

# STREAM INVENTORY REPORT

## Barber Creek

### INTRODUCTION

A stream inventory was conducted from July 22 to July 28, 2008 on Barber Creek. The survey began at the confluence with Eel River and extended upstream 2.5 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Barber Creek.

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

Barber Creek is a tributary to Eel River, which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Barber Creek's legal description at the confluence with Eel River is T2N R1W S22. Its location is 40.5472 north latitude and 124.1608 west longitude, LLID number 1241609405471. Barber Creek is a first order stream and has approximately 2.8 miles of blue line stream according to the USGS Fortuna 7.5 minute quadrangle. Barber Creek drains a watershed of approximately 1.8 square miles. Elevations range from about 40 feet at the mouth of the creek to 900 feet in the headwater areas. Mixed hardwood dominates the lower reaches of the watershed while mixed conifers, primarily redwood, dominate the upper watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Blue Slide Road, for access to the lower portions of the watershed, and Price Creek School Road for the middle and upper watershed.

### METHODS

The habitat inventory conducted in Barber Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Department of Fish and Game (DFG), Fish and Wildlife Scientific Aides that conducted the inventory were trained in standardized habitat inventory methods by DFG. 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

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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.

### 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 Barber 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 clinometer, hand level, hip chain, tape measure, and a stadia rod.

#### 3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

#### 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". Barber 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.

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### 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 Barber 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 unsuited 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. 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 Barber 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. 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 Barber 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 Barber 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.

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### 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. Detailed biological sampling (electrofishing and/or underwater observation) was not conducted on Barber Creek during the 2008 survey season. Fish presence was observed from the stream banks in Barber Creek. Bank observation techniques are 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 Game. 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Barber Creek include:

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

### HABITAT INVENTORY RESULTS

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

The habitat inventory of July 22 to July 28, 2008, was conducted by I. Mikus and S. McSmith, (DFG). The total length of the stream surveyed was 13,389 feet.

Stream flow was immeasurable due to low flow on Barber Creek using the Marsh-McBirney Model 2000 flow meter.

Barber Creek is an E6 channel type for 9,524 feet of the stream surveyed (Reach 1), a C4 channel type for 2,431 feet of the stream surveyed (Reach 2), and an F6 channel type for 1,434 feet of the stream surveyed (Reach 3). E6 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and silt/clay-dominant substrates. C4 channels are meandering point-bar, riffle/pool, alluvial channels with broad well defined floodplain on low gradients and gravel-dominant substrates. F6 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios, very stable with silt/clay-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 51 to 61 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 47% pool units, 36% flatwater units, 15% riffle units, 1% culvert units, 1% dry units, and 1% no survey units (Graph 1). Based on total length of Level II habitat types there were 54% flatwater units, 38% pool units, 7% riffle units, 1% culvert units, and 1% dry units (Graph 2).

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Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 42%; run units, 23%; and low gradient riffle units 15% (Graph 3). Based on percent total length, mid-channel pool units made up 35%, step run units 32%, and run units 21%.

A total of 150 pools were identified (Table 3). Main channel pools were the most frequently encountered at 91% (Graph 4), and comprised 93% 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. Sixty-eight of the 150 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 150 pool tail-outs measured, 2 had a value of 1 (1.3%); 7 had a value of 2 (4.7%); 29 had a value of 3 (19.3%); 87 had a value of 4 (58%); 25 had a value of 5 (16.7%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited 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 10, and pool habitats had a mean shelter rating of 27 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 27. Scour pools had a mean shelter rating of 26 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in Barber Creek. Graph 7 describes the pool cover in Barber Creek. Undercut banks are 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 61% of the pool tail-outs. Silt/clay was the next most frequently observed dominant substrate type and occurred in 21% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Barber Creek was 89%. Eleven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 99% and 1%, respectively. Graph 9 describes the mean percent canopy in Barber Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 95%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 97% sand/silt/clay, 1% bedrock, 1% boulder, and 1% cobble/gravel (Graph 10). Deciduous trees were the dominant vegetation type observed in 57% of the units surveyed. Additionally, 29% of the units surveyed had brush as the dominant vegetation type, and 14% had grass as the dominant vegetation type (Graph 11).

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### BIOLOGICAL INVENTORY RESULTS

No biological sampling was conducted on Barber Creek during the 2008 survey.

### DISCUSSION

Barber Creek is an E6 channel type for the first 9,524 feet of stream surveyed and a C4 channel type for the next 2,431 feet and an F6 channel type for the remaining 1,436 feet. The suitability of E6, C4, and F6 channel types for fish habitat improvement structures is as follows: E6 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. C4 channel types are good for bank-placed boulders and log cover and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors and log cover. F6 channel types are good for bank-placed boulders and fair for plunge weirs, boulder clusters, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days July 22 to July 28, 2008, ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 51 to 61 degrees Fahrenheit. This is a good temperature regime for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 54% of the total length of this survey, riffles 7%, and pools 38%. Sixty-eight of the 150 (45%) pools have 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.

Nine of the 150 pool tail-outs measured had embeddedness ratings of 1 or 2. One hundred sixteen of the pool tail-outs had embeddedness ratings of 3 or 4. Twenty-five 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 Barber Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred of the 150 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 was 27. The shelter rating in the flatwater habitats was 10. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by undercut banks in Barber Creek. Undercut banks are 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.

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The mean percent canopy density for the stream was 89%. Reach 1 had a canopy density of 88%, Reach 2 had a canopy density of 90%, and Reach 3 had a canopy density of 92%.

The percentage of right and left bank covered with vegetation was 95% and 94%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

### RECOMMENDATIONS

- 1) Approximately 377 feet upstream from the confluence with the Eel River, there is a 6.4 foot high, concrete, grade control structure which spans the channel. This structure is a barrier to salmonids. Conceptual design alternatives for removing the structure to provide unimpeded fish passage are needed. This will require working with the landowner upstream of the structure.
- 2) At approximately 5,680 feet Barber Creek flows through a culvert under Price Creek Road. The culvert is in poor condition with a significant bow in the middle and rust throughout the pipe. The outlet plunge is 1.3' with a pool depth of 1.0 feet within 5' of the outlet. The culvert's slope is between 1-2%. Barber Creek is beginning to undermine the culvert. This crossing should be upgraded to pass 100 year flow events and provide unimpeded fish passage, but only after the barrier at 377 feet is removed.
- 3) There are sections where the stream is being impacted from cattle trampling the riparian zone. Alternatives should be explored with the grazer and developed if possible.
- 4) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 5) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from undercut banks. Adding high quality complexity with woody cover in the pools is desirable.
- 6) 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.
- 7) 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.



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### 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 an Eel River side channel.
44	0002.00	Plunge over boulders of 3.2'.
331	0007.00	Barber Creek flows through a concrete box culvert at, Blue Slide Road, that is 8' high x 6' wide x 46' long; the bottom is concrete.
377	0008.00	At the top of the unit there is a concrete sill/plunge measuring 6.4', the sill is dated '1956' and says 'Hartley'. This structure is a barrier to adult and juvenile salmonids.
985	0020.00	A concrete bridge for a private road, is covered with earth and functions as a culvert with a natural bottom. The slope is < 1%. It's 6' long x 17' wide x 5' high at the inlet and approximately 4' high at the outlet. It is not a barrier to salmonids. The stream is side cutting the right bank wall of the bridge.
1358	0031.00	There is erosion on the left bank that is approximately 25' long x 7' high x 7' wide; it also looks like 4 cubic feet of fill dirt has fallen into the creek from where it was staged next to 2 plastic culverts on the bank.
1389	0032.00	There is a low water crossing here with cattle and tractor tracks. It is contributing sediment to the stream channel.
1752	0045.00	Cattle have been grazing in the stream channel.
2010	0054.00	There is left bank erosion measuring approximately 12' long x 7' high. This area may be an old crossing that is gone now.
2154	0056.00	Tributary #01 enters from the right bank. The discharge is estimated to be approximately 0.01cfs contributing roughly 3% to the flow of Barber Creek. The temperature downstream of the confluence is 55 degrees Fahrenheit while upstream is 54 degrees Fahrenheit. The temperature of the tributary is 57 degrees Fahrenheit. The slope of the tributary is 4%. No fish are present.

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- 3046 0075.00 On both banks there is erosion and evidence that cattle have been grazing in the creek channel. For the length of this unit there are cattle trails on both banks measuring approximately 5 feet wide.
- 3189 0077.00 Tributary #02 enters from the right bank. The discharge is estimated to be approximately 0.01cfs contributing roughly 3% to the flow of Barber Creek. The temperature downstream of the confluence is 55 degrees Fahrenheit while upstream is 56 degrees Fahrenheit. The temperature of the tributary is 56 degrees Fahrenheit. The slope of the tributary is 6%. While the tributary is accessible to fish, no fish are present.
- 3586 0079.00 There is a 4 inch water pipe in this pool, it is screened with approximately 0.5 inch mesh.
- 4809 0113.00 The left bank is being eroded by debris deflected water. The erosion measured approximately 6' wide x 10' tall.
- 5263 0127.00 At the bottom of this unit hunks of metal and wood have fallen into the active channel. Throughout this unit there are scattered pieces of junk metal.
- 5263 0127.00 Tributary #03 enters from the right bank. The discharge is estimated to be approximately 0.01cfs contributing roughly 2% to the flow of Barber Creek. The temperature downstream of the confluence is 54 degrees Fahrenheit while upstream is 52 degrees Fahrenheit. The temperature of the tributary is 58 degrees Fahrenheit. The slope of the tributary is 5%. No fish are present.
- 5531 0130.00 There is a bare bank on the right bank measuring approximately 20' long x 12' high, possibly caused by seeping water.
- 5629 0133.00 There is a debris accumulation made up of a large live tree and small woody debris (SWD) and large woody debris (LWD), it is currently fish passable.
- 5680 0136.00 Price Creek Road culvert is in poor condition with a significant bow in the middle and rust throughout the pipe. It measures 5.1' tall x 6.6' wide. The outlet plunge is 1.3' with a pool depth of 1.0 feet within 5' of the outlet. The culvert's slope is between 1-2%. Barber Creek is beginning to undermine the culvert. This crossing should be upgraded to pass 100 year flow events and provide unimpeded fish passage.
- 5790 0138.00 There is a partial dam at the top of this unit. Currently there is a 4.5' gap in the dam. The dam is not a barrier at this time.
- 5809 0139.00 The tail of the pool is covered in concrete.

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5832	0140.00	There is cattle access to the creek at this unit resulting in erosion and siltation. The bare bank measures 12' long x 50' high.
6436	0156.00	The right bank is bare in the dimensions of 15' long x 10' high, the left bank shows evidence of cattle.
6775	0170.00	Tributary #04 enters from the right bank. The discharge is estimated to be approximately 0.01cfs contributing roughly 2% to the flow of Barber Creek. The temperature downstream of the confluence is 53 degrees Fahrenheit while upstream is 53 degrees Fahrenheit. The temperature of the tributary is 52 degrees Fahrenheit. The slope of the tributary is 15%. No fish are present.
7425	0186.00	This unit is a U-shaped bend in the river and at the top there is a 2' plunge juvenile salmonid barrier.
8321	0209.00	Tributary #05 enters from the right bank. The discharge is estimated to be approximately 0.01cfs contributing roughly 3% to the flow of Barber Creek. The temperature downstream of the confluence is 53 degrees Fahrenheit while upstream is 53 degrees Fahrenheit. The temperature of the tributary is 53 degrees Fahrenheit. The slope of the tributary is 6%. The tributary is accessible to fish. At the mouth of the tributary there is an alluvial fan consisting of settled out excrement. There are no fish present.
8631	0217.00	There is cattle related erosion on both banks throughout this unit. Cattle use this unit and the previous unit for watering.
9145	0224.00	Barber Creek is flowing under root mass and soil.
9218	0228.00	A barbed wire fence crosses the creek on this unit. There has been extensive cattle tracks and scat in the creek from this unit downstream to the Price Creek road culvert.
9524	0230.00	The channel type changes from an E6 to a C4 at the top of this habitat unit.
9622	0233.00	Cattle traffic in Barber Creek has resumed.
9648	0235.00	At bottom of this unit there's a 1' diameter plastic culvert that appears to be blown out. Upstream of culvert is low water crossing with evidence of cattle using the creek. Upstream and downstream appears to be protected from cattle by fencing.
9797	0236.00	There is a root mass plunge of 1.9'.

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9984	0240.00	Despite cattle exclusion fencing, cows are still getting into the creek.
11472	0267.00	Tributary #06 enters from the left bank. The discharge is estimated to be approximately 0.1cfs contributing roughly 50% to the flow of Barber Creek. The temperature downstream of the confluence is 54 degrees Fahrenheit while upstream is 56 degrees Fahrenheit. The temperature of the tributary is 52 degrees Fahrenheit. The slope of the tributary is 4%. The bankfull width is less than 5' wide, however the salmonid habitat is good and it is contributing cold water to Barber Creek. No fish are present.
11637	0273.00	This unit has a thick layer of clay and silt. The silt layer measured up to 1.5' deep.
11955	0281.00	The channel type changes from a C4 to a F6 at the bottom of this habitat unit. Dry tributaries enter from the left and right banks.
11955	0281.00	There is right bank erosion measuring 30' long x 7' high.
12313	0293.00	Erosion on left bank measuring 25' long x 7' high.
12352	0295.00	There is a wet, but not flowing tributary entering from the right bank.
12430	0298.00	Cattle access to the creek has been greatly reduced since habitat unit #280, but there are still occasional tracks are still on the banks.
12523	0301.00	A dry tributary entered from the left bank.
12523	0301.00	There is a right bank slump measuring 20' high x 7' long.
12737	0308.00	There is evidence to suggest that this unit was a Humboldt crossing that has been removed or blown out.
12773	0309.00	This unit is highly sedimented at the bottom half.
13008	0314.00	Fill from a left bank road is slumping into the creek and contributing clay and silt. The bare bank measures approximately 50' long x 15' high. The slump runs the entire 90' of the unit length, but is partially vegetated.
13266	0318.00	Tributary #07 enters from the right bank. The discharge is estimated to be approximately 0.1cfs contributing roughly 95% to the flow of Barber Creek. The temperature downstream of the confluence is 59 degrees Fahrenheit while upstream is 58 degrees Fahrenheit. The temperature of the tributary is 62 degrees Fahrenheit. The slope of the tributary is 2%.

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This tributary has flow but lacks habitat. In the 1,000' visually surveyed, only 2 pools were observed and its width averaged 1.5'. Roughly 400' upstream from the confluence there was a blown out pipe, causing a 4' plunge barrier. No fish are present.

- 13279      0319.00      There is a root mass plunge of 5.5'. At moderate winter flows there is a side channel that would allow fish passage.
- 13365      0321.00      There is a 4.5' plunge that is probably not a barrier to salmonid adults.
- 13389      0321.00      The survey ended because Barber Creek went dry. The crew walked upstream over 1,000' and found no water. Anadromy could continue with flowing water. Reach 2 is heavily infested with English Ivy in the riparian zone.

## 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.

## Barber Creek

### 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]	

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

Stream Name: Barber Creek

LLID: 1241609405471 Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
2	0	CULVERT	0.6	38	76	0.6									
2	0	DRY	0.6	34	68	0.5									
116	19	FLATWATER	36.1	63	7267	54.3	5.3	0.4	0.8	296	34363	135	15667		10
2	0	NOSURVEY	0.6	8	16	0.1									
150	150	POOL	46.7	34	5062	37.8	8.9	1.1	2.1	294	44112	370	55561	331	27
49	7	RIFFLE	15.3	18	900	6.7	3.4	0.1	0.1	32	1580	3	151		0
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
321	176				13389					80054			71379		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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 (%)
48	7	LGR	15.0	18	856	6.4	3	0.1	0.2	32	1548	3	148		0	94
1	0	HGR	0.3	44	44	0.3										
6	2	GLD	1.9	36	215	1.6	6	0.7	1.3	174	1041	110	660		35	54
73	13	RUN	22.7	38	2747	20.5	5	0.3	0.9	214	15641	79	5755		5	88
37	4	SRN	11.5	116	4305	32.2	6	0.5	1.5	624	23088	330	12221		15	90
136	136	MCP	42.4	35	4715	35.2	9	1.1	6	302	41047	378	51344	337	27	89
1	1	CCP	0.3	17	17	0.1	8	0.9	1.4	136	136	136	136	122	20	97
5	5	CRP	1.6	30	151	1.1	7	0.8	1.85	200	1002	180	898	156	24	95
2	2	LSL	0.6	22	43	0.3	12	0.6	1.82	260	519	171	341	147	5	95
1	1	LSBo	0.3	19	19	0.1	7	0.3	0.8	120	120	60	60	36	20	56
5	5	PLP	1.6	23	117	0.9	11	2.0	3.7	258	1288	556	2781	525	37	91
2	0	DRY	0.6	34	68	0.5										
2	0	CUL	0.6	38	76	0.6										
2	0	NS	0.6	8	16	0.1										

Total Units  
321

Total Units Fully Measured  
176

Total Length (ft.)  
13389

Total Area (sq.ft.)  
85429

Total Volume (cu.ft.)  
74346



**Table 3 - Summary of Pool Types**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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
137	137	MAIN	91	35	4732	93	8.8	1.1	301	41183	336	45972	27
13	13	SCOUR	9	25	330	7	9.4	1.2	225	2929	287	3734	26

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
150	150	5062	44112	49706

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

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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
136	MCP	91	1	1	72	53	49	36	11	8	3	2
1	CCP	1	0	0	1	100	0	0	0	0	0	0
5	CRP	3	0	0	5	100	0	0	0	0	0	0
2	LSL	1	0	0	2	100	0	0	0	0	0	0
1	LSBo	1	1	100	0	0	0	0	0	0	0	0
5	PLP	3	0	0	0	0	3	60	2	40	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
150	2	1	80	53	52	35	13	9	3	2

Mean Maximum Residual Pool Depth (ft.): 2.1

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Dry Units: 2

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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
48	7	LGR	0	0	0	0	0	0	0	0	0
1	0	HGR									
49	7	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
6	2	GLD	45	0	0	0	55	0	0	0	0
73	13	RUN	48	32	9	0	9	0	0	2	0
37	4	SRN	45	46	3	1	5	0	0	0	0
116	19	TOTAL FLAT	47	31	6	0	14	0	0	1	0
136	136	MCP	38	36	11	2	11	0	0	1	0
1	1	CCP	95	0	0	5	0	0	0	0	0
5	5	CRP	80	14	0	3	3	0	0	0	0
2	2	LSL	0	30	20	0	50	0	0	0	0
1	1	LSBo	0	0	0	0	10	0	0	90	0
5	5	PLP	57	11	0	10	5	0	1	16	0
150	150	TOTAL POOL	40	34	10	3	11	0	0	2	0
2	0	CUL									
2	0	NS									
321	176	TOTAL	41	33	10	2	11	0	0	2	0

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Dry Units: 2

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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
48	7	LGR	0	0	100	0	0	0	0
1	0	HGR	0	0	0	0	0	0	0
6	2	GLD	100	0	0	0	0	0	0
73	13	RUN	23	31	46	0	0	0	0
37	4	SRN	25	0	75	0	0	0	0
136	135	MCP	78	13	9	0	0	0	0
1	1	CCP	0	0	100	0	0	0	0
5	5	CRP	80	20	0	0	0	0	0
2	2	LSL	100	0	0	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
5	5	PLP	80	0	0	0	0	20	0

**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
89	1	99	0	95	94

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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: Barber Creek LLID: 1241609405471 Drainage: Eel River - Lower  
 Survey Dates: 7/22/2008 to 7/28/2008 Survey Length (ft.): 13389 Main Channel (ft.): 13389 Side Channel (ft.): 0  
 Confluence Location: Quad: FORTUNA Legal Description: T02NR01WS22 Latitude: 40:32:50.0N Longitude: 124:09:39.0W

**Summary of Fish Habitat Elements By Stream Reach**

**STREAM REACH: 1**

Channel Type: E6	Canopy Density (%): 88.2	Pools by Stream Length (%): 39.6
Reach Length (ft.): 9524	Coniferous Component (%): 0.0	Pool Frequency (%): 47.8
Riffle/Flatwater Mean Width (ft.): 5.0	Hardwood Component (%): 100.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 56
Range (ft.): 11 to 19	Vegetative Cover (%): 95.2	2 to 2.9 Feet Deep: 35
Mean (ft.): 14	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 6
Std. Dev.: 3	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 3
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 10	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 53 - 55 Air (F): 51 - 61	LWD per 100 ft.:	Mean Pool Shelter Rating: 27
Dry Channel (ft): 8	Riffles: 0	
	Pools: 2	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 17 Sand: 13 Gravel: 64 Sm Cobble: 4 Lg Cobble: 0 Boulder: 2 Bedrock: 1		
Embeddedness Values (%): 1. 0.9 2. 3.6 3. 20.0 4. 60.0 5. 15.5		

**STREAM REACH: 2**

Channel Type: C4	Canopy Density (%): 90.3	Pools by Stream Length (%): 33.4
Reach Length (ft.): 2431	Coniferous Component (%): 4.0	Pool Frequency (%): 46.0
Riffle/Flatwater Mean Width (ft.): 5.0	Hardwood Component (%): 96.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 65
Range (ft.): 13 to 24	Vegetative Cover (%): 90.6	2 to 2.9 Feet Deep: 26
Mean (ft.): 19	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 9
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 4	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 54 - 56 Air (F): 54 - 57	LWD per 100 ft.:	Mean Pool Shelter Rating: 15
Dry Channel (ft): 0	Riffles: 0	
	Pools: 1	
	Flat: 0	
Pool Tail Substrate (%): Silt/Clay: 17 Sand: 4 Gravel: 65 Sm Cobble: 13 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 13.0 3. 21.7 4. 60.9 5. 4.3		

### Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 3**

Channel Type: F6	Canopy Density (%): 92.8	Pools by Stream Length (%): 33.2
Reach Length (ft.): 1434	Coniferous Component (%): 5.5	Pool Frequency (%): 41.5
Riffle/Flatwater Mean Width (ft.): 3.3	Hardwood Component (%): 94.5	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 29
Range (ft.): 10 to 15	Vegetative Cover (%): 95.0	2 to 2.9 Feet Deep: 47
Mean (ft.): 13	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 24
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 9	Mean Max Residual Pool Depth (ft.): 2.5
Water (F): 54 - 56	Air (F): 54 - 61	LWD per 100 ft.:
Dry Channel (ft): 60	Riffles: 1	Pools: 3
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 47	Sand: 6	Gravel: 35
	Sm Cobble: 12	Lg Cobble: 0
	Boulder: 0	Bedrock: 0
Embeddedness Values (%): 1. 5.9	2. 0.0	3. 11.8
	4. 41.2	5. 41.2

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

Latitude: 40:32:50.0N

Longitude: 124:09:39.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	2	0	0.6
Boulder	3	1	1.1
Cobble / Gravel	2	2	1.1
Sand / Silt / Clay	169	173	97.2

**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	16	34	14.2
Brush	55	46	28.7
Hardwood Trees	104	95	56.5
Coniferous Trees	1	1	0.6
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 4



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

StreamName: Barber Creek

LLID: 1241609405471

Drainage: Eel River - Lower

Survey Dates: 7/22/2008 to 7/28/2008

Confluence Location: Quad: FORTUNA

Legal Description: T02NR01WS22

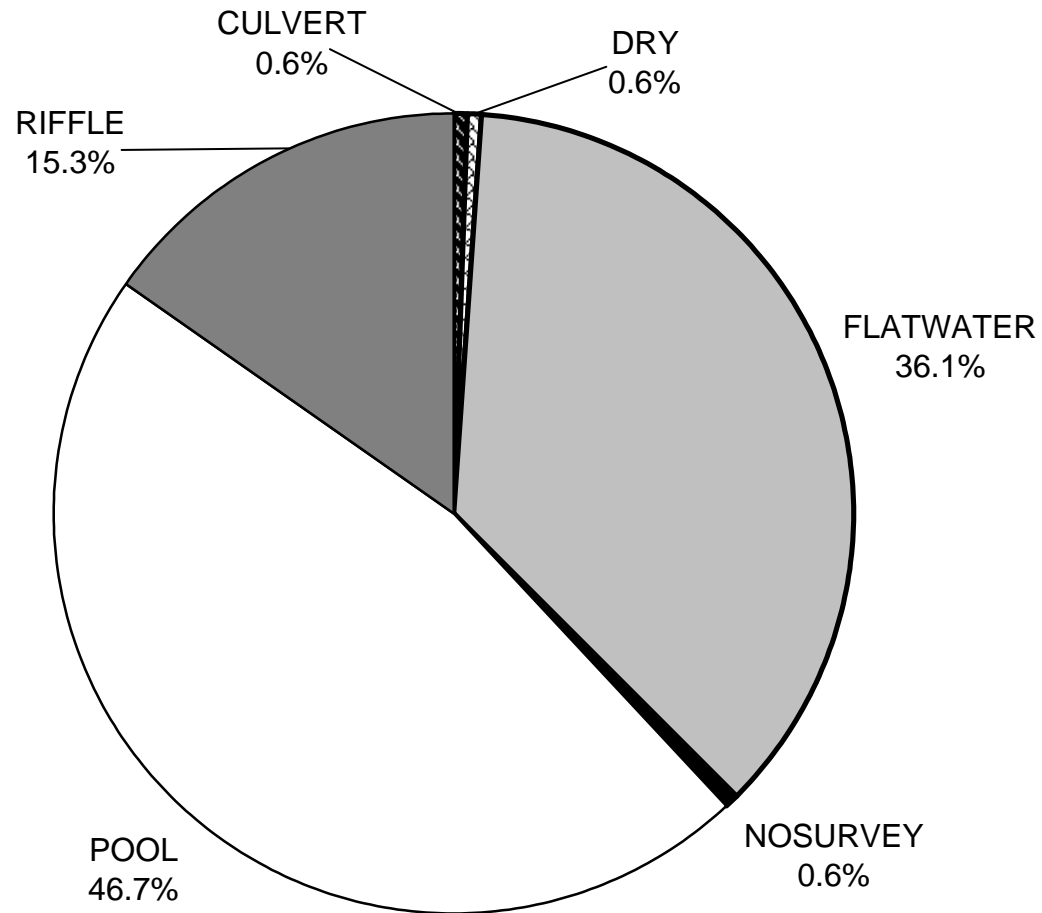
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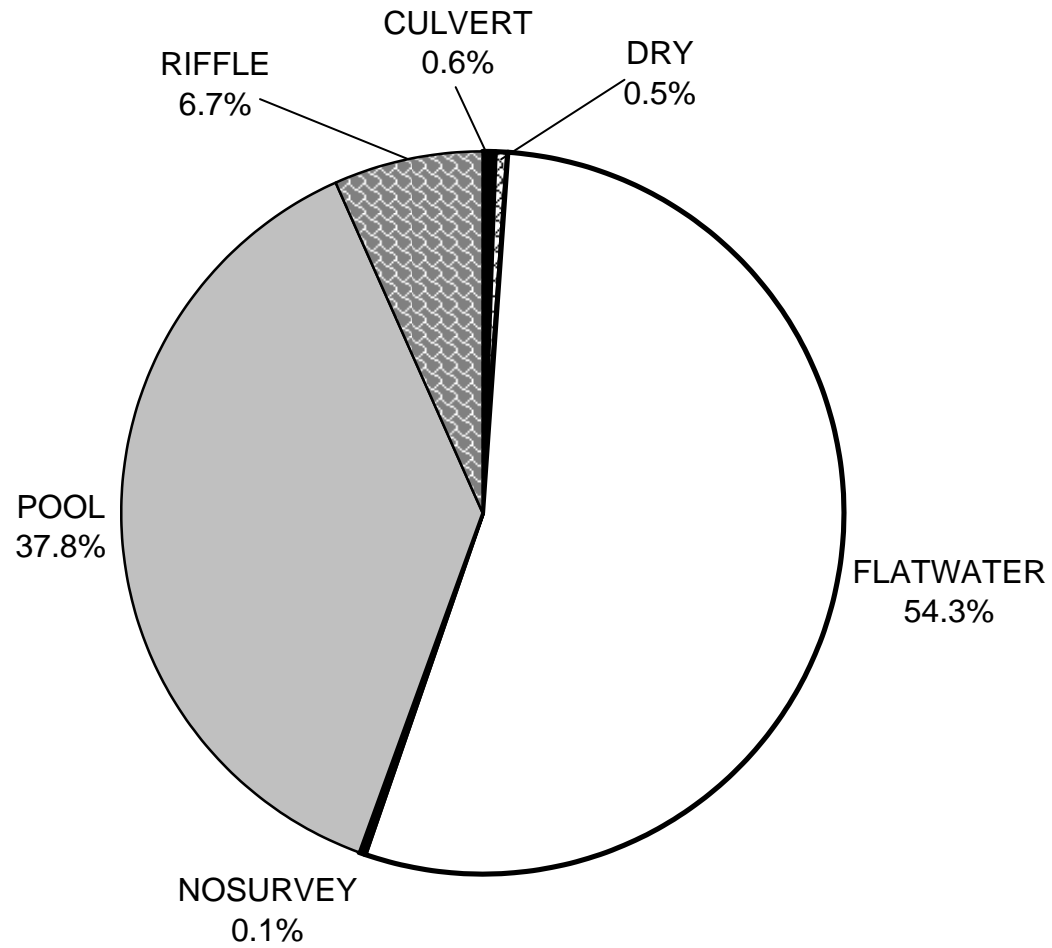
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	47	40
SMALL WOODY DEBRIS (%)	0	31	34
LARGE WOODY DEBRIS (%)	0	6	10
ROOT MASS (%)	0	0	3
TERRESTRIAL VEGETATION (%)	0	14	11
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	1	2
BEDROCK LEDGES (%)	0	0	0

# BARBER CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



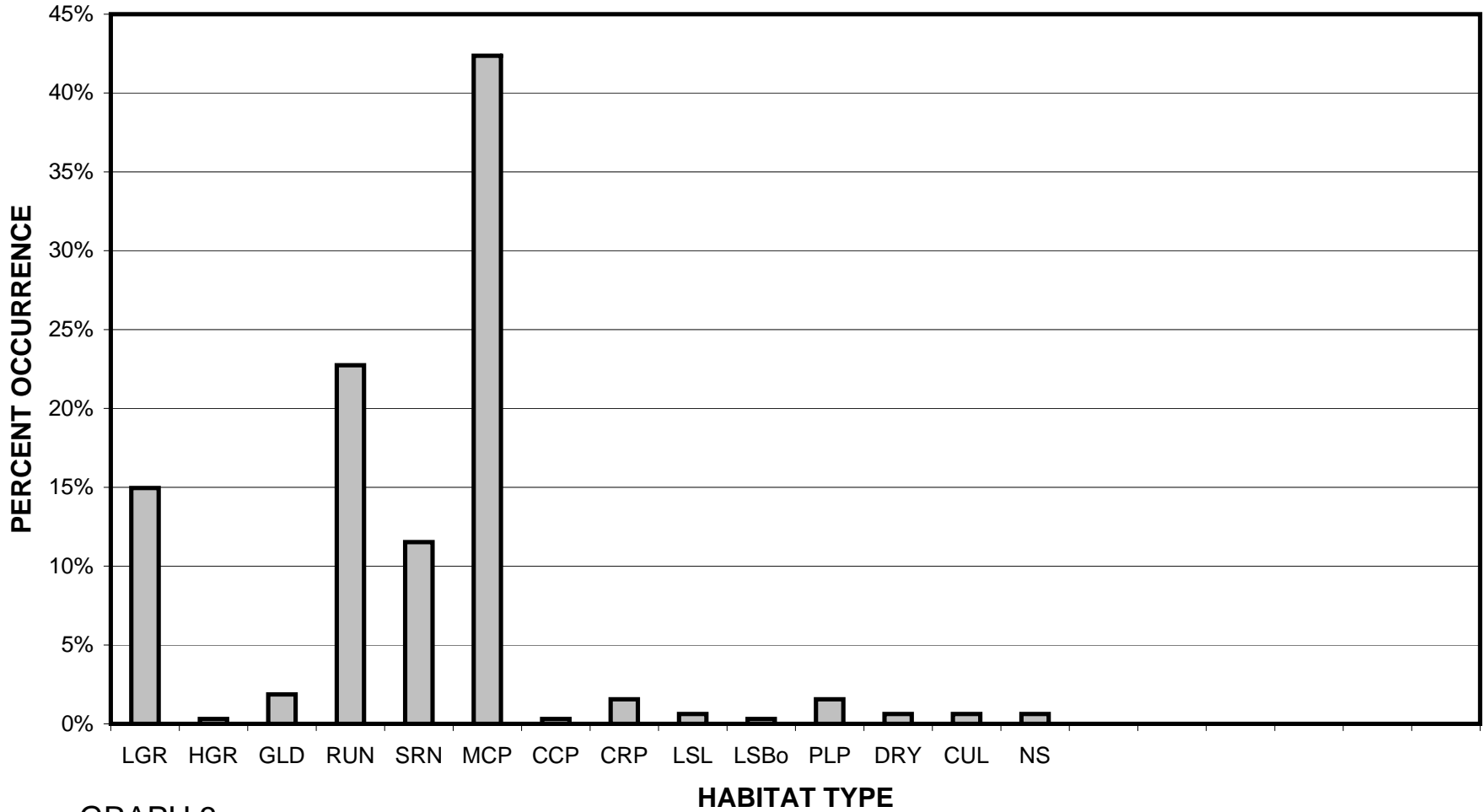
GRAPH 1

# BARBER CREEK 2008 HABITAT TYPES BY PERCENT TOTAL LENGTH



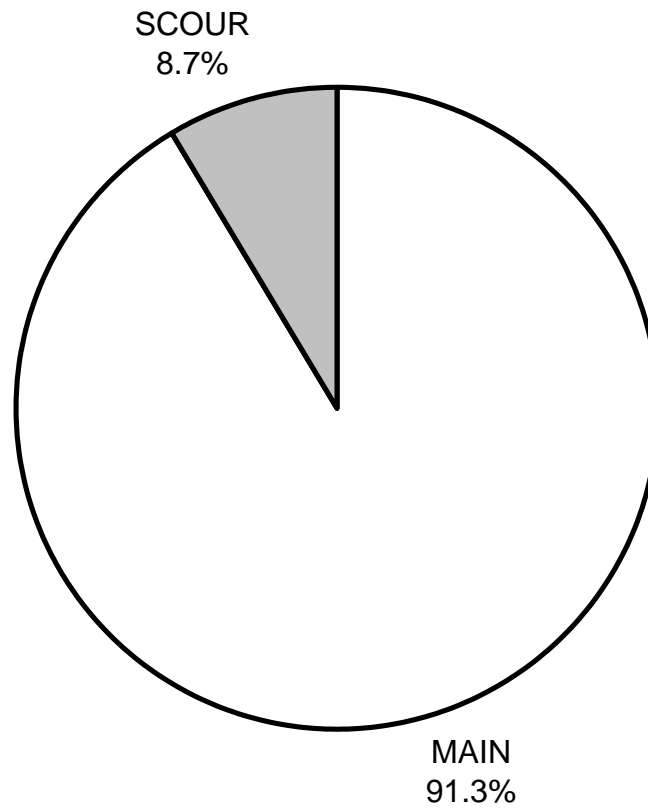
GRAPH 2

# BARBER CREEK 2008 HABITAT TYPES BY PERCENT OCCURRENCE



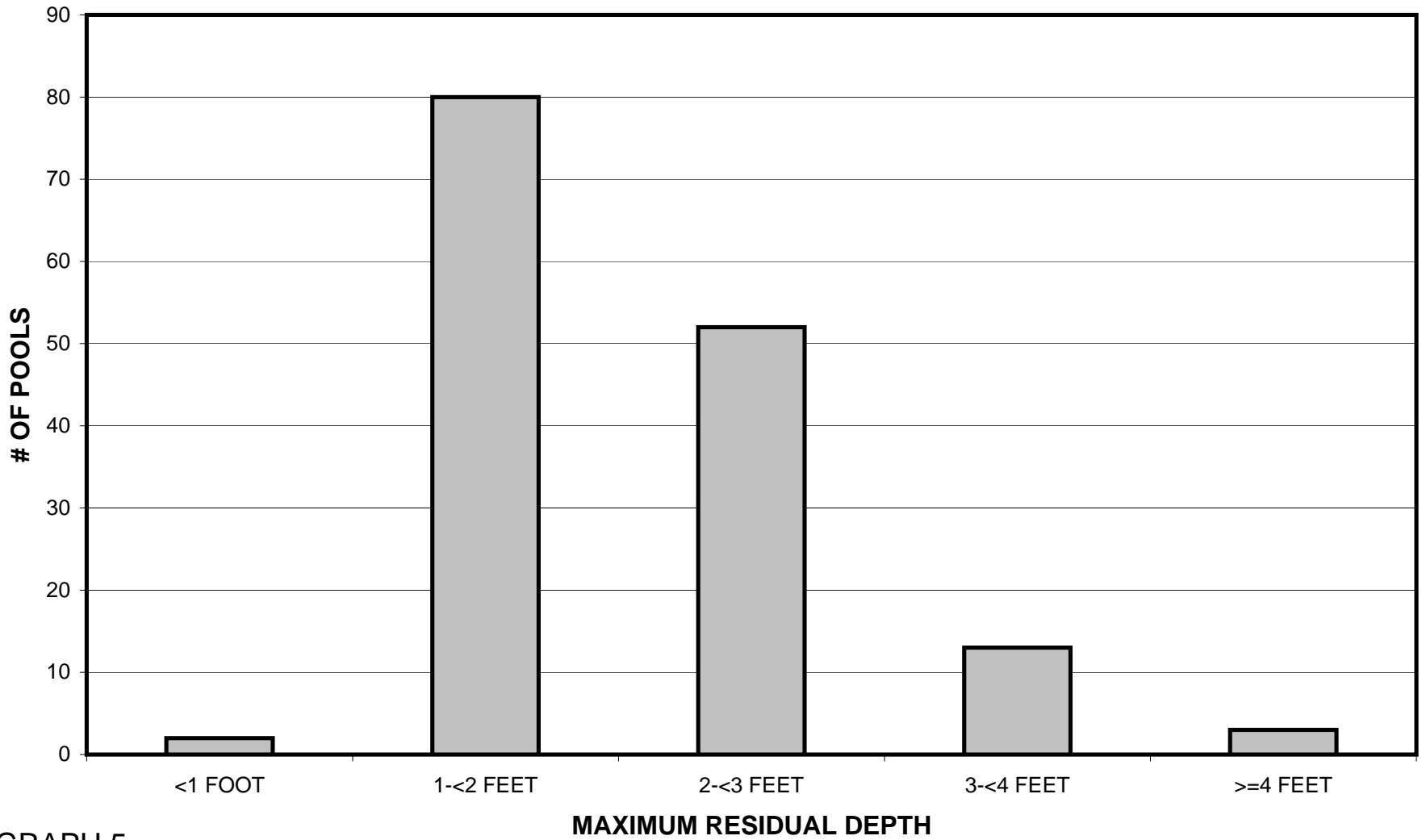
GRAPH 3

**BARBER CREEK 2008  
POOL TYPES BY PERCENT OCCURRENCE**



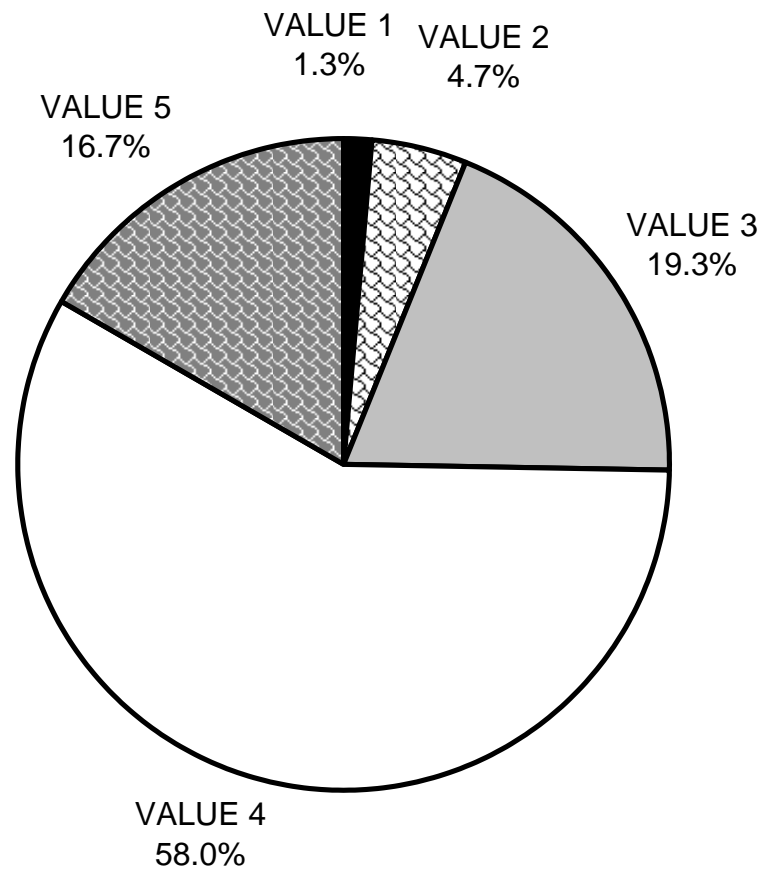
GRAPH 4

# BARBER CREEK 2008 MAXIMUM DEPTH IN POOLS



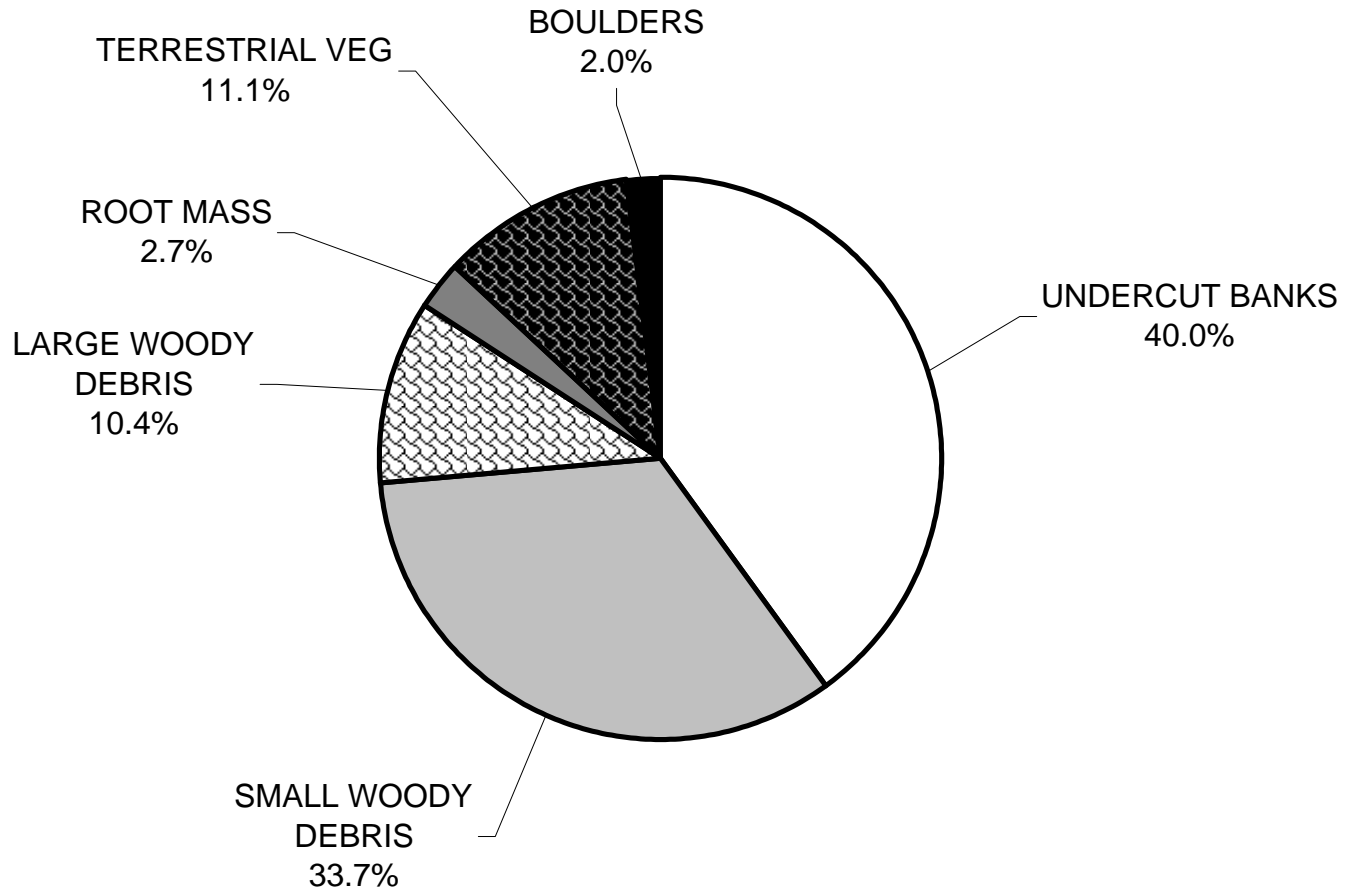
GRAPH 5

# BARBER CREEK 2008 PERCENT EMBEDDEDNESS



GRAPH 6

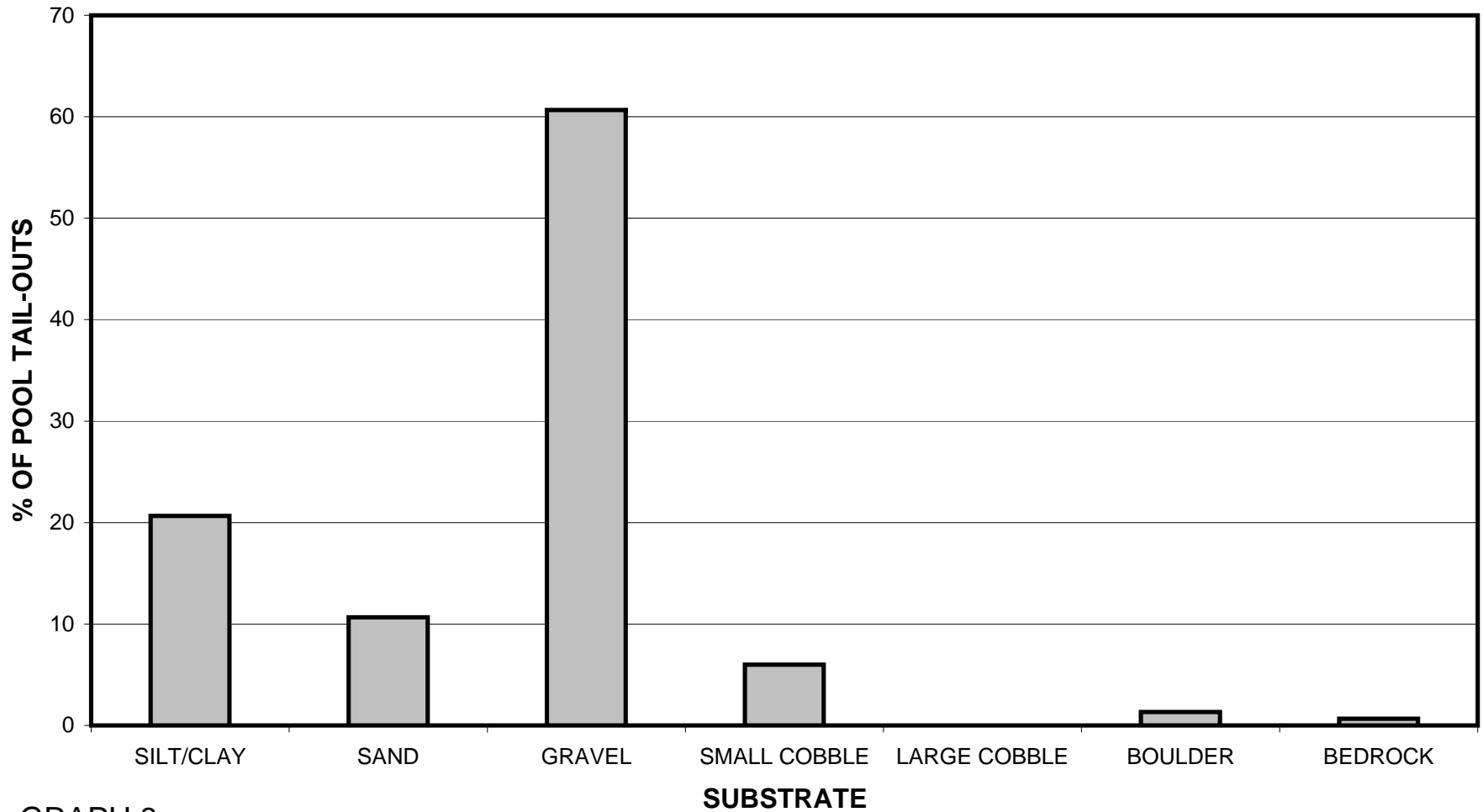
# BARBER CREEK 2008 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

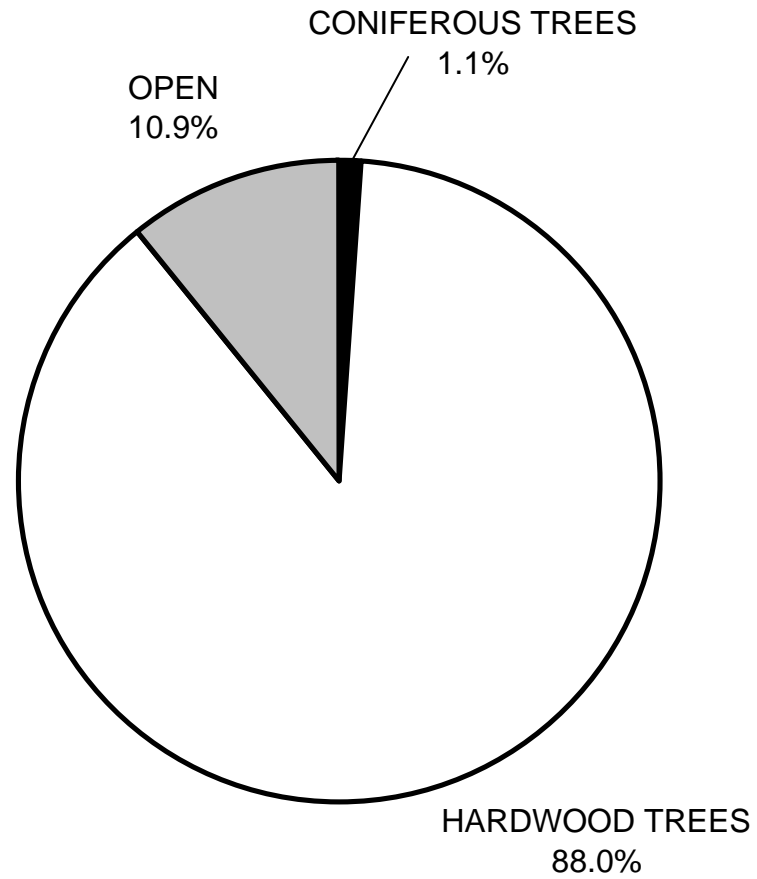


# BARBER CREEK 2008 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



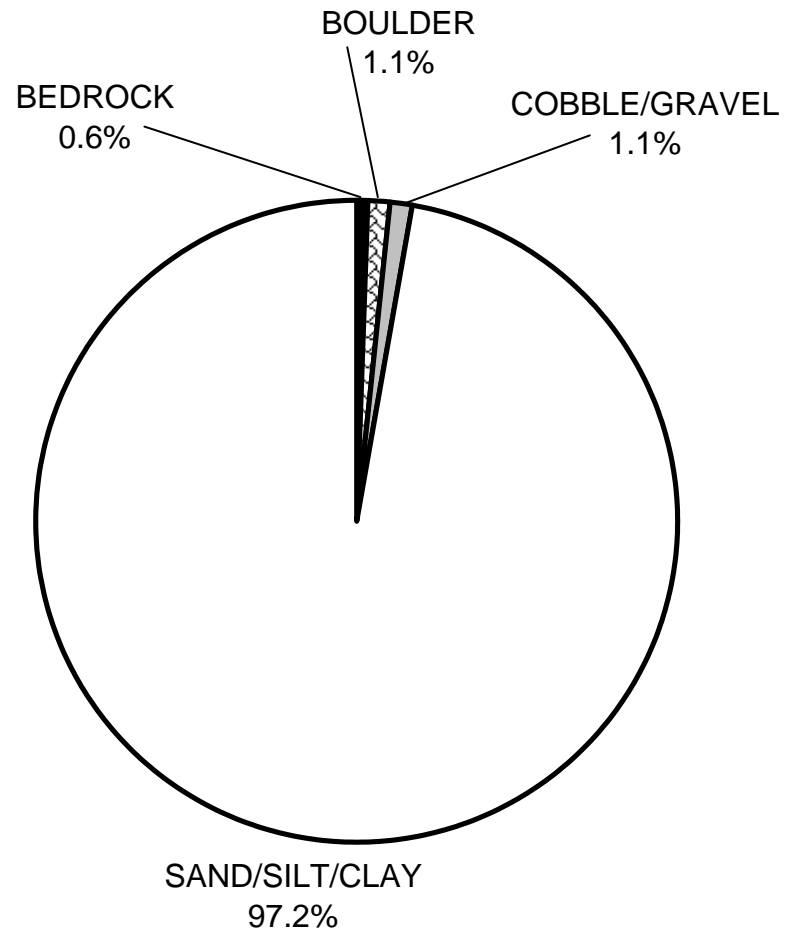
GRAPH 8

# BARBER CREEK 2008 MEAN PERCENT CANOPY



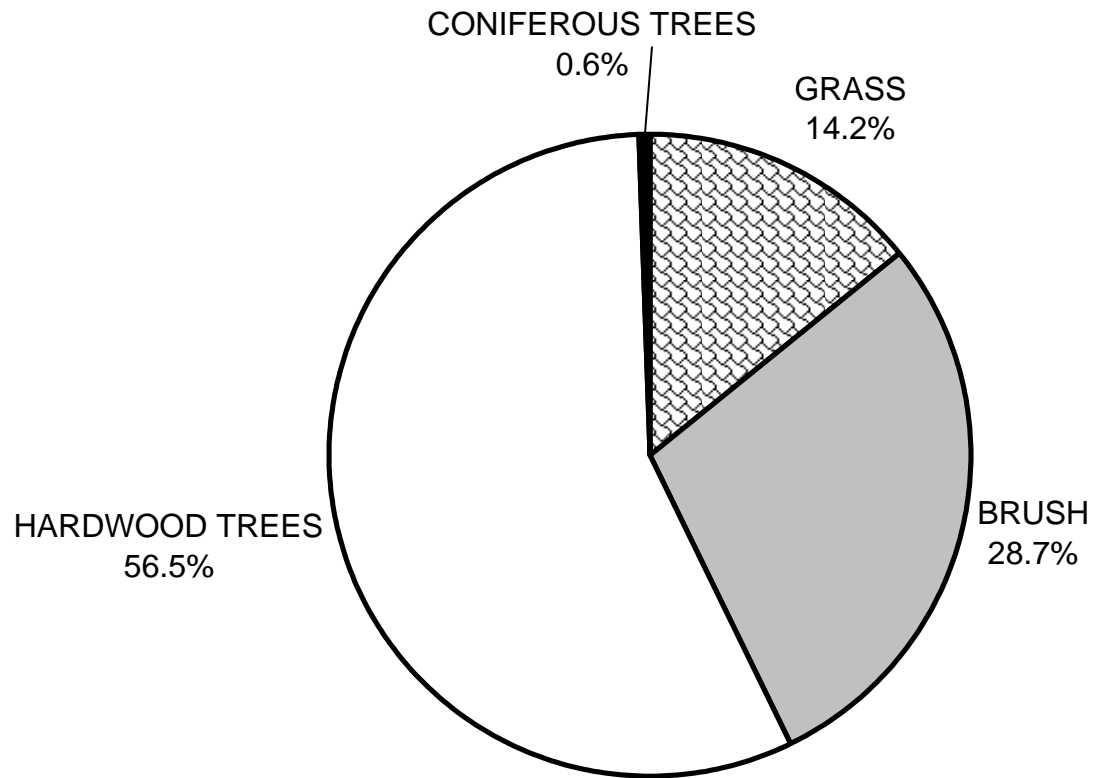
GRAPH 9

**BARBER CREEK 2008  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



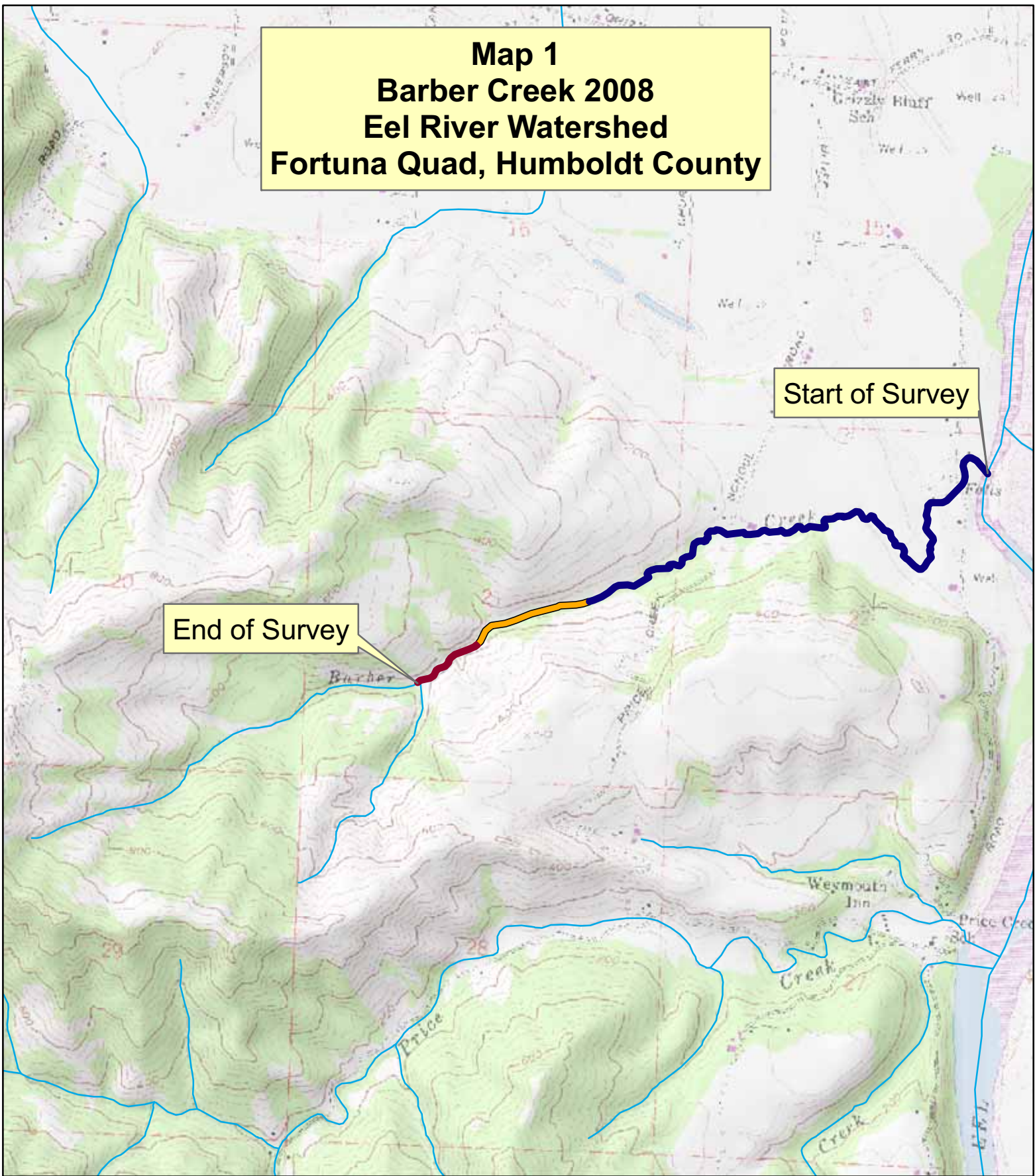
GRAPH 10

# BARBER CREEK 2008 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11




**Map 1  
Barber Creek 2008  
Eel River Watershed  
Fortuna Quad, Humboldt County**



End of Survey

Start of Survey

**Legend**

-  Reach 1, E6 Channel Type
-  Reach 2, C4 Channel Type
-  Reach 3, F6 Channel Type

