State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Coastal Watershed Planning and Assessment Program
1487 Sandy Prairie Court, Suite A
Fortuna, CA 95540

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Sebbas Creek

INTRODUCTION

A stream inventory was conducted August 2 to September 20, 2017, on Sebbas Creek. The survey began at the confluence with Indian Creek and extended upstream 4.2 miles.

The Sebbas 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 Sebbas 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 April, 2018.

WATERSHED OVERVIEW

Sebbas Creek, located in northern Mendocino County, is a tributary to Indian Creek, which is a tributary to the South Fork Eel River, which is a tributary to the Eel River, which drains into the Pacific Ocean in northern California (Map 1). Sebbas Creek's legal description at the confluence with Indian Creek is T24N R18W S05. Its location is 39.96728° north latitude and -123.88033° west longitude, LLID number 1238791399673. Sebbas Creek is a first order stream and has approximately 3.32 miles of blue line stream according to the USGS Bear Harbor 7.5 minute quadrangle. Sebbas Creek drains a watershed of approximately 2.85 square miles. Elevations range from about 750 feet at the mouth of the creek to 1,150 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. Vehicle access exists from State Highway 1 via Lost Coast Forestlands LLC's WRP Road, which is gated.

METHODS

The habitat inventory conducted in Sebbas Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Program (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 (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 Sebbas 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 (º) 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". Sebbas 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 Sebbas 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 Sebbas 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 Sebbas 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 Sebbas 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 Sebbas Creek. In addition, underwater mask and snorkel observations were made at 12 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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 Sebbas 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 August 2 to September 20, 2017, was conducted by Angela Cruz (WSP), Ryan Bernstein (CDFW), and Kori Roberts (CDFW). The total length of the stream surveyed was 22,291 feet.

Stream flow measurement of 0.25 cfs was recorded on August 10, 2017, near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter.

Sebbas Creek is a F4 channel type for 22,291 feet of the stream surveyed efficient and stable with a high meander width ratio and cobble-dominant substrates. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 57° to 63° Fahrenheit. Air temperatures ranged from 60° to 69° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 34% riffle units, 34% pool units, 30% flatwater units, and 3% dry units, (Graph 1). Based on total length of Level II habitat types there were 48% flatwater units, 27% pool units, 21% riffle units, and 4% dry units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 34%, low gradient riffle units, 32%, and run units, 22% (Graph 3). Based on percent total length, mid-channel pool units made up 27%, step run units 27%, and run units 21%.

A total of 176 pools were identified (Table 3). Main channel pools were the most frequently encountered at 99% (Graph 4), and comprised 99% 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. Fifty-two of the 176 pools (30%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 176 pool tail-outs measured, 96 had a value of 1 (54.5%), 55 had a value of 2 (31.2%), 19 had a value of 3 (10.8%),

and 6 had a value of 5 (3.4%) (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 3, flatwater habitat types had a mean shelter rating of 18, and pool habitats had a mean shelter rating of 30 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 30. Scour pools had a mean shelter rating of 22 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Sebbas Creek. Graph 7 describes the pool cover in Sebbas 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 type observed in 77% of pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 16% of pool tail-outs.

The mean percent canopy density for the surveyed length of Sebbas Creek was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 90% and 10%, respectively. Graph 9 describes the mean percent canopy in Sebbas Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 99%. The dominant elements composing the structure of the stream banks consisted of 82% sand/silt/clay, 13% bedrock, 4% cobble/gravel, and 0% boulder (Graph 10). Deciduous trees were the dominant vegetation type observed in 94.9% of the units surveyed. Additionally, 5.1% 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 12 sites for species composition and distribution in Sebbas Creek on September 20, 2017 (Table A). The sites were sampled by Kori Roberts (CDFW), and Ryan Bernstein (CDFW).

The survey yielded one young-of-the-year (YOY) coho salmon, 63 YOY steelhead trout (SH), four age 1+ SH, and one age 2+ SH.

During the survey, the upstream-most observation of juvenile coho salmon occurred at 39.98817° north latitude, -123.88903° west longitude, approximately 12,201 feet upstream from the confluence with Indian Creek (Map 1). The upstream-most observation of juvenile steelhead trout occurred at 40.00313° north latitude, -123.89178° west longitude, approximately 18,848 feet upstream from the confluence with Indian Creek (Map 1).

Table A. Summary of results for a fish composition and distribution survey within Sebbas Creek, September 20, 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+	
09/20/17	1	293	Pool	12,201	4	0	0	1	0	
	2	310	Pool	12,962	9	0	0	0	0	
	3	312	Pool	13,088	7	1	0	0	0	
	4	314	Pool	13,113	4	1	0	0	0	
	5	316	Pool	13,147	3	0	0	0	0	
	6	318	Pool	13,206	4	1	0	0	0	
	7	320	Pool	13,308	6	0	1	0	0	
	8	328	Pool	13,583	6	1	0	0	0	
	9	330	Pool	13,677	8	0	0	0	0	
	10	334	Pool	13,839	3	0	0	0	0	
	11	336	Pool	13,877	9	0	0	0	0	
	12	464	Pool	18,848	1	0	0	0	0	

DISCUSSION

Sebbas Creek is a F4 channel type for 22,291 feet of the 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 August 2 to September 20, 2017, ranged from 57° to 63° Fahrenheit. Air temperatures ranged from 60° to 69° 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 48% of the total length of this survey, riffles 21%, pools 27%, and dry 4%. Fifty-two of the 176 (30%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

One hundred fifty-one of the 176 pool tail-outs measured had embeddedness ratings of 1 or 2. Nineteen of the pool tail-outs had embeddedness ratings of 3 or 4. Six 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.

One hundred sixty-five of the 176 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 30. 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 Sebbas 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 97%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 100% and 99%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

Sebbas 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 Sebbas 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 small woody debris. Adding high quality complexity with woody cover in the pools is desirable.

2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

3) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

4) While overall canopy density is 100% on Sebbas Creek, this canopy density is composed mainly of hardwood trees (90%). In order to provide more structure to the canopy, reduce water temperatures, and increase LWD recruitment consider planting appropriate native coniferous species like redwood and Douglas fir along the riparian corridor. Also where site conditions are appropriate consider cautious thinning of hardwoods to hasten the development of denser and more extensive coniferous canopy component. 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 Indian Creek. Channel type is a F4.
858	0025.00	Young of the Year (YOY) steelhead observed throughout the reach
4189	0104.00	Log debris accumulation (LDA) #1 is 4' high, 17' wide, and 24’ long and contains 11 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 17' wide, 12' long and 1' deep. The dominant size of sediment being retained is gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
4810	0122.00	LDA #2 is 5' high, 45' wide, 93' long and contains 27 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 8' wide, 18' long and 2' deep. The dominant sediment size being retained is gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
5425	0136.00	Coho observed.
6593	0170.00	Dry tributary on left bank.
6689	0171.00	LDA #3 is 4' high, 30' wide, 13' long and contains 14 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 18' wide, 17' long and 1' deep. The dominant sediment size is gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
7060	0182.00	+1 observed.
7403	0189.00	Dry tributary on right bank.
7826	0196.00	Dry tributary on left bank.

7853	0197.00	Erosion on left bank.
8544	0213.00	Dry tributary on left bank.
9674	0243.00	Tributary #1 enters on the left bank. It contributes to approximately 1% of Sebbas Creek's flow. The water temperature of the tributary was 62° Fahrenheit, and the water temperature downstream and upstream of the confluence was 62° Fahrenheit. The slope of the tributary is an estimated 1%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
12086	0293.00	Bridge and rip rap present. Large piece of metal in creek.
12413	0301.00	LDA #4 is 4' high, 32' wide, 4' long and contains 7 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 18' wide, 30' long and 2' deep. The dominant sediment size being retained is gravel. The LDA is not a possible barrier to salmonids. It is dry above the LDA for less than 100 feet. Fish were observed above the LDA.
13408	0326.00	Dry tributary on left bank.
13817	0337.00	LDA #5 is 5' high, 30' wide, 8' 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 15' wide, 30' long and 3' deep. The dominant size of sediment being retained is gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
14216	0344.00	Dry tributary on right bank.
14948	0368.00	Tributary #2 enters on the left bank. It contributes to approximately 1% of Sebbas Creek's flow. The water temperature of the tributary was 61° Fahrenheit, and the water temperature downstream and upstream of the confluence was 61° Fahrenheit. The slope of the tributary is an estimated 4%. The tributary is accessible to salmonids. Fish were observed in the tributary. There is a pool at the bottom of the tributary with steelhead YOY. It goes dry above the pool.
15412	0388.00	LDA #6 is 4' high, 8' wide, 4' long and contains 1 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 8' wide, 20' long and 4' deep. The dominant sediment size being retained is gravel. The LDA is

		a possible barrier to juvenile salmonids. Fish were observed above the LDA.
15456	0390.00	LDA #7 is 4' high, 10' wide, 6' 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 18' wide, 6' long and 4' deep. The dominant sediment size being retained is gravel. The LDA is a possible barrier to juvenile salmonids. Fish were observed above the LDA.
15766	0400.00	Tributary #3 enters on the right bank. It contributes to approximately 1% of Sebbas Creek's flow. The water temperature of the tributary was 61° Fahrenheit, and the water temperature downstream and upstream of the confluence was 61° Fahrenheit. The slope of the tributary is an estimated 3%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
15861	0402.00	10' plunge over bedrock sheet into 3' deep pool.
15891	0404.00	2' plunge over bedrock sheet into 5' deep pool.
16670	0424.00	Dry tributary on right bank.
18283	0461.00	Dry tributary on left and right bank.
18707	0462.00	LDA #8 is 3' high, 12' wide, 4' 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 12' wide, 4' long and 2' deep. The dominant sediment size being retained is gravel. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
18774	0464.00	YOY observed.
19791	0487.00	LDA #9 is 5' high, 16' wide, 8' long and contains 2 pieces of LWD. Water flows through visible gaps in the LDA. Sediment is being retained in the approximate dimensions of 10' wide, 4' long and 4' deep. The dominant sediment size being retained is gravel. Fish were not observed above the LDA.
19883	0491.00	Tributary #4 enters on the left bank. It contributes to less than 1% of Sebbas Creek's flow. The water temperature of the tributary was 61 degrees Fahrenheit, and the water temperature downstream and upstream of the confluence was 61 degrees Fahrenheit. The slope of the tributary

		is an estimated 3%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
20102	0494.00	2' plunge over bedrock into 1.6' deep pool.
20116	0495.00	Low flow.
21557	0510.00	LDA #10 is 6' high, 11' wide, 4' long and contains 4 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 14' wide, 11' long and 5' deep. The dominant sediment size being retained is gravel. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
21595	0512.00	LDA #11 is 4' high, 9' wide, 5' long and contains 1 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 6' wide, 5' long and 4' deep. The dominant sediment size being retained is gravel. Fish were not observed above the LDA. There is subsurface flow.
21604	0513.00	LDA #12 is 4' high, 8' wide, 1' long and contains 1 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 6' wide, 3' long and 4' deep. The dominant size of sediment retained is gravel. Fish were not observed above the LDA. There is subsurface flow.
21880	0517.00	There is a 4' plunge into a dry unit.
22008	0518.00	End of survey and end of anatomy due to a 20' waterfall.

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

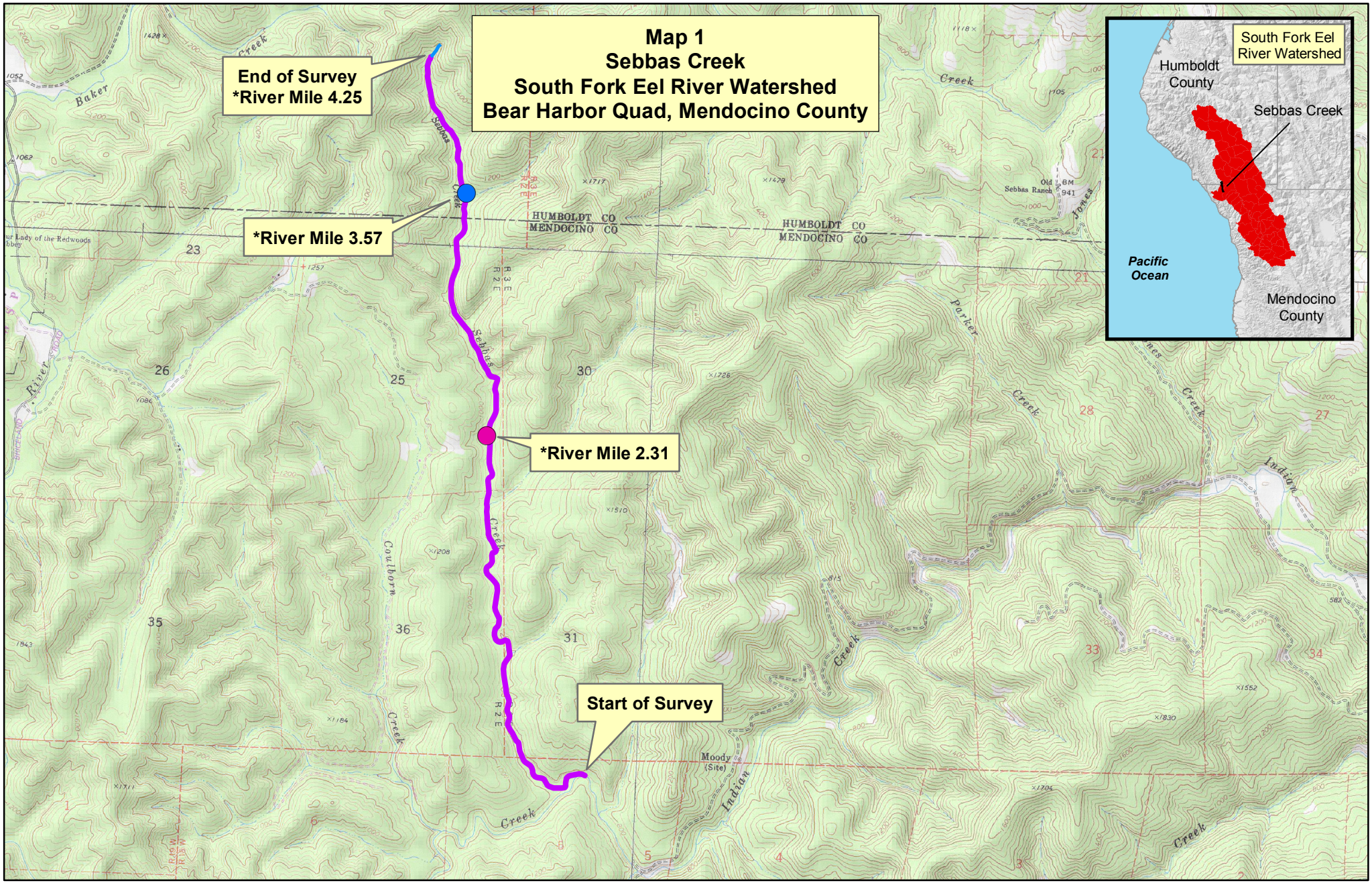
California Department of Fish and Wildlife
Coastal Watershed Planning and Assessment Program
1487 Sandy Prairie ct., Suite A
Fortuna, CA 95540
www.coastalwatersheds.ca.gov

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]	

APPENDIX I

TABLES AND GRAPHS



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

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

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0

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
13	0	DRY	2.5	68	881	4.0									
155	9	FLATWATER	29.9	69	10704	48.0	14.2	0.4	0.7	1015	157296	373	57747		18
176	176	POOL	34.0	35	6122	27.5	11.2	0.8	1.8	409	71955	458	80587	391	30
174	13	RIFFLE	33.6	26	4584	20.6	10.4	0.2	0.4	177	30787	36	6216		3

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
518	198	22291	260038	144549

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

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 (%)
168	11	LGR	32.4	26	4302	19.3	9	0.2	0.6	161	27112	34	5635		4	99
3	0	HGR	0.6	67	200	0.9										
3	2	BRS	0.6	27	82	0.4	18	0.2	0.4	263	788	48	143		0	99
113	7	RUN	21.8	42	4702	21.1	14	0.4	1	829	93729	336	38015		18	98
42	2	SRN	8.1	143	6002	26.9	16	0.3	0.6	1664	69869	499	20961		20	100
174	174	MCP	33.6	35	6072	27.2	11	0.8	6.3	408	70955	451	78447	384	30	97
2	2	PLP	0.4	25	50	0.2	20	1.9	4.9	500	1000	1070	2140	1020	23	98
13	0	DRY	2.5	68	881	4.0										99

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
518	198	22291	263452	145341

Table 3 - Summary of Pool Types

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

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
174	174	MAIN	99	35	6072	99	11.1	0.8	408	70955	384	66810	30
2	2	SCOUR	1	25	50	1	20.0	1.9	500	1000	1020	2040	23

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
176	176	6122	71955	68850

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

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

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
174	MCP	99	11	6	113	65	39	22	6	3	5	3
2	PLP	1	0	0	0	0	1	50	0	0	1	50

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
176	11	6	113	64	40	23	6	3	6	3

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: South Fork Eel River

Survey Dates: 8/2/2017 to 9/20/2017 Dry Units: 13

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude 39:58:02.0N Longitude: 123:52:45.0W

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
168	11	LGR	0	50	0	0	0	0	0	50	0
3	0	HGR	0	0	0	0	0	0	0	0	0
3	2	BRS	0	0	0	0	0	0	0	0	0
174	13	TOTAL RIFFLE	0	50	0	0	0	0	0	50	0
113	7	RUN	8	25	0	0	0	0	0	51	16
42	2	SRN	0	0	0	0	0	0	0	50	50
155	9	TOTAL FLAT	7	19	0	0	0	0	0	49	25
174	172	MCP	18	48	1	4	0	0	0	7	21
2	2	PLP	0	5	0	0	0	0	0	0	95
176	174	TOTAL POOL	18	47	1	4	0	0	0	7	22
518	196	TOTAL	17	46	1	3	0	0	0	10	23

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017 Dry Units: 13

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

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
168	11	LGR	0	0	91	0	0	9	0
3	0	HGR	0	0	0	0	0	0	0
3	2	BRS	0	0	0	0	50	0	50
113	7	RUN	0	0	43	14	29	14	0
42	2	SRN	0	0	50	0	0	50	0
174	172	MCP	0	1	83	8	6	2	1
2	2	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	10	90	0	100	99

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017 Survey Length (ft.): 22291 Main Channel (ft.): 22291 Side Channel (ft.): 0

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 22291
Riffle/Flatwater Mean Width (ft.): 12.0
BFW:
Range (ft.): 9 to 33
Mean (ft.): 18
Std. Dev.: 5
Base Flow (cfs.): 0.3
Water (F): 57 - 63 Air (F): 60 - 69
Dry Channel (ft): 881

Canopy Density (%): 97.1
Coniferous Component (%): 10.4
Hardwood Component (%): 89.6
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 99.7
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 1
LWD per 100 ft.:
Riffles: 1
Pools: 4
Flat: 2

Pools by Stream Length (%): 27.5
Pool Frequency (%): 34.0
Residual Pool Depth (%):
< 2 Feet Deep: 70
2 to 2.9 Feet Deep: 23
3 to 3.9 Feet Deep: 3
>= 4 Feet Deep: 3
Mean Max Residual Pool Depth (ft.): 1.8
Mean Pool Shelter Rating: 30

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 1 Gravel: 77 Sm Cobble: 16 Lg Cobble: 2 Boulder: 3 Bedrock: 1

Embeddedness Values (%): 1. 54.5 2. 31.3 3. 10.8 4. 0.0 5. 3.4

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Sebbas Creek LLID: 1238791399673 Drainage: Eel River - South Fork

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

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	36	16	13.1
Boulder	1	0	0.3
Cobble / Gravel	6	11	4.3
Sand / Silt / Clay	155	171	82.3

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	189	187	94.9
Coniferous Trees	9	11	5.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

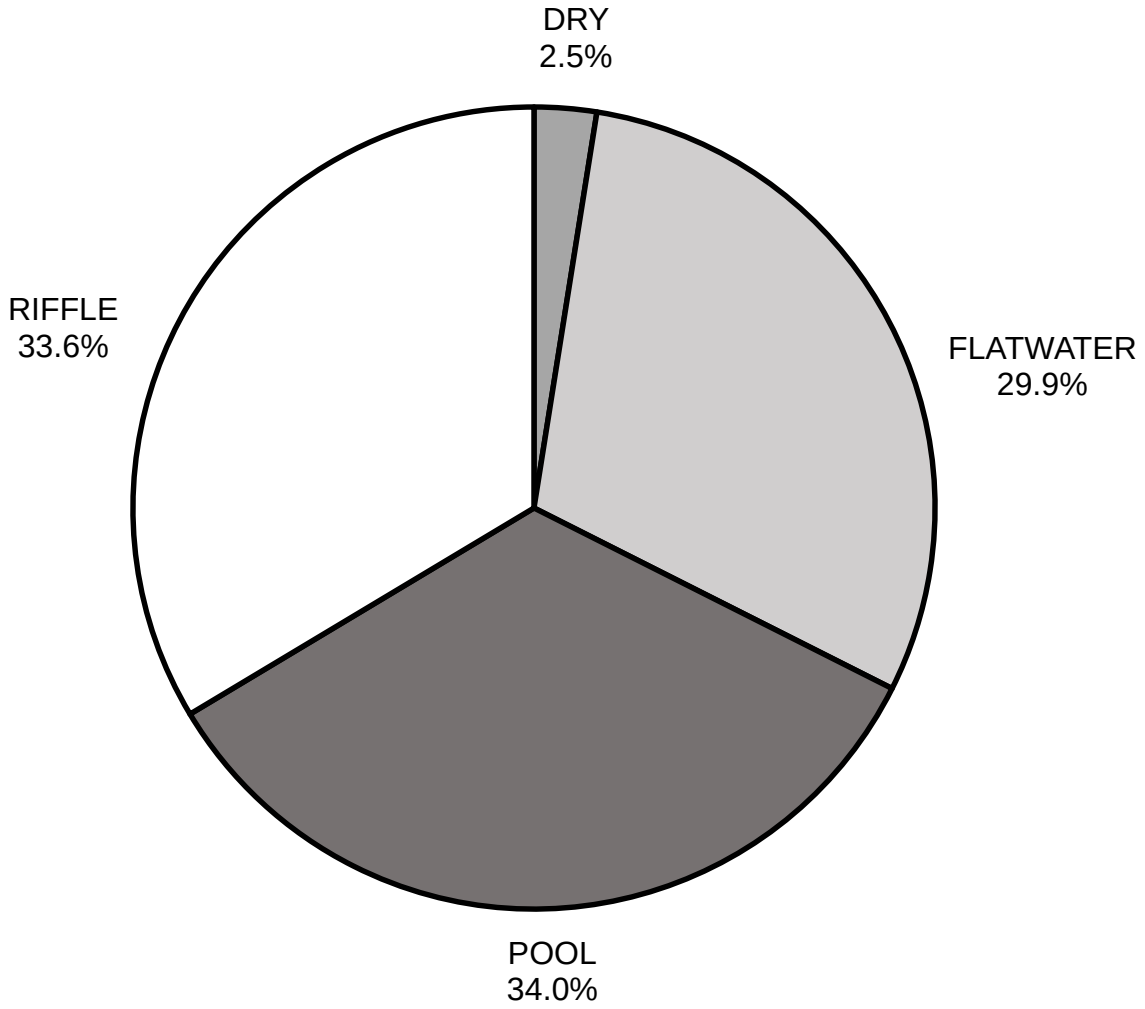
StreamName: Sebbas Creek LLID: 1238791399673 Drainage: South Fork Eel River

Survey Dates: 8/2/2017 to 9/20/2017

Confluence Location: Quad: BRICELAND Legal Description: T24NR18WS05 Latitude: 39:58:02.0N Longitude: 123:52:45.0W

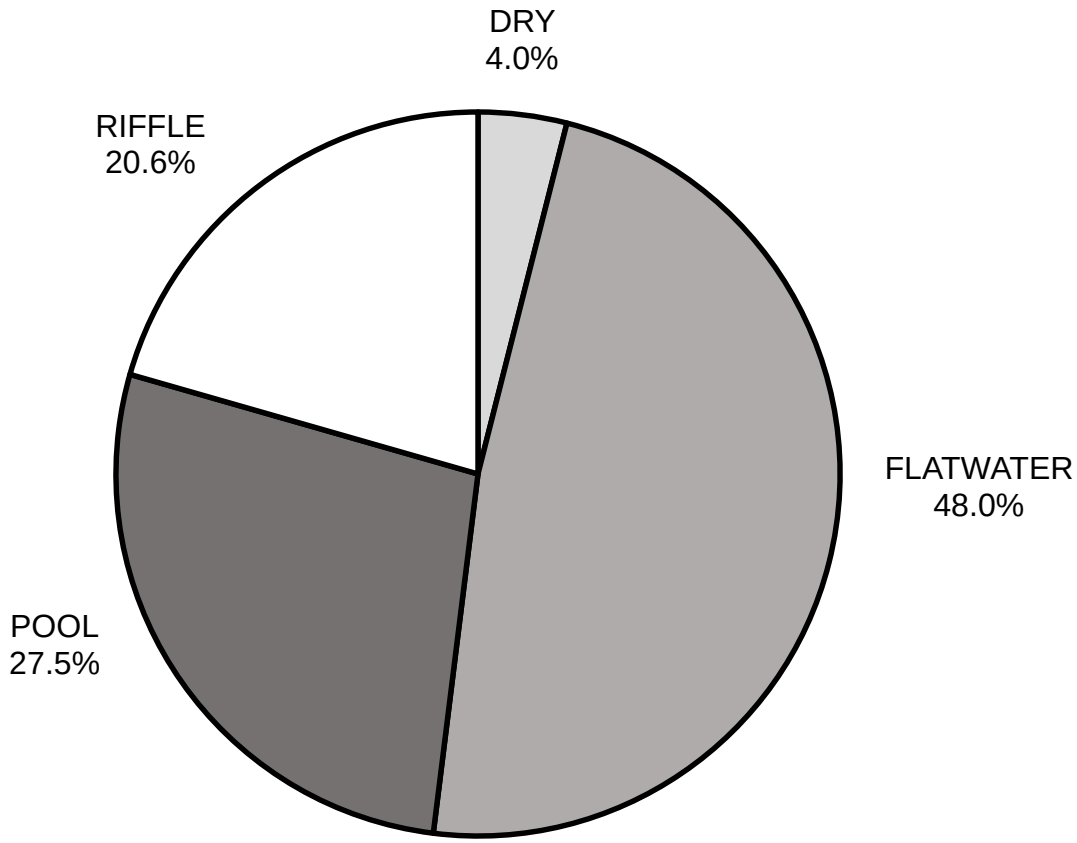
	Riffles	Flatwater	Pools
UNDERCUT BANKS(%)	0	7	18
SMALL WOODY DEBRIS (%)	50	19	47
LARGE WOODY DEBRIS (%)	0	0	1
ROOT MASS (%)	0	0	4
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	50	49	7
BEDROCK LEDGES (%)	0	25	22

SEBBAS CREEK 2017
HABITAT TYPES BY PERCENT OCCURRENCE



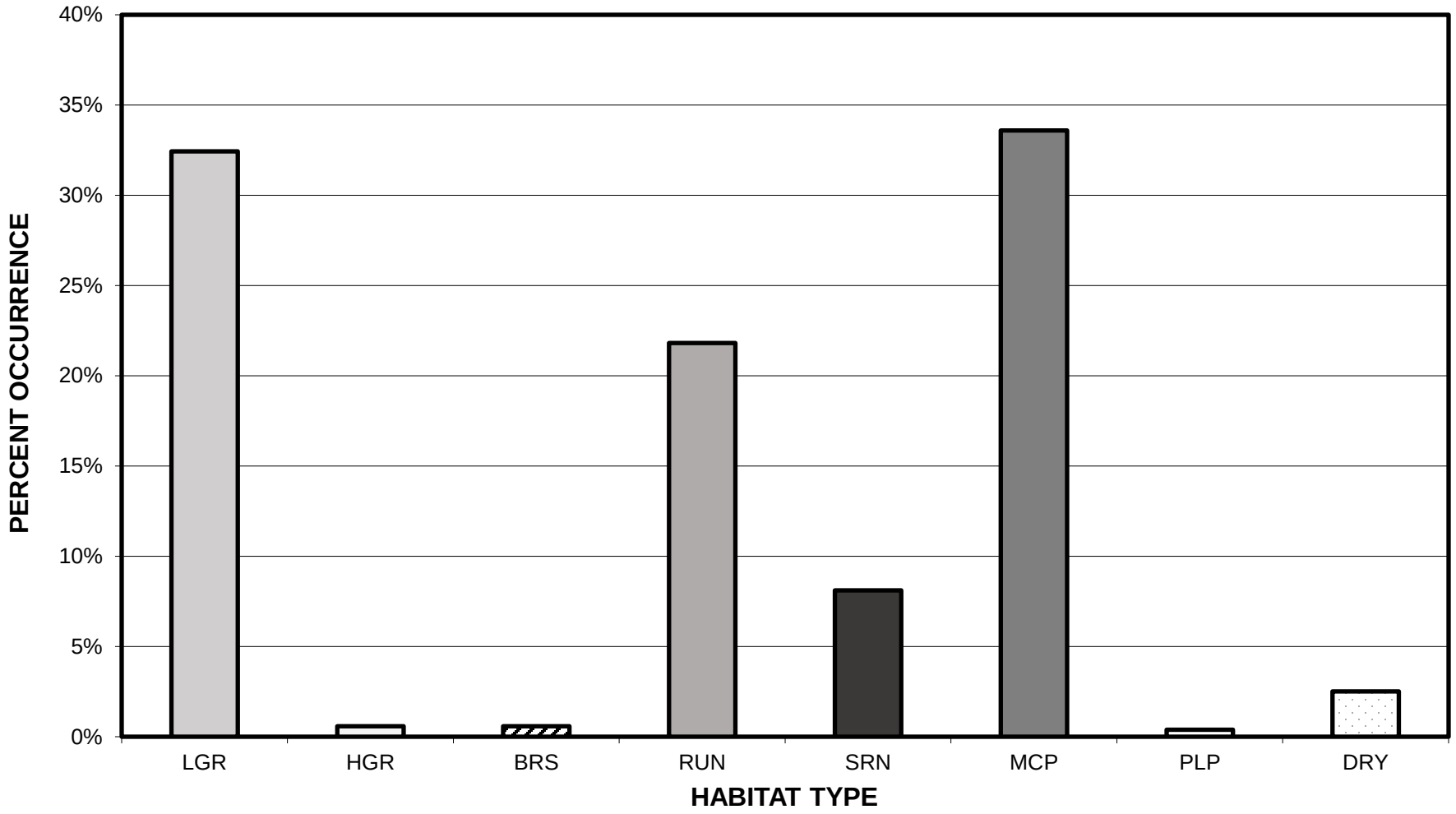
GRAPH 1

SEBBAS CREEK 2017
HABITAT TYPES BY PERCENT TOTAL LENGTH



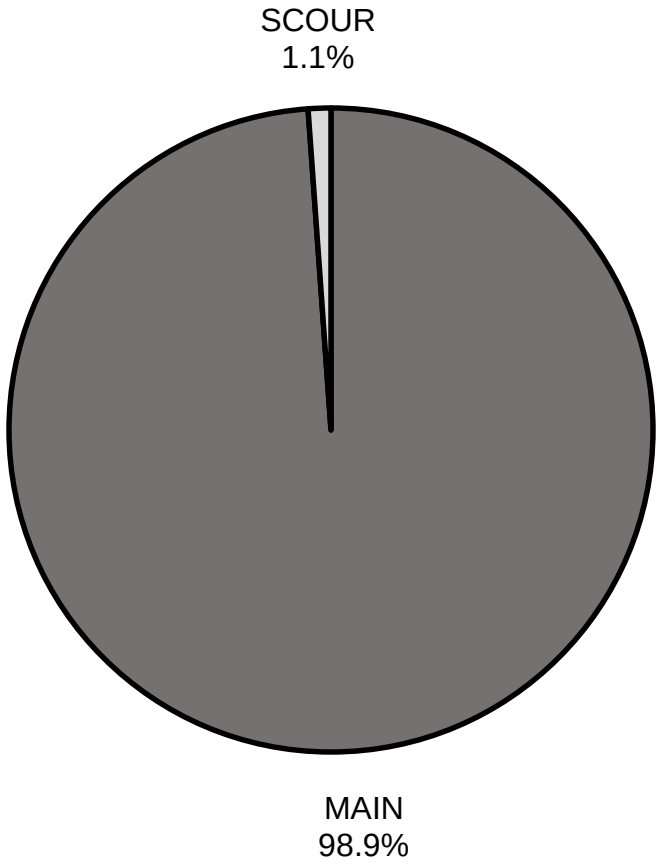
GRAPH 2

SEBBAS CREEK 2017
HABITAT TYPES BY PERCENT OCCURRENCE

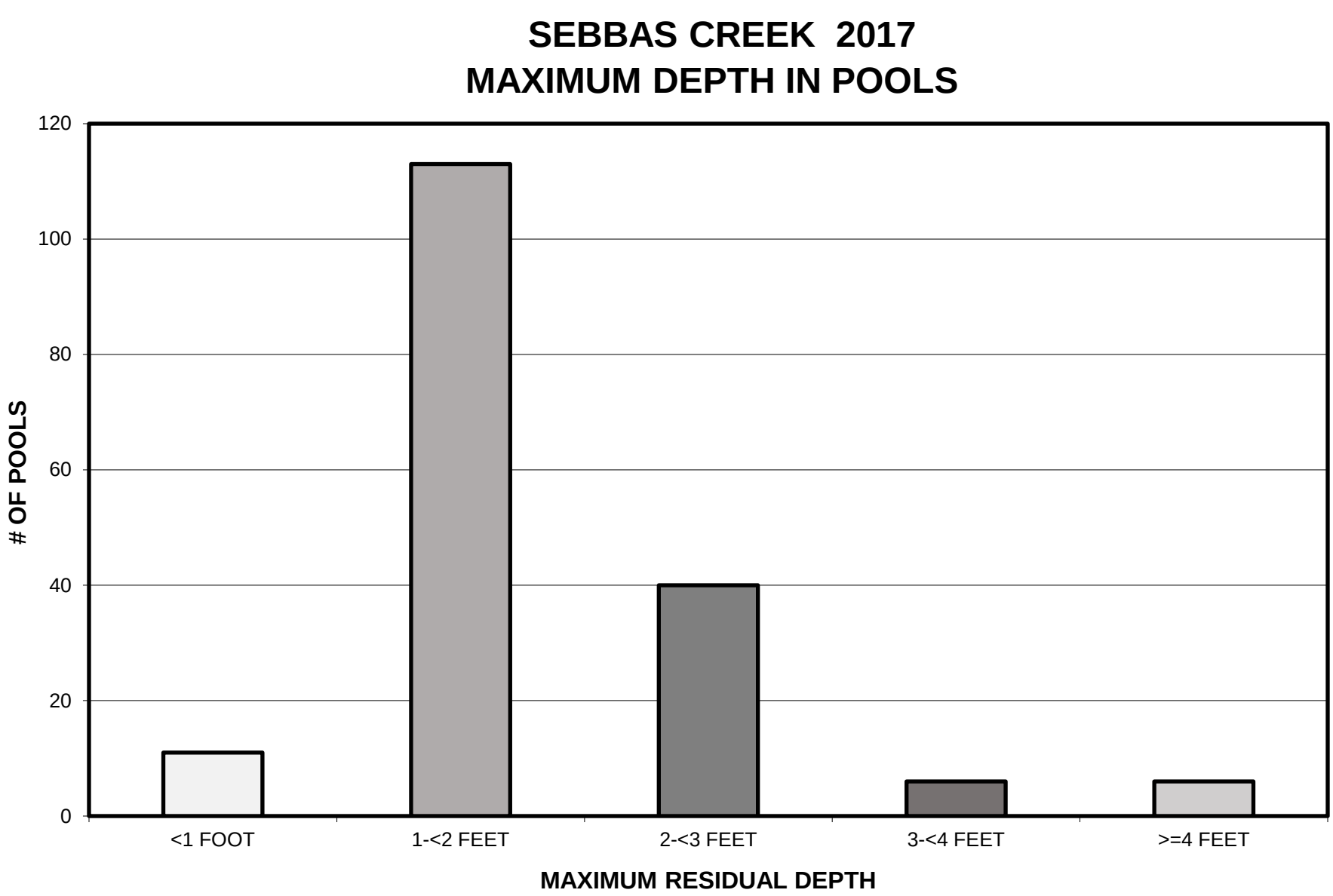


GRAPH 3

SEBBAS CREEK 2017
POOL TYPES BY PERCENT OCCURRENCE

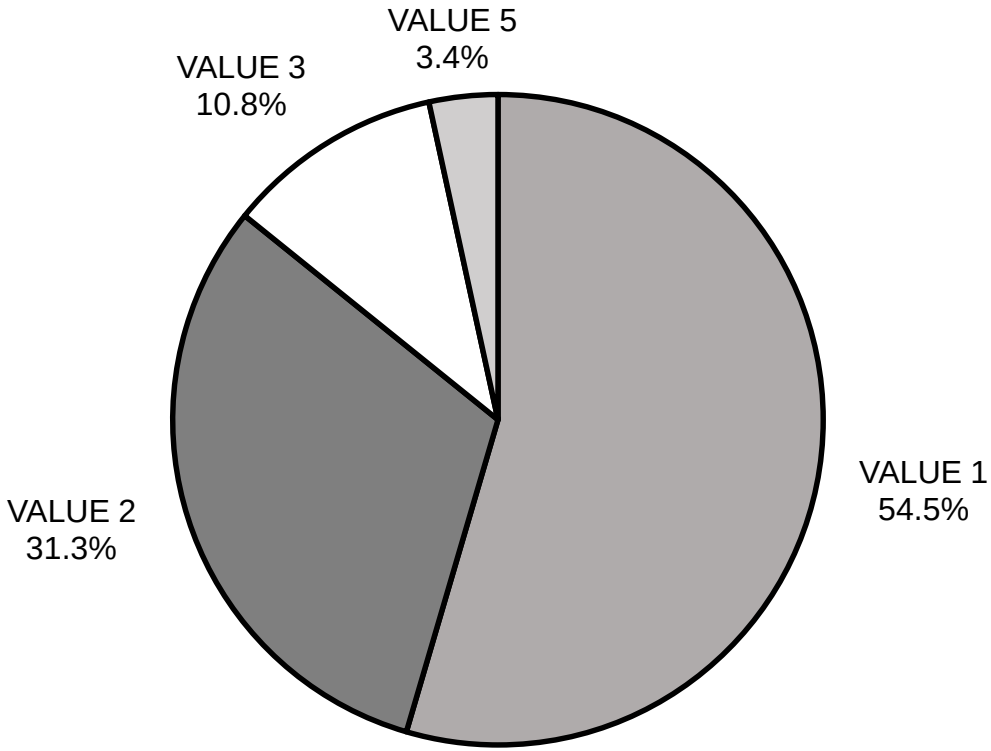


GRAPH 4


SEBBAS CREEK 2017
MAXIMUM DEPTH IN POOLS
120
100
80
60
40
20
0
OF POOLS
<1 FOOT
1-<2 FEET
2-<3 FEET
3-<4 FEET
>=4 FEET
MAXIMUM RESIDUAL DEPTH

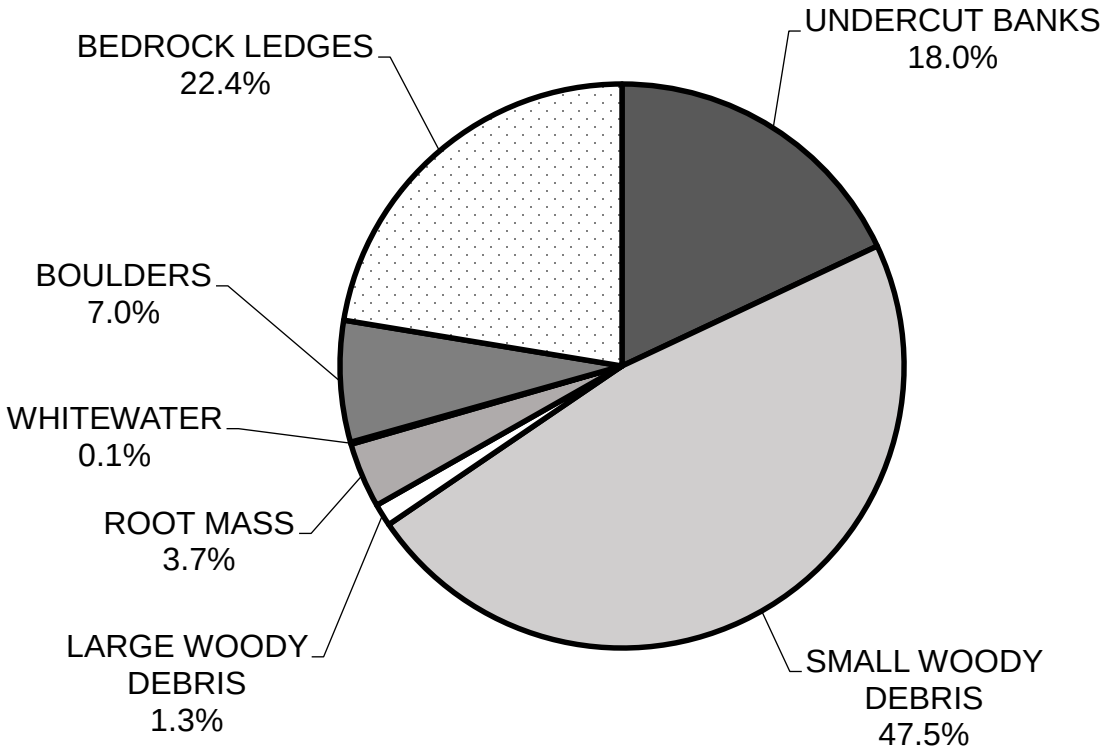
GRAPH 5

SEBBAS CREEK 2017
PERCENT EMBEDDEDNESS



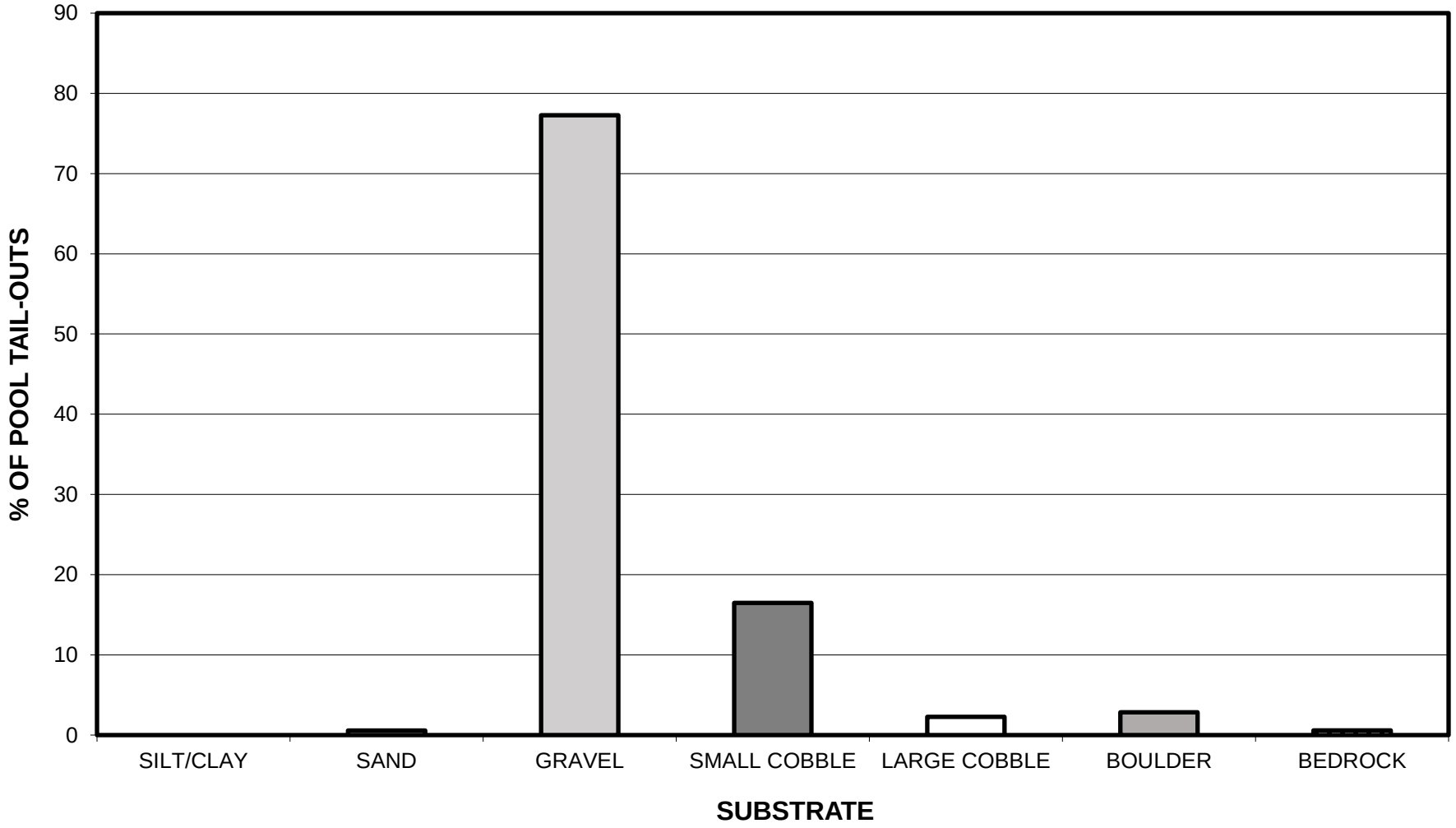
GRAPH 6

SEBBAS CREEK 2017
MEAN PERCENT COVER TYPES IN POOLS



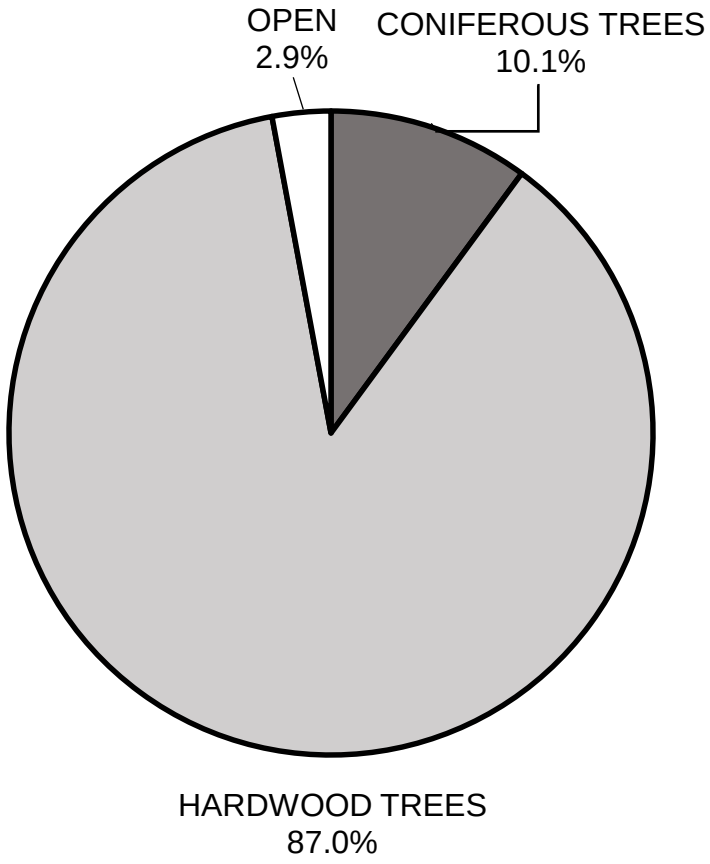
GRAPH 7

SEBBAS CREEK 2017
SUBSTRATE COMPOSITION IN POOL TAIL- OUTS



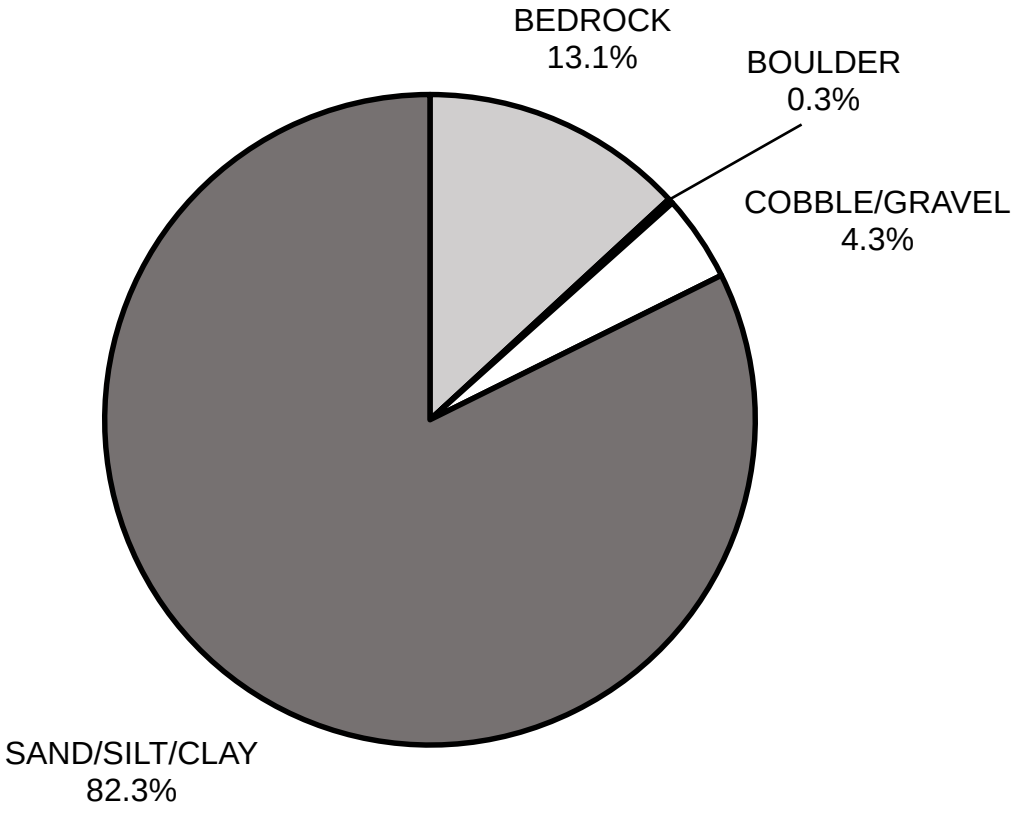
GRAPH 8

SEBBAS CREEK 2017
MEAN PERCENT CANOPY



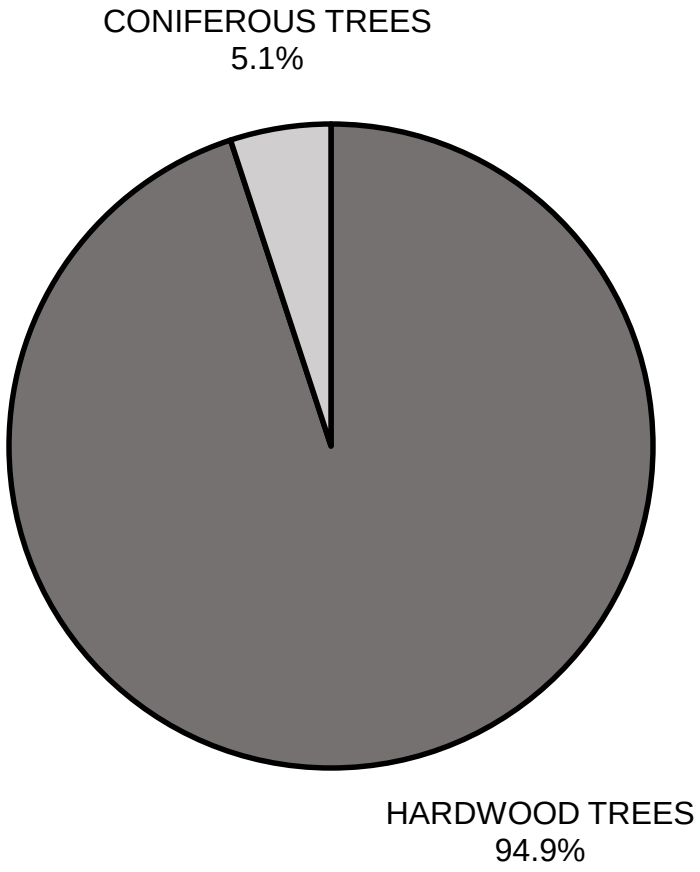
GRAPH 9

SEBBAS CREEK 2017
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

SEBBAS CREEK 2017
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS

Photo 1: Plunge pool at habitat unit #402, 15,992’ upstream from start of survey. (Photo taken 9/19/17)