



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Bridge Creek

INTRODUCTION

A stream inventory was conducted from July 6 to August 8, 2016 on Bridge Creek. The survey began at the confluence with Eel River and extended upstream 0.8 miles.

The Bridge 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 Bridge 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 salmon, 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.

WATERSHED OVERVIEW

Bridge Creek is a tributary to Eel River which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Bridge Creek's legal description at the confluence with Eel River is T01N R02E S34. Its location is 40.4250° north latitude and -123.9358° west longitude, LLID number 1239359404249. Bridge Creek is a second order stream and has approximately 1.599 miles of blue line stream according to the USGS Redcrest 7.5 minute quadrangle. Bridge Creek drains a watershed of approximately 2.2 square miles. Elevations range from about 96 feet at the mouth of the creek to 657 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 101 to Avenue of the Giants.

METHODS

The habitat inventory conducted in Bridge Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project (WSP) members and California Conservation Corps (CCC) personnel that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). The 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 Bridge Creek to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Water and air temperatures are measured and recorded at every tenth habitat unit using a hand-held thermometer. Both temperatures are taken in degrees Fahrenheit and the time of the measurement is also recorded. Air temperatures are recorded within one foot of the water surface, while water temperatures are recorded (where possible) in flowing water within the habitat unit.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Bridge 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 Bridge 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:

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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 Bridge Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. The shelter rating is then calculated by multiplying the qualitative shelter value by the percent of the unit covered. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Bridge 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 Bridge 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

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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 Bridge Creek. In addition, underwater mask and snorkel observations were made at 10 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Bridge 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 *

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The habitat inventory of July 7 to August 8, 2016 was conducted by Alejandra Camacho (WSP), Amidia Frederick (WSP), and Chantel Moore (CCC). The total length of the stream surveyed was 4,053 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.166 cfs on August 3, 2016.

Bridge Creek is a G4 channel type for 1,154 feet of the stream surveyed (Reach 1), an F4 channel type for 1,939 feet of the stream surveyed (Reach 2), and a G6 channel type for 960 feet of the stream surveyed (Reach 3).

G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios, very stable with gravel-dominant substrates. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with gravel-dominant substrates. G6 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios, very stable with silt/clay-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 61 degrees Fahrenheit. Air temperatures ranged from 60 to 74 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% pool units, 33% riffle units, 25% flatwater units, and 4% dry units (Graph 1). Based on total length of Level II habitat types there were 48% pool units, 25% riffle units, 24% flatwater units, 2% culvert units, and 1% dry units (Graph 2).

Thirteen 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, 30%; and run units, 22% (Graph 3). Based on percent total length, mid-channel pools units made up 42%, high gradient riffle units 22%, and step run units 20%.

A total of 76 pools were identified (Table 3). Main-channel pools were the most frequently encountered at 91% (Graph 4), and comprised 88% 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. Twenty-two of the 74 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 75 pool tail-outs measured, 15 had a value of 1 (20%); 18 had a value of 2 (24%); 17 had a value of 3 (22.7%); 6 had a value of 4 (8%); 19 had a value of 5 (25.3%) (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 1, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean

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shelter rating of 49 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 48, scour pools had a mean shelter rating of 60, and backwater pools had a mean shelter rating of 90 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Bridge Creek. Graph 7 describes the pool cover in Bridge 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 82% of the pool tail-outs. Silt/clay was the next most frequently observed dominant substrate type and occurred in 18% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Bridge Creek was 91%. Nine percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 45% and 55%, respectively. Graph 9 describes the mean percent canopy in Bridge 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 70% sand/silt/clay, 20% bedrock, and 10% cobble/gravel (Graph 10). Deciduous trees were the dominant vegetation type observed in 39% of the units surveyed. Additionally, 36% of the units surveyed had coniferous trees as the dominant vegetation type, and 18% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A survey team conducted a mask and snorkel survey at 10 sites for species composition and distribution in Bridge Creek on May 23, 2016 (Table A). The sites were sampled by Silvia Gwozdz (CDFW), Kori Roberts (CDFW), and David Lam (CDFW).

In Bridge Creek 10 sites were sampled. The reach sites yielded 2 age 1+ SH, 5 YOY coho salmon, 2 rough-skinned newt, and 2 coastal giant salamander.

During the survey, the upstream-most observation of juvenile coho salmon occurred at 40.425° north latitude, -123.935° west longitude, approximately 441 feet upstream from the confluence with the Eel River; the upstream-most observation of juvenile steelhead-trout occurred at 40.4255° north latitude, -123.9361° west longitude, approximately 204 feet upstream from the confluence with the Eel River.

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Table A. Summary of results for a fish composition and distribution survey within Bridge Creek, May 23, 2016.

| Date | Survey Site # | Habitat Unit # | Habitat Type | Approx. Dist. from mouth (ft.) | Steelhead Trout | | | Coho Salmon | | Additional Aquatic Species Observed |
|-------------|---------------|----------------|--------------|--------------------------------|-----------------|----|----|-------------|----|--|
| | | | | | YOY | 1+ | 2+ | YOY | 1+ | |
| Reach 1: G4 | | | | | | | | | | |
| 06/23/16 | 1 | 9 | Run | 204 | 0 | 2 | 0 | 0 | 0 | |
| | 2 | 15 | Pool | 343 | 0 | 0 | 0 | 5 | 0 | |
| | 3 | 18 | Pool | 427 | 0 | 0 | 0 | 1 | 0 | 1 rough skinned newt, 1 coastal giant salamander |
| | 4 | 23 | Pool | 579 | 0 | 0 | 0 | 0 | 0 | 1 Rough skinned newt |
| | 5 | 27 | Pool | 659 | 0 | 0 | 0 | 0 | 0 | |
| | 6 | 40 | Pool | 923 | 0 | 0 | 0 | 0 | 0 | |
| | 7 | 42 | Pool | 953 | 0 | 0 | 0 | 0 | 0 | 1 coastal giant salamander |
| | 8 | 47 | Pool | 1070 | 0 | 0 | 0 | 0 | 0 | |
| | 9 | 49 | Pool | 1097 | 0 | 0 | 0 | 0 | 0 | 1 coastal giant salamander |
| | 10 | 60 | Run | 1265 | 0 | 0 | 0 | 0 | 0 | |

DISCUSSION

Bridge Creek is a G4 channel type for the first 1,154 feet of stream surveyed, an F4 channel type for the next 1,939 feet, and a G6 channel type for the remaining 960 feet. The suitability of G4, F4, and G6 channel types for fish habitat improvement structures is as follows: G4 and G6 channels are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover. F4 channels are good for bank placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days July 6 to August 4, 2016, ranged from 54° to 61° Fahrenheit. Air temperatures ranged from 60° to 74° Fahrenheit. This is a suitable water temperature range for salmonids. However, 60° 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 24% of the total length of this survey, riffles 25%, and pools 48%. Twenty-two of the 74 (30%) pools had a maximum residual depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

Thirty-three of the 75 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-three

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

Fifty of the 73 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools is 49. The shelter rating in the flatwater habitats is 0. 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 Bridge 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 91%. Reach 1 had a canopy density of 75.5%; Reach 2 had a canopy density of 98%; and Reach 3 had a canopy density of 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 99% and 100%, respectively.

RECOMMENDATIONS

Bridge 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 Bridge 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 large woody debris. Adding high quality complexity with woody cover in the pools is desirable.
- 2) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.
- 3) Increase the canopy in Reach 1 on Bridge Creek by planting appropriate native vegetation like willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels.
- 4) 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

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August temperature extreme period should be performed for three to five 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 confluence with the Eel River. Channel type is a G4. Channel type cross-section location is at Habitat Unit (HU) #15. |
| 16 | 0002.00 | The Eel River forms a backwater pool parallel to Bridge Creek. |
| 120 | 0004.00 | The start of a bedrock canyon with 35' walls. Habitat units 001-004 have sand mounds on both sides of the banks. The mound on the left bank is about 8' tall at a 35-50 degree angle towards the creek. The right bank has slightly more gravel mixed in the sand. |
| 343 | 0015.00 | Salmonid young-of-the-year (YOY) present. |
| 461 | 0019.00 | There is a piece of large wood that spans through the unit and it retains sediment. |
| 599 | 0023.00 | Dry tributary enters from right bank. |
| 659 | 0026.00 | The Canyon begins to taper off. A dry tributary enters on the right bank with a 6' high ledge. |
| 752 | 0029.00 | There are many pieces of large wood throughout this unit. The left bank is steep. Throughout units 029-033 there is a large number of logs both within and out of bank full. Sizes range from small to large old growth root wads. Some logs have silver tags. There was a possible landslide on both sides. The log jams do not span entire bankfull at one given point so it is not a log debris accumulation (LDA), but may be a possible barrier during different seasons and/or salmonid life cycle stages. |
| 792 | 0030.00 | There is erosion on the left bank and the substrate is held back from an LDA wood that might have cause a dry unit. |
| 828 | 0033.00 | There was another cluster of large wood but it does not span the entire bank and retains the sediment. There is erosion on the left bank 3' high x 30' long. |
| 853 | 0035.00 | The canyon seems to end but is still entrenched. The banks are no longer bedrock and there is erosion on the right bank. |

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| 921 | 0040.00 | LDA #1 is 7.5' high x 24' wide x 16' 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 21' wide x 18' long x 4' deep. The sediment is sand. The LDA is a possible barrier to salmonids as it has tightly knit wood. Fish were not observed above the LDA. In the event of high flows the LDA would have a plunge of about 4'. |
| 943 | 0041.00 | There is erosion on the left bank. In habitat units 41-50 there is erosion in most of the units on the left and right banks. |
| 973 | 0042.00 | There is a landslide on the right bank. |
| 1021 | 0045.00 | Dry tributary enters on the right bank. A fallen log is retaining sediment. |
| 1068 | 0046.00 | There is erosion on the left and right banks. |
| 1081 | 0047.00 | LDA #2 is 6' high x 25' wide x 17' long and contains 6 pieces of LWD. Water does not flow through the LDA and there are no visible gaps in it. The LDA is a possible barrier to salmonids as it has tightly knit wood. Fish were not observed above the LDA. |
| 1101 | 0048.00 | LDA #3 is 10' high x 28' wide x 13' 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 20' wide x 18' long x 3' deep. The sediment is sand. The LDA is a possible barrier to salmonids as it has a long matrix of wood to navigate to get upstream. Fish were not observed above the LDA. |
| 1138 | 0050.00 | LDA #4 is 8.5' high x 21' wide x 27' long and contains 10 pieces of LWD. Water flows through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 21' wide x 28' long x 3' deep. The sediment is gravel. The LDA is a possible barrier to salmonids as it has tightly knit wood and sediment in areas where water is flowing. Fish were not observed above the LDA. |
| 1154 | 0051.00 | Channel type is an F4. Channel type cross-section location is at HU #73. |
| 1165 | 0053.00 | There are many pieces of small woody debris (SWD). |
| 1176 | 0054.00 | The erosion stops on the left bank, but continues on the right bank. |
| 1186 | 0055.00 | There is a lot of sediment retained from the wood on this unit. |
| 1229 | 0058.00 | There are six upright wood logs with rebar through them, parts of an old bridge. |

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| 1290 | 0062.00 | There is erosion on the left bank. |
| 1367 | 0067.00 | The large woody debris (LWD) is retaining sediment but is not spanning the whole channel. |
| 1569 | 0075.00 | There is erosion on the right bank, approximately 5' high x 13 feet long. There are more upright logs with rebar in this unit. |
| 1585 | 0076.00 | There is erosion on the right bank, approximately 25' high x 10' long. |
| 1802 | 0084.00 | There is a 1.3' plunge into a 0.7' pool. |
| 1828 | 0085.00 | The right bank has slid into the creek, while the left bank is affected by the fallen trees. |
| 1922 | 0087.00 | There is a railroad post causing a dam and holding back sediment. There is also a landslide on the left bank. |
| 1989 | 0088.00 | Erosion on the right bank, approximately 4' high x 10' long. |
| 2092 | 0091.00 | There are more vertical log posts. The channel also gets wider starting here. |
| 2316 | 0099.00 | There are more log posts with rebar. |
| 2445 | 0104.00 | There are 4 stumps, greater than 12 inches in diameter, holding back SWD. |
| 2522 | 0108.00 | LDA #5 is 10' high x 23' wide x 10' long and contains 4 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 19' long x 4' 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. |
| 2583 | 0110.00 | This pool is caused by a root wad, lwd, and swd, and is holding back sediment. |
| 2627 | 0112.00 | There is a large log retaining a large amount of sediment, almost making a dammed pool. |
| 2634 | 0113.00 | There is erosion on the right bank under a large log which is trapping more wood. |
| 2735 | 0118.00 | There are more upright logs from an old bridge holding back wood and retaining sediment. |

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| 2835 | 0123.00 | There are more log posts catching wood. |
| 2887 | 0126.00 | Tributary #1 enters on the right bank. It contributes approximately 50% of Bridge Creek's flow. The water temperature of the tributary was 59 degrees Fahrenheit, the water temperature downstream of the confluence was 60 degrees Fahrenheit, and the water temperature upstream of the confluence was 60 degrees Fahrenheit. The slope of the tributary is 1.28%. The tributary is accessible to salmonids due to a low gradient and no significant blockages. Fish were not observed in the tributary. |
| 2934 | 0128.00 | There is erosion on the right bank, approximately 6' high x 20' long. |
| 2955 | 0130.00 | The erosion continues on the right bank. |
| 3021 | 0133.00 | Culvert #1 is Shively Creek Road and is 12.3' high x 12.2' wide x 72' long. It is composed of one culvert, and is made of CMP. The culvert's diameter is 12', its plunge height is 0', and it has a maximum depth of 1.1' within 5' of the outlet. The slope is 0%, and its condition is good. It is not a possible barrier to juvenile and adult salmonids. |
| 3093 | 0134.00 | Channel type is a G6. Channel type cross-section location is at HU #151. |
| 3135 | 0136.00 | There is erosion on the left bank, approximately 7' high x 15' long. |
| 3173 | 0139.00 | LDA #6 is 7' high x 17' wide x 11' long and contains 7 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 21' long x 5' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to salmonids as the pool is covered by a 6' wide log which may be difficult for adults to jump. Fish were not observed above the LDA. |
| 3248 | 0145.00 | There is a large accumulation of LWD at the top of this pool, which is trapping significant sediment and causing water to go subsurface, despite not spanning the entire channel. The accumulation is 6 feet long. |
| 3447 | 0154.00 | The right bank has an undercut of 4' deep. |
| 3541 | 0159.00 | The right bank is very undercut, with a log post. |
| 3638 | 0164.00 | LDA #7 is 12' high x 11' wide x 14' long and contains 21 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 13' wide x 16' long x 3' deep. The sediment ranges in size from silt to sand. The LDA is a possible barrier to salmonids as it has a 7' plunge into a 0.3' pool. Fish were not observed above the LDA. |

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| 3669 | 0165.00 | There is LWD retaining sediment and wood. Water is going subsurface. At higher flows there would be a 0.8' plunge into a 2' pool. |
| 3696 | 0167.00 | LWD is retaining sediment and creating a nearly dry unit above. |
| 3712 | 0169.00 | LWD is retaining sediment and creating a dry unit above. |
| 3730 | 0172.00 | Extensive SWD retaining sediment. The unit is nearly dry. |
| 3746 | 0173.00 | The channel is getting more narrow again. |
| 3792 | 0176.00 | The channel opened up again. |
| 3805 | 0177.00 | There are more log posts trapping wood. |
| 3822 | 0179.00 | LWD is trapping wood and sediment, stopping visible flow. |
| 3831 | 0180.00 | LDA #8 is 6.3' high x 15' wide x 8' long and contains 9 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 12' wide x 8' long x 4' deep. The sediment ranges in size from silt to gravel. The LDA is a possible barrier to salmonids as it is dry above the unit and it may be too high for adults to jump. Fish were not observed above the LDA. |
| 3851 | 0182.00 | There is a large wood accumulation that is approximately 6' long x 11' wide x 8 feet high retaining sediment on the right bank and causing a 2 foot plunge into a 0.7 foot deep pool. |
| 3872 | 0185.00 | Flow is very low. |
| 3892 | 0188.00 | LDA #9 is 8' high x 9' wide x 17' long and contains 8 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 11' wide x 12' long x 4' deep. The sediment ranges in size from sand to gravel. The LDA is a possible barrier to salmonids as it is too closely knit for juveniles and too big for adults to jump. Fish were not observed above the LDA. |
| 3989 | 0196.00 | The step is caused by a log. |
| 3995 | 0197.00 | There is a 1.2' plunge. LWD is retaining sediment through the channel. |
| 4023 | 0200.00 | End of survey due to significant barriers through much of the stream. No fish have been observed above the first LDA, and there have been 9 significant LDAs total. More blockages are observed upstream as well. |

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Tributary #2 enters on the left bank. It contributes to approximately 0% of Bridge Creek's flow. The water temperature of the tributary was 58 degrees Fahrenheit, the water temperature downstream of the confluence was 56 degrees Fahrenheit, and the water temperature upstream of the confluence was 57 degrees Fahrenheit. The slope of the tributary is 1%. The tributary is accessible to salmonids due to low gradient and no significant blockages. Fish were not observed in the tributary.

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.

California Department of Fish and Wildlife

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 } |

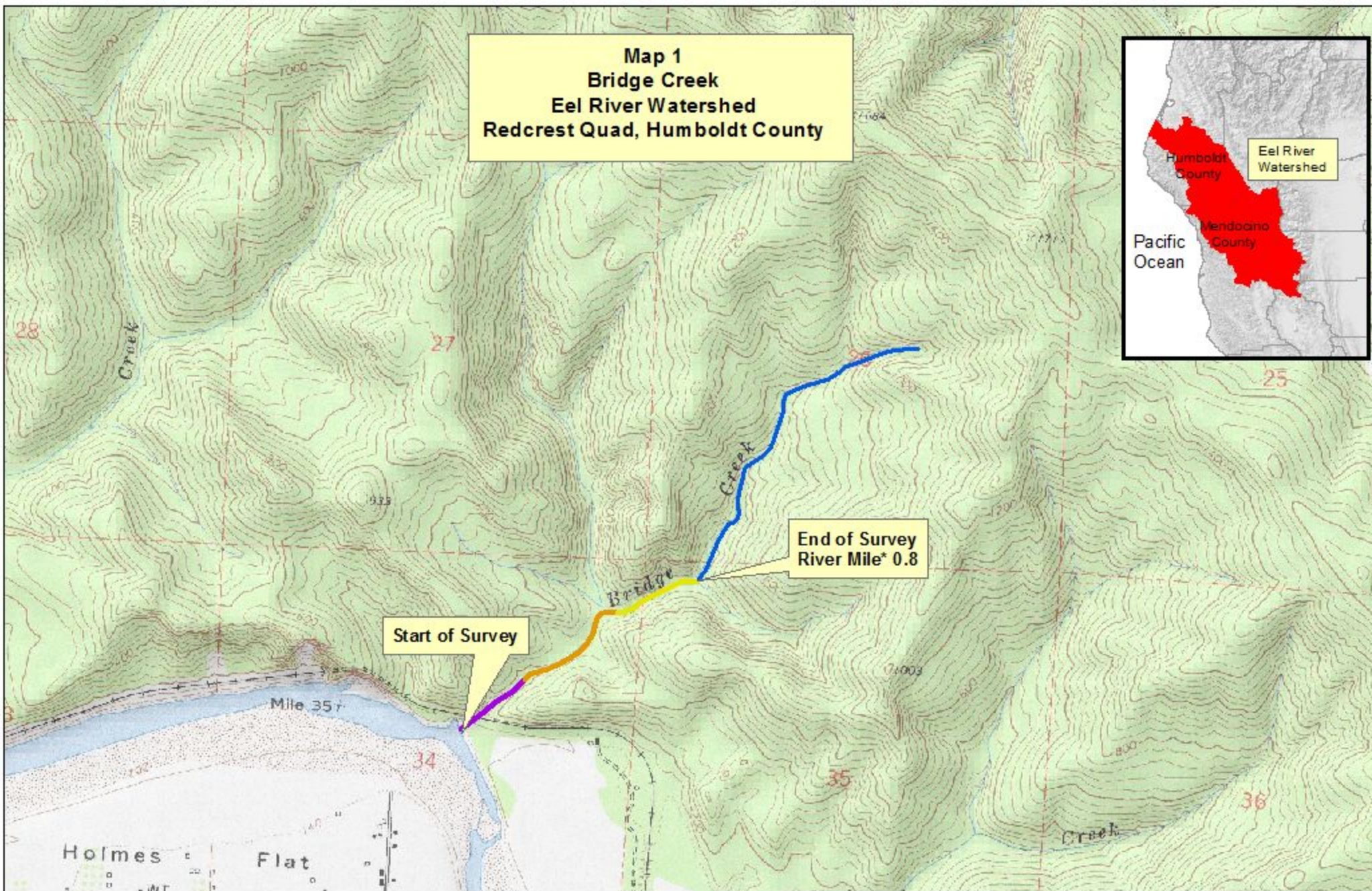
BACKWATER POOLS

| | | | |
|----------------------------------|-------|-------|-------|
| 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} |

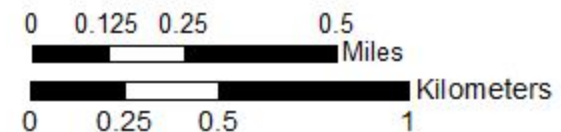
ADDITIONAL UNIT DESIGNATIONS

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

Map 1
Bridge Creek
Eel River Watershed
Redcrest Quad, Humboldt County



- | | | | |
|---|-----------------------------|---|-----------------------------|
|  | Reach 1: G4 Channel Type |  | Reach 3: G6 Channel Type |
|  | Reach 2: F4 Channel Type |  | Bridge Creek |



APPENDIX I

TABLES AND GRAPHS

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

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0

| Habitat Units | Units Fully Measured | Habitat Type | Habitat Occurrence (%) | Mean Length (ft.) | Total Length (ft.) | Total Length (%) | Mean Width (ft.) | Mean Depth (ft.) | Mean Max Depth (ft.) | Mean Area (sq.ft.) | Estimated Total Area (sq.ft.) | Mean Volume (cu.ft.) | Estimated Total Volume (cu.ft.) | Mean Residual Pool Vol (cu.ft.) | Mean Shelter Rating |
|---------------|----------------------------|--------------|------------------------|--------------------|--------------------|------------------|------------------|------------------|----------------------|---------------------|-------------------------------|-----------------------|---------------------------------|---------------------------------|---------------------|
| 1 | 0 | CULVERT | 0.5 | 72 | 72 | 1.8 | | | | | | | | | |
| 7 | 0 | DRY | 3.5 | 8 | 54 | 1.3 | | | | | | | | | |
| 50 | 3 | FLATWATER | 25.0 | 19 | 974 | 24.0 | 3.5 | 0.3 | 0.5 | 44 | 2192 | 15 | 748 | | 0 |
| 76 | 74 | POOL | 38.0 | 26 | 1959 | 48.3 | 10.9 | 0.9 | 1.7 | 285 | 21648 | 373 | 28336 | 297 | 49 |
| 66 | 9 | RIFFLE | 33.0 | 15 | 994 | 24.5 | 10.1 | 0.2 | 0.4 | 318 | 21008 | 142 | 9382 | | 1 |
| Total Units | Total Units Fully Measured | | | Total Length (ft.) | | | | | | Total Area (sq.ft.) | | Total Volume (cu.ft.) | | | |
| 200 | 86 | | | 4053 | | | | | | 44847 | | 38466 | | | |

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| 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 (%) |
|---------------|----------------------|--------------|------------------------|-------------------|--------------------|------------------|------------------|------------------|-----------------|--------------------|-------------------------------|----------------------|---------------------------------|---------------------------------|---------------------|-----------------|
| 60 | 7 | LGR | 30.0 | 15 | 890 | 22.0 | 5 | 0.2 | 0.6 | 74 | 4469 | 16 | 959 | | 0 | 81 |
| 4 | 1 | HGR | 2.0 | 22 | 89 | 2.2 | 54 | 0.5 | 0.7 | 2333 | 9331 | 1166 | 4666 | | 10 | 82 |
| 2 | 1 | BRS | 1.0 | 8 | 15 | 0.4 | 2 | 0.1 | 0.2 | 11 | 21 | 1 | 2 | | 0 | 19 |
| 44 | 2 | RUN | 22.0 | 18 | 813 | 20.1 | 4 | 0.3 | 0.5 | 39 | 1705 | 12 | 512 | | 0 | 92 |
| 6 | 1 | SRN | 3.0 | 27 | 161 | 4.0 | 3 | 0.4 | 0.6 | 54 | 324 | 22 | 130 | | 0 | 75 |
| 1 | 1 | TRP | 0.5 | 8 | 8 | 0.2 | 5 | 0.8 | 1.5 | 40 | 40 | 40 | 40 | 32 | 80 | 97 |
| 68 | 67 | MCP | 34.0 | 25 | 1715 | 42.3 | 11 | 0.9 | 4.3 | 270 | 18327 | 340 | 23117 | 268 | 47 | 93 |
| 2 | 2 | LSL | 1.0 | 28 | 56 | 1.4 | 18 | 1.5 | 3.7 | 468 | 935 | 809 | 1617 | 694 | 85 | 100 |
| 1 | 1 | LSR | 0.5 | 39 | 39 | 1.0 | 19 | 1.8 | 2.9 | 741 | 741 | 1408 | 1408 | 1334 | 120 | 100 |
| 1 | 1 | LSBk | 0.5 | 32 | 32 | 0.8 | 5 | 0.8 | 1.1 | 160 | 160 | 176 | 176 | 128 | 0 | 92 |
| 2 | 1 | PLP | 1.0 | 21 | 42 | 1.0 | 14 | 1.8 | 3 | 140 | 280 | 266 | 532 | 252 | 10 | 98 |
| 1 | 1 | DPL | 0.5 | 67 | 67 | 1.7 | 15 | 0.9 | 2.2 | 1005 | 1005 | 1307 | 1307 | 905 | 90 | 97 |
| 7 | 0 | DRY | 3.5 | 8 | 54 | 1.3 | | | | | | | | | | 73 |
| 1 | 0 | CUL | 0.5 | 72 | 72 | 1.8 | | | | | | | | | | |

Total Units
200

Total Units Fully Measured
86

Total Length (ft.)
4053

Total Area (sq.ft.)
37338

Total Volume (cu.ft.)
34465

Table 3 - Summary of Pool Types

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| 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 |
|-------------------|----------------------------------|--------------|------------------------|-------------------|----------------------------|------------------|------------------|---------------------------|--------------------|-------------------------------|---------------------------------|-------------------------------------|---------------------|
| 69 | 68 | MAIN | 91 | 25 | 1723 | 88 | 10.6 | 0.9 | 266 | 18363 | 264 | 18238 | 48 |
| 6 | 5 | SCOUR | 8 | 28 | 169 | 9 | 14.6 | 1.5 | 395 | 2371 | 620 | 3721 | 60 |
| 1 | 1 | BACKWATER | 1 | 67 | 67 | 3 | 15.0 | 0.9 | 1005 | 1005 | 905 | 905 | 90 |
| Total Units 76 | Total Units Fully Measured 74 | | | | Total Length (ft.) 1959 | | | | | Total Area (sq.ft.) 21740 | | Total Volume (cu.ft.) 22863 | |

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

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| 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 |
|---------------|--------------|------------------------|---------------------------------|-----------------------------|-----------------------------------|-------------------------------|-----------------------------------|-------------------------------|-----------------------------------|-------------------------------|----------------------------------|------------------------------|
| 1 | TRP | 1 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 67 | MCP | 91 | 8 | 12 | 42 | 63 | 14 | 21 | 2 | 3 | 1 | 1 |
| 2 | LSL | 3 | 0 | 0 | 0 | 0 | 1 | 50 | 1 | 50 | 0 | 0 |
| 1 | LSR | 1 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 |
| 1 | LSBk | 1 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | PLP | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| 1 | DPL | 1 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 |

| Total Units | Total < 1 Foot Max Resid. Depth | Total < 1 Foot % Occurrence | Total 1< 2 Foot Max Resid. Depth | Total 1< 2 Foot % Occurrence | Total 2< 3 Foot Max Resid. Depth | Total 2< 3 Foot % Occurrence | Total 3< 4 Foot Max Resid. Depth | Total 3< 4 Foot % Occurrence | Total >= 4 Foot Max Resid. Depth | Total >= 4 Foot % Occurrence |
|-------------|---------------------------------|-----------------------------|----------------------------------|------------------------------|----------------------------------|------------------------------|----------------------------------|------------------------------|----------------------------------|------------------------------|
| 74 | 8 | 11 | 44 | 59 | 17 | 23 | 4 | 5 | 1 | 1 |

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Bridge Creek

LLID: 123935940429

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Dry Units: 7

Confluence Location:

Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| 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 |
|---------------|----------------------|---------------------|-----------------------|------------|------------|------------------|-------------------------|---------------------------|--------------------|-----------------|-----------------------|
| 60 | 5 | LGR | 0 | 2 | 63 | 0 | 0 | 0 | 2 | 33 | 0 |
| 4 | 1 | HGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | BRS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 66 | | TOTAL RIFFLE | 0 | 3 | 62 | 0 | 0 | 0 | 3 | 33 | 0 |
| 44 | 2 | RUN | 14 | 0 | 0 | 14 | 0 | 0 | 14 | 58 | 0 |
| 6 | 1 | SRN | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 76 | 0 |
| 50 | 3 | TOTAL FLAT | 9 | 0 | 0 | 9 | 0 | 0 | 17 | 65 | 0 |
| 61 | 1 | TRP | 17 | 5 | 47 | 6 | 0 | 0 | 7 | 18 | 0 |
| 68 | 67 | MCP | 0 | 0 | 85 | 0 | 0 | 0 | 0 | 15 | 0 |
| 2 | 2 | LSL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 1 | 1 | LSR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 1 | 1 | LSBk | 5 | 0 | 55 | 5 | 0 | 0 | 35 | 0 | 0 |
| 2 | 1 | PLP | 14 | 5 | 44 | 5 | 0 | 0 | 8 | 24 | 0 |
| 1 | 1 | DPL | 13 | 4 | 41 | 5 | 0 | 0 | 8 | 29 | 0 |
| 76 | 74 | TOTAL POOL | 16 | 28 | 52 | 0 | 0 | 0 | 0 | 0 | 4 |
| 1 | 0 | CUL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 200 | 84 | TOTAL | 17 | 26 | 50 | 0 | 0 | 0 | 0 | 0 | 7 |

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Dry Units: 7

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| 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 |
|---------------|----------------------|--------------|----------------------------|-----------------------|-------------------------|-------------------------------|-------------------------------|--------------------------|--------------------------|
| 60 | 7 | LGR | 0 | 14 | 71 | 14 | 0 | 0 | 0 |
| 4 | 1 | HGR | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 2 | 1 | BRS | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| 44 | 2 | RUN | 0 | 50 | 0 | 0 | 0 | 0 | 50 |
| 6 | 1 | SRN | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 1 | 1 | TRP | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| 68 | 66 | MCP | 26 | 68 | 5 | 2 | 0 | 0 | 0 |
| 2 | 2 | LSL | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | LSR | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | LSBk | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | PLP | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | DPL | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

| Mean Percent Canopy | Mean Percent Conifer | Mean Percent Hardwood | Mean Percent Open Units | Mean Right Bank % Cover | Mean Left Bank % Cover |
|---------------------------|----------------------------|-----------------------------|-------------------------------|-------------------------------|------------------------------|
| 91 | 55 | 45 | 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: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Survey Length (ft.): 4053

Main Channel (ft.): 4053

Side Channel (ft.): 0

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34 Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

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

| | | |
|--|--|---|
| Channel Type: G4 | Canopy Density (%): 75.5 | Pools by Stream Length (%): 48.2 |
| Reach Length (ft.): 1154 | Coniferous Component (%): 55.6 | Pool Frequency (%): 36.0 |
| Riffle/Flatwater Mean Width (ft.): 10.9 | Hardwood Component (%): 44.4 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Hardwood Trees | < 2 Feet Deep: 67 |
| Range (ft.): 12 to 24 | Vegetative Cover (%): 97.5 | 2 to 2.9 Feet Deep: 22 |
| Mean (ft.): 19 | Dominant Shelter: Large Woody Debris | 3 to 3.9 Feet Deep: 11 |
| Std. Dev.: 4 | Dominant Bank Substrate Type: Bedrock | >= 4 Feet Deep: 0 |
| Base Flow (cfs.): 0.2 | Occurrence of LWD (%): 21 | Mean Max Residual Pool Depth (ft.): 1.7 |
| Water (F): 58 - 61 Air (F): 66 - 70 | LWD per 100 ft.: | Mean Pool Shelter Rating: 44 |
| Dry Channel (ft): 13 | Riffles: 4 | |
| | Pools: 12 | |
| | Flat: 1 | |
| Pool Tail Substrate (%): Silt/Clay: 12 Sand: 12 Gravel: 53 Sm Cobble: 12 Lg Cobble: 0 Boulder: 0 Bedrock: 12 | | |
| Embeddedness Values (%): 1. 33.3 2. 33.3 3. 11.1 4. 0.0 5. 22.2 | | |

STREAM REACH: 2

| | | |
|---|--|---|
| Channel Type: F4 | Canopy Density (%): 98.0 | Pools by Stream Length (%): 44.1 |
| Reach Length (ft.): 1939 | Coniferous Component (%): 56.8 | Pool Frequency (%): 36.1 |
| Riffle/Flatwater Mean Width (ft.): 6.7 | Hardwood Component (%): 43.2 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Hardwood Trees | < 2 Feet Deep: 66 |
| Range (ft.): 11 to 25 | Vegetative Cover (%): 99.6 | 2 to 2.9 Feet Deep: 28 |
| Mean (ft.): 18 | Dominant Shelter: Large Woody Debris | 3 to 3.9 Feet Deep: 3 |
| Std. Dev.: 5 | Dominant Bank Substrate Type: Sand/Silt/Clay | >= 4 Feet Deep: 3 |
| Base Flow (cfs.): 0.2 | Occurrence of LWD (%): 45 | Mean Max Residual Pool Depth (ft.): 1.8 |
| Water (F): 56 - 59 Air (F): 62 - 74 | LWD per 100 ft.: | Mean Pool Shelter Rating: 51 |
| Dry Channel (ft): 22 | Riffles: 8 | |
| | Pools: 19 | |
| | Flat: 5 | |
| Pool Tail Substrate (%): Silt/Clay: 21 Sand: 11 Gravel: 54 Sm Cobble: 14 Lg Cobble: 0 Boulder: 0 Bedrock: 0 | | |
| Embeddedness Values (%): 1. 10.3 2. 24.1 3. 31.0 4. 10.3 5. 24.1 | | |

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

| | | |
|---|--|---|
| Channel Type: G6 | Canopy Density (%): 97.0 | Pools by Stream Length (%): 57.0 |
| Reach Length (ft.): 960 | Coniferous Component (%): 52.6 | Pool Frequency (%): 41.8 |
| Riffle/Flatwater Mean Width (ft.): 2.5 | Hardwood Component (%): 47.4 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Coniferous Trees | < 2 Feet Deep: 78 |
| Range (ft.): 8 to 18 | Vegetative Cover (%): 99.7 | 2 to 2.9 Feet Deep: 19 |
| Mean (ft.): 11 | Dominant Shelter: Large Woody Debris | 3 to 3.9 Feet Deep: 4 |
| Std. Dev.: 4 | Dominant Bank Substrate Type: Sand/Silt/Clay | >= 4 Feet Deep: 0 |
| Base Flow (cfs.): 0.2 | Occurrence of LWD (%): 43 | Mean Max Residual Pool Depth (ft.): 1.5 |
| Water (F): 54 - 58 Air (F): 60 - 68 | LWD per 100 ft.: | Mean Pool Shelter Rating: 51 |
| Dry Channel (ft): 19 | Riffles: 10 | |
| | Pools: 24 | |
| | Flat: 9 | |
| Pool Tail Substrate (%): Silt/Clay: 25 Sand: 4 Gravel: 68 Sm Cobble: 4 Lg Cobble: 0 Boulder: 0 Bedrock: 0 | | |
| Embeddedness Values (%): 1. 21.4 2. 17.9 3. 21.4 4. 10.7 5. 28.6 | | |

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location: Quad: REDCREST

Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

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 | 15 | 20 | 20.1 |
| Boulder | 0 | 0 | 0.0 |
| Cobble / Gravel | 11 | 7 | 10.3 |
| Sand / Silt / Clay | 61 | 60 | 69.5 |

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 | 2 | 6 | 4.6 |
| Brush | 15 | 16 | 17.8 |
| Hardwood Trees | 38 | 30 | 39.1 |
| Coniferous Trees | 28 | 35 | 36.2 |
| No Vegetation | 4 | 0 | 2.3 |

Total Stream Cobble Embeddedness Values: 3

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

Stream Name: Bridge Creek

LLID: 1239359404249

Drainage: Eel River - Lower

Survey Dates: 7/6/2016 to 8/4/2016

Confluence Location:

Quad: REDCREST

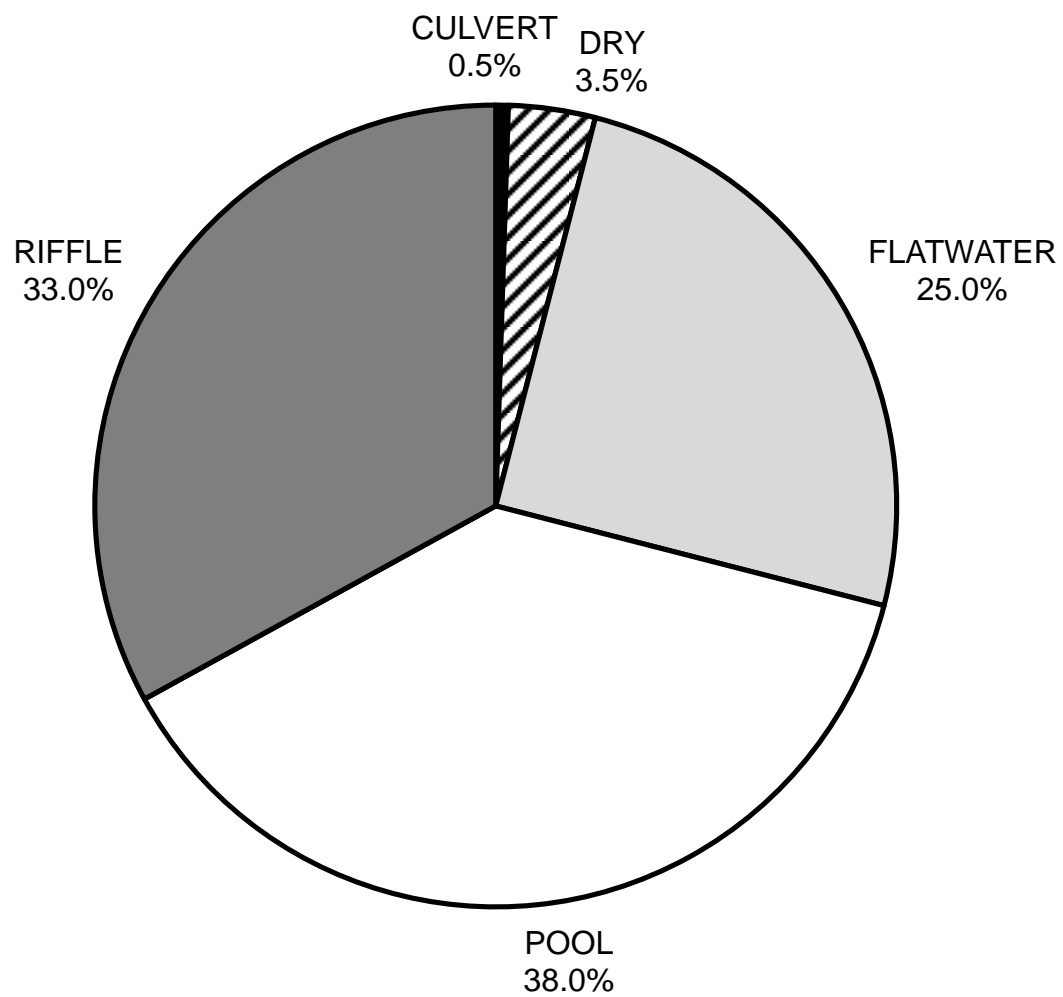
Legal Description: T01NR02ES34

Latitude: 40:25:30.0N

Longitude: 123:56:09.0W

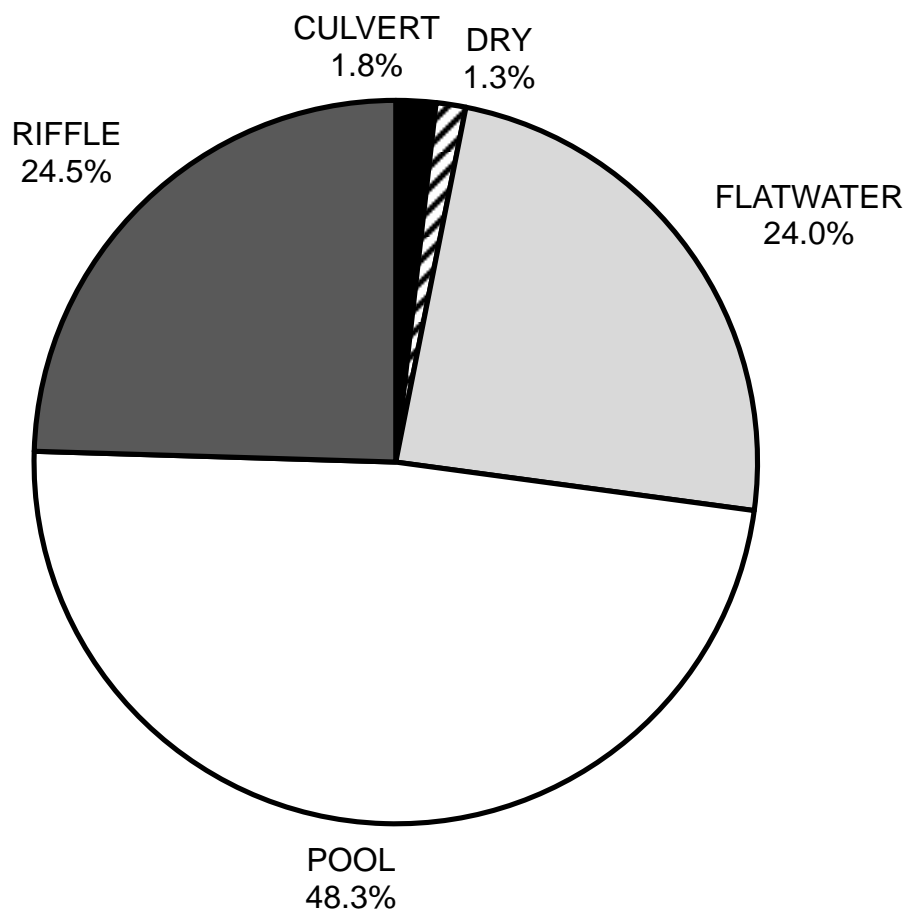
| | Riffles | Flatwater | Pools |
|----------------------------|----------------|------------------|--------------|
| UNDERCUT BANKS (%) | 100 | 0 | 16 |
| SMALL WOODY DEBRIS (%) | 0 | 0 | 29 |
| LARGE WOODY DEBRIS (%) | 0 | 0 | 55 |
| ROOT MASS (%) | 0 | 0 | 0 |
| TERRESTRIAL VEGETATION (%) | 0 | 0 | 0 |
| AQUATIC VEGETATION (%) | 0 | 0 | 0 |
| WHITewater (%) | 0 | 0 | 0 |
| BOULDERS (%) | 0 | 0 | 0 |
| BEDROCK LEDGES (%) | 0 | 100 | 0 |

BRIDGE CREEK 2016 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

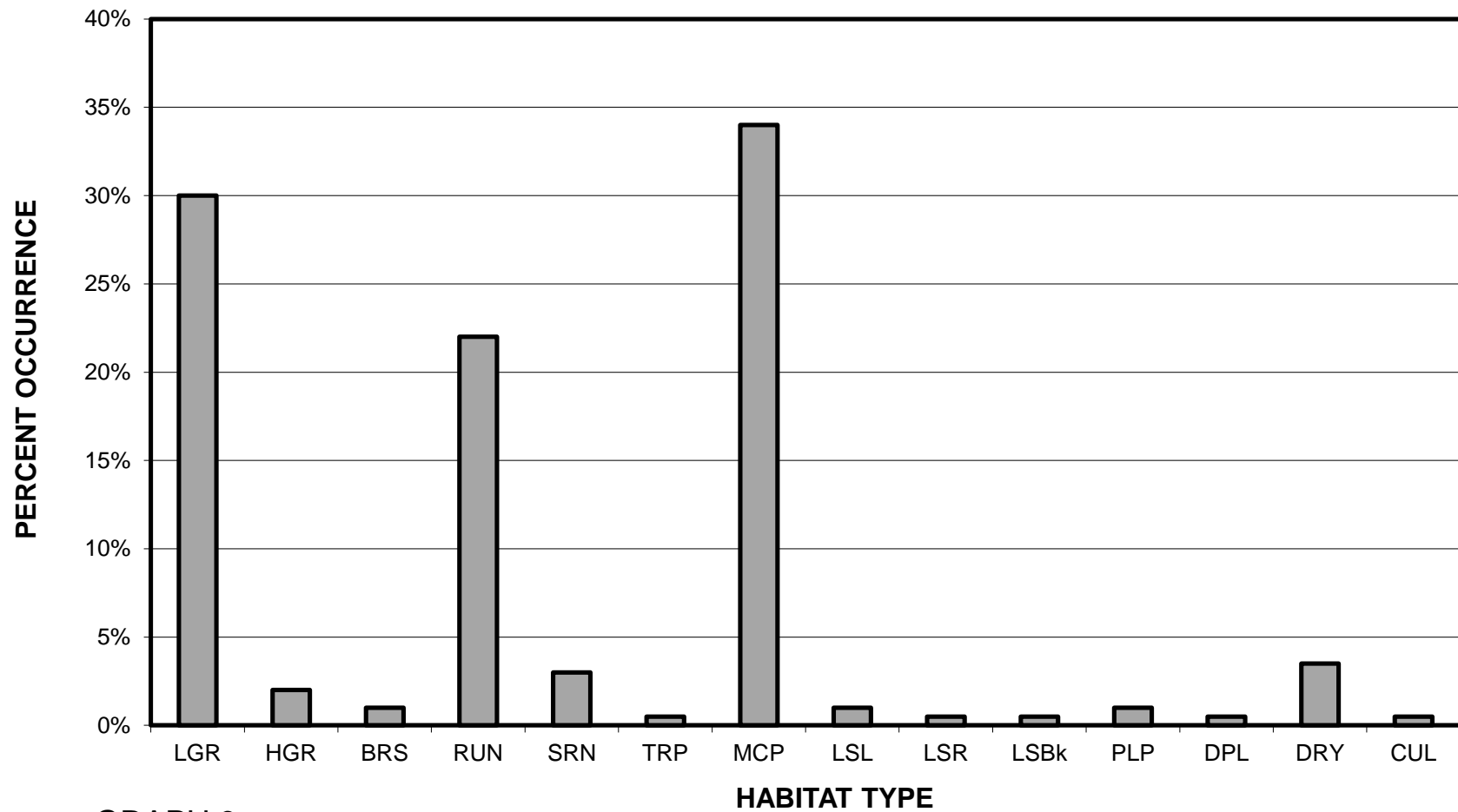
BRIDGE CREEK 2016 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

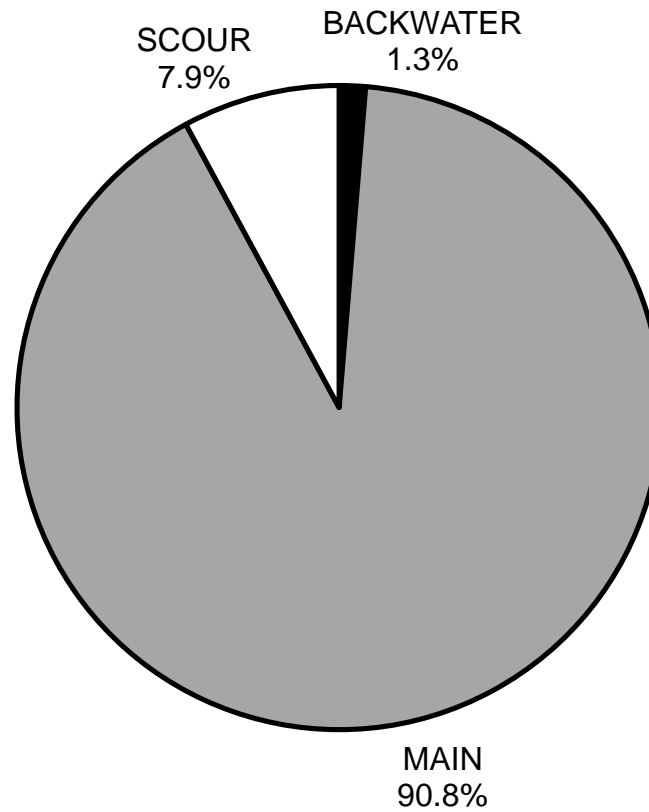
BRIDGE CREEK 2016

HABITAT TYPES BY PERCENT OCCURRENCE



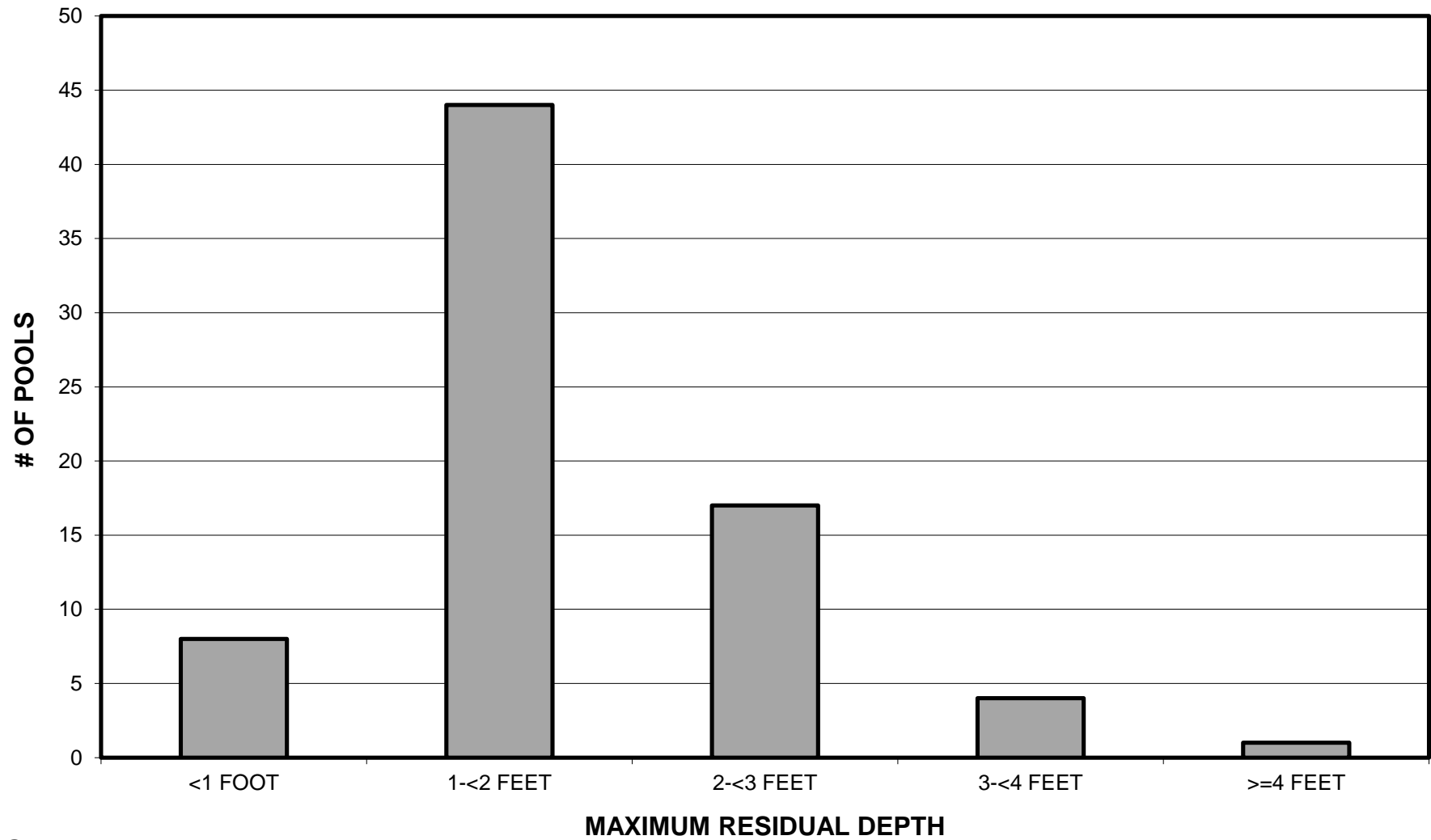
GRAPH 3

**BRIDGE CREEK 2016
POOL TYPES BY PERCENT OCCURRENCE**



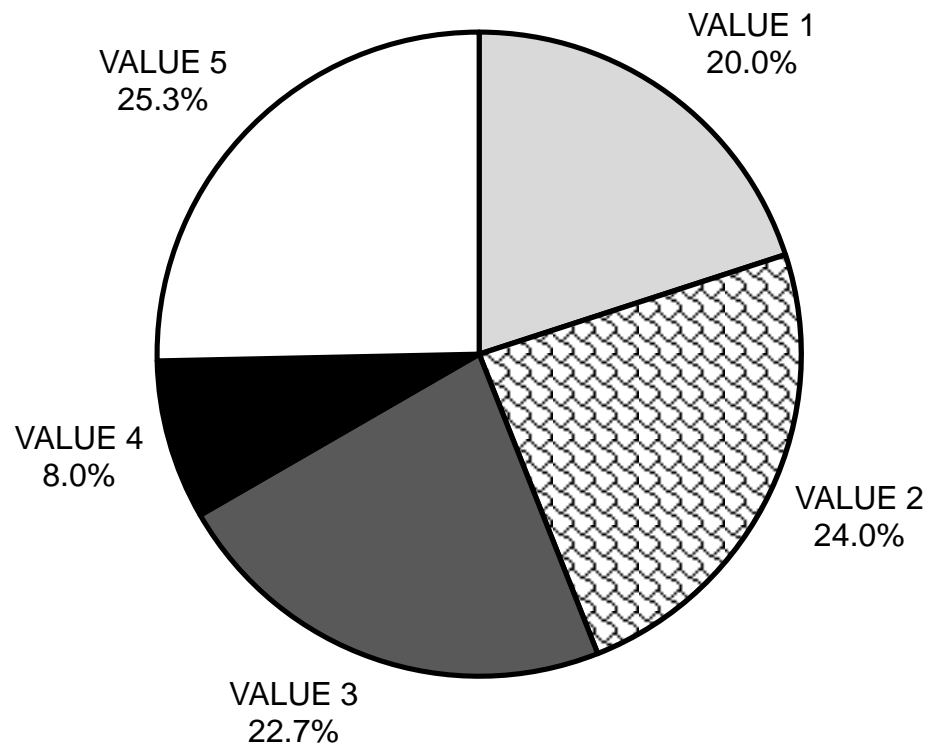
GRAPH 4

BRIDGE CREEK 2016 MAXIMUM DEPTH IN POOLS



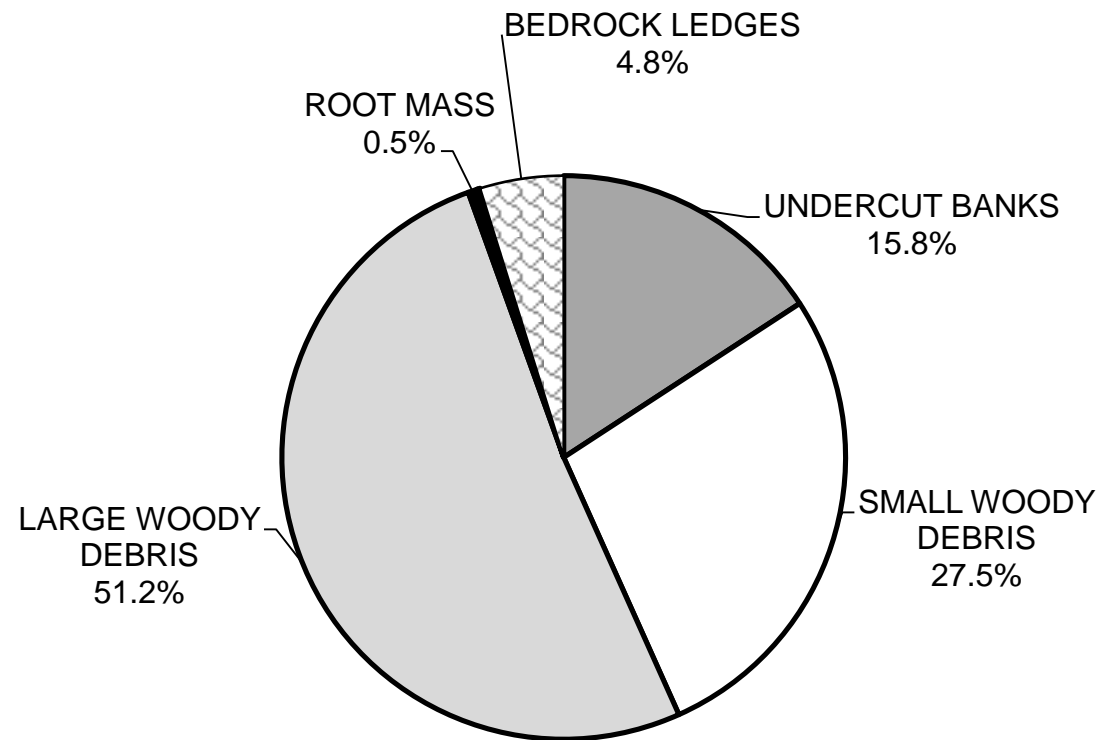
GRAPH 5

BRIDGE CREEK 2016 PERCENT EMBEDDEDNESS



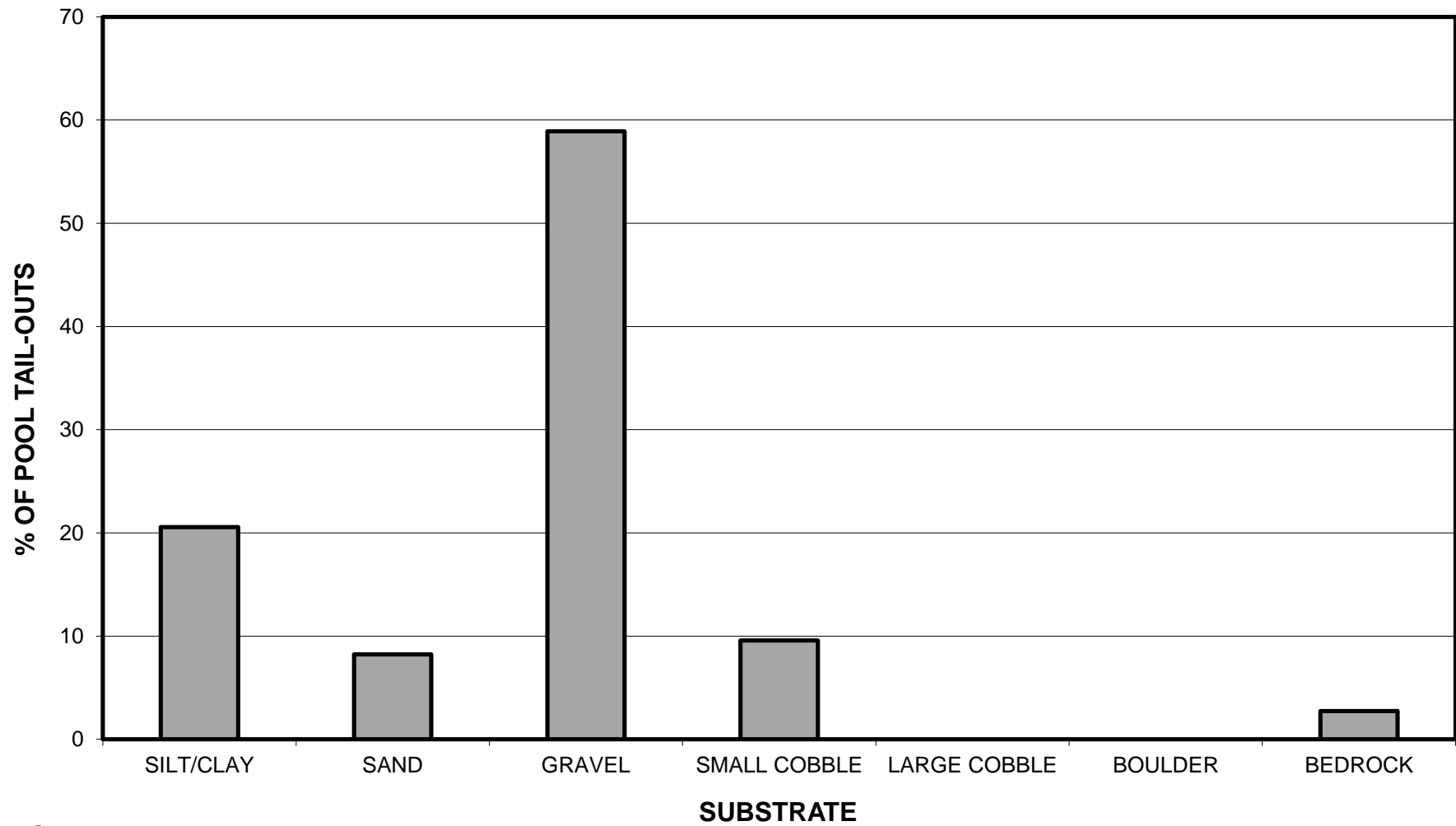
GRAPH 6

BRIDGE CREEK 2016 MEAN PERCENT COVER TYPES IN POOLS



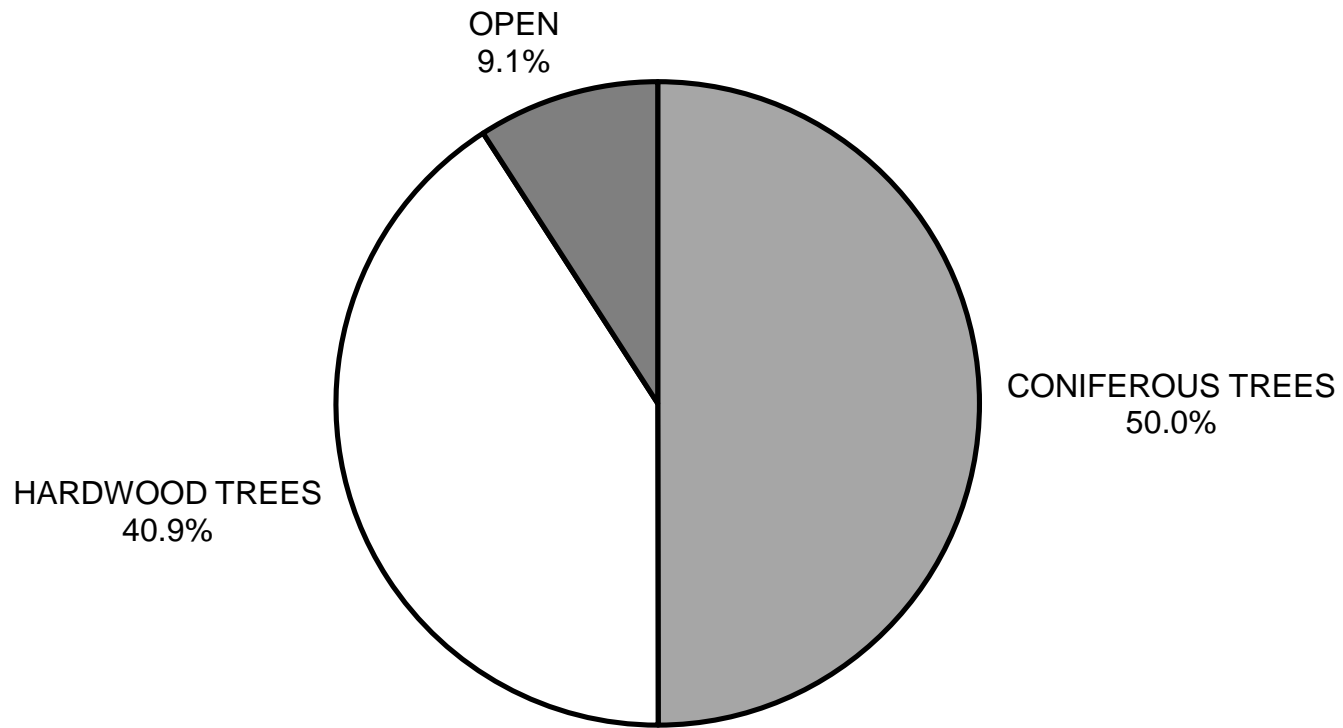
GRAPH 7

BRIDGE CREEK 2016 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



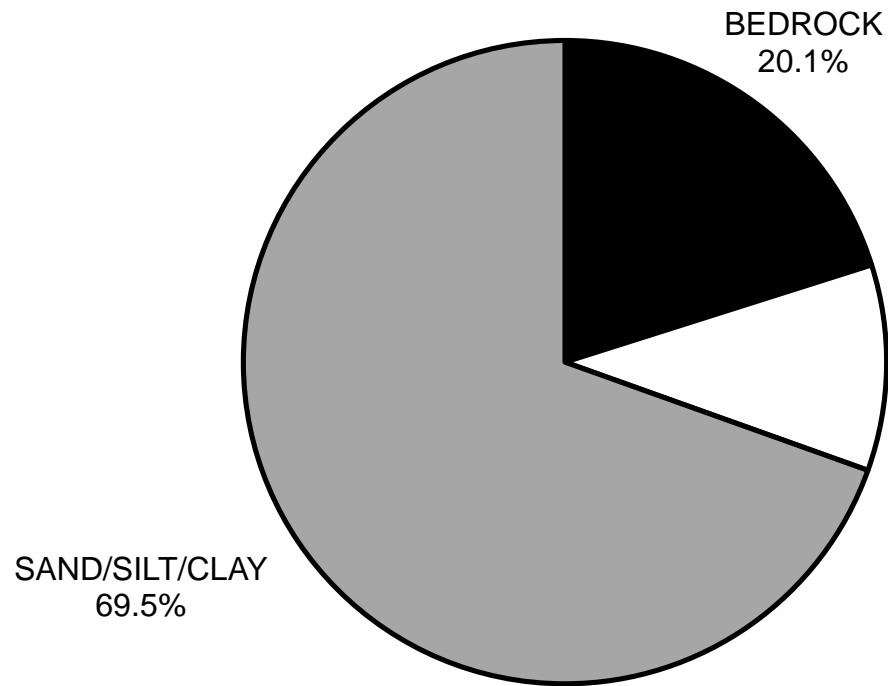
GRAPH 8

BRIDGE CREEK 2016 MEAN PERCENT CANOPY



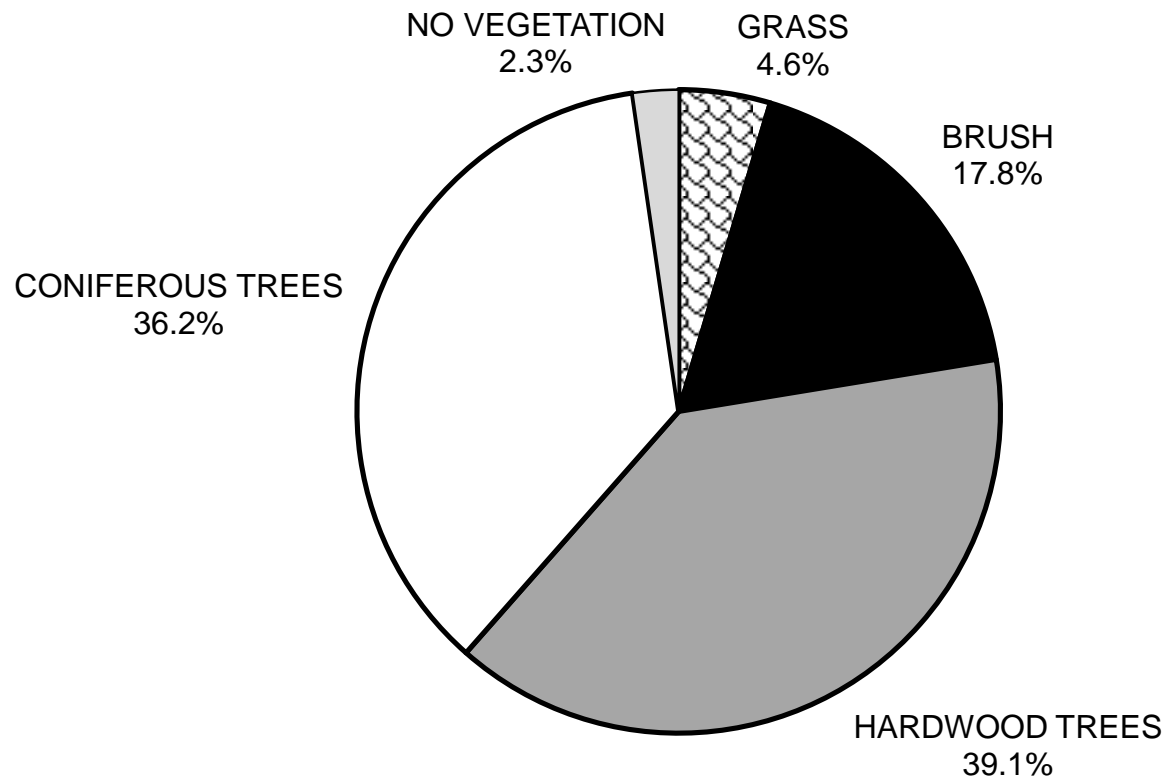
GRAPH 9

**BRIDGE CREEK 2016
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

BRIDGE CREEK 2016 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

APPENDIX II

STREAM INVENTORY PHOTOS



Photo 1: Habitat units #27-30. Large amount of woody debris accumulated in canyon (Photo taken 7-6-16).



Photo 2: Habitat unit #31, upstream of woody debris (Photo taken 7-6-16).



Photo 3: LDA#1 at habitat unit #40 (Photo taken 7-6-16).