



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

SEELY CREEK

INTRODUCTION

A stream inventory was conducted from July 25 to July 30, 2017 on Seely Creek. The survey began at the confluence with Redwood Creek and extended upstream 1.7 miles.

The Seely 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 Seely 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

Seely Creek, located in southern Humboldt County, is a tributary to Redwood Creek, which is a tributary to South Fork Eel River, a tributary to the Eel River which drains to the Pacific Ocean in northern California (Map 1). Seely Creek's legal description at the confluence with Redwood Creek is T04S R03E S09. Its location is 40.1326 north latitude and -123.8597 west longitude, LLID number 1238574401310. Seely Creek is a first order stream and has approximately 2.8 miles of blue line stream according to the USGS Miranda 7.5 minute quadrangle. Seely Creek drains a watershed of approximately 5.8 square miles. Elevations range from about 350 feet at the mouth of the creek to 800 feet in the headwaters. Redwood/Douglas fir forest dominates the watershed. The watershed is entirely privately owned. Vehicle access exists via Highway 101 to Briceland Thorn Road, to Seely Creek Road.

METHODS

The habitat inventory conducted in Seely 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 Seely 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". Seely 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 Seely 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 Seely 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 Seely 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 Seely 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 Seely Creek. In addition, underwater mask and snorkel observations were made at 7 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 Seely Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length

- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of July 25 to July 30, 2017 was conducted by Josh Gruver, Ryan Bernstein (CDFW), and Ashley Woodford (WSP). The total length of the stream surveyed was 9,079 feet.

A stream flow measurement 0.42 cfs was recorded on August 1, 2017 near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter.

Seely Creek is a F3 channel type for 9,079 feet of the stream surveyed (Reach 1).

Water temperatures taken during the survey period ranged from 62° to 69° Fahrenheit. Air temperatures ranged from 67° to 86° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 45% pool units, 38% flatwater units, and 17% riffle units (Graph 1). Based on total length of Level II habitat types there were 57% pool units, 36% flatwater units, and 7% riffle units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units (44%), run units (25%), and low gradient riffle units (17%) (Graph 3). Based on percent total length, mid-channel pool units made up 56%, run units 21%, and step run units 14%.

A total of 73 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (Graph 4), and comprised 100% 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-seven of the 73 pools (51%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 73 pool tail-outs measured, 13 had a value of 1 (17.8%), 30 had a value of 2 (41.1%), 19 had a value of 3 (26%), 4 had a value of 4 (5.5%), 7 had a value of 5 (9.6%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed not suitable 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 5, flatwater habitat types had a mean shelter rating of 7, and pool habitats had a mean shelter rating of 28 (Table 1). Only main channel pools were observed (Table 3).

Table 5 summarizes mean percent cover by habitat type. Bedrock ledges are the dominant cover type in Seely Creek. Graph 7 describes the pool cover in Seely Creek. Bedrock ledges are 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. Small cobble was the most dominate substrate type, observed in 36% of the pool tail-outs. Large cobble was the next most frequently observed dominant substrate type and occurred in 32% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Seely Creek was 76%. Twenty-four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 53% and 47%, respectively. Graph 9 describes the mean percent canopy in Seely 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 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 61.7% of the units surveyed. Additionally, 38.3% of the units surveyed had hardwood tress as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at 7 sites for species composition and distribution in Seely Creek on July 31, 2017 and August 31, 2017 (Table A). The sites were sampled by Joshua Gruver, Ryan Bernstein, and Kori Roberts (CDFW).

In reach 1, which comprised the first 9,079 feet of stream, 7 sites were sampled. On July 31, 2017 survey site # 1 was sampled as the upstream most observation on juvenile steelhead. The remaining 6 sites were surveyed on August 31, 2017 starting upstream of the confluence with Indian Creek. Only 6 sites were surveyed because visibility became too poor due to the lack of steam flow to identify fish. The combined surveys sites within reach 1 yielded 37 young-of-the-year steelhead (SH), 139 Sacramento Pikeminnow (SPM), and 10 Stickleback (STB). No coho salmon were observed during the survey.

During the survey on July 31, 2017, the upstream-most observation of juvenile steelhead occurred at 40.1434° north latitude and -123.8733° west longitude, approximately 9,030 feet upstream from the confluence with Indian Creek.

Table A. Summary of results for a fish composition and distribution survey within Seely Creek, July 31 & August 31, 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+	
08/31/17	1	007	Pool	401	2	0	0	0	0	5 (SPM)
	2	009	Pool	475	2	0	0	0	0	30 (SPM)
	3	013	Pool	679	3	0	0	0	0	10 (SPM)
	4	017	Pool	842	2	0	0	0	0	14 (SPM)
	5	019	Pool	1,027	15	0	0	0	0	30 (SPM)
	6	021	Pool	1,091	8	0	0	0	0	15 (SPM) 10 (STB)
	7	161	Pool	9,030	3	0	0	0	0	

Species abbreviations: SPM = Sacramento pikeminnow, STB = Stickleback

DISCUSSION

Seely Creek is an F3 channel type. The suitability of a F3 channel types for fish habitat improvement structures is as follows: F3 channel types are good for bank-placed boulders, single and opposing wing-deflectors and fair for plunge weirs, boulder clusters, channel constrictors and log cover.

The water temperatures recorded on the survey days July 25 to July 31, 2017 ranged from 62° to 69° Fahrenheit. Air temperatures ranged from 67° to 86° Fahrenheit. The high end of this water temperature range (>65°F) is considered unsuitable 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 36% of the total length of this survey, riffles 7%, and pools 57%. Thirty-seven of the 73 (51%) 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.

Forty-three of the 73 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-three of the pool tail-outs had embeddedness ratings of 3 or 4. Seven of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Seely Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Forty of the 73 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 7. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by bedrock ledges in Seely Creek. Bedrock ledges are the dominant cover type in pools followed by undercut banks. Log and rootwad 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 76%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation were both 100%.

RECOMMENDATIONS

Seely 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 Seely 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/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 Bedrock Ledges. Adding high quality complexity with woody cover in the pools is desirable.
- 2) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 3) Suitable size spawning substrate on Seely Creek is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel.
- 4) The limited water temperature data available suggest that maximum temperatures are above 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.
- 5) 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.
- 6) Increase the canopy on Seely Creek by planting appropriate native vegetation, particularly coniferous tree species like redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or

upslope erosion control projects.

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 Redwood Creek.
103	0005.00	Bridge #1 is the crossing for an unnamed road and is 10' high x 13' wide x 60' long. It is an automobile bridge made of metal and is not a barrier to salmonids. Young-of-the-year (YOY) salmonids observed.
176	0006.00	The creek is out of the influence of the confluence with Redwood Creek.
842	0018.00	Tributary #1 enters on the left bank. The water temperature of the tributary was 62° Fahrenheit, the water temperature downstream of the confluence was 64° Fahrenheit, and the water temperature upstream of the confluence was 67° Fahrenheit. The slope of the tributary is ~1%. The tributary is accessible to salmonids. Fish were not observed in the tributary. Bridge #2 is the crossing for an unnamed road and is 10.5' high x 14' wide x 45' long. It is an automobile bridge (made of wood) and is not a barrier to salmonids. Channel Type is a F3. Channel type cross-section was measured at Habitat Unit (HU) #018.
3465	0055.00	Bucket in creek with pump. Truck backed up near creek.
4513	0078.00	Log debris accumulation (LDA) #1 is 13' high x 60' wide x 38' long and contains 30 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 12' wide x 6' long x and 2' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to salmonids. Fish were observed above the LDA.
6831	0114.00	Tributary #2 enters on the left bank. The water temperature of the tributary was 62° Fahrenheit, the water temperature downstream of the confluence was 64° Fahrenheit, and the water temperature upstream of the confluence was 67° Fahrenheit. The slope of the tributary is ~1%. The tributary is accessible to salmonids. Fish were not observed in the tributary.

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9030 0162.00 End of survey due to access. 200m short of last accessible parcel is an extensive landslide. Channel full with sediment, trees, and trash. Cut trees form LDA-like debris. Water flow is minimal through landslide. Last fish (YOY) observed in HU 161, the pool just prior to the landslide. Much of creek is comprised of bedrock and large cobble/boulders.

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

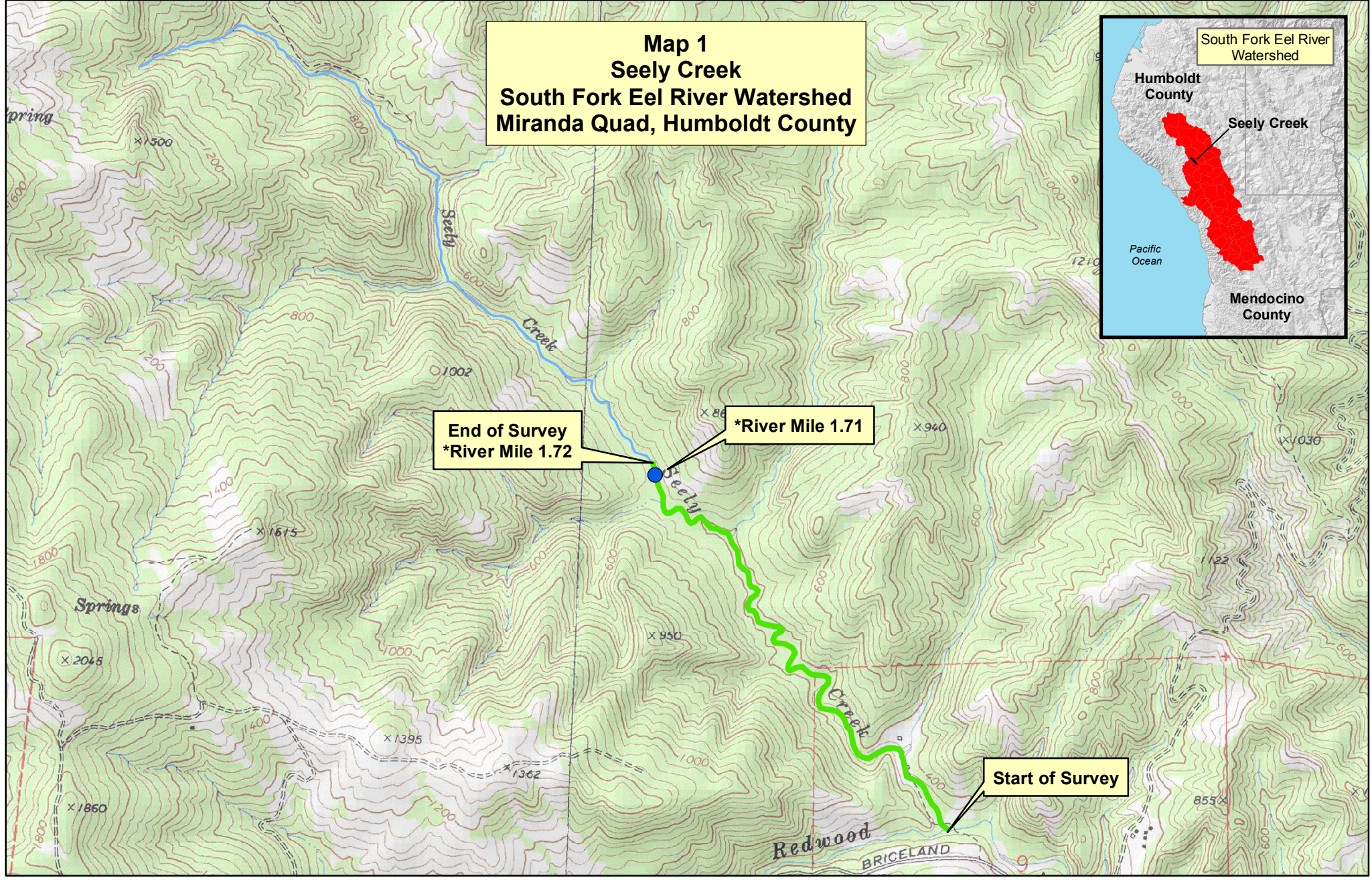
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Rootwad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

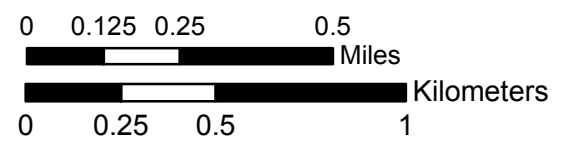
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Rootwad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

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]	



- Reach 1: F3 Channel Type
- Seely Creek
- Last observed juvenile steelhead trout



APPENDIX I

TABLES AND GRAPHS

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

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0

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
61	7	FLATWATER	37.7	53	3237	35.7	9.7	0.3	0.6	419	25569	133	8109		7
73	73	POOL	45.1	71	5174	57.0	13.1	1.1	2.2	981	71615	1416	103369	1159	28
28	4	RIFFLE	17.3	24	668	7.4	7.8	0.3	0.4	119	3326	30	842		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
162	84				9079					100509			112320		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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 (%)
28	4	LGR	17.3	24	668	7.4	8	0.3	0.5	119	3326	30	842		5	82
41	3	RUN	25.3	46	1867	20.6	10	0.3	0.9	217	8887	55	2249		8	62
19	3	SRN	11.7	69	1306	14.4	11	0.3	0.7	676	12843	213	4041		8	91
1	1	EDW	0.6	64	64	0.7	4	0.5	0.6	256	256	128	128		0	30
72	72	MCP	44.4	70	5069	55.8	13	1.0	4.8	974	70145	1387	99841	1130	28	76
1	1	STP	0.6	105	105	1.2	14	2.2	3.4	1470	1470	3528	3528	3234	40	84

Total Units
162

Total Units Fully Measured
84

Total Length (ft.)
9079

Total Area (sq.ft.)
96927

Total Volume (cu.ft.)
110629

Table 3 - Summary of Pool Types

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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
73	73	MAIN	100	71	5174	100	13.1	1.1	981	71615	1159	84587	28

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
73	73	5174	71615	84587

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

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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
72	MCP	99	2	3	34	47	23	32	10	14	3	4
1	STP	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
73	2	3	34	47	23	32	11	15	3	4

Mean Maximum Residual Pool Depth (ft.): 2.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Dry Units: 0

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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
28	4	LGR	0	50	0	0	0	50	0	0	0
28	4	TOTAL RIFFLE	0	50	0	0	0	50	0	0	0
41	4	RUN	0	50	0	0	0	50	0	0	0
19	4	SRN	50	0	0	0	0	50	0	0	0
1	1	EDW	0	0	0	0	0	0	0	0	0
61	9	TOTAL FLAT	25	25	0	0	0	50	0	0	0
72	72	MCP	33	9	3	6	0	6	0	4	38
1	1	STP	0	0	0	0	0	0	0	20	80
73	73	TOTAL POOL	33	9	2	7	0	7	0	4	38
162	86	TOTAL	32	11	2	6	0	9	0	5	35

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Dry Units: 0

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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
28	4	LGR	0	25	0	50	0	0	25
41	3	RUN	0	0	0	33	33	0	33
19	3	SRN	0	0	0	33	67	0	0
1	1	EDW	100	0	0	0	0	0	0
72	72	MCP	0	24	13	18	7	1	38
1	1	STP	0	0	0	0	0	0	100

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
76	47	53	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.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Survey Length (ft.): 9079

Main Channel (ft.): 9079

Side Channel (ft.): 0

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09 Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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

Channel Type: F3

Canopy Density (%): 75.7

Pools by Stream Length (%): 57.0

Reach Length (ft.): 9079

Coniferous Component (%): 46.8

Pool Frequency (%): 45.1

Riffle/Flatwater Mean Width (ft.): 9.0

Hardwood Component (%): 53.2

Residual Pool Depth (%):

BFW:

Dominant Bank Vegetation: Coniferous Trees

< 2 Feet Deep: 49

Range (ft.): 19 to 45

Vegetative Cover (%): 100.0

2 to 2.9 Feet Deep: 32

Mean (ft.): 32

Dominant Shelter: Undercut Banks

3 to 3.9 Feet Deep: 15

Std. Dev.: 8

Dominant Bank Substrate Type: Sand/Silt/Clay

>= 4 Feet Deep: 4

Base Flow (cfs.): 0.4

Occurrence of LWD (%): 2

Mean Max Residual Pool Depth (ft.): 2.2

Water (F): 62 - 69 Air (F): 67 - 86

LWD per 100 ft.:

Mean Pool Shelter Rating: 28

Dry Channel (ft): 0

Riffles: 0

Pools: 1

Flat: 0

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 19 Sm Cobble: 36 Lg Cobble: 32 Boulder: 7 Bedrock: 7

Embeddedness Values (%): 1. 17.8 2. 41.1 3. 26.0 4. 5.5 5. 9.6

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES09

Latitude: 40:07:52.0N

Longitude: 123:51:27.0W

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	0	0	0.0
Sand / Silt / Clay	84	84	100.0

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	30	30	35.7
Hardwood Trees	10	10	11.9
Coniferous Trees	44	44	52.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Seely Creek

LLID: 1238574401310

Drainage: Eel River - South Fork

Survey Dates: 7/25/2017 to 7/31/2017

Confluence Location: Quad: MIRANDA

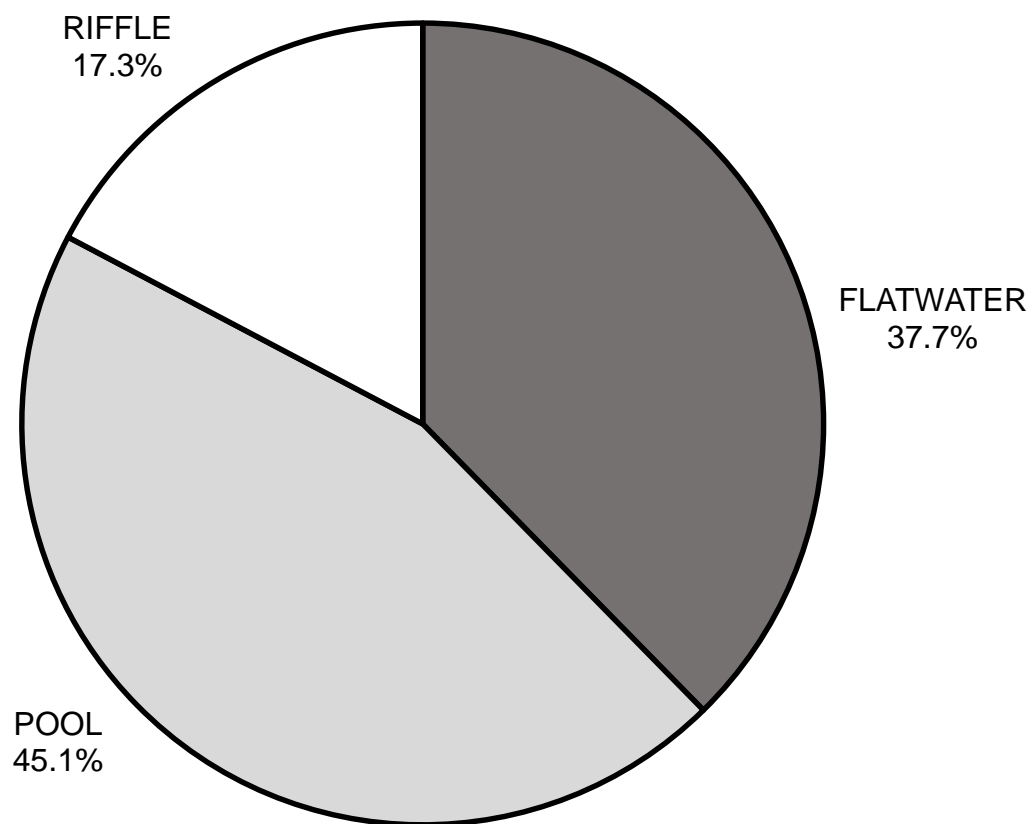
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Longitude: 123:51:27.0W

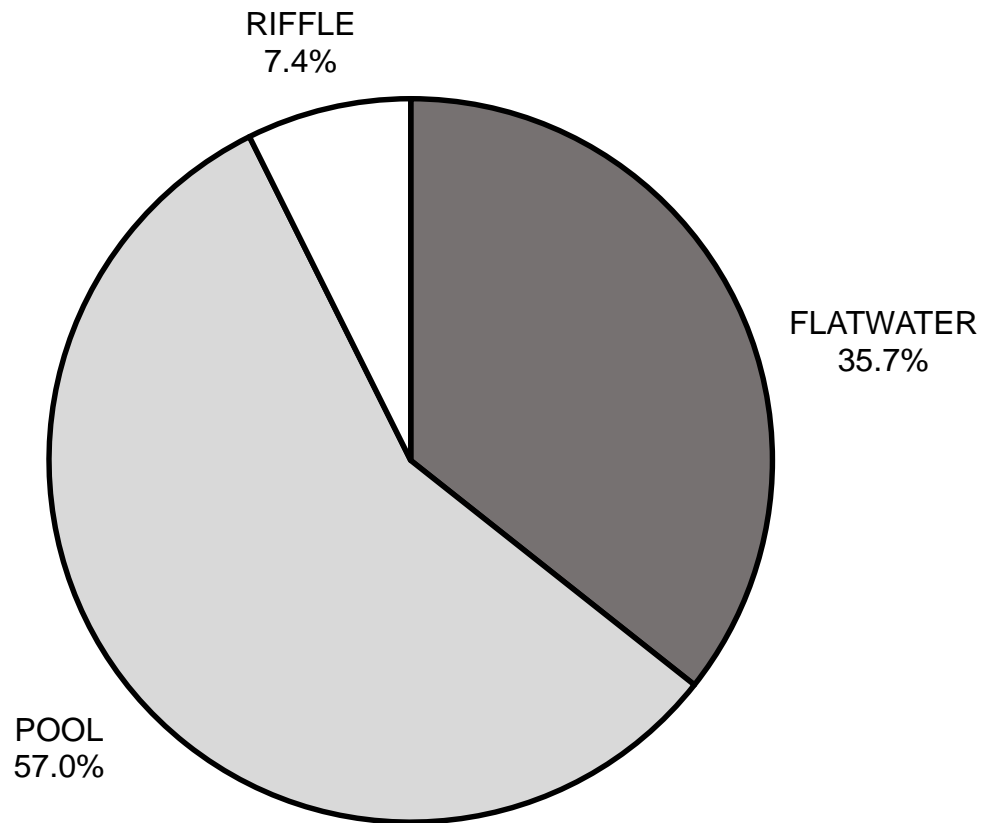
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	25	33
SMALL WOODY DEBRIS (%)	50	25	9
LARGE WOODY DEBRIS (%)	0	0	2
ROOT MASS (%)	0	0	7
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	50	50	7
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	4
BEDROCK LEDGES (%)	0	0	38

SEELY CREEK 2017 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

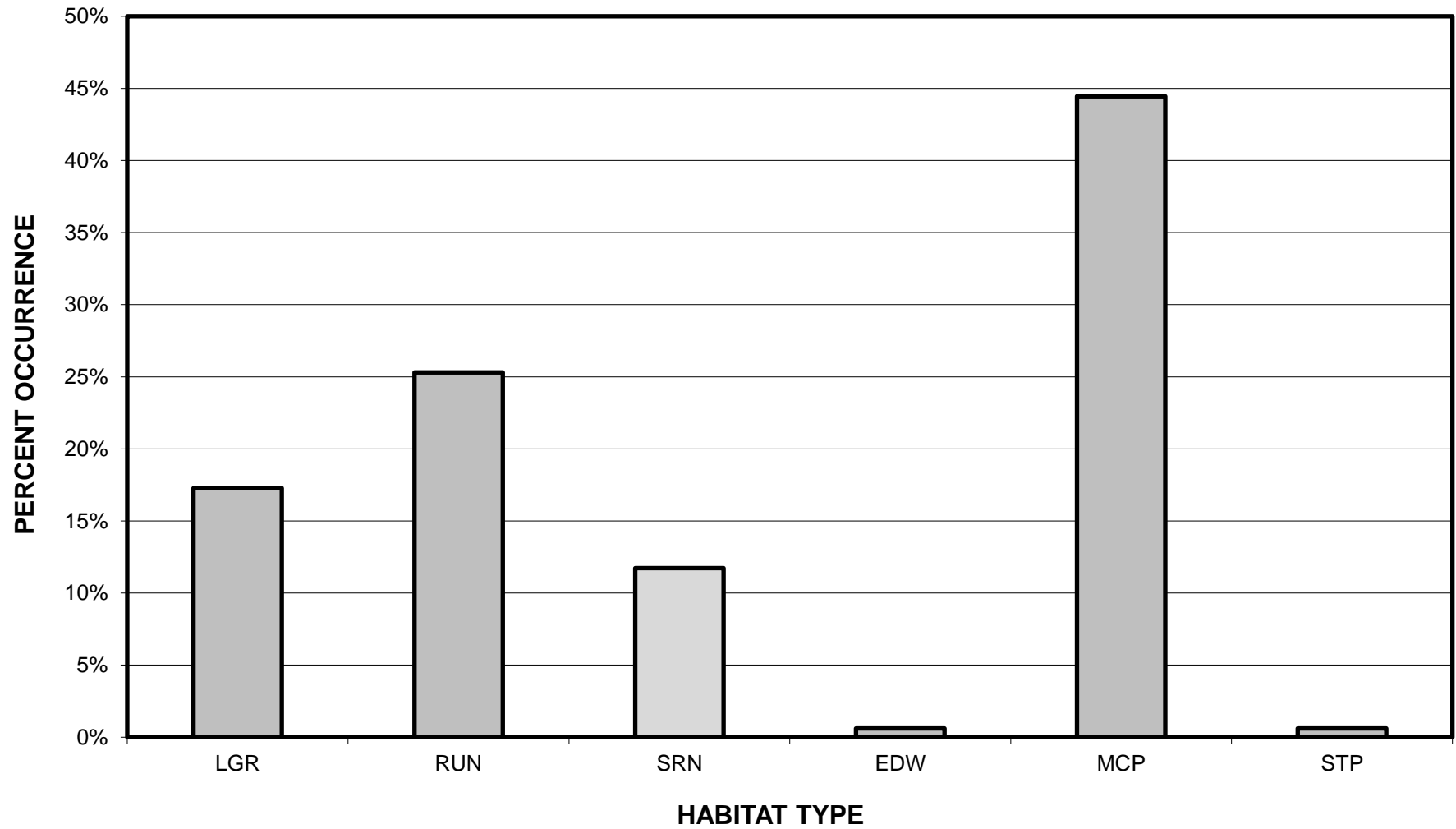
**SEELY CREEK 2017
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

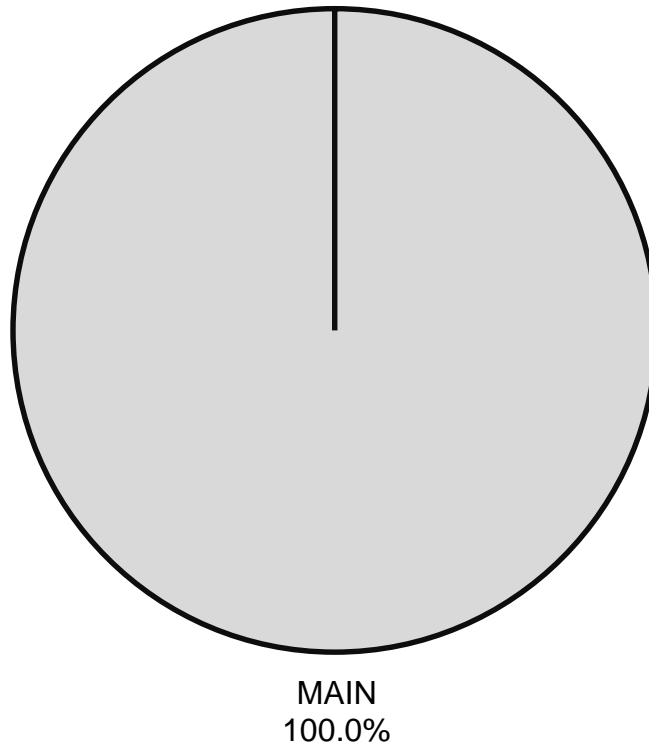
SEELY CREEK 2017

HABITAT TYPES BY PERCENT OCCURRENCE



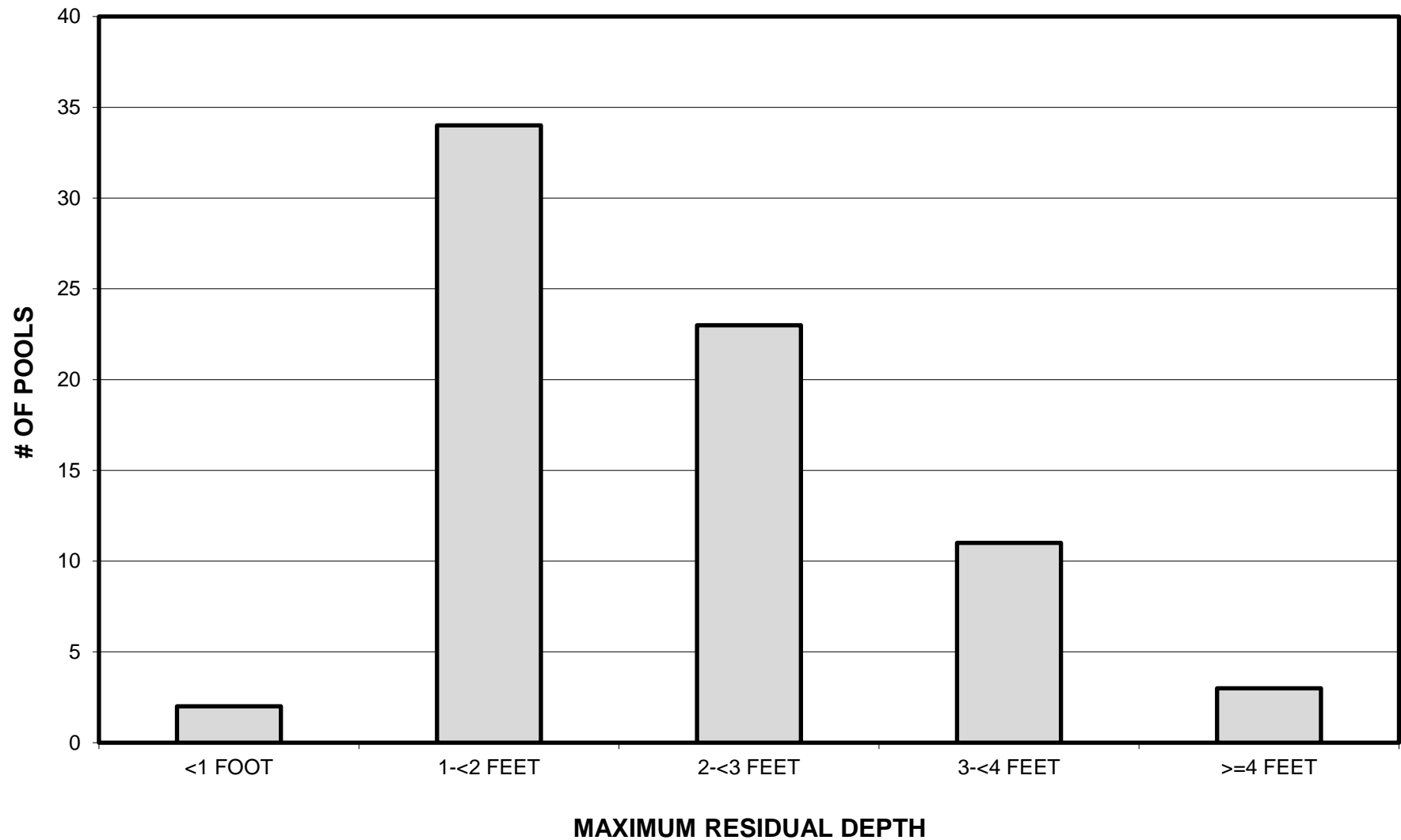
GRAPH 3

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



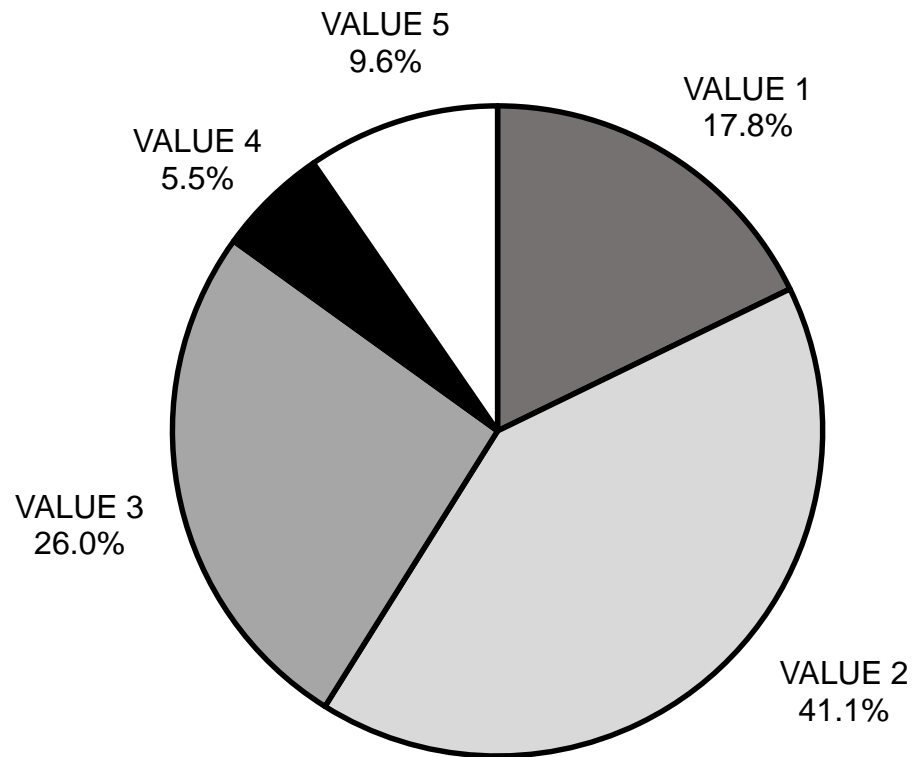
GRAPH 4

**SEELY CREEK 2017
MAXIMUM DEPTH IN POOLS**



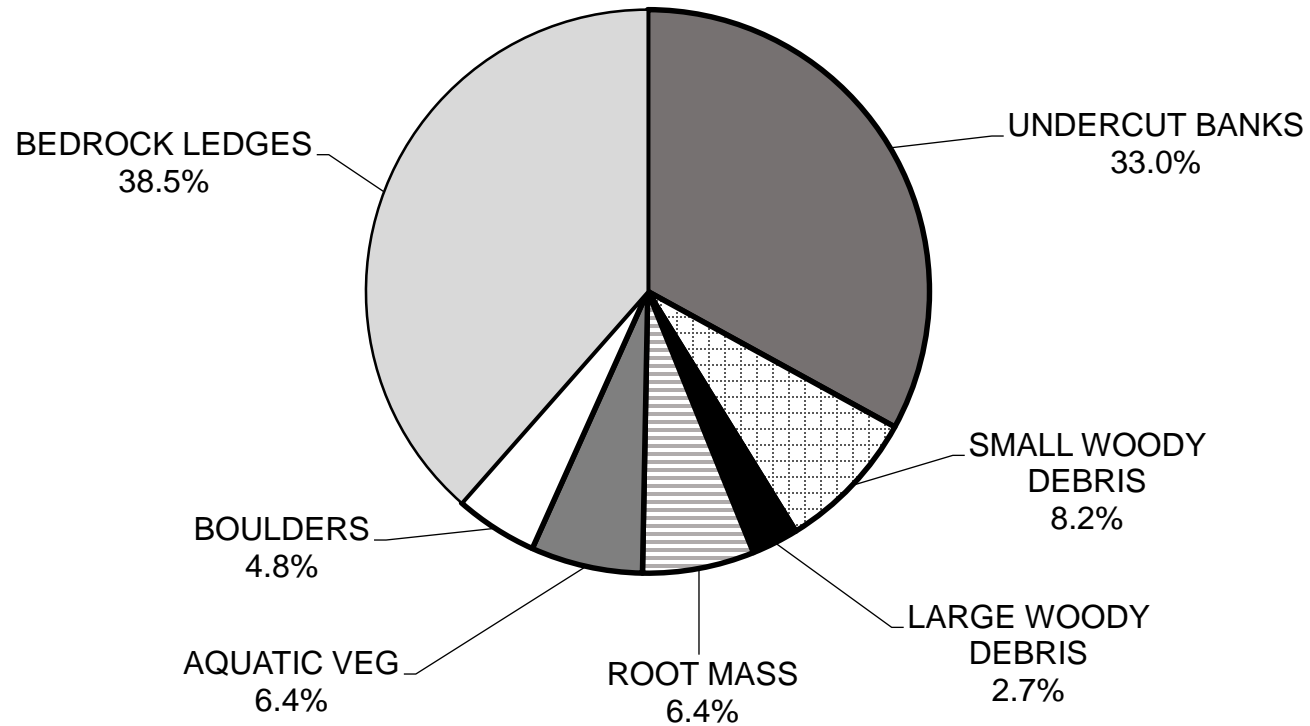
GRAPH 5

SEELY CREEK 2017 PERCENT EMBEDDEDNESS



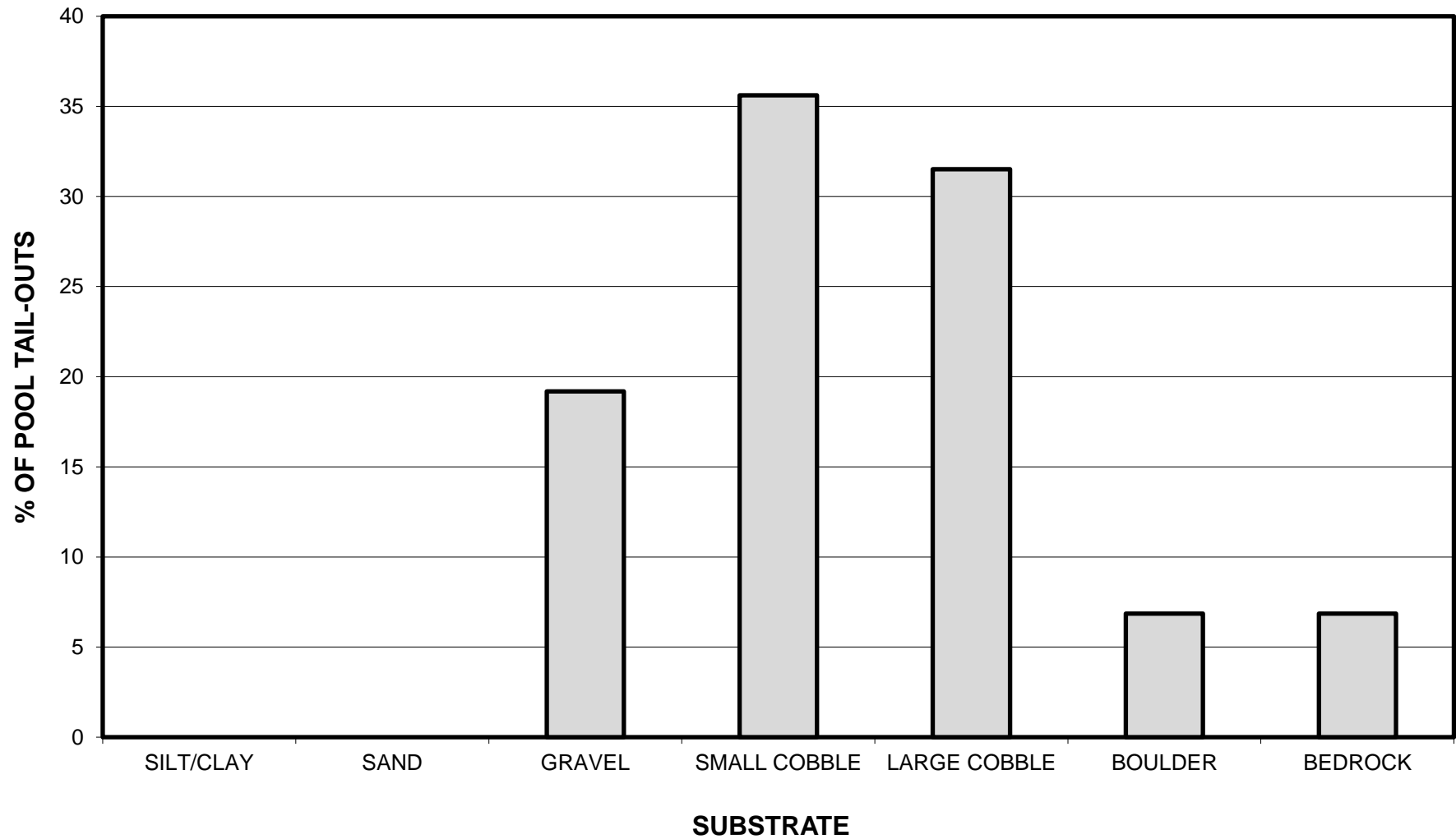
GRAPH 6

SEELY CREEK 2017 MEAN PERCENT COVER TYPES IN POOLS



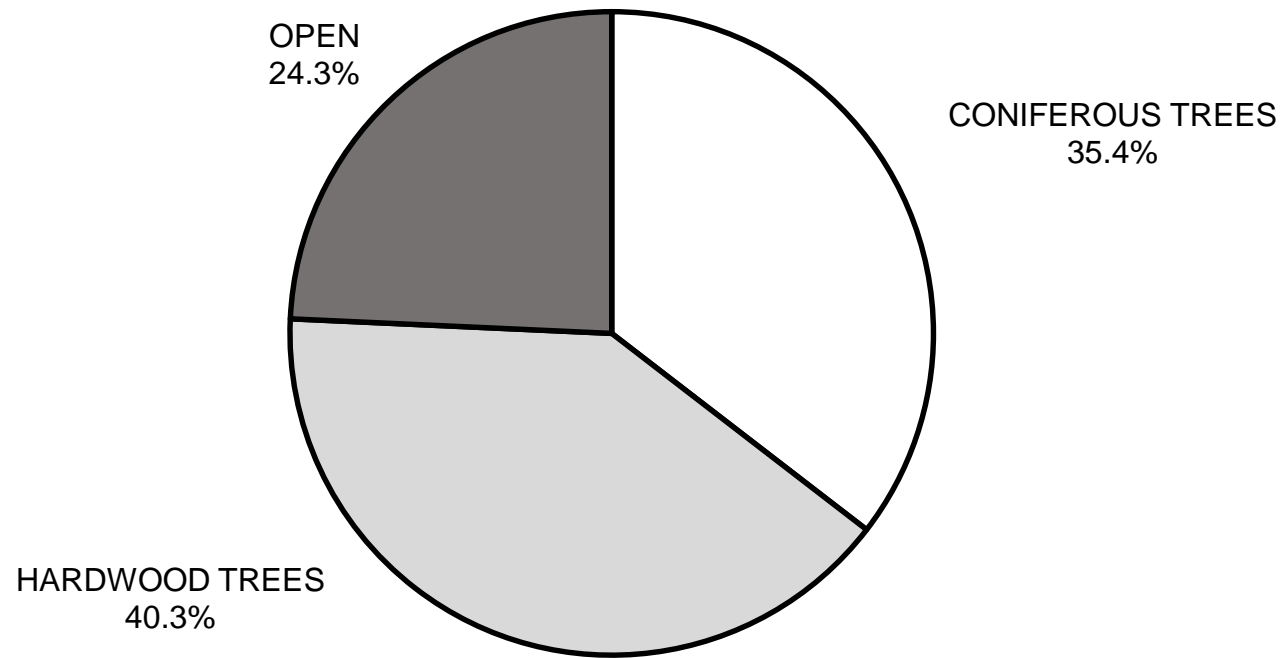
GRAPH 7

SEELY CREEK 2017
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



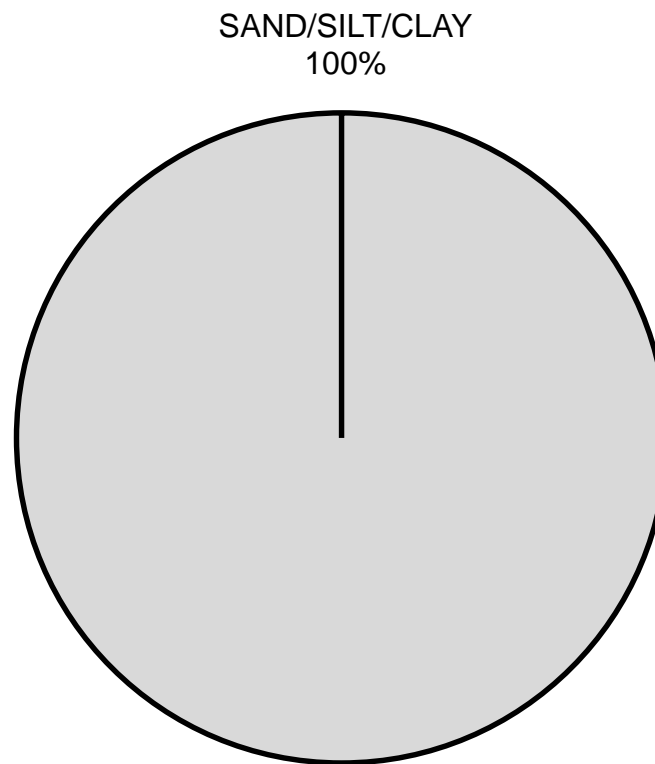
GRAPH 8

**SEELY CREEK 2017
MEAN PERCENT CANOPY**



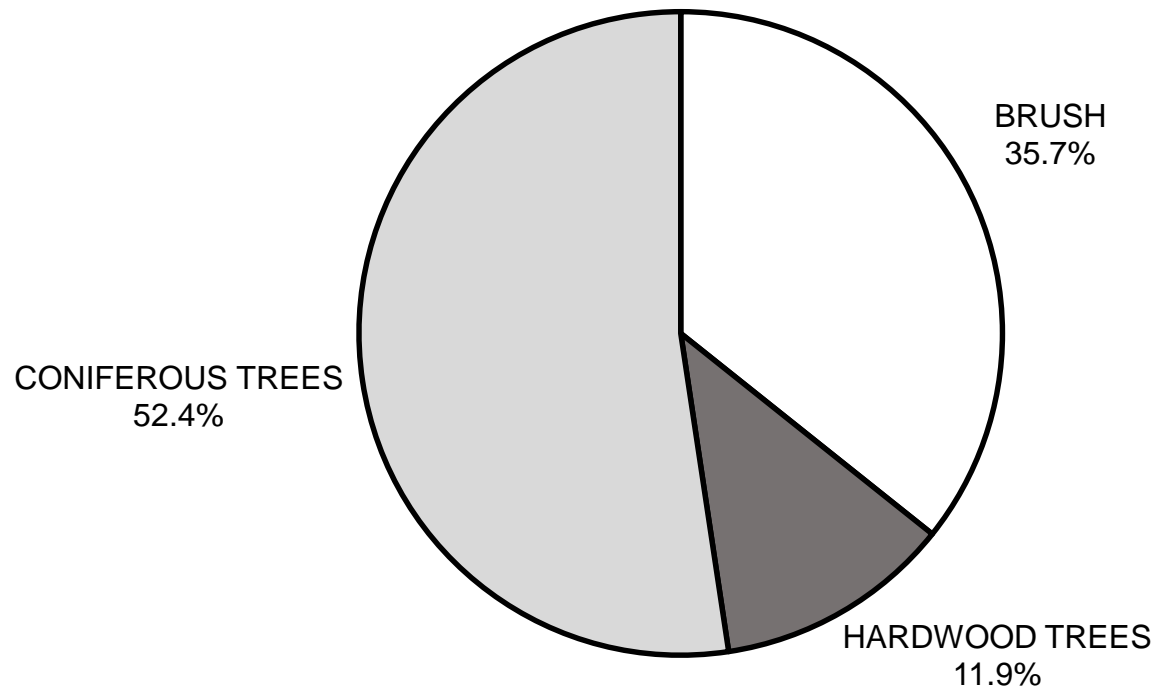
GRAPH 9

SEELY CREEK 2017
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

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



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS



Photo 1: End of survey at habitat unit #162, 9,030' upstream of the start of survey. (Photo taken 7/30/17)