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CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Hare Creek

INTRODUCTION

A stream inventory was conducted from August 2 to September 1, 2017 on Hare Creek. The survey began at the confluence with Pacific Ocean and extended upstream 7.8 miles.

The Hare 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 Hare 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 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 stream report was finalized in April, 2018.

WATERSHED OVERVIEW

Hare Creek is a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Hare Creek's legal description at the confluence with Pacific Ocean is T18N R18W S13. Its location is 39.4171° north latitude and -123.8122° west longitude, LLID number 1238116394173. Hare Creek is a second order stream and has approximately 8.0 miles of blue line stream according to the USGS Fort Bragg 7.5 minute quadrangle. Hare Creek drains a watershed of approximately 9.7 square miles. Elevations range from sea level at the mouth of the creek to 600 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is partially state park, partially privately owned and is managed for recreation and timber production. Vehicle access exists via Hwy 1 to Ocean View Drive to Harbor Avenue.

METHODS

The habitat inventory conducted in Hare Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project (WSP) members, California Conservation Corps personnel (CCC), and California Department of Fish and Wildlife (CDFW) personnel that conducted the inventory were trained in standardized habitat inventory methods by the 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 Hare 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". Hare 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 Hare 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 Hare 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 Hare 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 Hare 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 Hare Creek. In addition, underwater mask and snorkel observations were made at 6 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 Hare 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 August 30, 2017 was conducted by Kori Roberts (CDFW), Ryan Bernstein (CDFW), Rachel Karlov (WSP), Chris Tevini (CCC). The total length of the stream surveyed was 41,217 feet. A section from the Pacific Ocean upstream approximately 10,350 feet was not surveyed due to a lack of landowner permission. Start of survey began at the most downstream end of Jackson Demonstration State Forest property line.

A stream flow measurement 1.29 cfs was recorded on August 28, 2017 near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter.

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

Water temperatures taken during the survey period ranged from 54° to 67° Fahrenheit. Air temperatures ranged from 54° to 71° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 32% flatwater units, and 29% riffle units (Graph 1). Based on total length of Level II habitat types there were 41% pool units, 42% flatwater units, 15% riffle units, and 1% culvert 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 (39%), low gradient riffle units (29%), and run units (23%) (Graph 3). Based on percent total length, mid-channel pool units made up 41%, run units made up 29%, low gradient riffle units make up 15%.

A total of 322 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (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. One hundred forty-six of the 322 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 322 pool tail-outs measured, 227 had a value of 1 (70.5%), 78 had a value of 2 (24.2%), 6 had a value of 3 (1.9%), 5 had a value of 4 (1.6%), and 6 had a value of 5 (1.9%) (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 0, flatwater habitat types had a mean shelter rating of 1, and pool habitats had a mean shelter rating of 17 (Table 1). Of the pool types, main channel pools had the highest shelter rating of 17. Scour pools had a mean shelter rating of 0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Hare Creek. Graph 7 describes the pool cover in Hare Creek. Large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate, observed in 86% of pool tail outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 7% of the pool tail-outs. The mean percent canopy density for the surveyed length of Hare Creek was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 40% and 60%, respectively. Graph 9 describes the mean percent canopy in Hare Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 53% cobble/gravel, 36% sand/silt/clay, 10% bedrock, and 1% boulder (Graph 10). Coniferous trees were the dominant vegetation type, observed in 55% of the units surveyed. Additionally, 31% of the units surveyed had hardwood trees as the dominant vegetation type, and 14% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at 6 sites for species composition and distribution in Hare Creek on September 1, 2017 (Table A). The sites were sampled by Ryan Bernstein and Kori Roberts (CDFW).

The survey yielded two young-of-the-year (YOY) coho salmon, 16 YOY steelhead-trout (SH), and 2 age 1+ SH.

During the survey, the upstream-most observation of coho salmon and steelhead-trout occurred at 39.3869° north latitude, -123.71949° west longitude, approximately 31,165 feet upstream from the confluence with the Pacific Ocean (Map 1).

Table A. Summary of results for a fish composition and distribution survey within Hare Creek, September 1, 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+	
09/01/17	1	531	Pool	30,384	2	1	0	0	0	
	2	539	Pool	30,563	6	0	0	0	0	
	3	546	Pool	30,718	2	1	0	0	0	
	4	549	Pool	30,887	3	0	0	0	0	
	5	552	Pool	31,101	2	0	0	0	0	
	6	554	Pool	31,165	1	0	0	2	0	

DISCUSSION

Hare Creek is an F4 channel type. 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 August 30, 2017 ranged from 54° to 67° Fahrenheit. Air temperatures ranged from 54° to 71° Fahrenheit. This is a suitable water temperature range for salmonids. However, ≥66° Fahrenheit, if sustained, is near the threshold stress level 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 42% of the total length of this survey, riffles 15%, and pools 41%. One hundred forty-six of the 322 (45%) 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.

Three hundred five of the 322 pool tail-outs measured had embeddedness ratings of 1 or 2. Eleven 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.

Three hundred of the 322 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 17. The shelter rating in the flatwater habitats is 1. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in Hare Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad 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%. The percentage of right and left bank covered with vegetation was 99% and 100%, respectively.

RECOMMENDATIONS

Hare 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 Hare 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 to improve shelter values. Most of the existing cover in the pools is from large 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.

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 most downstream end of Jackson Demonstration State Forest property line. Channel type is an F4. Channel type cross-section location is at Habitat Unit (HU) #195.
678	0009.00	Log debris accumulation (LDA) #1 is 5' high x 35' wide x 37' long and contains 12 pieces of large woody debris (LWD). Water does not flow through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
1500	0022.00	Tributary #1 enters on the left bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 10%. The tributary is not accessible to salmonids. It is narrow and steep. Fish were not observed in the tributary.

2939	0040.00	Tributary #2 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, the water temperature downstream of the confluence was 54° Fahrenheit, and the water temperature upstream and downstream of the confluence was 54° Fahrenheit. The slope of the tributary is and estimated 10%. The tributary is not accessible to salmonids. It is narrow and steep. Fish were not observed in the tributary.
3296	0043.00	LDA #2 is 6' high x 30' wide x 30' long and contains 6 pieces of LWD. Water does not flow through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
3876	0051.00	Tributary #3 enters on the left bank. It contributes to approximately 5% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 3%. The tributary is accessible to salmonids. It is narrow, small, and covered in vegetation. Fish were not observed in the tributary.
4352	0059.00	Tributary #4 enters on the left bank. It contributes to approximately 5% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 3%. The tributary is accessible to salmonids. It is narrow and entrenched. Fish were not observed in the tributary.
4856	0066.00	LDA #3 is 8' high x 30' wide x 60' long and contains 12 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 20' wide x 15' long x 2' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
5638	0077.00	Tributary #5 enters on the right bank. It contributes to approximately 5% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 3%. The tributary is accessible to salmonids. It is narrow and entrenched. Fish were not observed in the tributary.
7119	0099.00	LDA #4 is 6' high x 25' wide x 15' long and contains 7 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.

7218	0101.00	Tributary #6 enters on the left bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 10%. The tributary is not accessible to salmonids. It is steep and narrow with low flow. Fish were not observed in the tributary.
7952	0107.00	Tributary #7 enters on the right bank. It contributes to approximately 20% of Hare Creek's flow. The water temperature of the tributary was 55° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 2%. The tributary is accessible to salmonids. It quickly becomes steep and entrenched. Fish were not observed in the tributary.
8079	0109.00	YOY Coho observed.
8917	0122.00	Tributary #8 enters on the left bank. It contributes to approximately 10% of Hare Creek's flow. The water temperature of the tributary was 56° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 70%. The tributary is not accessible to salmonids due to the slope. Fish were not observed in the tributary.
8995	0123.00	LDA #5 is 6' high x 25' wide x 40' long and contains 7 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
9119	0125.00	LDA #6 is 4' high x 25' wide x 14' long and contains 8 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
9366	0130.00	Tributary #9 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 56° Fahrenheit, and the water temperature downstream and upstream of the confluence was 56° Fahrenheit. The slope of the tributary is an estimated 10%. The tributary is not accessible to salmonids. It is small, entrenched, and has little water flow. Fish were not observed in the tributary.
10550	0147.00	Tributary #10 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated

		2%. The tributary is accessible to salmonids. It is very narrow and quickly becomes very steep. Fish were not observed in the tributary.
11352	0154.00	LDA #7 is 8' high x 20' wide x 45' long and contains 13 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 x 10' long x 1' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
12733	0172.00	Rip rap on RB.
13360	0181.00	LDA #8 is 5' high x 24' wide x 12' long and contains 8 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
13746	0187.00	Tributary #11 enters on the left bank. It contributes to approximately 10% of Hare Creek's flow. The water temperature of the tributary was 55° Fahrenheit, and the water temperature downstream and upstream of the confluence was 56° Fahrenheit. The slope of the tributary is an estimated 5-10%. The tributary is accessible to salmonids. It is very narrow and entrenched. Fish were not observed in the tributary.
14582	0200.00	Tributary #12 enters on the right bank. It contributes to approximately 2% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream of the confluence was 56° Fahrenheit. The slope of the tributary is an estimated 5-10%. The tributary is accessible to salmonids. It is very narrow and entrenched. Fish were not observed in the tributary.
14940	0204.00	Rip rap on RB.
15226	0209.00	LDA #9 is 7.5' high x 20' wide x 36' long and contains 15 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
15526	0216.00	LDA #10 is 6.5' high x 30' wide x 25' long and contains 8 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.

16757	0234.00	Tributary #13 enters on the left bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 10%. The tributary is not accessible to salmonids. It is steep, narrow, entrenched, and has low flow. Fish were not observed in the tributary.
16884	0237.00	Rip rap on right bank. Logs on LB from old bridge crossing.
17180	0243.00	Tributary #14 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is an estimated 10%. The tributary is not accessible to salmonids. There is a 9’ jump from a culvert. Fish were not observed in the tributary.
17606	0251.00	LDA #11 is 9' high x 36' wide x 68' long and contains 22 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 x 10' long x 2' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
17860.8	0258.00	Tributary #15 enters on the left bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The slope of the tributary is and estimated 3%. The tributary is accessible to salmonids. It is narrow and quickly becomes steep, entrenched, and overgrown.
18093.8	0263.00	Rip rap on right bank. YOY Coho observed.
19495.8	0281.00	Tributary #16 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The tributary is not accessible to salmonids. It is a narrow, entrenched, and overgrown. There is a 10 foot jump to a culvert. Fish were not observed in the tributary.
19540.8	0283.00	LDA #12 is 8' high x 40' wide x 16' long and contains 9 pieces of LWD. Water flows through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 17' wide x 13' long x 2.5' deep. The sediment ranges in size from sand to gravel.

		The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
20137.8	0293.00	Tributary #17 enters on the right bank. It contributes to approximately 1% of Hare Creek's flow. The water temperature of the tributary was 54° Fahrenheit, and the water temperature downstream and upstream of the confluence was 54° Fahrenheit. The tributary is not accessible to salmonids due to subsurface flow. Fish were not observed in the tributary.
20641.8	0302.00	LDA #13 is 8' high x 33' wide x 55' long and contains 11 pieces of LWD. Water flows through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 17' wide x 12' long x 3' deep. The sediment size is sand. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
21341.8	0316.00	Landslide on RB.
21405.8	0317.00	LDA #14 is 5' high x 25' wide x15' long and contains 7 pieces of LWD. Water flows through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 12' wide x 20' long x 3' deep. The sediment ranges in size from sand to gravel. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
21473.8	0320.00	LDA #15 is 4.5' high x 27' wide x 18' long and contains 8 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were observed above the LDA.
21680.8	0326.00	LDA #16 is 4.5' high x 20' wide x 7' long and contains 8 pieces of LWD. Water flows through the LDA and there are visible gaps in it. The LDA is not a possible barrier to salmonids. Fish were not observed above the LDA.
22181.8	0333.00	Tributary #18 (Walton Gulch) enters on the right bank. It contributes to approximately 10-20% of Hare Creek's flow. The water temperature of the tributary was 55° Fahrenheit and the water temperature downstream and upstream of the confluence was 55° Fahrenheit. The slope of the tributary is 1-2%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
22637.8	0340.00	Bridge #1 is the crossing for an unnamed road. It is an automobile bridge (made of wood) and is not a barrier to salmonids.

23239.8	0357.00	Tributary #19 enters on the left bank. It contributes to approximately 5-10% of Hare Creek's flow. The water temperature of the tributary was 55° Fahrenheit, and the water temperature downstream and upstream of the confluence was 57° Fahrenheit. The slope of the tributary is an estimated 3-4%. The tributary is accessible to salmonids. It is entrenched, cobble-dominated, and has step-runs over wood. Fish were not observed in the tributary.
25612.8	0406.00	Tributary #20 (South Fork Hare Creek) enters on the left bank. It contributes to approximately 25% of Hare Creek's flow. The water temperature of the tributary was 58° Fahrenheit, and the water temperature downstream and upstream of the confluence was 57° Fahrenheit. The slope of the tributary is 1-2%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
26991.8	0437.00	Tributary #21 (Bunker Gulch) enters on the right bank. It contributes to approximately 30-40% of Hare Creek's flow. The water temperature of the tributary was 56° Fahrenheit, and the water temperature downstream and upstream of the confluence was 56° Fahrenheit. The slope of the tributary is 1-2%. The tributary is accessible to salmonids. Fish were observed in the tributary.
30018.8	0519.00	Tributary #22 enters on the left bank. It contributes to approximately 30-40% of Hare Creek's flow. The water temperature of the tributary was 58° Fahrenheit, and the water temperature downstream and upstream of the confluence was 59° Fahrenheit. The slope of the tributary is 1-2%. The tributary is accessible to salmonids. It has a bedrock-dominated substrate. Fish were not observed in the tributary.
31143.8	0555.00	Tributary #23 enters on the right bank. It contributes to approximately 10% of Hare Creek's flow. The water temperature of the tributary was 58° Fahrenheit, and the water temperature downstream and upstream of the confluence was 59° Fahrenheit. The slope of the tributary is 1-2%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
33415.8	0632.00	YOY observed.
34105.8	0651.00	YOY Steelhead observed.
34552.8	0664.00	LDA #17 is 5' high x 20' wide x 8' long and contains 3 pieces of LWD. Water does not flow through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 10' wide x 10' long x 3' deep. The sediment ranges in size from sand to gravel. The

		LDA is a possible barrier to juvenile salmonids. Fish were observed above the LDA.
34614.8	0667.00	YOY Steelhead observed.
34687.8	0671.00	4’ plunge. LDA #18 is 8' high x 12' wide x 10' long and contains 4 pieces of LWD. Water does not flow through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 8' wide x 20' long x 4' deep. The sediment ranges in size from sand to cobble. The LDA is a possible barrier to juvenile salmonids. Fish were observed above the LDA.
35238.8	0691.00	LDA #19 is 7' high x 15' wide x 12' long and contains 6 pieces of LWD. Water does not flow through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 9' wide x 15' long x 6' deep. The sediment ranges in size from sand to cobble. The LDA is a possible barrier to juvenile salmonids. Fish were not observed above the LDA.
35904.8	0717.00	LDA #20 is 4.5' high x 11' wide x 6' long and contains 5 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 8' wide x 10' long x 5' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to juvenile salmonids. Fish were not observed above the LDA.
36104.8	0726.00	LDA #21 is 3' high x 11' wide x 11' long and contains 5 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 7' wide x 6' long x 1' deep. The sediment ranges in size from sand to small cobble. The LDA is a possible barrier to juvenile salmonids. Fish were not observed above the LDA.
36252.8	0731.00	LDA #22 is 4' high x 8' wide x 6' long and contains 3 pieces of LWD. Water flows through the LDA and there are no visible gaps in it. Sediment is being retained in the approximate dimensions of 10' wide x 18' long x 1' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to juvenile salmonids. Fish were not observed above the LDA.
36930.8	0753.00	LDA #23 is 3' high x 12' wide x 12' long and contains 5 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 8' wide x 8' long x 1.5' deep. The sediment ranges in size from sand to gravel. The LDA is a

		possible barrier to juvenile salmonids. Fish were not observed above the LDA.
38101.8	0774.00	LDA #24 is 5' high x 10' wide x 8' 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 8' wide x 8' long x 1.5' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to juvenile salmonids. Fish were not observed above the LDA.
38460.8	0781.00	Tributary #24 enters Hare Creek. It is overgrown with poison oak. Unable to observe flow.
39070.8	0793.00	Dry tributary on LB.
39247.8	0794.00	Dry Tributary on LB.
39954.8	0815.00	4' plunge into pool.
40153.8	0820.00	There are logs in the creek creating a step run for 200 ft. There is a 6.5' plunge with no pool underneath. Tributary #25 enters Hare Creek. The water temperature of the tributary was 56° Fahrenheit, and the water temperature downstream and upstream of the confluence was 56° Fahrenheit. The slope of the tributary is an estimated 2%. The tributary is accessible to salmonids. Fish were not observed in the tributary.
40890.8	0826.00	End of Survey. The creek becomes dry and then there is no sign of the creek. There is only vegetation.

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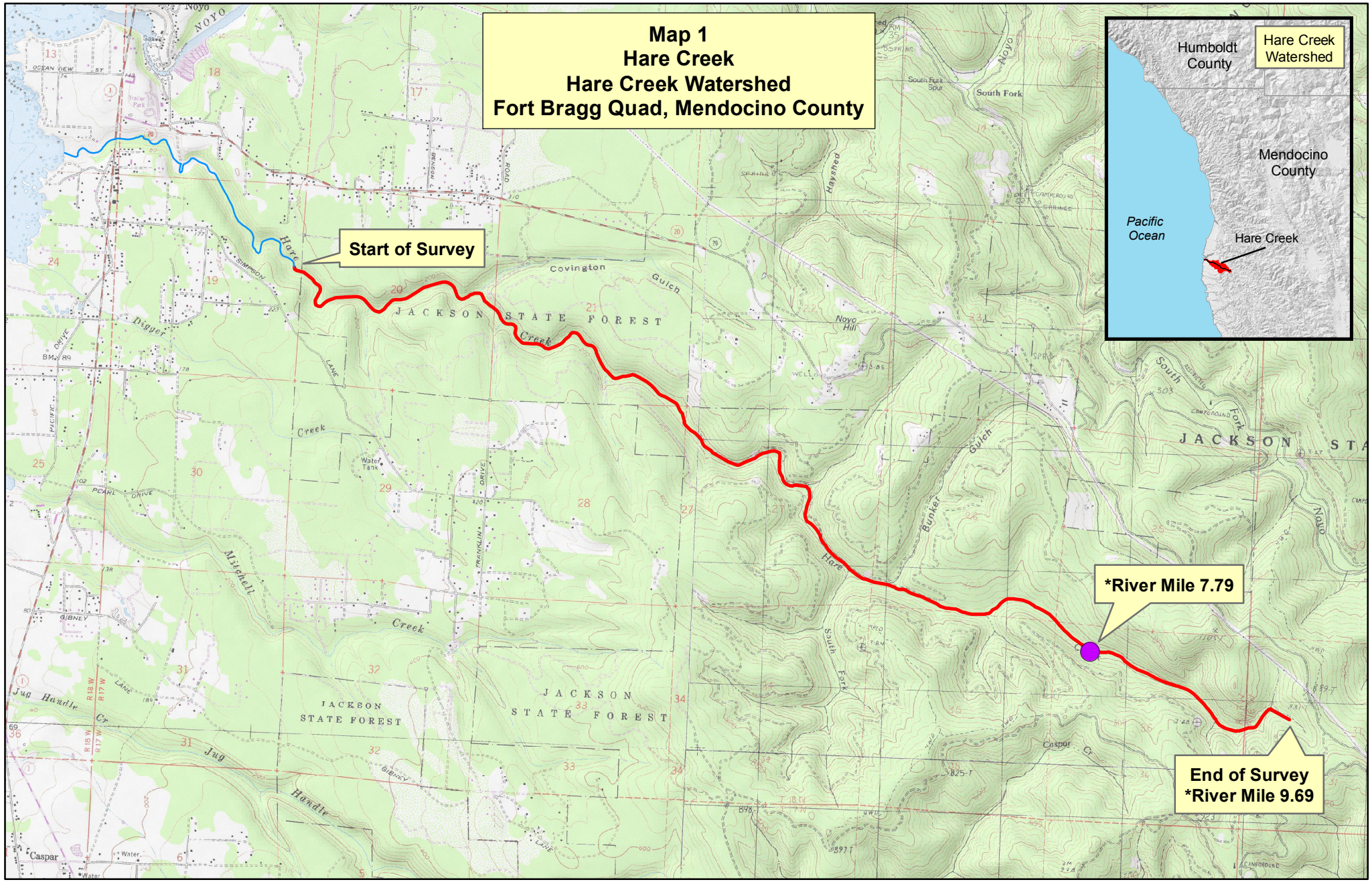
Coastal Watershed Planning and Assessment Program
1487 Sandy Prairie ct., Suite A
Fortuna, CA 95540
www.coastalwatersheds.ca.gov

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 - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}
ADDITIONAL UNIT DESIGNATIONS			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	



Coordinate System: NAD 1983 California Teale Albers
Data Sources: CDFW, USGS, CalWater 2.21, CDF 24k

*River Mile indicates distance from the Pacific Ocean

APPENDIX I

TABLES AND GRAPHS

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

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0

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
4	0	CULVERT	0.5	106	422	1.0									
2	0	DRY	0.2	14	28	0.1									
262	21	FLATWATER	31.7	67	17430	42.3	8.1	0.4	0.8	535	140297	224	58637		1
322	317	POOL	38.9	53	16963	41.2	12.7	0.9	2.2	788	253067	1128	362220	916	17
237	23	RIFFLE	28.7	27	6373	15.5	7.6	0.2	0.4	294	69731	92	21911		0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
826	361	41216.8	463095	442768

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

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 (%)
237	23	LGR	28.7	27	6373	15.5	8	0.2	1	294	69731	92	21911		0	98
1	0	POW	0.1	42	42	0.1										
3	0	GLD	0.4	100	299	0.7										
189	11	RUN	22.9	62	11757	28.5	10	0.5	1.8	587	110866	308	58218		0	99
69	10	SRN	8.4	77	5333	12.9	6	0.3	0.8	479	33070	131	9050		2	98
321	316	MCP	38.7	53	16870	40.9	13	0.9	22.7	787	251758	1127	360520	915	17	97
1	1	LSBk	0.1	93	93	0.2	14	1.0	3.1	1302	1302	1693	1693	1302	0	96
2	0	DRY	0.2	14	28	0.1										
4	0	CUL	0.5	106	422	1.0										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
826	361	41216.8	466726	451392

Table 3 - Summary of Pool Types

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

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
321	316	MAIN	100	53	16870	99	12.7	0.9	787	251758	915	292733	17
1	1	SCOUR	0	93	93	1	14.0	1.0	1302	1302	1302	1302	0

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
321	317	16963	253060	294035

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

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

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
321	MCP	100	13	4	162	51	91	28	32	10	22	7
1	LSBk	0	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
321	13	4	162	50	91	28	33	10	22	7

Mean Maximum Residual Pool Depth (ft.): 2.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2017 to 8/30/2017 Dry Units: 2

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude 39:25:02.0N Longitude: 123:48:42.0W

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
237	25	LGR	0	0	0	0	100	0	0	0	0
237	25	TOTAL RIFFLE	0	0	0	0	100	0	0	0	0
1	0	POW									
3	0	GLD									
189	11	RUN	0	11	0	67	11	0	0	0	11
69	9	SRN	30	25	5	0	16	0	0	0	25
262	20	TOTAL FLAT	23	23	4	12	15	0	0	0	23
320	310	MCP	13	23	38	5	9	0	0	5	7
1	1	LSBk	0	0	0	0	0	0	0	0	0
321	311	TOTAL POOL	13	23	38	5	9	0	0	5	7
4	0	CUL									
826	356	TOTAL	13	23	39	4	9	0	0	4	8

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017 Dry Units: 2

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

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
237	24	LGR	0	0	88	13	0	0	0
1	0	POW	0	0	0	0	0	0	0
3	0	GLD	0	0	0	0	0	0	0
189	11	RUN	0	0	91	0	0	0	9
69	10	SRN	0	0	90	0	0	0	10
321	319	MCP	2	8	82	2	1	1	6
1	1	LSBk	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	60	40	0	99	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: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017 Survey Length (ft.): 41216.8 Main Channel (ft.): 41216.8 Side Channel (ft.): 0

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 41216.8
Riffle/Flatwater Mean Width (ft.): 7.8
BFW:
Range (ft.): 7 to 35
Mean (ft.): 17
Std. Dev.: 7
Base Flow (cfs.): 2.0
Water (F): 54 - 67 Air (F): 54 - 71
Dry Channel (ft): 28

Canopy Density (%): 97.2
Coniferous Component (%): 60.1
Hardwood Component (%): 39.9
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 99.5
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Cobble/Gravel
Occurrence of LWD (%): 29
LWD per 100 ft.:
Riffles: 0
Pools: 3
Flat: 1

Pools by Stream Length (%): 41.2
Pool Frequency (%): 38.9
Residual Pool Depth (%):
< 2 Feet Deep: 55
2 to 2.9 Feet Deep: 28
3 to 3.9 Feet Deep: 10
>= 4 Feet Deep: 7
Mean Max Residual Pool Depth (ft.): 2.2
Mean Pool Shelter Rating: 17

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 2 Gravel: 86 Sm Cobble: 7 Lg Cobble: 1 Boulder: 0 Bedrock: 3

Embeddedness Values (%): 1. 70.5 2. 24.2 3. 1.9 4. 1.6 5. 1.9

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2007 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

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	37	36	10.0
Boulder	2	3	0.7
Cobble / Gravel	187	203	53.3
Sand / Silt / Clay	140	124	36.1

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	57	44	13.8
Hardwood Trees	117	106	30.5
Coniferous Trees	190	214	55.2
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 1

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

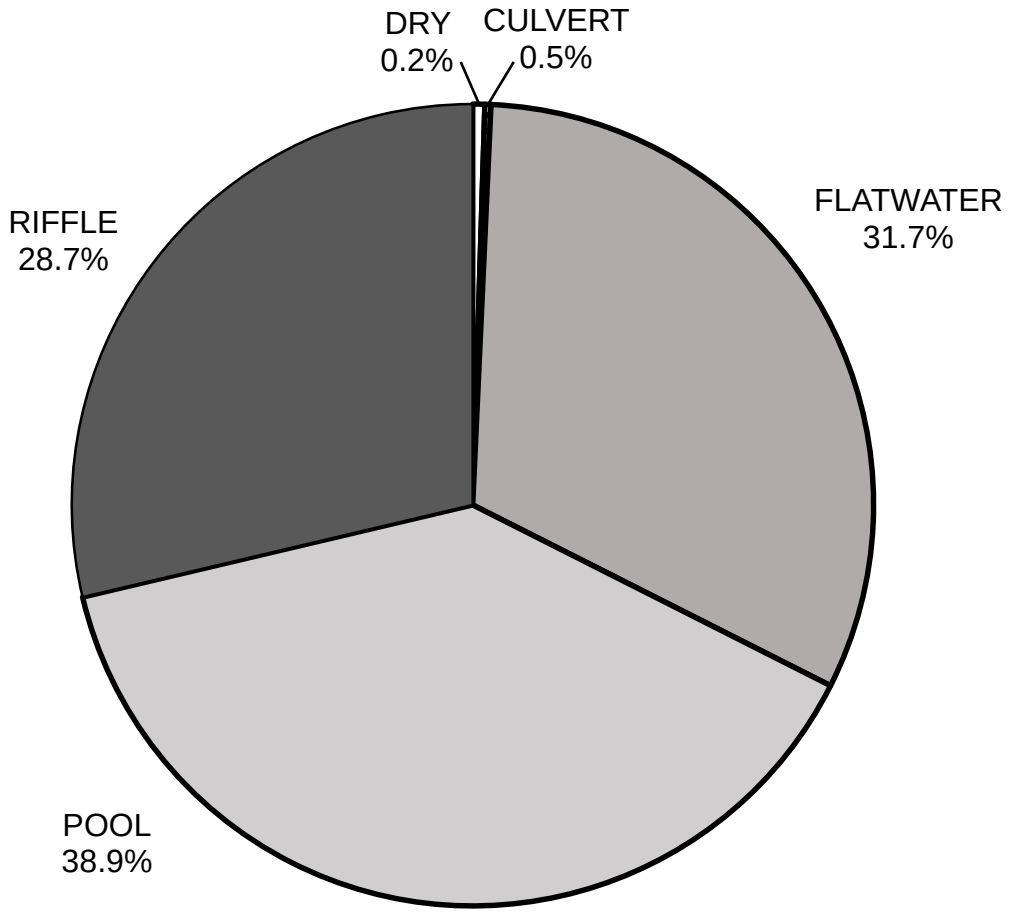
StreamName: Hare Creek LLID: 1238116394173 Drainage: Noyo River

Survey Dates: 8/2/2017 to 8/30/2017

Confluence Location: Quad: FORT BRAGG Legal Description: T18NR18WS13 Latitude: 39:25:02.0N Longitude: 123:48:42.0W

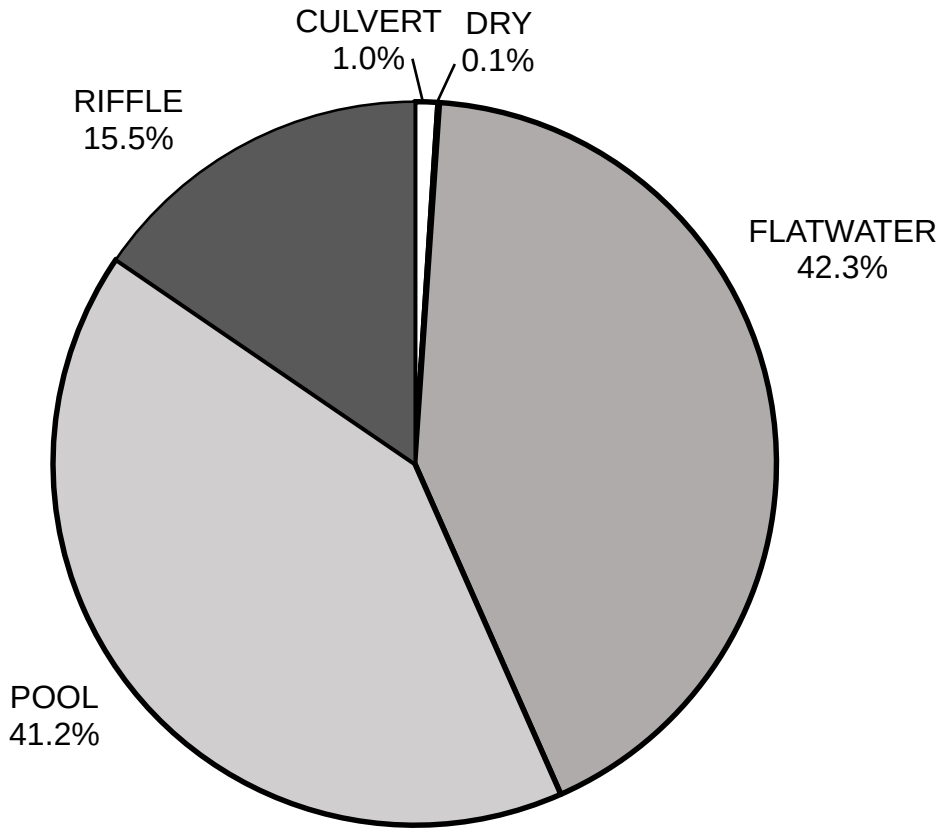
	Riffles	Flatwater	Pools
UNDERCUT BANKS(%)	0	23	13
SMALL WOODY DEBRIS (%)	0	23	23
LARGE WOODY DEBRIS (%)	0	4	38
ROOT MASS (%)	0	12	5
TERRESTRIAL VEGETATION (%)	100	15	9
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	5
BEDROCK LEDGES (%)	0	23	7

HARE CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE



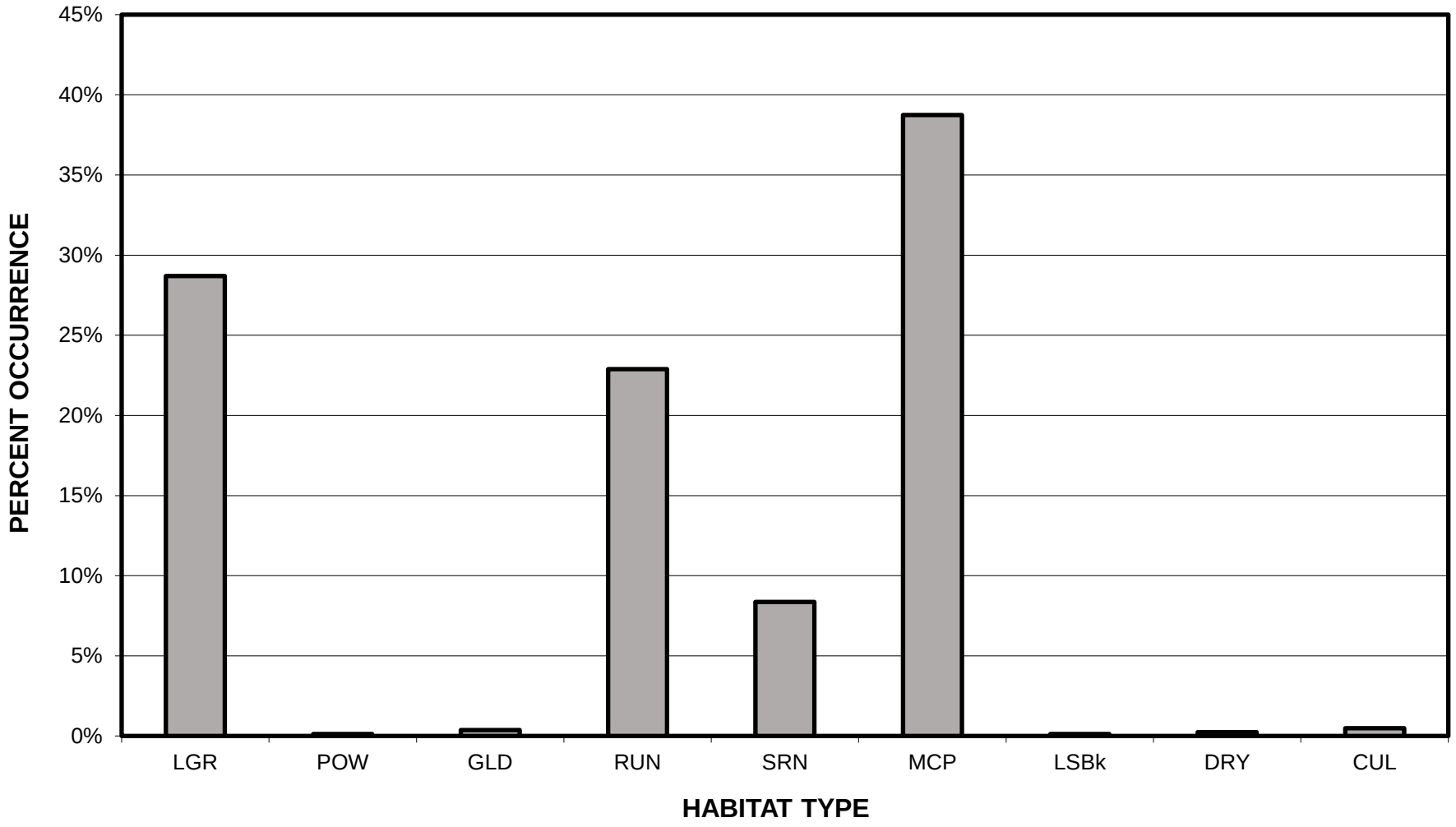
GRAPH 1

HARE CREEK 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH



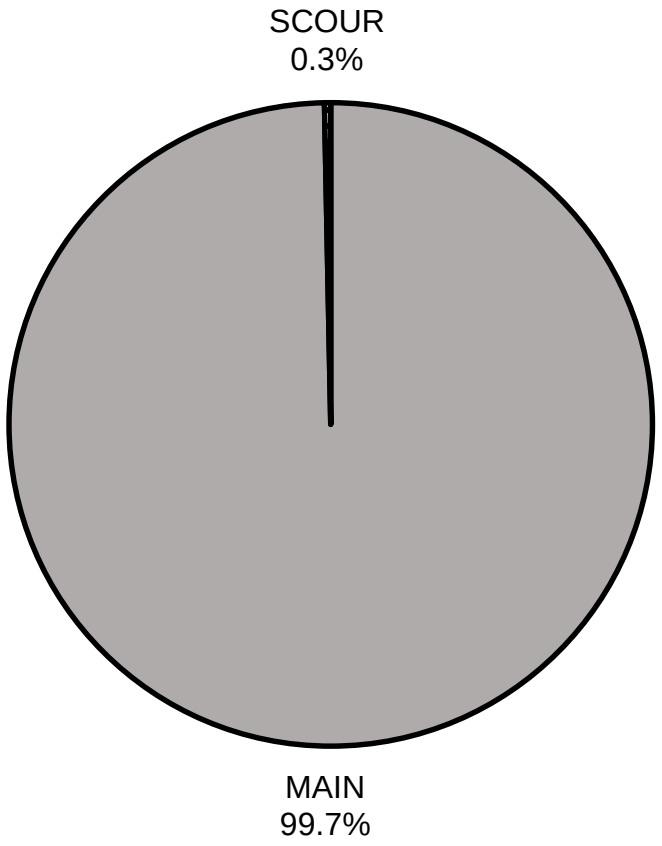
GRAPH 2

HARE CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE



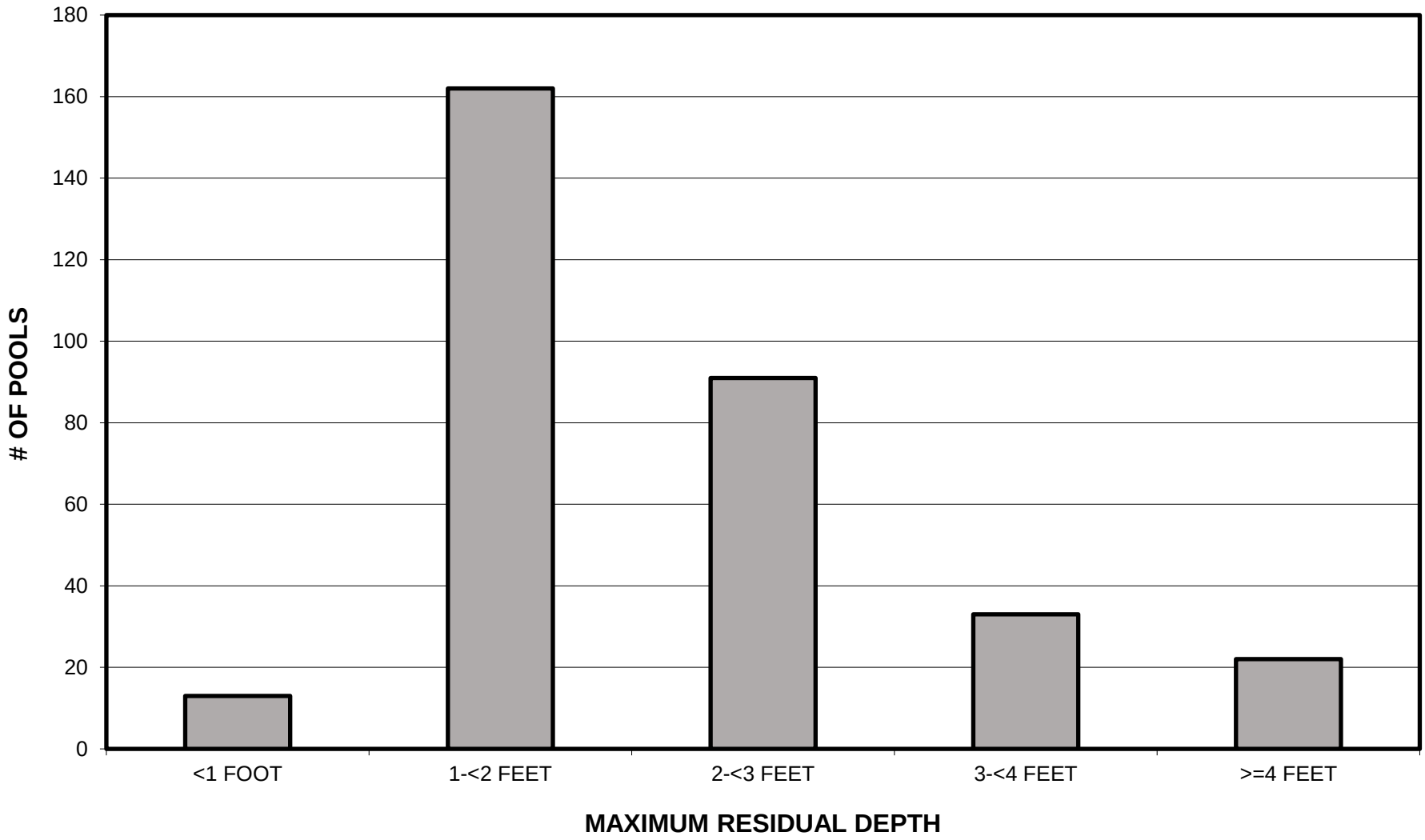
GRAPH 3

HARE CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE



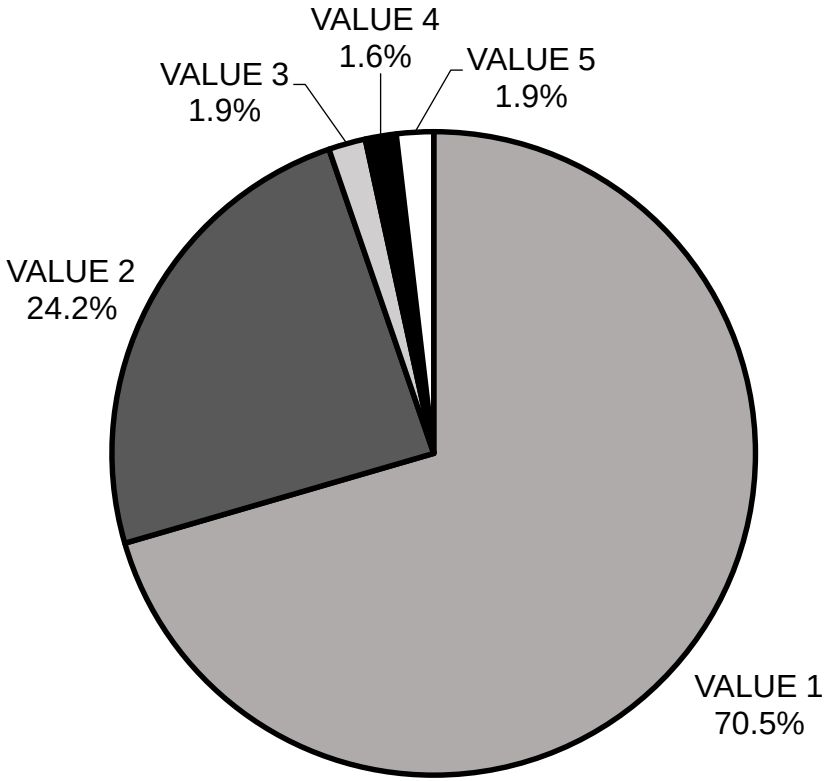
GRAPH 4

HARE CREEK 2007
MAXIMUM DEPTH IN POOLS



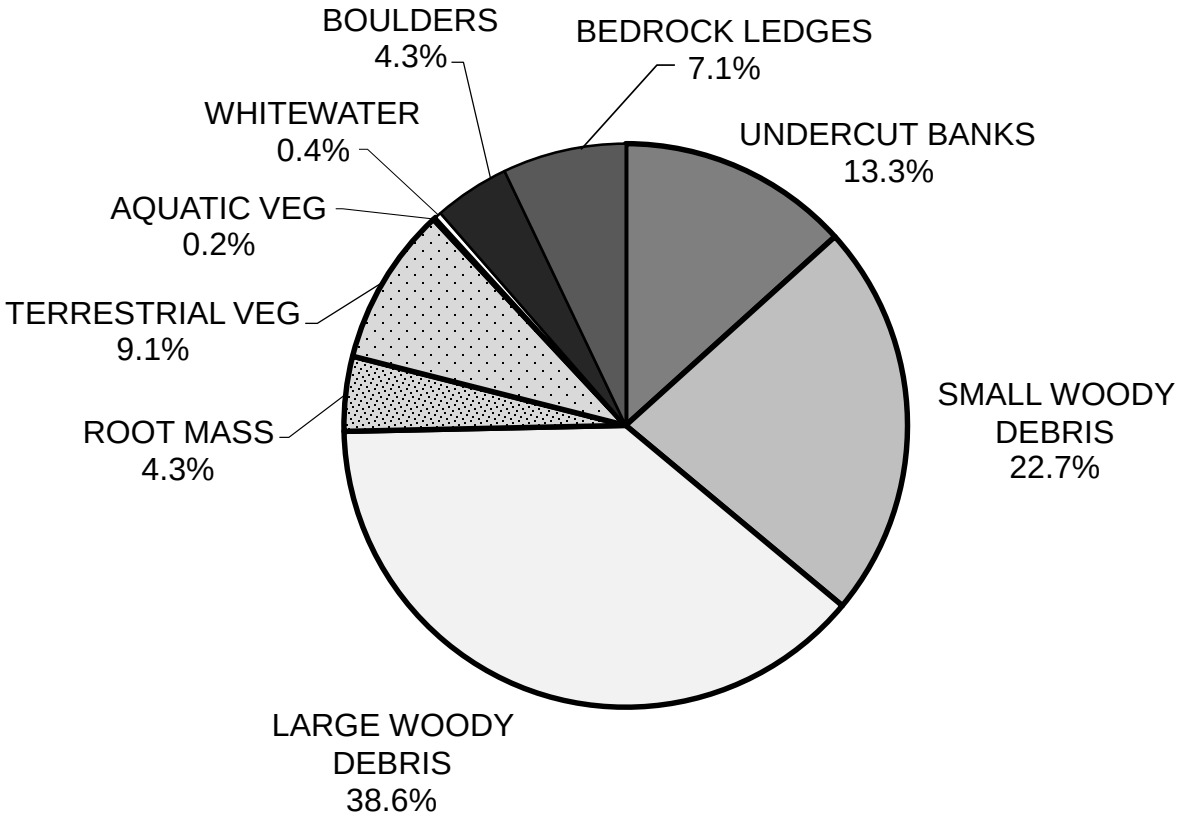
GRAPH 5

HARE CREEK 2007
PERCENT EMBEDDEDNESS



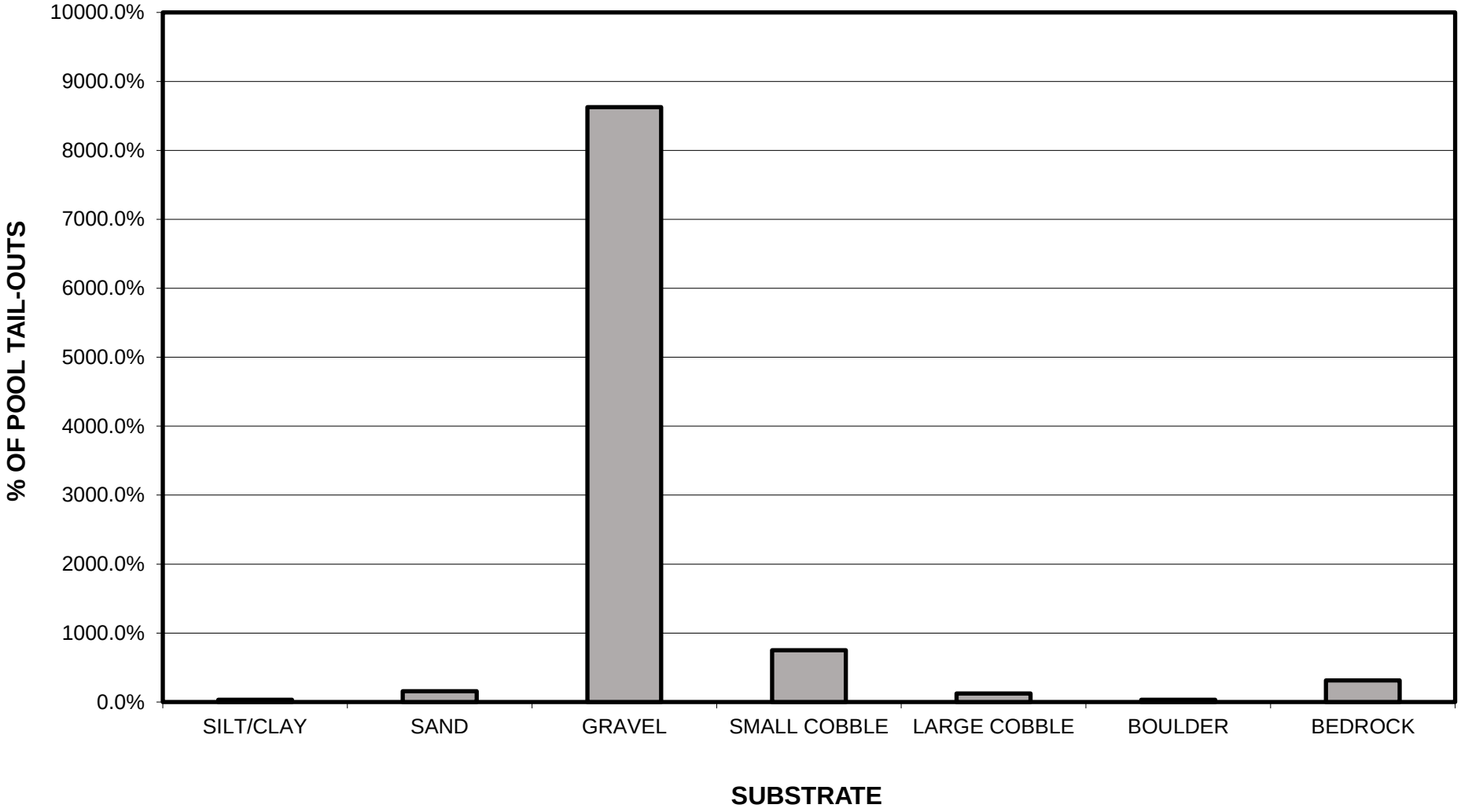
GRAPH 6

HARE CREEK 2007
MEAN PERCENT COVER TYPES IN POOLS



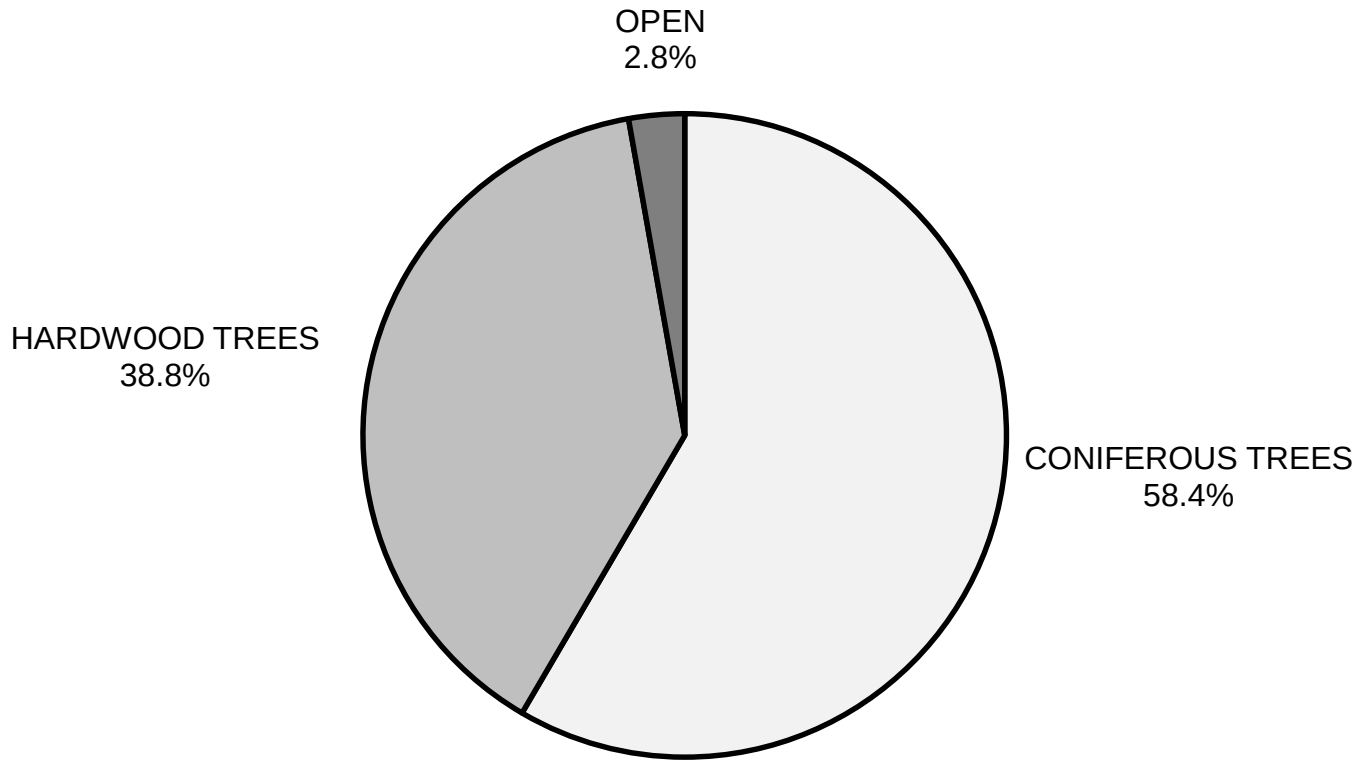
GRAPH 7

HARE CREEK 2007
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



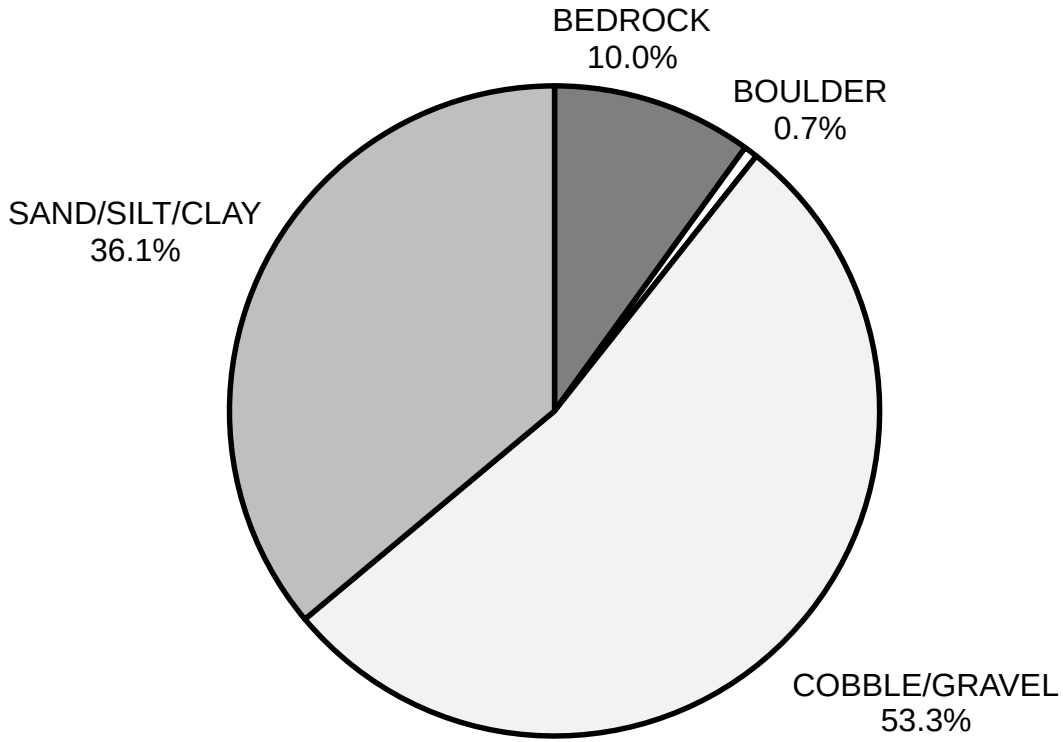
GRAPH 8

HARE CREEK 2007
MEAN PERCENT CANOPY

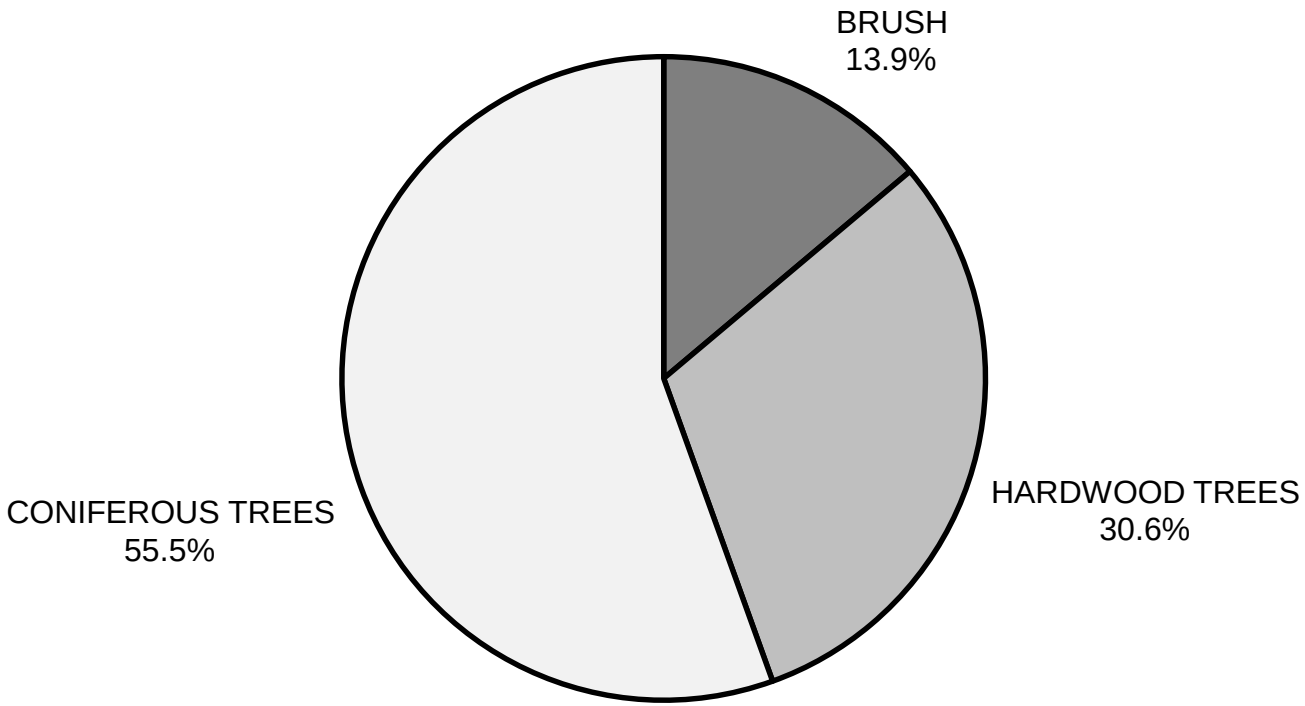


GRAPH 9

HARE CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



HARE CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS

Photo 1: Run at habitat unit #311, 21,111' upstream of start of survey. (Photo taken 7/18/17)

Photo 3: Bridge #1 at habitat unit #340; 22,683' upstream of start of survey. Looking downstream Pictured: Kori Roberts. (Photo taken 8/2/17)

Photo 3: Bedrock substrate at habitat unit #455; 27,733’ upstream of start of survey. Looking upstream. (Photo taken 8/3/17)