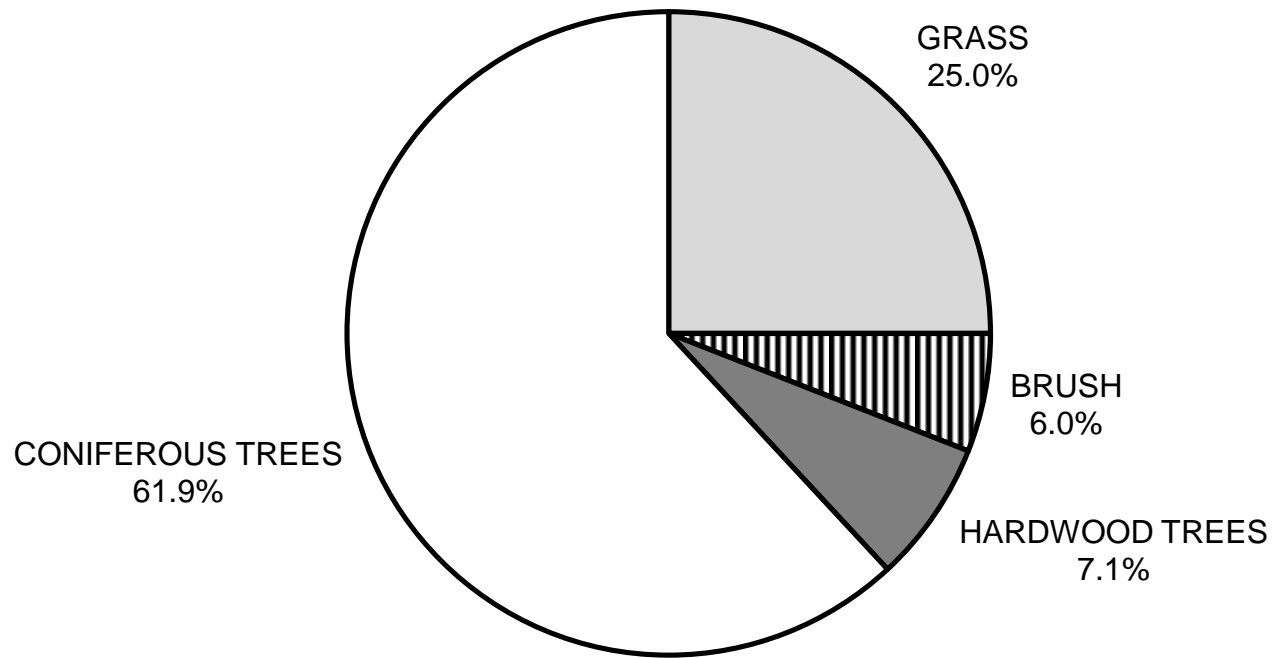
GRAPH 9

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**UNNAMED TRIBUTARY TO THE ALBION RIVER
(SLAUGHTERHOUSE) 2016
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS



Photo 1: Significant plunge and possible barrier at habitat unit #51. (Photo taken 6-15-16)



Photo 2: LDA at habitat unit # 103. Amidia Frederick Pictured. (Photo taken (6-15-16)



Photo 3: End of survey at habitat unit # 108. (Photo taken 6-15-16)