



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Coulborn Creek

INTRODUCTION

A stream inventory was conducted from July 18 to July 26, 2017 on Coulborn Creek. The survey began at the confluence with Indian Creek and extended upstream 2.0 miles.

The Coulborn 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 Coulborn 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 and 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. This report was finalized in March, 2018.

WATERSHED OVERVIEW

Coulborn Creek, located in northern Mendocino County, is a tributary to Indian Creek, which is a tributary to South Fork Eel River, which is a tributary to the Eel River, which drains into the Pacific Ocean in northern California (Map 1). Coulborn Creek's legal description at the confluence with Indian Creek is T24N R18W S06. Its location is 39.9634° north latitude and -123.8917° west longitude, LLID number 1238905399635. Coulborn Creek is a first order stream and has approximately 0.6 miles of blue line stream according to the USGS Bear Harbor 7.5 minute quadrangle. Coulborn Creek drains a watershed of approximately 2.5 square miles. Elevations range from about 760 feet at the mouth of the creek to 1,400 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production/rangeland/recreation. Vehicle access exists via highway 101 to highway 1 to a gated road (WRP Road) managed by Lost Coast Forestlands, LLC.

METHODS

The habitat inventory conducted in Coulborn Creek 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 CDFW. 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. Surveyors also take photos to document general habitat conditions, significant features (landslides, potential barriers, etc.), and end of survey (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 Coulborn 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 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". Coulborn 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 Coulborn 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 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 Coulborn 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. 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 Coulborn 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 Coulborn 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 Coulborn Creek. In addition, underwater mask and snorkel observations were made at eight 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 Coulborn 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 IN APPENDIX I *

The habitat inventory of July 18 to July 26, 2017 was conducted by Ryan Bernstein (CDFW) and Rachel Karlov (WSP). The total length of the stream surveyed was 10,590 feet.

A stream flow measurement 0.47 cfs was recorded on July 27, 2017 near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter.

Coulborn Creek is an F4 channel type. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 58° to 59° Fahrenheit. Air temperatures ranged from 60° to 75° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% riffle units, 31% pool units, 27% flatwater units, 5% dry units, and 1% no-survey units (Graph 1). Based on total length of Level II habitat types there were 38% flatwater units, 33% pool units, 21% riffle units, 6% dry units, and 1% no-survey units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units (32%), mid-channel pool units (30%), and run units (23%) (Graph 3). Based on percent total length, mid-channel pool units made up 32%, run units made up 25%, and low gradient riffle units made up 19%.

A total of 82 pools were identified (Table 3). Main channel pools were the most frequently encountered at 99% (Graph 4), and comprised 98% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-two of the 81 pools (40%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 82 pool tail-outs measured, 67 had a value of 1 (81.7%), 7 had a value of 2 (8.5%), and 8 had a value of 5 (9.8%) (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 4, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 27 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 27. Scour pools had a mean shelter rating of 15 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Coulborn Creek. Graph 7 describes the pool cover in Coulborn Creek. Small woody debris is the dominant pool cover type followed by bedrock ledges.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate, observed in 75% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 14% of pool tail-outs.

The mean percent canopy density for the surveyed length of Coulborn Creek was 100%. Of the canopy present, the mean percentages of hardwood and coniferous trees were 72% and 28%, respectively. Graph 9 describes the mean percent canopy in Coulborn Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 65% sand/silt/clay, and 35% bedrock (Graph 10). Hardwood trees was the dominant vegetation type, observed in 70% of the units surveyed. Additionally, 30% of the units surveyed had coniferous trees as the dominant vegetation type. (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at eight sites for species composition and distribution in Coulborn Creek on September 11, 2017 (Table A). The sites were sampled by Ryan Bernstein and Kori Roberts (CDFW).

The survey yielded 116 young-of-the-year (YOY) coho salmon (COHO), 59 YOY steelhead-trout (SH), and 1 age 1+ SH.

During the survey, the upstream-most observation of coho salmon and steelhead trout occurred at 39.9804° north latitude, -123.8974° west longitude, approximately 7,924 feet upstream from the confluence with Indian Creek (Map 1).

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Table A. Summary of results for a fish composition and distribution survey within Coulborn Creek, September 11, 2017.

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+	
09/11/17	1	005	Run	237	6	0	0	11	0	
	2	007	Pool	299	3	0	0	13	0	
	3	015	Pool	577	14	0	0	17	0	
	4	023	Pool	1,005	15	1	0	30	0	
	5	037	Pool	1,781	12	0	0	20	0	
	6	097	Pool	4,190	6	0	0	16	0	
	7	145	Pool	6,242	0	0	0	8	0	
	8	195	Pool	7,865	3	0	0	1	0	

DISCUSSION

Coulborn Creek is an F4 channel type for the entire 10,590 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channels are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days July 18 to July 26, 2017 ranged from 58° to 59° Fahrenheit. Air temperatures ranged from 60° to 75° 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 38% of the total length of this survey, riffles 21%, and pools 33%. Thirty-two of the 81 (40%) 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.

Seventy-four of the 82 pool tail-outs measured had embeddedness ratings of 1 or 2. None of the pool tail-outs had embeddedness ratings of 3 or 4. Eight 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.

Seventy-two of the 81 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Ten of the 81 pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools is 27. The shelter rating in the flatwater habitats is 8. 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 Coulborn Creek. Small woody debris is the dominant cover type in pools followed by bedrock ledges. Log and rootwad 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 100%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

Coulborn Creek 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 Coulborn Creek. 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 or 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) Pools are disconnected or sections of the stream are dry/subsurface. Streamflow should be monitored to determine if it is limiting for salmonids and treatment options should be investigated.
- 3) 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.

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 the survey at the confluence with Indian Creek. Channel type is a F4. Channel type cross-section location is at Habitat Unit (HU) #5.
299	0007.00	The creek is out of the influence of the confluence with Indian Creek.

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831	0021.00	Log debris accumulation (LDA) #1 is 10' high x 30' wide x 45' long and contains 14 pieces of large woody debris (LWD). Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 20' wide x 45' long x 4' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
1278	0030.00	There is a bedrock canyon on the right and left banks.
1552	0035.00	There is a LWD Salmon Restoration Project (SRP).
2067	0045.00	Tributary #1 enters on the right bank. It contributes to approximately 2% of Coulborn Creek's flow. The water temperature of the tributary was 58° Fahrenheit, the water temperature downstream of the confluence was 58° Fahrenheit, and the water temperature upstream of the confluence was 58° Fahrenheit. The slope of the tributary is 2%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
4190	0098.00	Tributary #2 enters on the right bank. It contributes to approximately 2% of Coulborn Creek's flow. The water temperature of the tributary was 59° Fahrenheit, the water temperature downstream of the confluence was 59° Fahrenheit, and the water temperature upstream of the confluence was 59° Fahrenheit. The slope of the tributary is less than 1%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
4404	0103.00	LDA #2 is 7' high x 25' wide x 10' long and contains 6 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 16' wide, 11' long and 2' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
4954	0114.00	LDA #3 is 8' high x 25' wide x 21' long and contains 3 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 16' wide x 16' long x 2' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
6122	0142.00	There is an old culvert that is very badly damaged. The culvert is no longer intact and is large metal debris in the channel.
6959	0168.00	LDA #5 is 3.5' high x 25' wide x 15' long and contains 5 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment

is being retained in the approximate dimensions of 17' wide, 12' long and 3' deep. The sediment ranges in sizes of gravel. The LDA is a possible barrier to salmonids. Fish were not observed above the LDA.

7727	0189.00	LDA #6 is 5' high x 20' wide x 42' long and contains 11 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 10' wide x 15' long x 4' deep. The sediment ranges in sizes of gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
7865	0195.00	Tributary #3 enters on the right bank. It contributes to approximately less than 1% of Coulborn Creek's flow. The water temperature of the tributary was 59° Fahrenheit, the water temperature downstream of the confluence was 59° Fahrenheit, and the water temperature upstream of the confluence was 59° Fahrenheit. The slope of the tributary is less than 1%. The tributary is not accessible to salmonids. Fish were not observed in the tributary.
8131	0202.00	Isolated pool.
8189	0205.00	Entrenched channel.
8650	0210.00	Culvert #1 is an unnamed road, and is 6' high x 6' wide x 20' long. It is composed of 1 culverts, and is made of CMP. The culvert's diameter is 6', its plunge height is 0', and it has a maximum depth of 1.6' within 5' of the outlet. The slope is 0%, and its condition is good. It is not a possible barrier to juvenile and adult salmonids.
8855	0214.00	Isolated pool
9257	0225.00	There is a dry right bank tributary.
10131	0250.00	LDA #7 is 4.5' high x 10' wide x 7' long and contains 4 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is not being retained. The LDA is a possible barrier to salmonids. Fish were not observed above the LDA.
10552	0266.00	End of survey due to lack of access. Visual observations of large greenhouse/homestead beyond last habitat unit. Creek was getting overgrown and the substrate was mud/silt. Fish habitat past this point was very limited.

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.

REPORT CONTACT INFORMATION

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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 - Rootwad 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 }

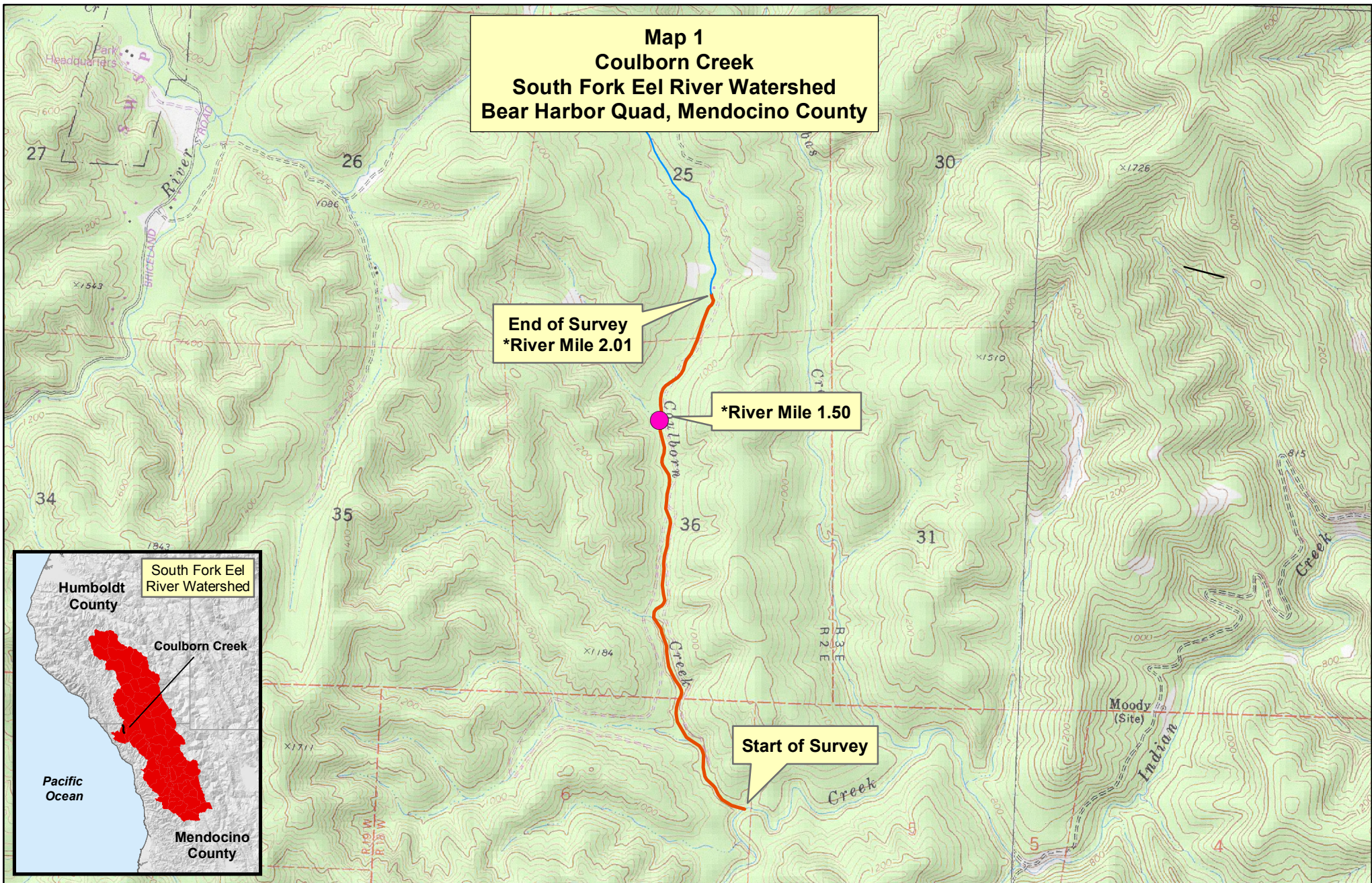
BACKWATER POOLS

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

ADDITIONAL UNIT DESIGNATIONS

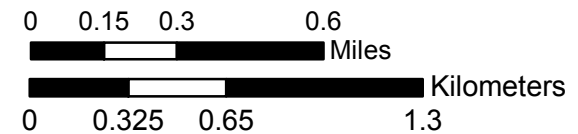
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Map 1 Coulborn Creek South Fork Eel River Watershed Bear Harbor Quad, Mendocino County



— Reach 1: F4 Channel Type
— Coulborn Creek

● Last observed juvenile coho & steelhead trout



APPENDIX I

TABLES AND GRAPHS

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

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0

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
1	0	CULVERT	0.4	19	19	0.2									
12	0	DRY	4.5	56	673	6.4									
71	7	FLATWATER	26.7	57	4047	38.2	6.3	0.3	0.7	269	19109	98	6935		8
3	0	NOSURVEY	1.1	46	137	1.3									
82	81	POOL	30.8	42	3451	32.6	9.0	0.8	1.9	381	31208	407	33406	342	27
97	8	RIFFLE	36.5	23	2263	21.4	7.5	0.2	0.4	140	13580	30	2867		4
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
266	96				10590					63897			43208		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
84	7	LGR	31.6	25	2061	19.5	7	0.2	0.5	142	11942	28	2388		0	94
13	1	BRS	4.9	16	202	1.9	13	0.3	0.7	125	1622	37	487		30	100
60	6	RUN	22.6	44	2623	24.8	6	0.3	1.1	183	10980	62	3694		9	100
11	1	SRN	4.1	129	1424	13.4	6	0.4	0.9	786	8646	314	3458		0	100
81	80	MCP	30.5	42	3388	32.0	9	0.8	6.4	377	30511	399	32358	335	27	100
1	1	LSBk	0.4	63	63	0.6	11	1.3	3.5	693	693	1040	1040	901	15	100
12	0	DRY	4.5	56	673	6.4										
1	0	CUL	0.4	19	19	0.2										
3	0	NS	1.1	46	137	1.3										

Total Units
266

Total Units Fully Measured
96

Total Length (ft.)
10590

Total Area (sq.ft.)
64395

Total Volume (cu.ft.)
43425

Table 3 - Summary of Pool Types

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

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
81	80	MAIN	99	42	3388	98	8.9	0.8	377	30511	335	27118	27
1	1	SCOUR	1	63	63	2	11.0	1.3	693	693	901	901	15
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)		Total Volume (cu.ft.)	
82	81				3451					31204		28019	

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

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

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
80	MCP	99	1	1	48	60	24	30	6	8	1	1
1	LSBk	1	0	0	0	0	0	0	1	100	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
81	1	1	48	59	24	30	7	9	1	1

Mean Maximum Residual Pool Depth (ft.): 1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Coulborn Creek

LLID: 1238905399635 Drainage: Eel River- South Fork

Survey Dates: 7/18/2017 to 7/26/2017 Dry Units: 12

Confluence Location: Quad: BEAR HARBOR Legal Description: T24NR18WS06 Latitude: 39:57:49.0N Longitude: 123:53:26.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
84	7	LGR	0	0	0	0	0	0	0	0	0
13	1	BRS	0	0	0	0	0	0	50	0	50
97	8	TOTAL RIFFLE	0	0	0	0	0	0	50	0	50
60	7	RUN	0	67	0	0	0	0	0	0	33
11	1	SRN	0	0	0	0	0	0	0	0	0
71	8	TOTAL FLAT	0	66	0	0	0	0	0	0	34
81	80	MCP	14	42	5	3	0	0	0	1	34
1	1	LSBk	0	0	0	0	0	0	0	0	100
82	81	TOTAL POOL	13	42	5	3	0	0	0	1	35
1	0	CUL									
3	0	NS									
266	97	TOTAL	13	43	5	2	0	0	1	1	35

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Dry Units: 12

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
84	7	LGR	0	0	71	14	14	0	0
13	1	BRS	0	0	0	0	0	0	100
60	6	RUN	0	0	67	0	0	17	17
11	1	SRN	0	0	0	0	100	0	0
81	79	MCP	1	0	73	3	0	3	20
1	1	LSBk	0	0	0	0	0	0	100

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
100	28	72	0	100	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.

Stream Name:	Coulborn Creek	LLID:	1238905399635	Drainage:	Eel River - South Fork		
Survey Dates:	7/18/2017 to 7/26/2017	Survey Length (ft.):	10590	Main Channel (ft.):	10590	Side Channel (ft.):	0
Confluence Location:	Quad: BEAR HARBOR	Legal Description:	T24NR18WS06	Latitude:	39:57:49.0N	Longitude:	123:53:26.0W

STREAM REACH: 1												
Channel Type:			F4	Canopy Density (%):			99.6	Pools by Stream Length (%):		32.6		
Reach Length (ft.):			10590	Coniferous Component (%):			28.2	Pool Frequency (%):		30.8		
Riffle/Flatwater Mean Width (ft.):			6.9	Hardwood Component (%):			71.8	Residual Pool Depth (%):				
BFW:				Dominant Bank Vegetation:			Hardwood Trees	< 2 Feet Deep:		60		
Range (ft.):			7 to 20	Vegetative Cover (%):			100.0	2 to 2.9 Feet Deep:		30		
Mean (ft.):			12	Dominant Shelter:			Small Woody Debris	3 to 3.9 Feet Deep:		9		
Std. Dev.:			3	Dominant Bank Substrate Type:			Sand/Silt/Clay	>= 4 Feet Deep:		1		
Base Flow (cfs.):			0.5	Occurrence of LWD (%):			4	Mean Max Residual Pool Depth (ft.):		1.9		
Water (F):			58 - 59	Air (F):			60 - 75	LWD per 100 ft.:				
Dry Channel (ft):			673	Riffles:			1	Mean Pool Shelter Rating:		27		
				Pools:			3					
				Flat:			1					
Pool Tail Substrate (%):			Silt/Clay: 0 Sand: 0 Gravel: 75 Sm Cobble: 14 Lg Cobble: 1 Boulder: 0 Bedrock: 10									
Embeddedness Values (%):			1. 81.7 2. 8.5 3. 0.0 4. 0.0 5. 9.8									

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Coulborn Creek

LLID: 1238905399635

Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

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	34	34	35.1
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	63	63	64.9

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	0	0	0.0
Hardwood Trees	74	62	70.1
Coniferous Trees	23	35	29.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

1

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

StreamName: Coulborn Creek

LLID: 1238905399635 Drainage: Eel River - South Fork

Survey Dates: 7/18/2017 to 7/26/2017

Confluence Location: Quad: BEAR HARBOR

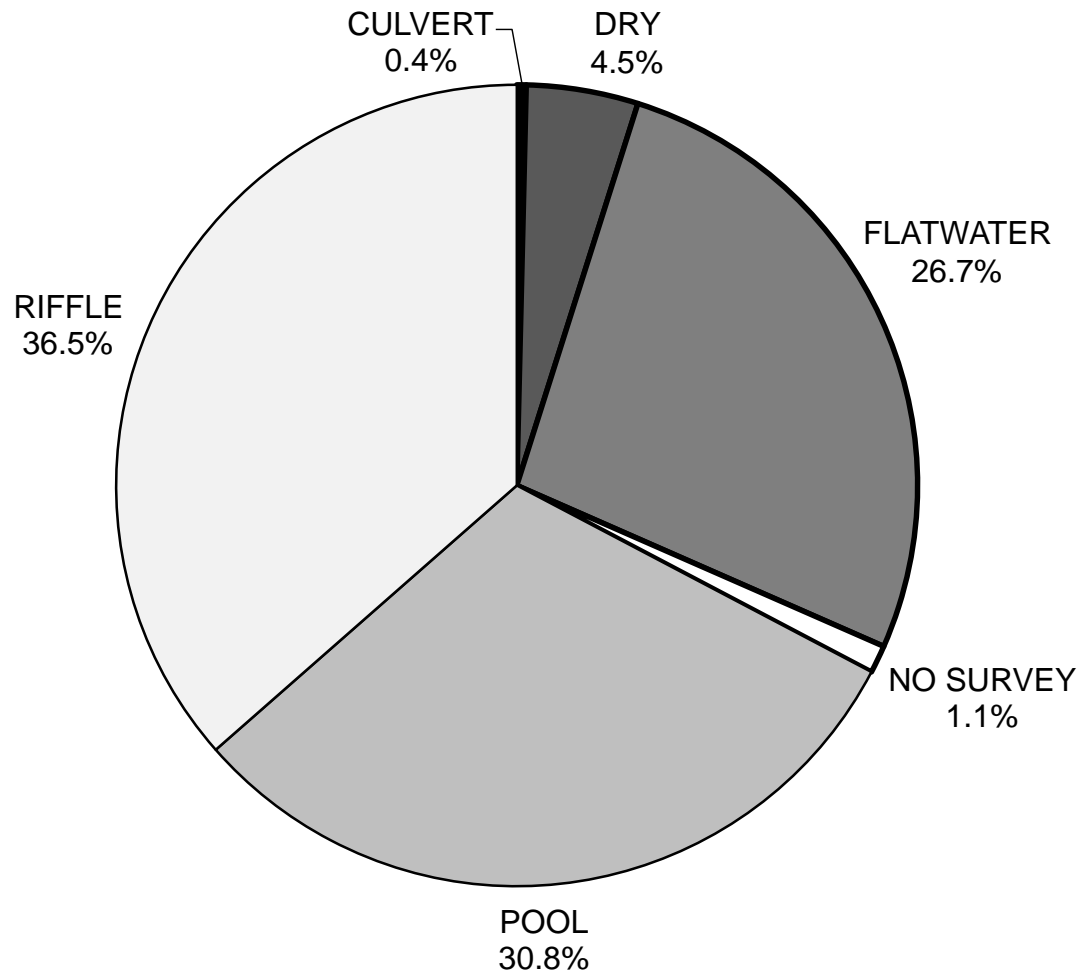
Legal Description: T24NR18WS06

Latitude: 39:57:49.0N

Longitude: 123:53:26.0W

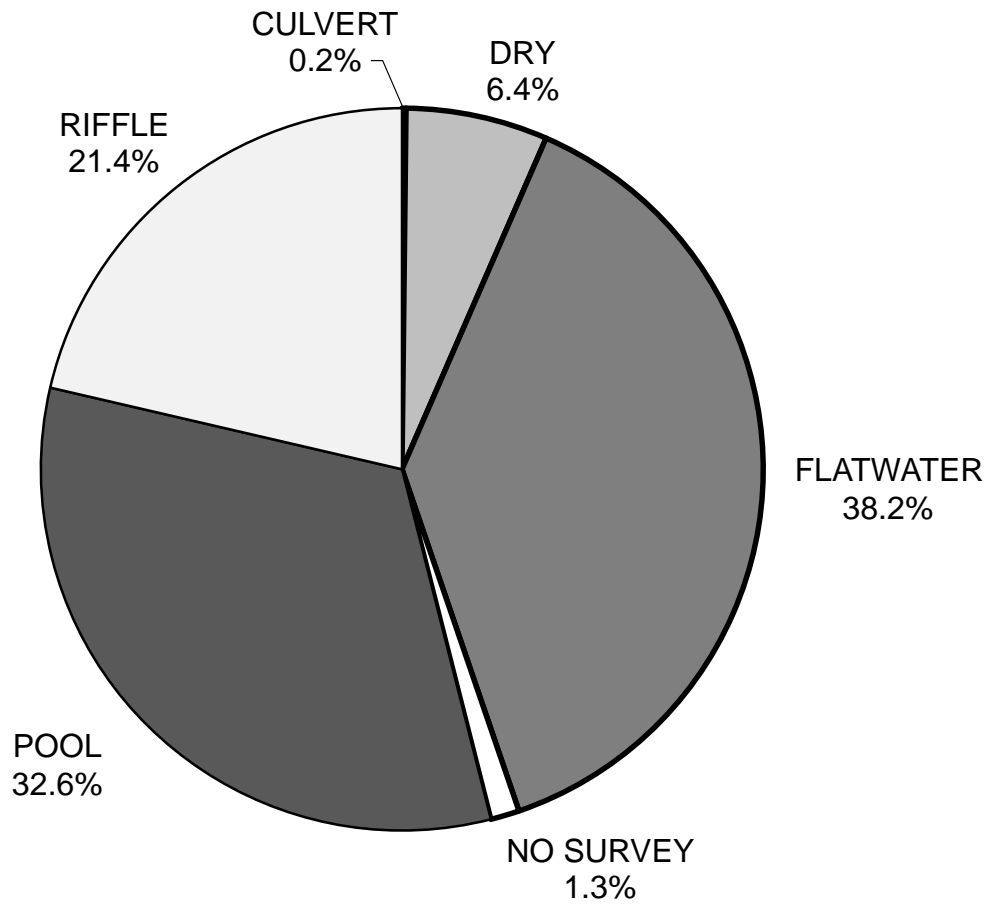
	Riffles	Flatwater	Pools
UNDERCUT BANKS(%)	0	0	13
SMALL WOODY DEBRIS (%)	0	25	42
LARGE WOODY DEBRIS (%)	0	0	5
ROOT MASS (%)	0	0	3
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITewater (%)	6	0	0
BOULDERS (%)	0	0	1
BEDROCK LEDGES (%)	6	13	35

COULBORN CREEK 2017 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

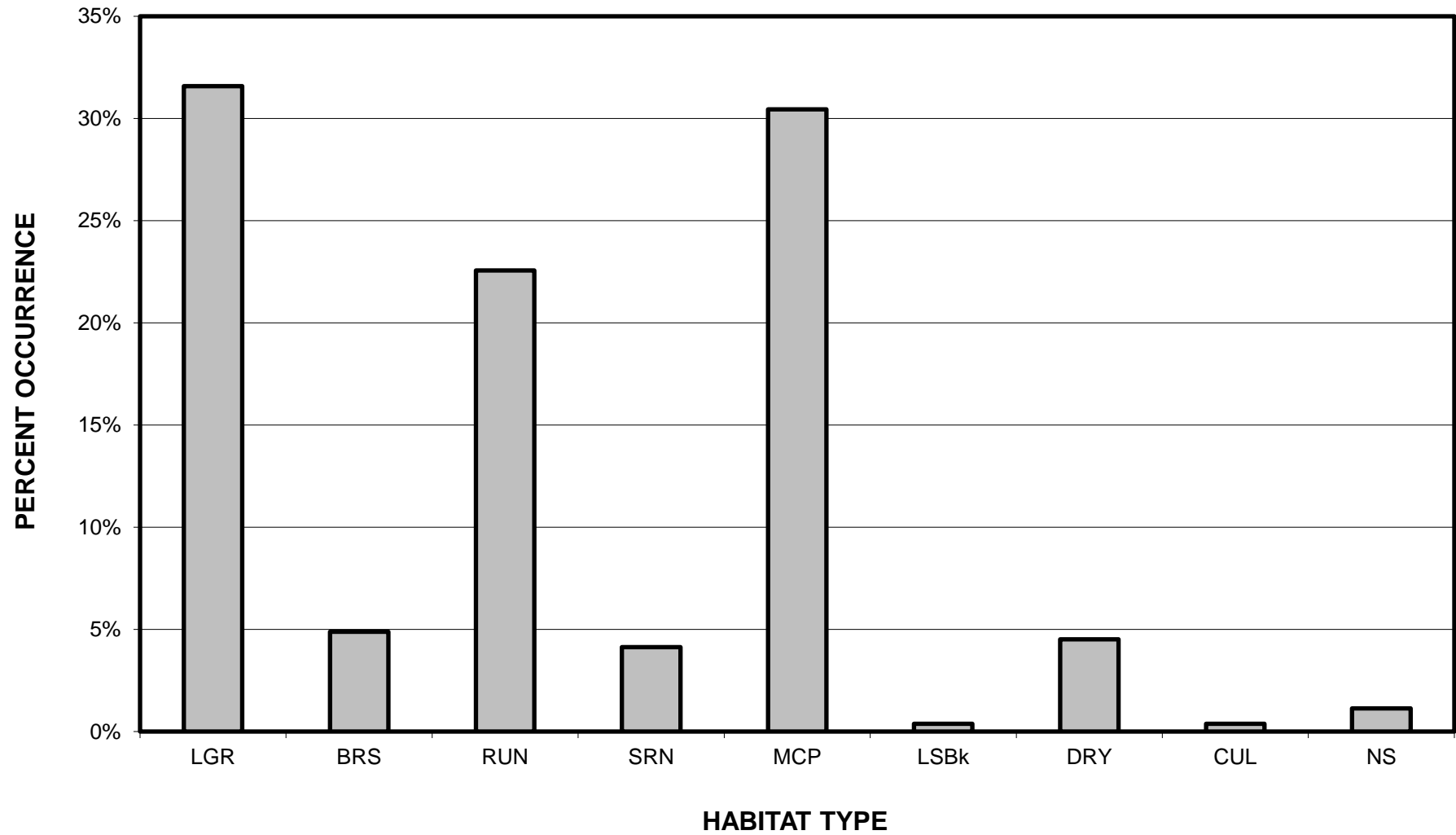
COULBORN CREEK 2017 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

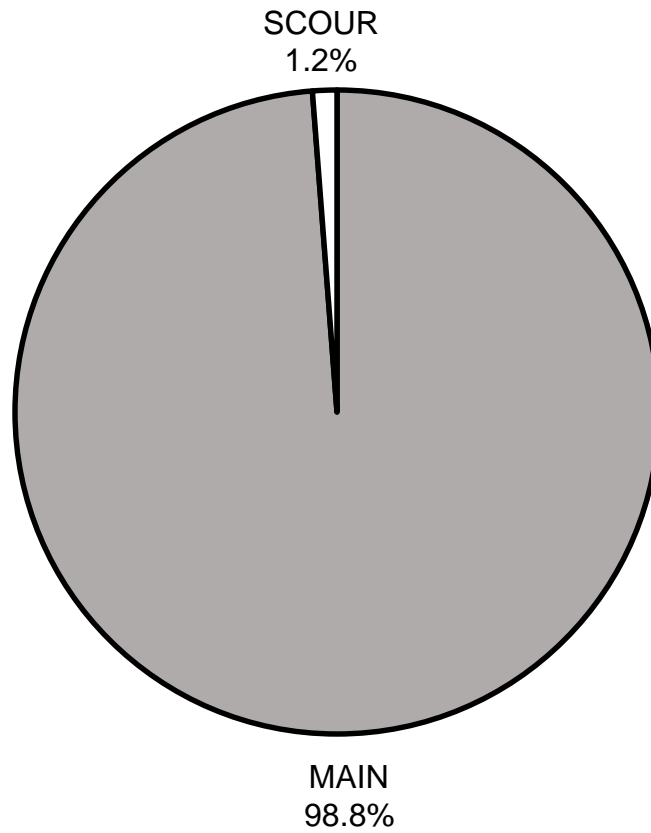
COULBORN CREEK 2017

HABITAT TYPES BY PERCENT OCCURRENCE



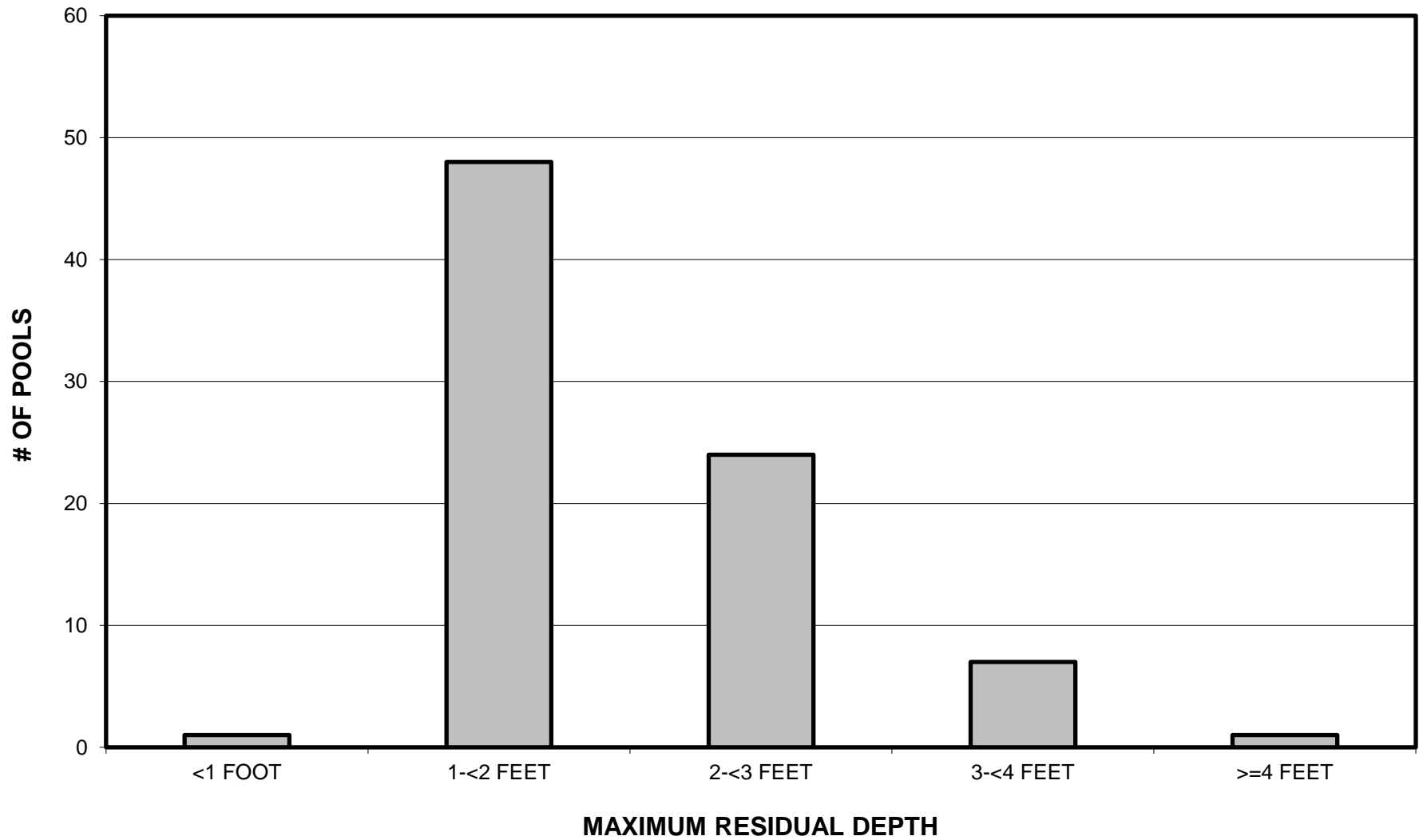
GRAPH 3

**COULBORN CREEK 2017
POOL TYPES BY PERCENT OCCURRENCE**



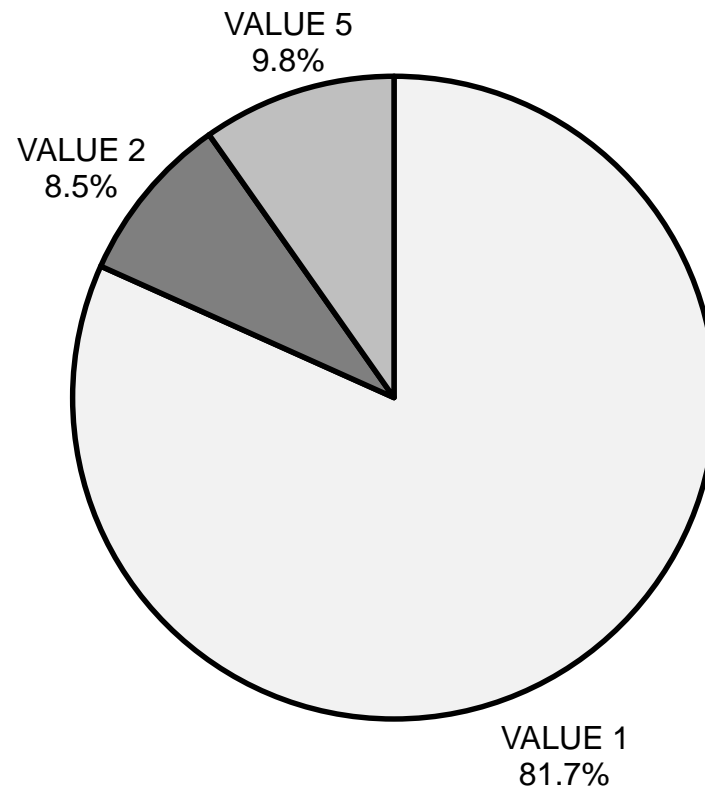
GRAPH 4

COULBORN CREEK 2017 MAXIMUM DEPTH IN POOLS



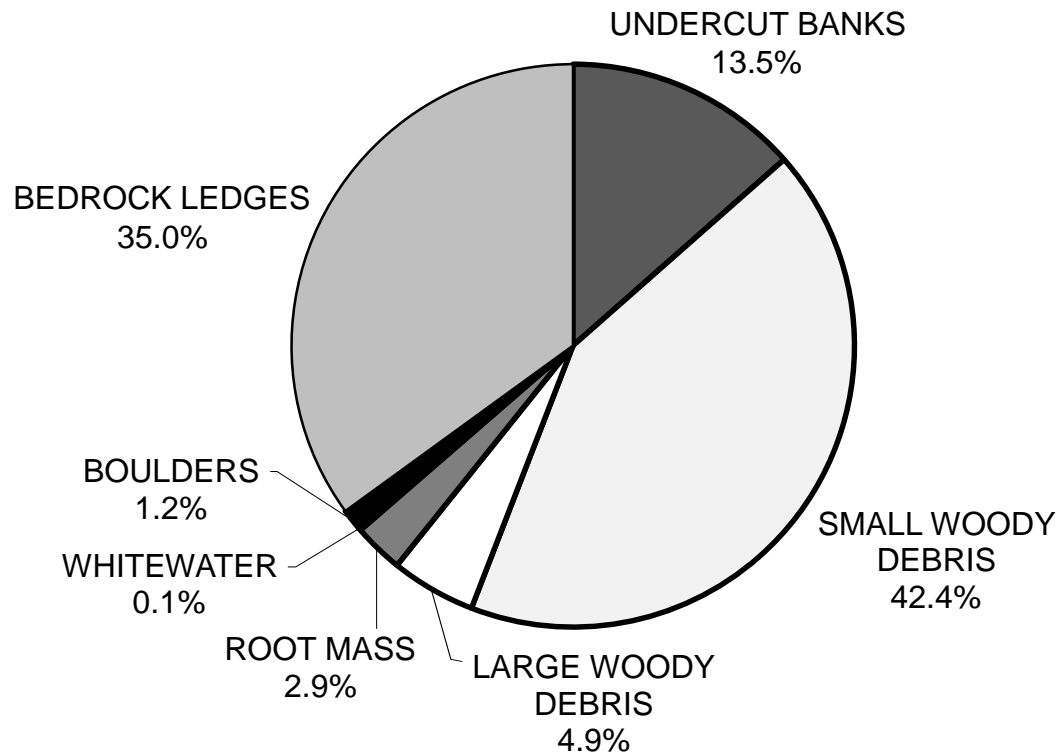
GRAPH 5

COULBORN CREEK 2017 PERCENT EMBEDDEDNESS



GRAPH 6

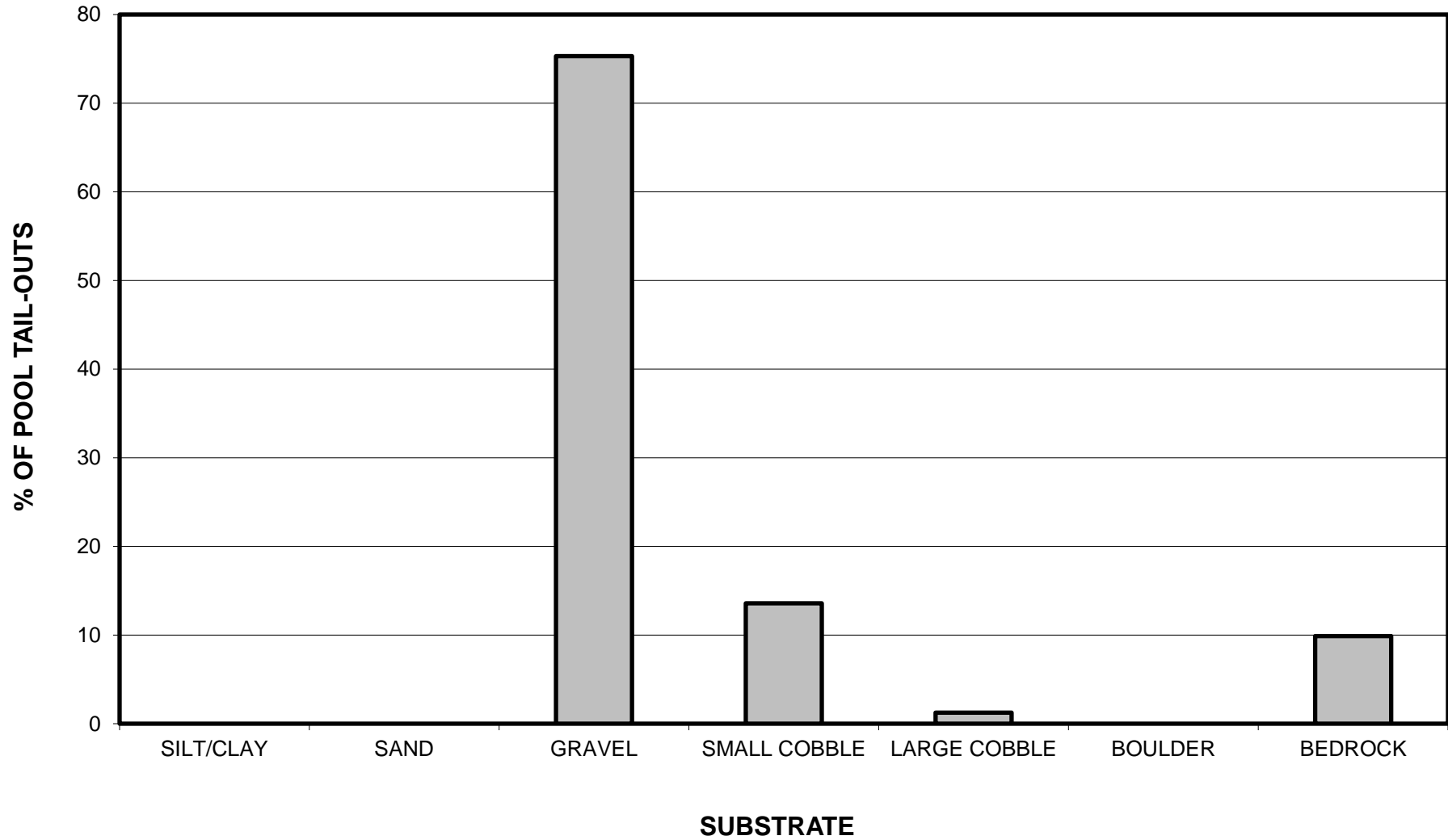
COULBORN CREEK 2017 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

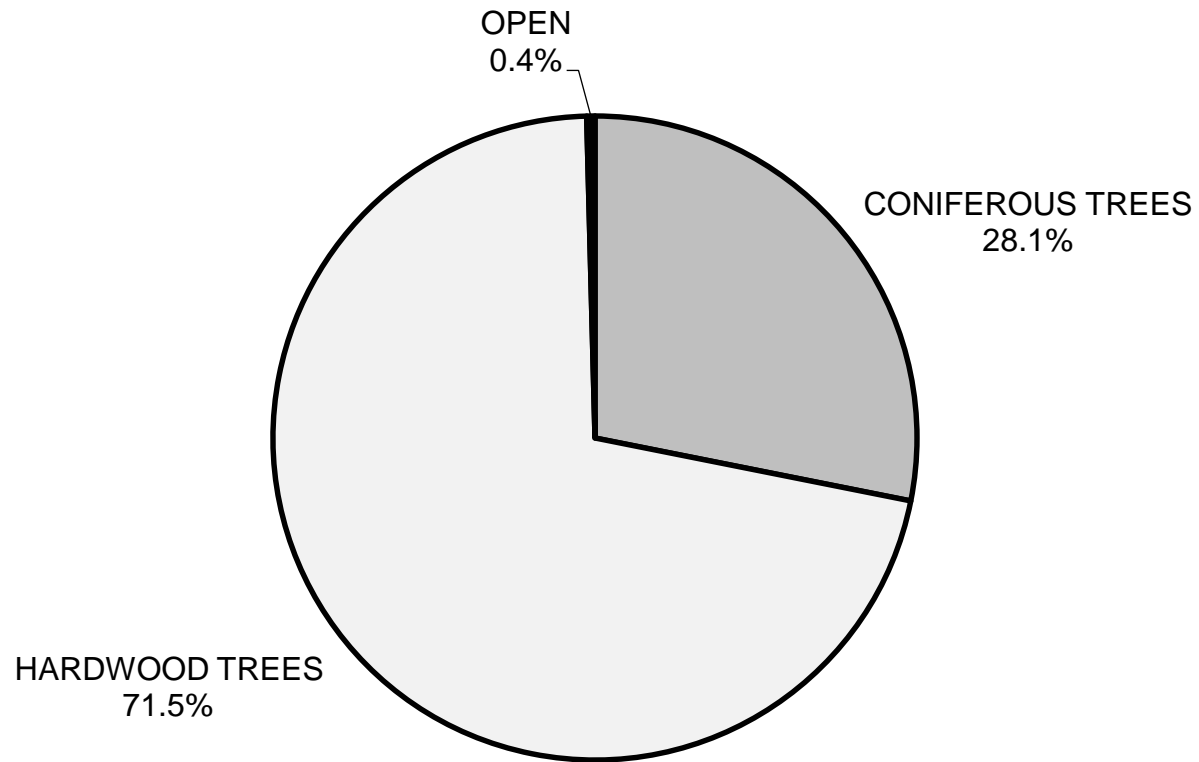
COULBORN CREEK 2017

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



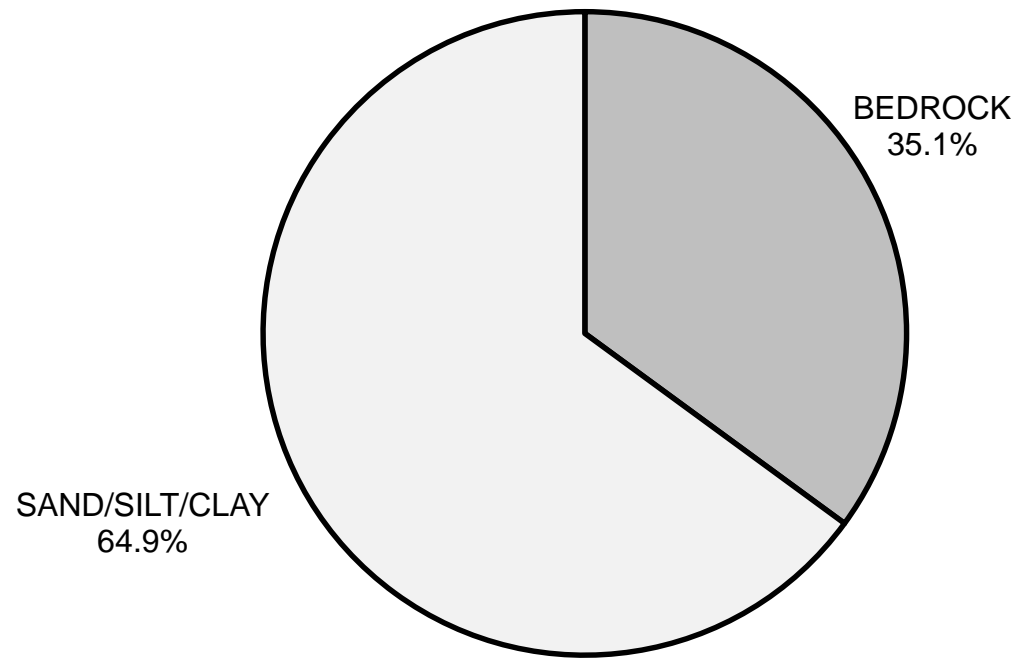
GRAPH 8

COULBORN CREEK 2017 MEAN PERCENT CANOPY

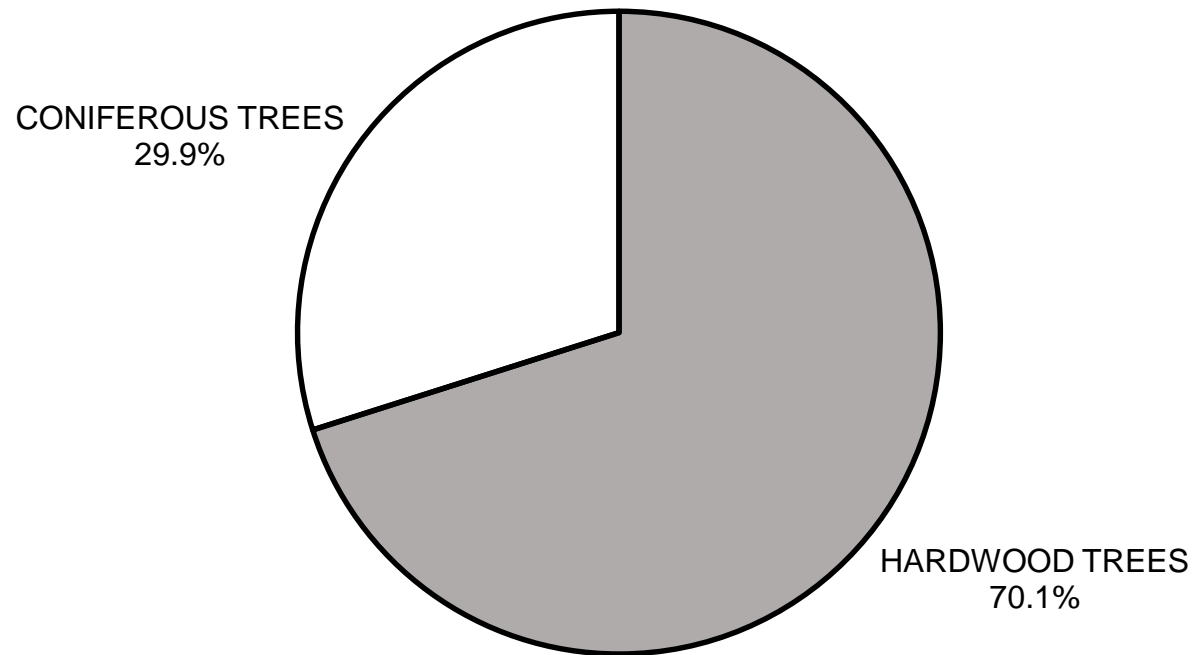


GRAPH 9

COULBORN CREEK 2017
DOMINANT BANK COMPOSITION IN SURVEY REACH



**COULBORN CREEK 2017
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS



Photo 1: Start of survey at the confluence with Indian Creek. Looking upstream towards the mouth of Coulborn Creek. Pictured: Rachel Karlov. (Photo taken: 7/19/17)



Photo 2: LDA at habitat unit #021, 830' upstream from start of survey. (Photo taken 7/19/17)



Photo 3: Dry creek bed at habitat unit #231, 9,465' upstream from start of survey. (Photo taken 7/25/17)