



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Jones Creek

INTRODUCTION

A stream inventory was conducted from July 10 to July 12, 2017 on Jones Creek. The survey began at the confluence with Indian Creek and extended upstream 1.7 miles.

The Jones 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 Jones 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

Jones Creek, located in northern Mendocino County, is a tributary to Indian 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). Jones Creek's legal description at the confluence with Indian Creek is T05S R03E S27. Its location is 39.9866° north latitude and 123.8288° west longitude, LLID number 1238289399866. Jones Creek is a first order stream and has approximately 1.3 miles of blue line stream according to the USGS Piercy 7.5 minute quadrangle. Jones Creek drains a watershed of approximately 2.4 square miles. Elevations range from about 550 feet at the mouth of the creek to 1,600 feet in the headwater areas. Redwood, Douglas fir forest, and grassland dominate the watershed. The watershed is privately owned and is managed for timber production and rangeland. Vehicle access exists from U.S. Highway 101 at Piercy, via State Highway 271.

METHODS

The habitat inventory conducted in Jones 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 Jones 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". Jones 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 Jones 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 Jones 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Jones 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 Jones 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 Jones Creek. 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 Jones 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 10 to July 12, 2017, was conducted by Ryan Bernstein (CDFW), Angela Cruz, and Sidney Stewart (WSP). The total length of the stream surveyed was 9,112 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.23 cfs on July 17, 2017.

Jones Creek is a G4 channel type for 4,767 feet of the stream surveyed (Reach 1), and an F4 channel type for 4,345 feet of the stream surveyed (Reach 2). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width /depth ratios, very stable with gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 58° to 64° Fahrenheit. Air temperatures ranged from 60° to 64° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 40% pool units, 35% flatwater units 23% riffle units, 1% dry units, 1% no-survey units (Graph 1). Based on total length of Level II habitat types there were 61% flatwater units, 25% pool units, 11% riffle units, 3% dry units 1% no-survey units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units 39%; step run units, 23%; and low gradient riffle units, 22% (Graph 3). Based on percent total length, step run units made up 50%, mid-channel pool units, 24%, and run units 11%.

A total of 69 pools were identified (Table 3). Main channel pools were the most frequently encountered at 97% (Graph 4), and comprised 97% 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-one of the 69 pools (45%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 69 pool tail-outs measured, 17 had a value of 1 (24.6%); 25 had a value of 2 (36.2%); 17 had a value of 3 (24.6%); 10 had a value of 5 (14.5%) (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 10, flatwater habitat types had a mean shelter rating of 18, and pool habitats had a mean shelter rating of 29 (Table 1). Of the pool types, scour pools had the highest mean shelter rating at 65, and main channel pools had a mean shelter rating of 27 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Jones Creek. Graph 7 describes the pool cover in Jones Creek. 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 most dominant substrate type, observed in 49% of pool tail-outs. Small cobble was the next most frequently observed dominant substrate observed in 22% of pool tail-outs.

The mean percent canopy density for the surveyed length of Jones Creek was 92%. Eight percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 44% and 56%, respectively. Graph 9 describes the mean percent canopy in Jones 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 93% sand/silt/clay, 5% cobble/gravel, 2% bedrock (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 as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at 11 sites for species composition and distribution in Jones Creek on July 24, 2017. The sites were sampled by Ryan Bernstein (CDFW) and Rachel Karlov (WSP).

In Reach 1, which comprised the first 4,703 feet of stream, one site was sampled. The reach sites yielded 57 young-of-the-year (YOY) steelhead (SH), and three age 1+ SH.

In Reach 2, one site was sampled starting approximately 4,757 from the confluence with Indian Creek and continuing upstream 8,114 feet. The reach site yielded three YOY SH.

During the survey, the upstream-most observation of juvenile steelhead occurred at 40.0027° north latitude and -123.8423° west longitude, approximately 8,114 feet upstream from the

confluence with Indian Creek. No coho salmon were observed during the biological or habitat inventory.

Table A. Summary of results for a fish composition and distribution survey within Jones Creek, July 24, 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+	
Reach 1: G4 Channel Type										
07/24/17	1	005	Pool	419	12	3	0	0	0	
	2	007	Pool	571	19	8	0	0	0	
	3	009	Pool	704	6	4	0	0	0	
	4	012	Pool	806	0	6	0	0	0	
	5	014	Pool	973	17	3	0	0	0	
	6	016	Pool	1,138	3	3	0	0	0	
	7	018	Pool	1,183	7	11	0	0	0	
	8	023	Pool	1,356	19	2	0	0	0	
	9	025	Pool	1,426	3	3	0	0	0	
	10	027	Pool	1,512	3	14	3	0	0	
Reach 2: F4 Channel Type										
07/24/17	11	157	Pool	8,114	3	0	0	0	0	

DISCUSSION

Jones Creek is a G4 channel type for the first 4,767 feet of stream surveyed (Reach 1) and a F4 channel type for the next 4,345 feet (Reach 2). The suitability of G4 and F4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover. F4 channel types 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 10 to July 12, 2017 ranged from 58° to 64° Fahrenheit. Air temperatures ranged from 60° to 64° 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 61% of the total length of this survey, riffles 11%, and pools 25%. Thirty-one of the 69 (45%) 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-two of the 69 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen 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 Jones Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Forty-nine of the 69 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 29. The shelter rating in the flatwater habitats is 18. 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 Jones Creek. Small woody debris is 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 92%. Reach 1 had a canopy density of 89% and Reach 2 had a canopy density of 95%. The percentage of right and left bank covered with vegetation were both 100%.

RECOMMENDATIONS

Jones 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 Jones 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) Due to the culvert located at 8,077 feet, access for migrating salmonids is an ongoing potential problem. A fish passage assessment should be conducted at this site. If the assessment finds the culvert to be a barrier to fish passage, it should be replaced with a structure that provides unimpeded fish passage. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish.
- 3) The limited water temperature data available suggest that maximum temperatures are near 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.

- 4) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with Indian Creek.
352	0005.00	The creek is out of the influence of the confluence with Indian Creek.
551	0008.00	Channel type is a G4. Channel type cross-section location is at habitat unit (HU) #008
638	0009.00	Young-of-the-year (YOY) observed.
1917	0034.00	Tributary #1 enters on the left bank.
2324	0046.00	Log debris accumulation (LDA) #1 is 3' high x 16' wide x 28' long, and contains 5 pieces of large wood debris (LWD). Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 11' wide x 2' long x and 2' deep. The sediment ranges in size from silt to boulder. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
2367	0047.00	There is a 2.5' plunge over wood into a 2.9' pool at the top of this unit. It is not a barrier to salmonids.
3490	0075.00	Tributary #2 enters on the left bank.
4713	0090.00	Tributary #3 enters on the left bank.
4767	0091.00	Culvert #1 is an unnamed road, and is 6' high x 7' wide x 20' long. It is composed of 1 culvert, and is made of CMP. The culvert's diameter is 10'. The slope is <1% and its condition is good. It is not a possible barrier to juvenile and adult salmonids. There are two large logs with wire around them on top of the culvert.
6574	0126.00	Tributary #4 enters on the left bank.

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6956	0134.00	LDA #2 is 4.5' high, 12' wide, 40' long and contains 8 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, 18' long and 2' deep. The sediment ranges in size from silt to boulders. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
7002	0135.00	Tributary #5 enters on the right bank.
7343	0145.00	There is a 1' plunge over wood into a 2.9' pool at the top of this unit. It is not a barrier to salmonids.
7754	0149.00	Landslide makes creek unsurveyable
7819	0150.00	Tributary #6 enters on the right bank.
8077	0157.00	Culvert #2 is an unnamed road, and is 6.5' high x 7' wide x 23' long. It is composed of 1 culvert, and is made of CMP. The culvert's diameter is 7', its plunge height is 4', and it has a maximum depth of 3.1' within 5' of the outlet. The slope is 1%, and its condition is good. It is a possible barrier to juvenile and adult salmonids. Rip-rap leads up to the culvert.
8891	0170.00	LDA #3 is 5.8' high, 14' wide, 23' long and contains 2 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 13' wide, 16' long and 2' deep. The sediment ranges in size from silt to boulders. The LDA is a possible barrier to juvenile salmonids as the channel becomes dry above it. Fish were not observed above the LDA.
8912	0171.00	End of survey due to dry channel. The creek runs dry for an indefinite distance upstream of LDA #3. The last fish was seen at HU#157 at the base of culvert #2. The culvert could be a barrier to juvenile salmonids, but adults may swim through during high flows. Rip rap immediately downstream of culvert may make downstream passage challenging.

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

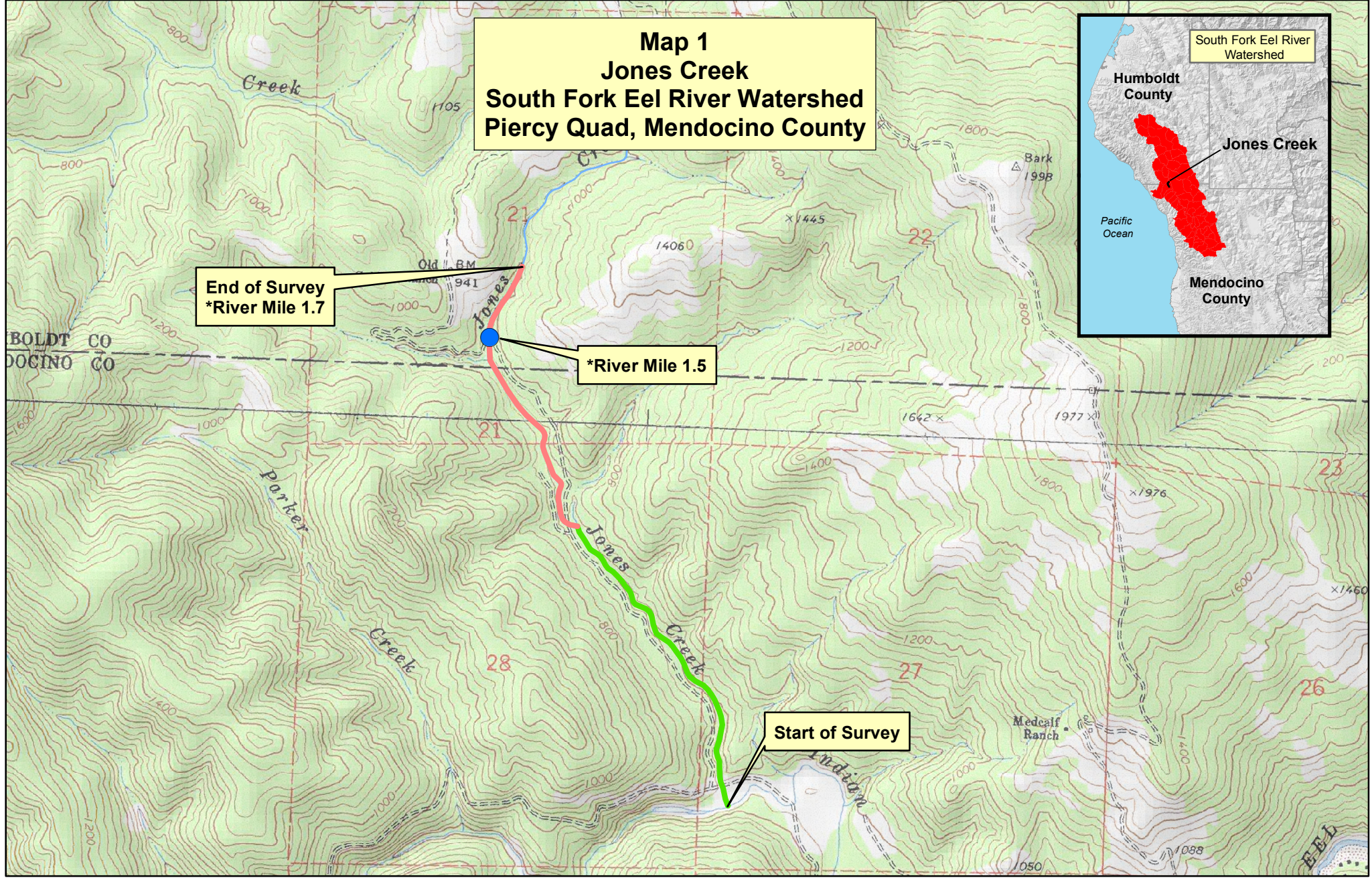
Corner Pool	(CRP)	[5.1]	{ 22 }
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{ 10 }
Lateral Scour Pool - Rootwad Enhanced	(LSR)	[5.3]	{ 11 }
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{ 12 }
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{ 20 }
Plunge Pool	(PLP)	[5.6]	{ 9 }

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: Channel Type G4
- Reach 2: Channel Type F4
- Last observed juvenile steelhead trout



Coordinate System: NAD 1983 California Teale Albers
Data Sources: CDFW, USGS, CalWater 2.21, CDF 24k
*River Mile indicates distance from confluence with Indian Creek

APPENDIX I

TABLES AND GRAPHS

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

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
2	0	DRY	1.2	115	230	2.5									
60	5	FLATWATER	35.1	93	5579	61.2	11.2	0.4	0.8	687	41204	277	16631		18
1	0	NOSURVEY	0.6	65	65	0.7									
69	69	POOL	40.4	33	2272	24.9	11.8	0.8	1.9	391	27003	421	29041	349	29
39	3	RIFFLE	22.8	25	966	10.6	12.3	0.3	0.6	423	16505	145	5641		10
Total Units	Total Units Fully Measured			Total Length (ft.)						Total Area (sq.ft.)		Total Volume (cu.ft.)			
171	77			9112						84712		51312			

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
37	2	LGR	21.6	24	873	9.6	11	0.2	0.5	185	6838	37	1368		10	100
2	1	HGR	1.2	46	93	1.0	15	0.4	0.9	900	1800	360	720			100
21	3	RUN	12.3	50	1041	11.4	11	0.5	0.9	657	13797	304	6376		20	100
39	2	SRN	22.8	116	4538	49.8	12	0.4	0.8	731	28523	238	9264		15	100
67	67	MCP	39.2	33	2211	24.3	12	0.8	5.3	387	25930	413	27688	343	27	91
2	2	PLP	1.2	30	61	0.7	18	1.1	2.7	537	1073	676	1352	569	65	83
2	0	DRY	1.2	115	230	2.5										
1	0	NS	0.6	65	65	0.7										

Total Units
171

Total Units Fully Measured
77

Total Length (ft.)
9112

Total Area (sq.ft.)
77960

Total Volume (cu.ft.)
46768

Stream Name: Jones Creek LLID: 1238289399866 Drainage: Eel River - South Fork
Survey Dates: 7/10/2017 to 7/12/2017
Confluence Location: Quad: PIERCY Legal Description: T05SR03ES27 Latitude: 39:59:12.0N Longitude: 123:49:44.0W

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
69	69	2272	27003	24091

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

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
67	MCP	97	4	6	34	51	22	33	5	7	2	3
2	PLP	3	0	0	0	0	2	100	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
69	4	6	34	49	24	35	5	7	2	3

Mean Maximum Residual Pool Depth (ft.): 1.9

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Jones Creek

LLID: 1238289399866 Drainage: Eel River-South Fork

Survey Dates: 7/10/2017 to 7/12/2017 Dry Units: 2

Confluence Location: Quad: PIERCY Legal Description: T05SR03ES27 Latitude: 39:59:12.0N Longitude: 123:49:44.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
37	1	LGR	0	0	0	0	0	0	0	100	0
2	0	HGR	0	0	0	0	0	0	0	0	0
39	1	TOTAL RIFFLE	0	0	0	0	0	0	0	100	0
21	2	RUN	0	0	0	0	0	0	0	100	0
39	2	SRN	0	0	0	0	0	0	0	100	0
60	4	TOTAL FLAT	0	0	0	0	0	0	0	100	0
67	63	MCP	23	55	4	1	0	0	0	14	3
2	2	PLP	0	75	0	0	0	0	20	5	0
69	65	TOTAL POOL	23	54	4	1	0	0	1	14	3
1	0	NS	23	54	4	1	0	0	1	14	3
171	70	TOTAL	23	54	4	1	0	0	1	14	3

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Dry Units: 2

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
37	2	LGR	0	0	0	0	50	50	0
2	1	HGR	0	0	0	0	0	100	0
21	2	RUN	0	0	0	100	0	0	0
39	2	SRN	0	0	0	0	100	0	0
67	67	MCP	0	0	54	19	12	13	1
2	2	PLP	0	0	50	0	0	50	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
92	56	44	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: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Survey Length (ft.): 9112

Main Channel (ft.): 9112

Side Channel (ft.): 0

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27 Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

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

Channel Type: G4	Canopy Density (%): 89.4	Pools by Stream Length (%): 25.4
Reach Length (ft.): 4767	Coniferous Component (%): 63.4	Pool Frequency (%): 43.3
Riffle/Flatwater Mean Width (ft.): 12.3	Hardwood Component (%): 36.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 72
Range (ft.): 19 to 27	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 23
Mean (ft.): 23	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 3
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 3
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 0	Mean Max Residual Pool Depth (ft.): 1.7
Water (F): 58 - 60 Air (F): 60 - 63	LWD per 100 ft.:	Mean Pool Shelter Rating: 27
Dry Channel (ft): 0	Riffles: 0	
	Pools: 3	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 33 Sm Cobble: 15 Lg Cobble: 26 Boulder: 23 Bedrock: 3		
Embeddedness Values (%): 1. 17.9 2. 23.1 3. 33.3 4. 0.0 5. 25.6		

STREAM REACH: 2

Channel Type: F4	Canopy Density (%): 95.0	Pools by Stream Length (%): 24.4
Reach Length (ft.): 4345	Coniferous Component (%): 45.0	Pool Frequency (%): 37.0
Riffle/Flatwater Mean Width (ft.): 9.5	Hardwood Component (%): 55.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 33
Range (ft.): 13 to 21	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 50
Mean (ft.): 18	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 13
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 3
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 10	Mean Max Residual Pool Depth (ft.): 2.2
Water (F): 59 - 64 Air (F): 60 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 30
Dry Channel (ft): 230	Riffles: 1	
	Pools: 5	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 70 Sm Cobble: 30 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 33.3 2. 53.3 3. 13.3 4. 0.0 5. 0.0		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Jones Creek

LLID: 1238289399866

Drainage: Eel River - South Fork

Survey Dates: 7/10/2017 to 7/12/2017

Confluence Location: Quad: PIERCY

Legal Description: T05SR03ES27

Latitude: 39:59:12.0N

Longitude: 123:49:44.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	2	1	1.9
Boulder	0	0	0.0
Cobble / Gravel	1	7	5.2
Sand / Silt / Clay	74	69	92.9

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	28	31	38.3
Coniferous Trees	49	46	61.7
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Jones Creek

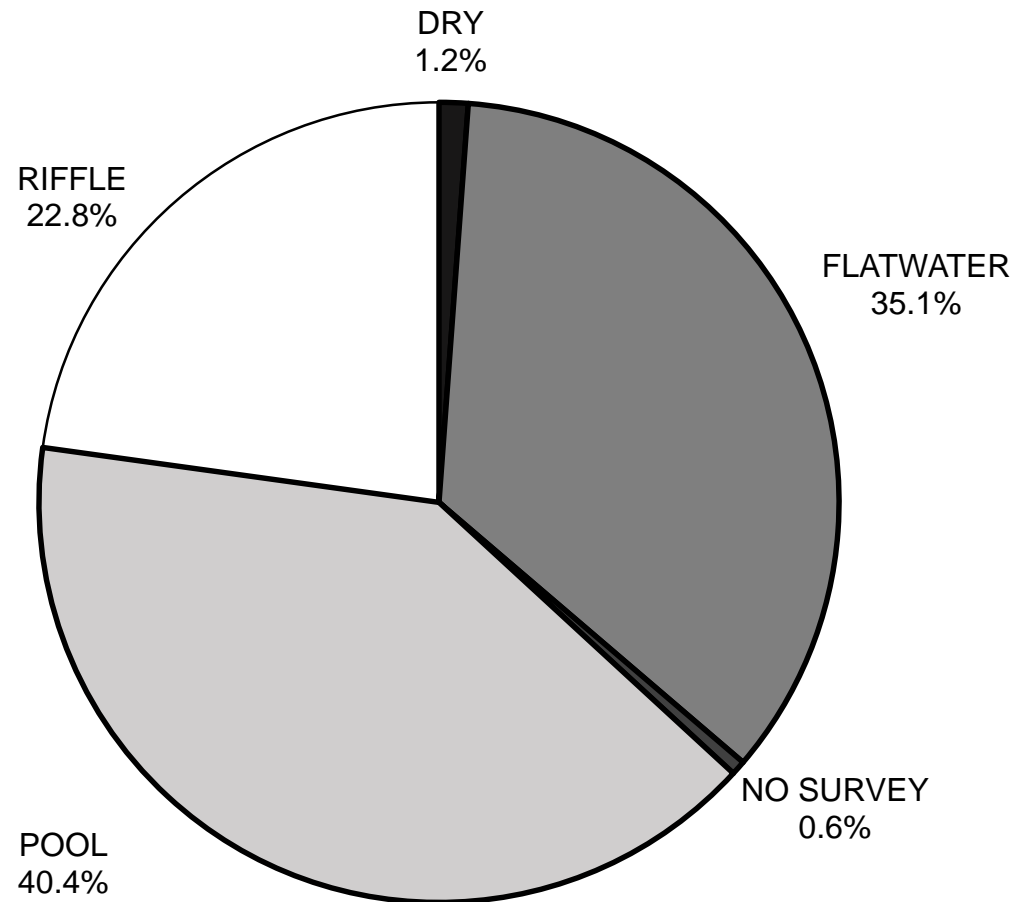
LLID: 1238289399866 Drainage: Eel River-South Fork

Survey Dates: 8/28/2017 to 8/29/2017

Confluence Location: Quad: Briceland Legal Description: T04SR02ES12 Latitude: 40:07:17.0N Longitude: 123:54:54.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	23
SMALL WOODY DEBRIS (%)	0	0	54
LARGE WOODY DEBRIS (%)	0	0	4
ROOT MASS (%)	0	0	1
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	1
BOULDERS (%)	100	100	14
BEDROCK LEDGES (%)	0	0	3

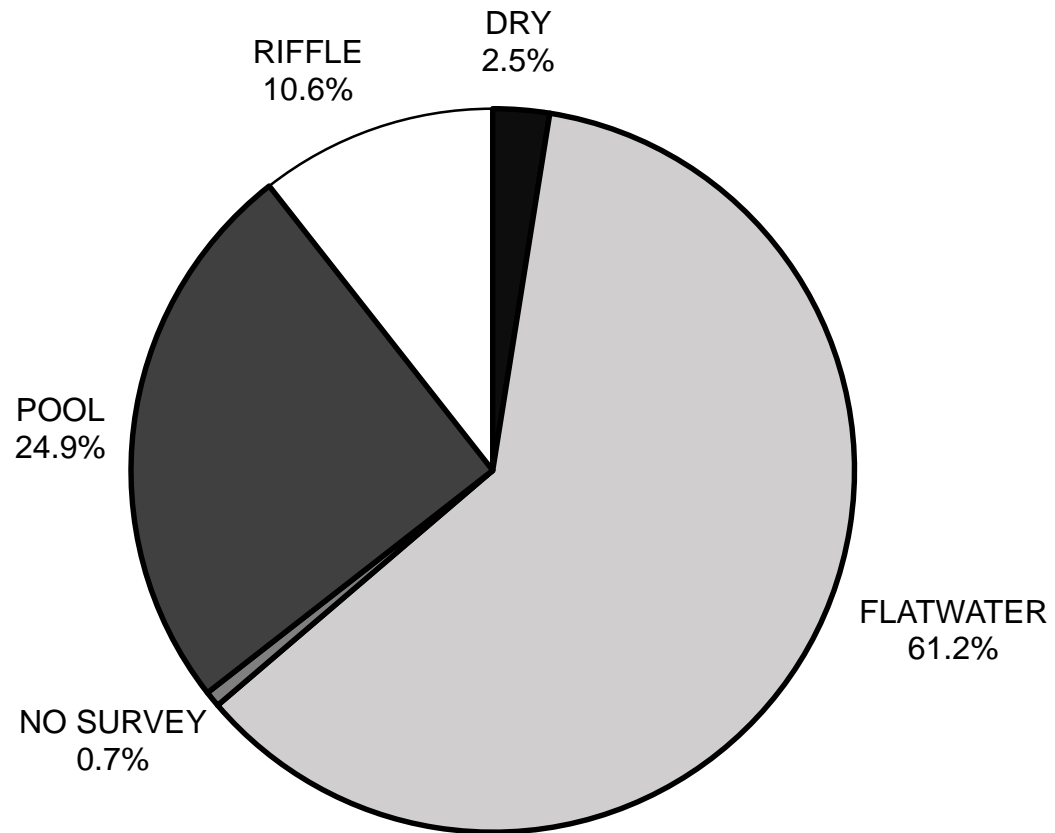
JONES CREEK 2017 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

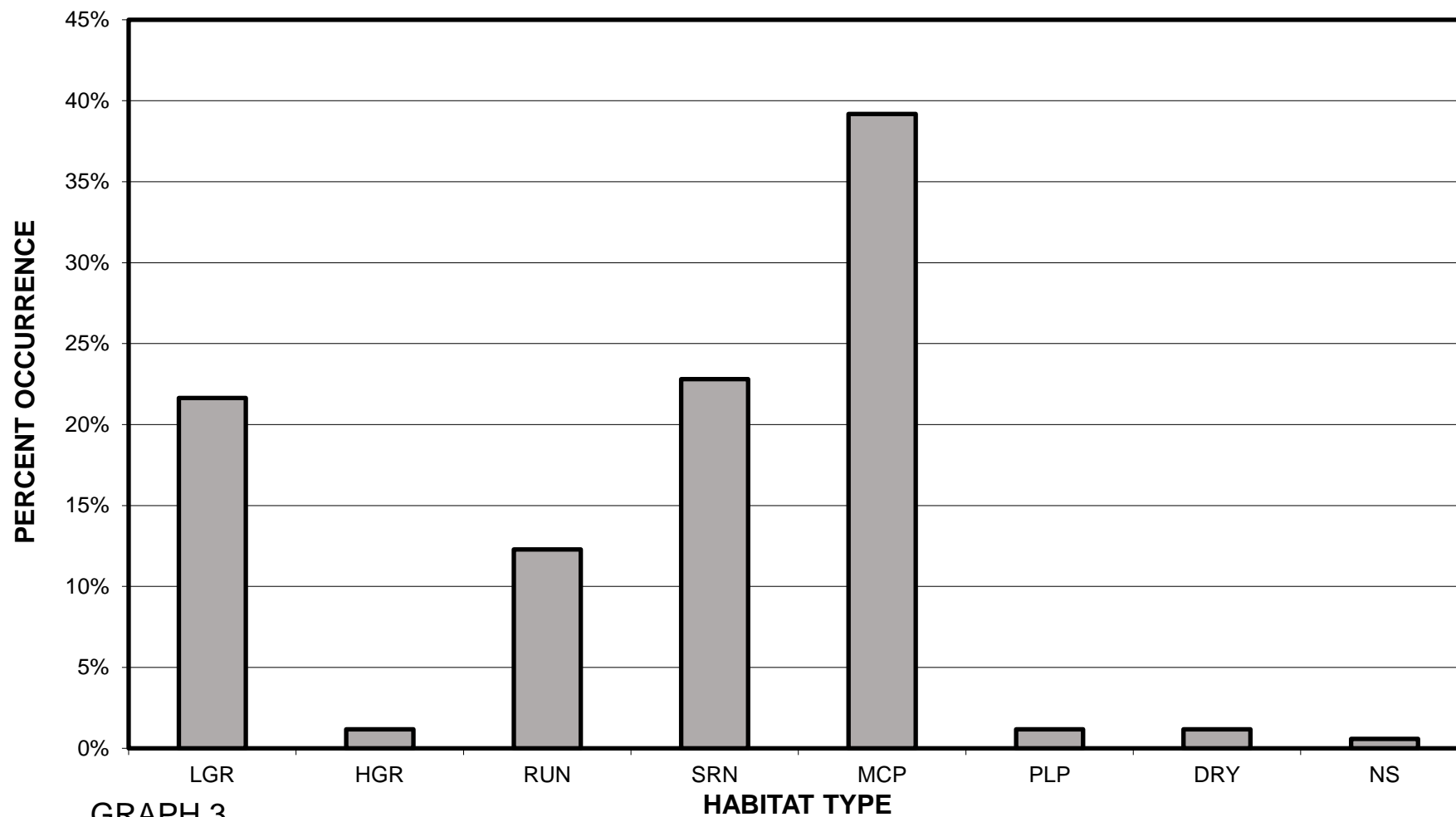
JONES CREEK 2017

HABITAT TYPES BY PERCENT TOTAL LENGTH



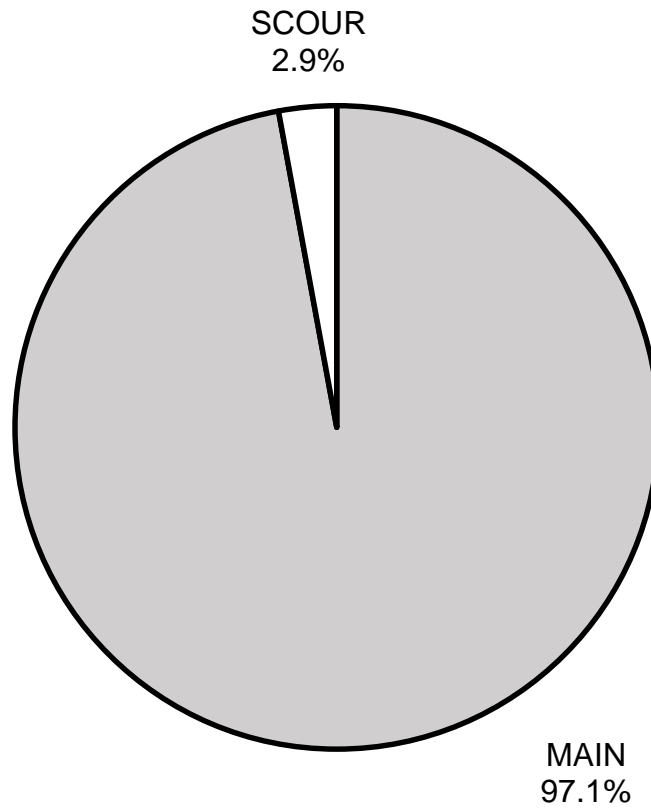
GRAPH 2

JONES CREEK 2017 **HABITAT TYPES BY PERCENT OCCURRENCE**



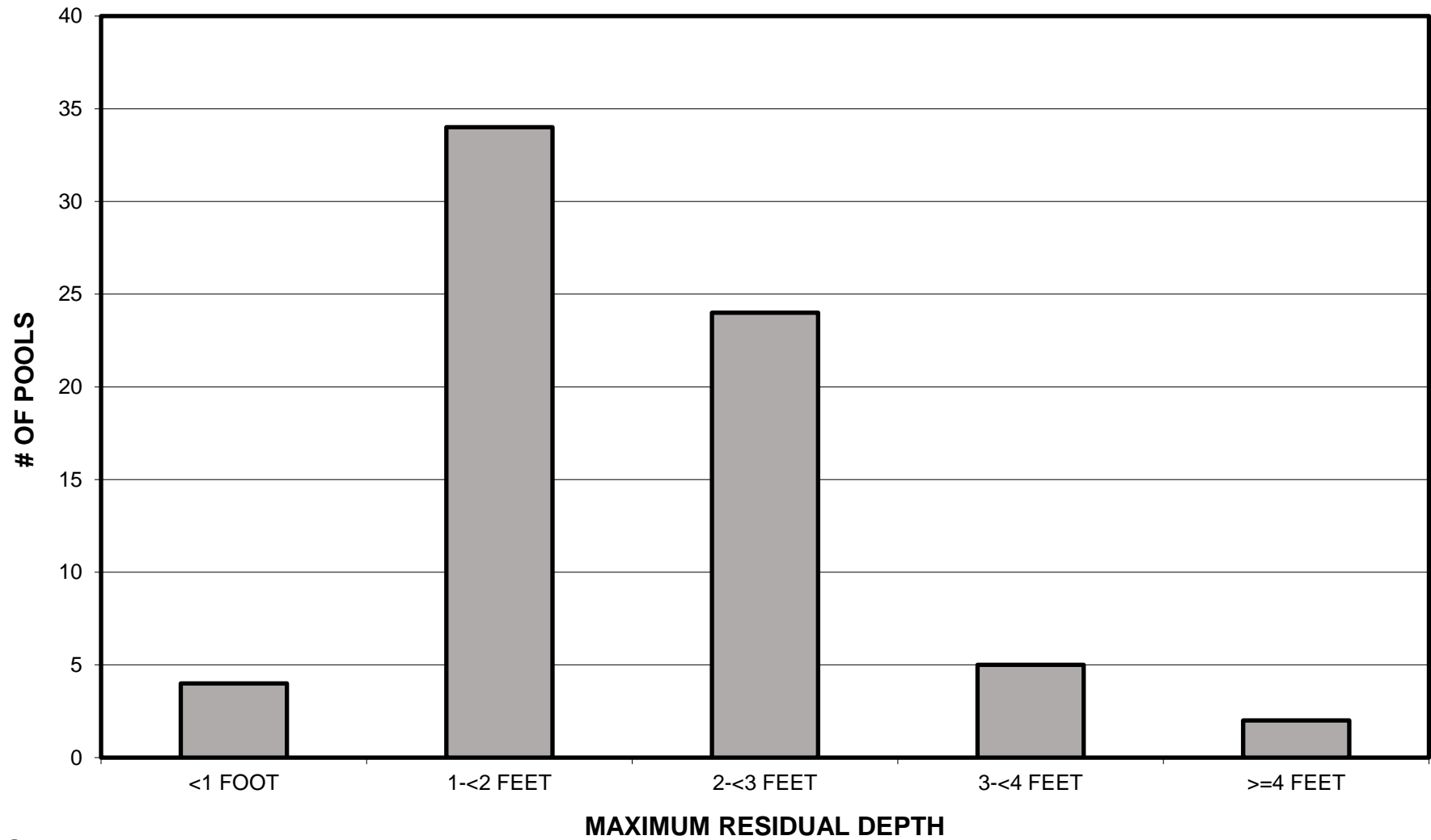
GRAPH 3

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



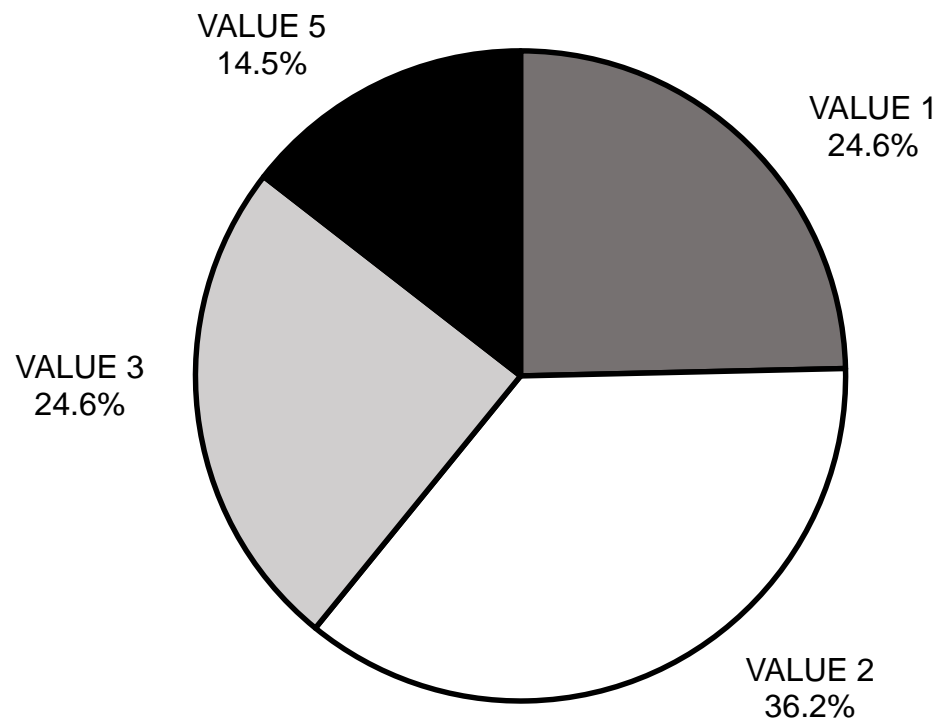
GRAPH 4

JONES CREEK 2017 MAXIMUM DEPTH IN POOLS

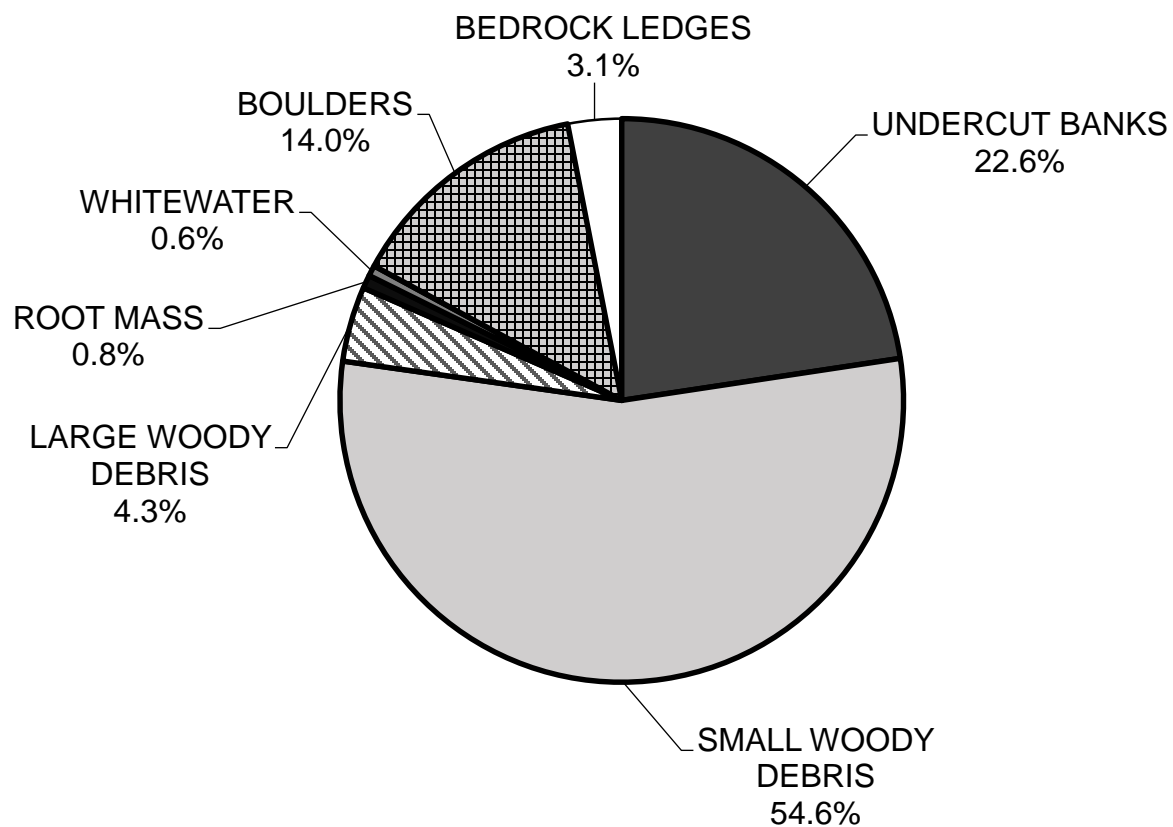


GRAPH 5

JONES CREEK 2017 PERCENT EMBEDDEDNESS

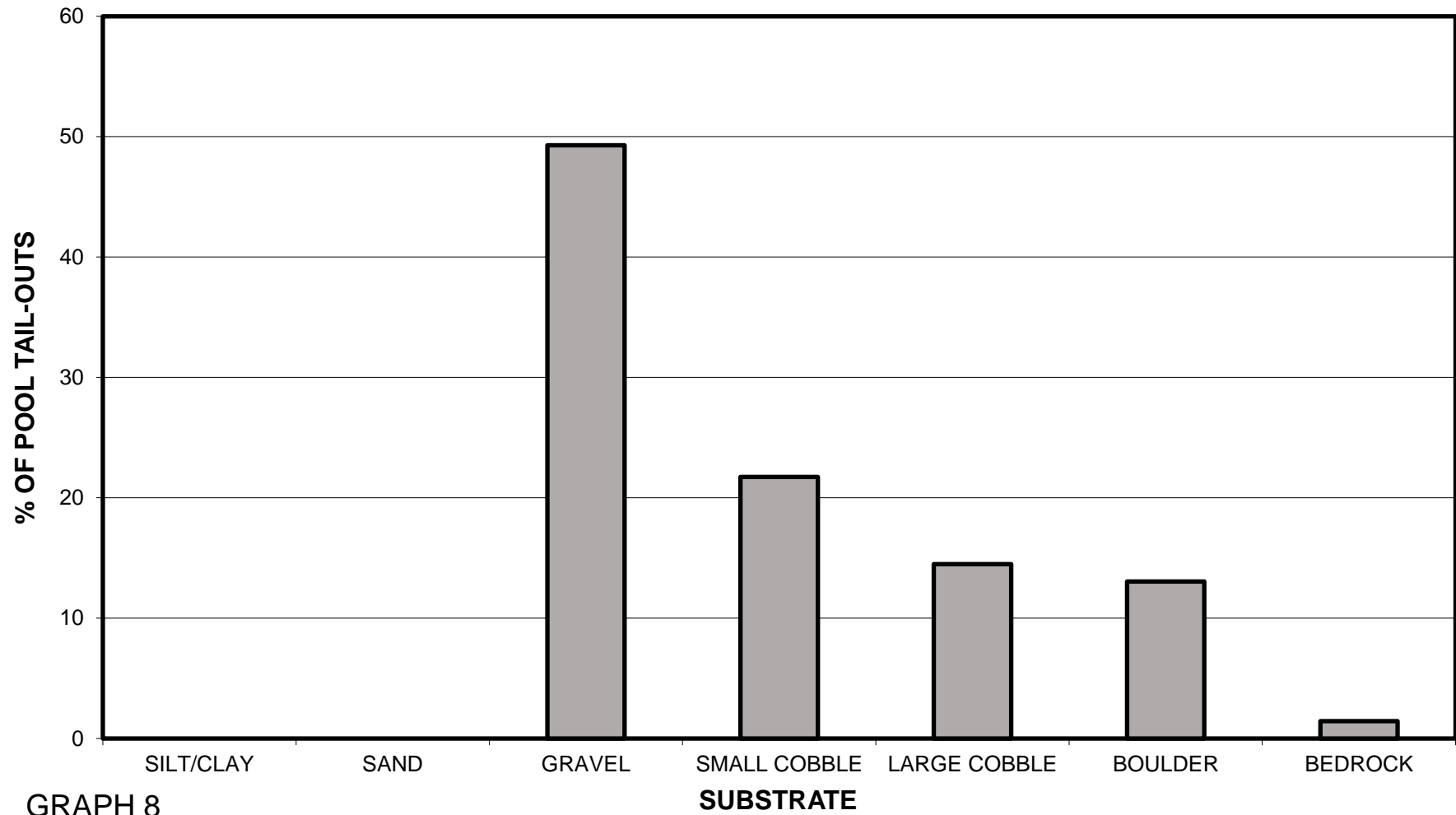


JONES CREEK 2017 MEAN PERCENT COVER TYPES IN POOLS



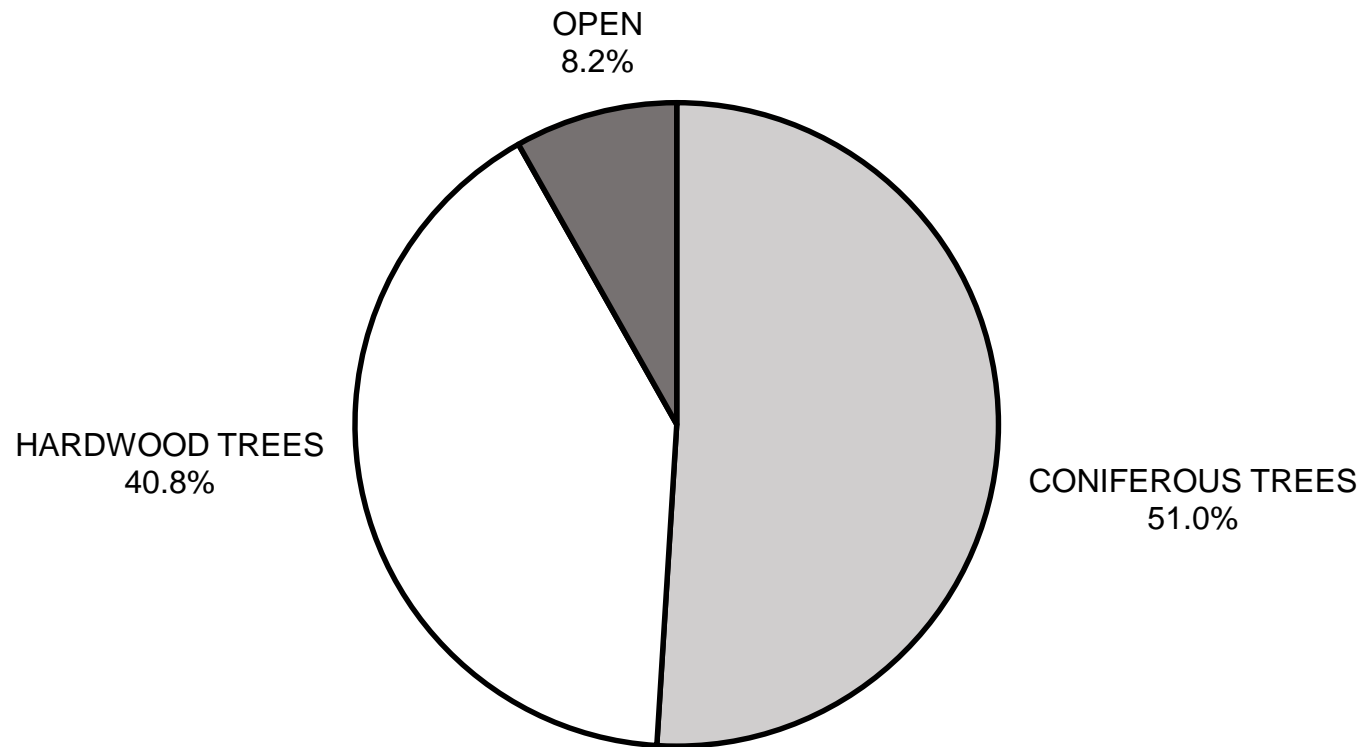
GRAPH 7

JONES CREEK 2017 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



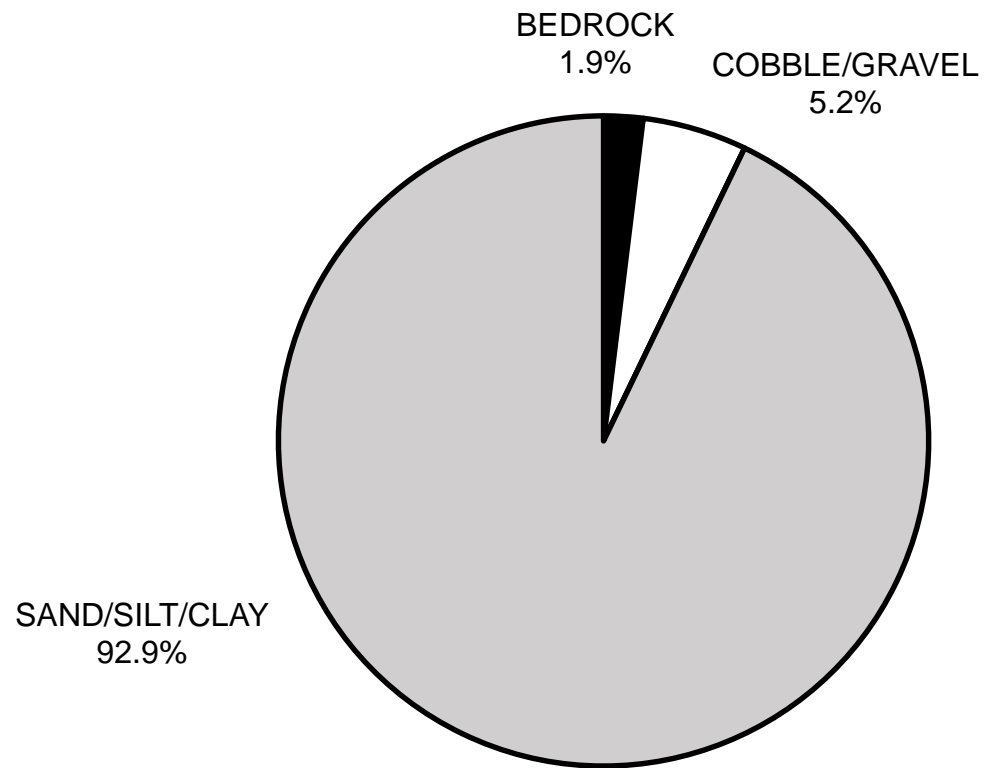
GRAPH 8

**JONES CREEK 2017
MEAN PERCENT CANOPY**

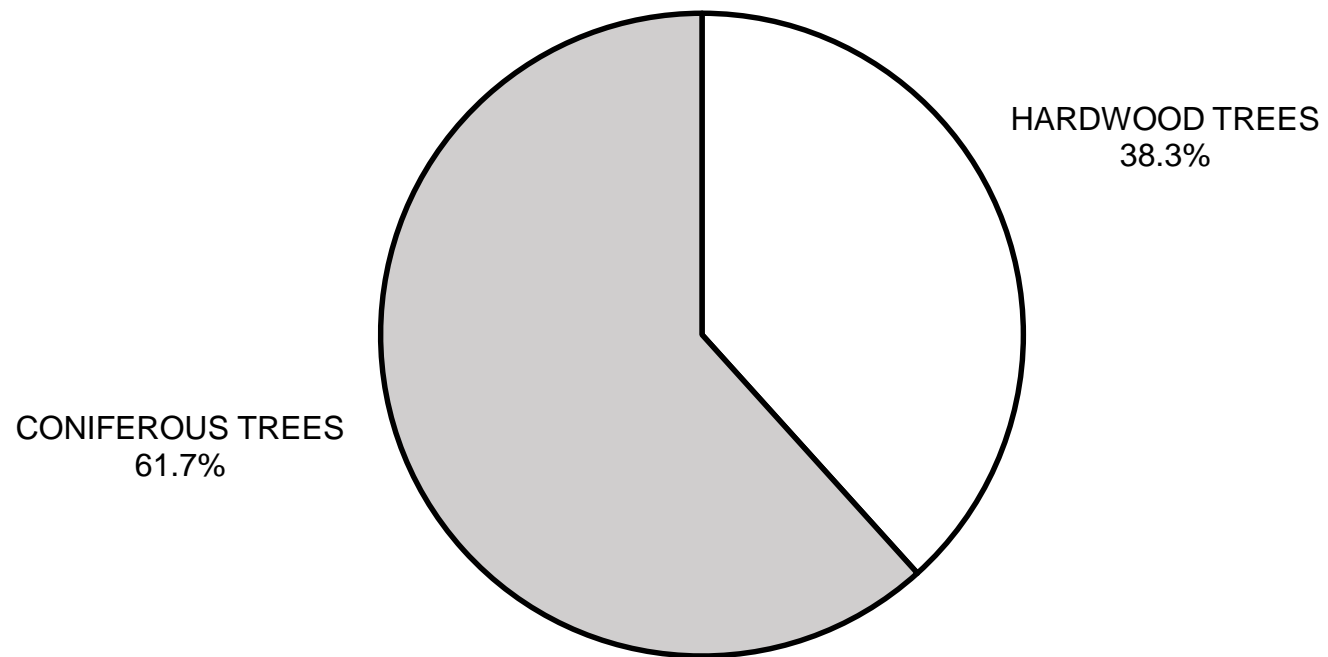


GRAPH 9

**JONES CREEK 2017
DOMINANT BANK COMPOSITION IN SURVEY REACH**



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



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS



Photo 1: Culvert #1 under log bridge at habitat unit #091, 4,900' upstream from start of survey (Photo taken 7/11/17).



Photo 2: Run unit at habitat unit #101, 5,393' upstream from start of survey. Pictured: Angela Cruz. (Photo taken 7/11/17)



Photo 3: Culvert #2 at habitat unit # 0157, 8,077 upstream of start of survey. Pictured: Angela Cruz. (Photo taken 7/11/2017).