

# STREAM INVENTORY REPORT

## McCoy Creek

### INTRODUCTION

A stream inventory was conducted during October 2, 2007 to October 24, 2007 on McCoy Creek. The survey began at the confluence with South Fork Eel River and extended upstream 4.6 miles.

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

A biological survey of McCoy Creek was last conducted in 2003 to document the presence of juvenile salmonid species. Findings from that survey will also be included in this report.

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

McCoy Creek is a tributary to South Fork Eel River, tributary to Eel River which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). McCoy Creek's legal description at the confluence with South Fork Eel River is T24N R17W S6. Its location is 39.9571 north latitude and 123.7798 west longitude, LLID number 1237786399572. McCoy Creek is a fourth order stream and has approximately 11.1 miles of blue line stream according to the USGS Piercy 7.5 minute quadrangle. McCoy Creek drains a watershed of approximately 6.8 square miles. Elevations range from about 525 feet at the mouth of the creek to 1,600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via the Piercy Exit off of Highway 101 following Highway 271 to where it crosses over McCoy Creek.

### METHODS

The habitat inventory conducted in McCoy Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

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### 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.

### 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 McCoy 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". McCoy 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

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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 McCoy 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 McCoy 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In McCoy 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 McCoy Creek, the dominant composition type and the dominant

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vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

### 10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

### 11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

## BIOLOGICAL INVENTORY

Biological sampling is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks during habitat typing in McCoy Creek. Detailed biological sampling was not conducted on McCoy Creek during the 2007 survey. Data from a June 12, 2003 electrofishing survey is listed in the Biological Inventory Results section of this report. Electrofishing sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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

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- 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 McCoy 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 October 2, 2007 to October 24, 2007, was conducted by R. Marsh (WSP), T. Fisher (WSP) and S. McSmith (DFG). The total length of the stream surveyed was 24,272 feet with an additional 673 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.8 cfs on October 25, 2007.

McCoy Creek is a B2 channel type for 7,904 feet of the stream surveyed (Reach 1) and a B3 channel type for 17,041 feet of the stream surveyed (Reach 2).

B3 channels are moderately entrenched, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks, moderate gradient, with low width/depth ratios and cobble-dominant substrates. B2 channels are moderately entrenched, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks, moderate gradient, with low width /depth ratios and boulder-dominant substrates.

Water temperatures taken during the survey period ranged from 46 to 53 degrees Fahrenheit. Air temperatures ranged from 42 to 64 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of

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occurrence there were 44% riffle units, 31% flatwater units, and 24% pool units (Graph 1). Based on total length of Level II habitat types there were 57% riffle units, 25% flatwater units, and 17% pool units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 26% low gradient riffle units, 22% run units, and 19% mid-channel pool units (Graph 3). Based on percent total length, low gradient riffle units made up 36%, high gradient riffle units 21%, run units 13%, and mid-channel pool units 13%.

A total of 124 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 85% (Graph 4), and comprised 86% 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. Seven of the 124 pools (6%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 124 pool tail-outs measured, 47 had a value of 1 (37.9%); 20 had a value of 2 (16.1%); 16 had a value of 3 (12.9%); 12 had a value of 4 (9.7%); 29 had a value of 5 (23.4%) (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 33, flatwater habitat types had a mean shelter rating of 21, and pool habitats had a mean shelter rating of 43 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 44, scour pools had a mean shelter rating of 36, and backwater pools had a mean shelter rating of 30 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in McCoy Creek. Graph 7 describes the pool cover in McCoy Creek. Boulders are the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 48% of pool tail-outs and boulders were observed in 24% of pool tail-outs.

The mean percent canopy density for the surveyed length of McCoy Creek was 82%. Eighteen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 78% and 22%, respectively. Graph 9 describes the mean percent canopy in McCoy Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 83%. The mean percent left bank vegetated was 83%. The dominant elements composing the structure of the stream banks consisted of 39% cobble/gravel, 21% sand/silt/clay, 20% bedrock, and 20%

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boulder (Graph 10). Deciduous trees were the dominant vegetation type observed in 50% of the units surveyed. Additionally, 31% of the units surveyed had grass as the dominant vegetation type, 10% of the units surveyed had brush as the dominant vegetation type, and 8% had coniferous trees as the dominant vegetation (Graph 11).

### **BIOLOGICAL INVENTORY RESULTS**

McCoy Creek was biologically sampled on June 12, 2003, by the California Department of Fish and Game for fish presence and identification. Using an electrofisher 6 coho and 29 steelhead trout were captured and identified during the survey. The survey started at the confluence with South Fork Eel River and ended approximately 1,612 feet upstream.

### **DISCUSSION**

McCoy Creek is a B2 channel type for the first 7,904 feet of stream surveyed and a B3 channel type for the next 17,041. The suitability of B2 and B3 channel types for fish habitat improvement structures is as follows: B2 channels are excellent for plunge weirs, log cover, and single and opposing wing-deflectors. B3 channels are excellent for plunge weirs, log cover, boulder clusters, bank placed boulders, and single and opposing wing-deflectors.

The water temperatures recorded on the survey days October 2, 2007 to October 24, 2007 ranged from 46 to 53 degrees Fahrenheit. Air temperatures ranged from 42 to 64 degrees Fahrenheit. 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 25% of the total length of this survey, riffles 57%, and pools 17%. Seven of the 124 (6%) pools had a maximum residual depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth streams, a primary pool is defined to have a maximum residual depth of at least three 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.

Sixty-seven of the 124 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-eight of the pool tail-outs had embeddedness ratings of 3 or 4. Twenty-nine 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 McCoy Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-four of the 124 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

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The mean shelter rating for pools was 43. The shelter rating in the flatwater habitats was 21. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in McCoy Creek. Boulders are the dominant cover type in pools followed by large woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 82%. Reach 1 had a canopy density of 86.6% and Reach 2 had a canopy density of 78.8%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 83% and 83%, 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) McCoy Creek should be managed as an anadromous, natural production stream.
- 2) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from boulders. Adding high quality complexity with woody cover in the pools is desirable.
- 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) 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.
- 6) 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	Survey began at the confluence with the South Fork Eel River. This marks the beginning of reach 1, which is a B2 channel type.
1309	0031.00	The slope was measured to be 5.5%.
1632	0037.00	Bridge #1 (Highway 271) was 10' into this habitat unit. It was 29.5' wide (downstream to upstream), 26' high x 225' long (bank to bank). It had concrete abutments and steel and wood supports.
2098	0051.00	There was a vegetated slide the right bank, it measured 100' long x 70' high.
2391	0057.00	There was eroding blue goo ledge on the left bank measuring 30' long x 8' high.
2895	0066.00	There was a slide measuring 40' long x 100' high. It was contributing gravel and silt to the stream.
3568	0083.00	There was a left bank blue goo slide measuring 60' long x 30' high. It was contributing small cobbles, silt and clay to the stream.
3665	0087.00	There was a slide on the right bank measuring 300' long x 150' high. The slide was contributing all substrate size classes.
3759	0089.00	The bottom of the habitat unit has a dry side channel which appears to be the old main channel and it is wider than the current flowing channel.
4217	0099.00	There was a vegetated slide on the right bank measuring 150' long x 50' high.
4507	0107.00	The slope at this habitat unit was 18%.
4526	0108.00	There was a slide on the right bank measuring 150' long x 40' high. The slide was contributing small quantities of gravel and silt.
4831	0115.00	There was a 2' plunge.

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5083	0122.00	There was a slide on the right bank measuring 150' long x 200' high.
5384	0128.00	There was a 1.5' plunge at the top of this unit.
5572	0134.00	There was a small sandbag dam.
6760	0158.00	There was a slide on the left bank composed of blue goo and sandstone; it measured 200' long x 200' high. The slide was contributing all substrate size classes to the creek. The slide had disrupted the main channel causing two channels with numerous backwater areas. According to landowners, the slide began in the early 1980's.
6896	0163.00	There was a slide on the right bank measuring 300' long x 100' high that was contributing cobbles, gravels and silt to the stream.
6949	0164.00	There was a 4.5' plunge with a 1.1' pool.
7231	0171.00	Reach 2 begins at the bottom of this habitat unit. The channel type changed to a B3.
7311	0172.00	Tributary #1 entered from the right bank. The tributary was dry. The tributary is accessible to fish when flowing. The tributary's slope was ~20%.
7406	0174.00	A channel type was taken at this unit.
7638	0177.00	Tributary #2 was flowing at less than 0.1 cubic feet per second (cfs), contributing a negligible amount of flow to McCoy Creek. The temperature of the tributary was 48 degrees Fahrenheit, the temperature of McCoy upstream and downstream of the tributary was 50 degrees Fahrenheit. The first 300' of the tributary was walked and no fish were observed. It had a slope of 7% and was accessible to fish.
9915	0227.00	There was right bank erosion measuring 200' long x 300' high; contributing cobbles, gravels and silt.
10888	0245.00	There was an active slide on the right bank measuring 50' long x 50' high and contributing cobbles, gravels and silt substrates.
11419	0255.00	Tributary #3 "North Fork McCoy Creek" entered from the right bank. The tributary was flowing at an estimated 1-2 cfs and an estimated 35% slope. The temperature of the tributary was 50 degrees Fahrenheit; the temperature of McCoy Creek downstream and upstream of the tributary was 52 degrees Fahrenheit. The tributary was accessible to fish and juvenile salmonids were observed in the first 200'. The tributary's slope was an estimated 2%.

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11659	0261.00	There was left bank erosion measuring 40' long x 15' high; contributing gravel and silt substrates.
12245	0269.00	There was left bank erosion measuring 150' long x 150' high; contributing cobbles, gravels and silt to the creek.
12287	0271.00	Log debris accumulation (LDA) #1 measured 5' high x 29' long x 8' wide. The LDA had 4 pieces of large woody debris (LWD) with water flowing through it and visible gaps. The sediment being retained measured 8' wide x 6' long x 2' deep and ranged in size from large cobble to silt.
12677	0280.00	There was right bank erosion measuring 150' long x 100' high.
13359	0289.00	LDA #2 was about 4' high x 35' wide x 31 long; it had about 8 pieces of large woody debris (LWD) contained within it. The LDA had visible gaps and water flowing through it. The LDA was not retaining sediment, fish were observed above it.
13932	0300.00	There was right bank erosion measuring 100' long x 150' high; it was partially vegetated and was contributing small cobble to silt substrates.
15142	0317.00	There was a 3' plunge at the top of this unit.
16101	0338.00	There was left bank erosion measuring 100' long x 75' high.
16549	0349.00	There was left bank erosion 30' long x 125' high; the erosion was contributing cobbles and gravels to the stream.
16954	0358.00	There was left bank erosion measuring 20' long x 60' high.
17633	0373.00	This pool was scoured by pinched bedrock walls and had a 1' plunge.
18074	0381.00	There was right bank erosion measuring 15' long x 60' high; the erosion was contributing cobbles, gravels and silt to the stream.
18684	0392.00	Tributary #5 enters from the left bank. It was flowing at an estimated 0.1 cfs and it was contributing to less than 2% of McCoy Creek's flow. The tributary's temperature was 49 degrees Fahrenheit; the temperature of McCoy Creek upstream and downstream of the tributary was 52 degrees Fahrenheit. The tributary was inaccessible to fish due to increasingly high gradient. No fish were observed in the first 150 feet. The tributary's slope was estimated as greater than 50%.

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19541	0409.00	Tributary #6 entered from the left bank. Its flow was an estimated 1 cfs and was contributing to approximately 20% of McCoy Creek's flow. The temperature of the tributary and the temperature of McCoy Creek upstream and downstream was 52 degrees Fahrenheit. The tributary was accessible to fish and juvenile salmonids were observed in the first 300 feet. The slope of the tributary was estimated at 15%.
20245	0418.00	There was left bank erosion measuring 40' long x 15' high. Cobbles, gravels and silt were eroding into the creek.
20363	0421.00	There was right bank erosion measuring 75' long x 75' high, and contributing cobbles, gravels and silt to the creek.
20641	0429.00	Tributary #7 entered from the right bank. It was flowing at an estimated 1 cfs and was contributing to approximately a third of McCoy Creek's flow. The temperature of the tributary was 51 degrees Fahrenheit; the temperature of McCoy Creek upstream and downstream of the tributary was 51 and 52 degrees Fahrenheit, respectively. The first 200' of the tributary was accessible to fish, and then there is a potential LDA barrier. The slope was estimated to be 5%.
20843	0432.00	There was right bank erosion measuring 50' long x 60' high; contributing mostly cobble and gravel substrates.
21053	0433.00	YOY salmonids were observed in this unit.
21182	0437.00	There was a LWD and boulder plunge of 2.1' at the top of this unit.
21276	0440.00	The channel was clogged by small woody debris.
21316	0441.00	There was a 1' plunge over a log.
21875	0450.00	There was right bank erosion measuring 40' long x 60' high, contributing small cobble, gravels and silt to the creek.
22009	0455.00	This unit is a possible end of anadromy. The first 15' of the habitat unit had a 29% slope with a 1.1' deep bedrock pool. At the top of the habitat unit there was a 5.2' plunge with a 1.2' deep pool. YOY were observed in this unit and throughout this survey. After this habitat unit no juvenile salmonids were observed.
22113	0458.00	There was a plunge of 1.3' over bedrock substrate.
22896	0477.00	From this habitat unit location on to the end of the survey the stream gradient increased and the banks were unstable and contributing cobble, gravel and silt substrates.

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23175	0485.00	Tributary #8 entered from the right bank. It was estimated to be flowing at less than 0.1 cfs and was contributing to approximately 5% of McCoy Creek's flow. The temperature of the tributary was 52 degrees Fahrenheit, the temperature of McCoy Creek downstream and upstream of the tributary was 52 and 53 degrees Fahrenheit, respectively. The tributary was not accessible to fish due to a 5' waterfall without a jump pool and a greater than 20% slope. No fish were observed in the first 100' of stream.
23175	0485.00	There was a left bank slide 100' long x 125' high; and was contributing all substrate sizes to the stream channel.
23989	0489.00	Tributary #9 entered from the left bank. It was flowing at less than 0.1 cfs and was contributing an estimated 1% to McCoy Creek's flow. The temperature of the tributary was 52 degrees Fahrenheit; the temperature of McCoy Creek upstream and downstream of the tributary was 52 and 53 degrees Fahrenheit respectively. The tributary was inaccessible to fish due to large and small woody debris blocking the mouth. The tributary had an estimated 20% slope. No fish were observed in the first 150 feet.
24272	0495.00	End of survey due to 10' waterfall with a 6 inch deep jump pool approximately 750' above the end of the survey. Gradient increased and the channel narrowed before the waterfall. No fish were seen past habitat unit 455. The waterfall was a possible barrier to anadromous migration. Upstream of the end of the survey the channel type changes from a "B" to an "A" with a bankfull width of 6'-10'.

## 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.

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### LEVEL III and LEVEL IV HABITAT TYPES

#### RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

#### CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

#### FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

#### MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

#### SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - 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 }

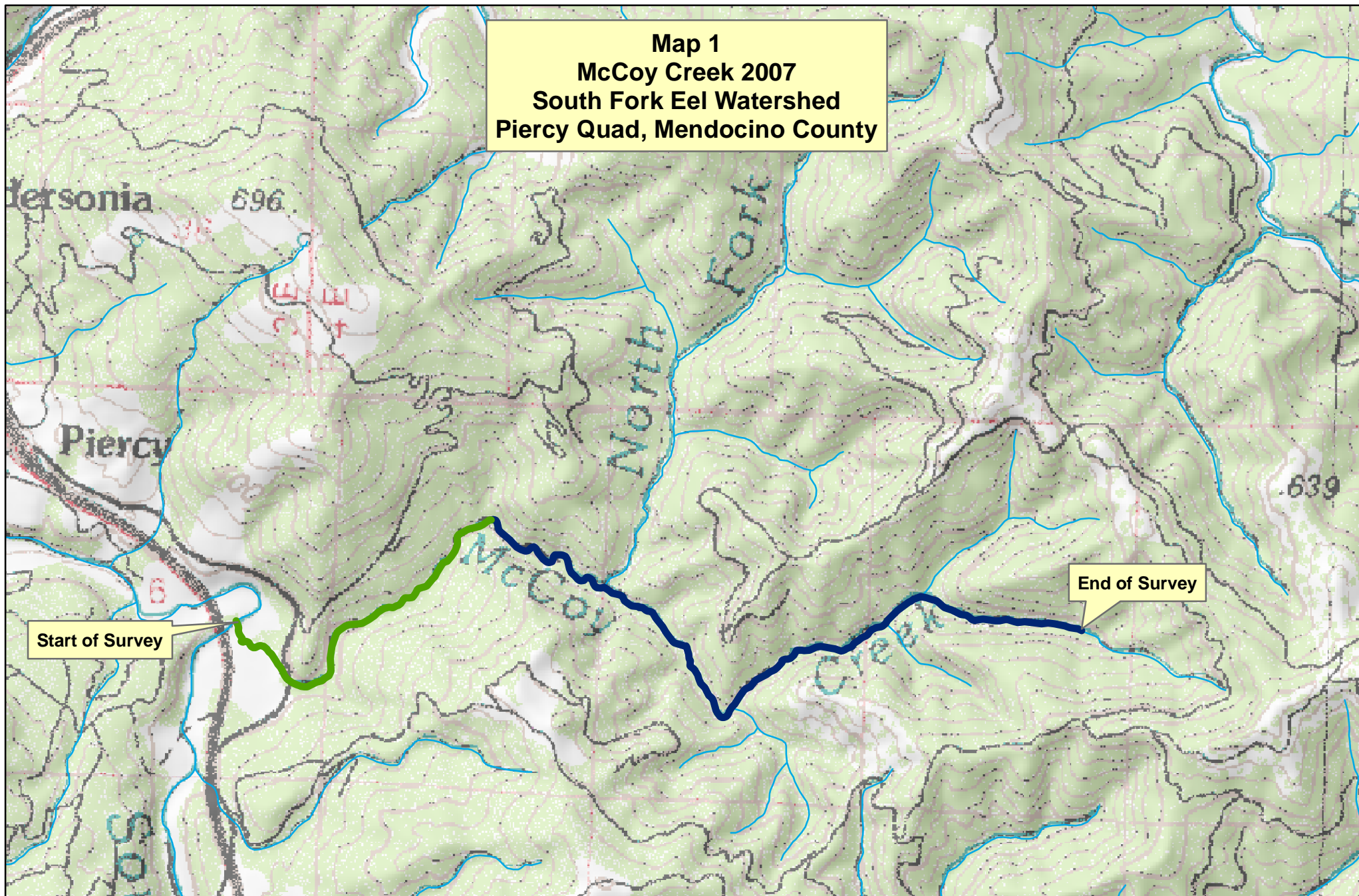
#### BACKWATER POOLS

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  
McCoy Creek 2007  
South Fork Eel Watershed  
Piercy Quad, Mendocino County



Legend

- Reach 1, B2 Channel Type
- Reach 2, B3 Channel Type

0 1,500 3,000 6,000 Feet



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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
2	0	DRY	0.4	44	88	0.4									
158	18	FLATWATER	31.0	40	6298	25.2	9.9	0.6	1.0	479	75740	246	38819		21
124	124	POOL	24.4	34	4241	17.0	11.7	0.8	1.7	384	47635	464	57488	346	43
225	29	RIFFLE	44.2	64	14318	57.4	9.4	0.4	0.7	310	69670	116	26200		33
Total Units 509	Total Units Fully Measured 171				Total Length (ft.) 24945					Total Area (sq.ft.) 193046			Total Volume (cu.ft.) 122507		



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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

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 (%)
133	14	LGR	26.1	67	8876	35.6	11	0.3	1.2	435	57874	148	19733		19	77
87	13	HGR	17.1	61	5307	21.3	7	0.5	1.1	202	17609	93	8050		40	84
5	2	CAS	1.0	27	135	0.5	13	0.5	1	128	641	48	242		80	81
2	2	GLD	0.4	78	156	0.6	14	0.4	1.3	1068	2136	411	822		5	90
110	10	RUN	21.6	30	3341	13.4	10	0.6	1.6	366	40236	187	20595		22	81
46	6	SRN	9.0	61	2801	11.2	9	0.6	1.3	472	21730	288	13251		23	86
96	96	MCP	18.9	33	3192	12.8	11	0.8	4.7	373	35785	451	43314	335	44	83
1	1	CCP	0.2	40	40	0.2	12	0.8	1.9	480	480	528	528	384	30	96
8	8	STP	1.6	52	418	1.7	11	0.7	2.2	500	4001	550	4399	388	46	84
7	7	LSBk	1.4	45	313	1.3	11	0.5	1.9	458	3203	344	2411	212	6	80
2	2	LSBo	0.4	15	30	0.1	18	0.4	1.3	209	417	130	260	67	40	90
9	9	PLP	1.8	18	165	0.7	15	1.1	4.3	268	2409	433	3896	359	58	83
1	1	DPL	0.2	83	83	0.3	17	1.8	3.1	1340	1340	2681	2681	2413	30	35
2	0	DRY	0.4	44	88	0.4										

Total Units  
509

Total Units Fully Measured  
171

Total Length (ft.)  
24945

Total Area (sq.ft.)  
187863

Total Volume (cu.ft.)  
120180

Table 3 - Summary of Pool Types

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

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
105	105	MAIN	85	35	3650	86	11.3	0.8	383	40266	339	35294	44
18	18	SCOUR	15	28	508	12	13.8	0.8	335	6029	270	4852	36
1	1	BACKWATER	1	83	83	2	17.0	1.8	1340	1340	2413	2413	30
Total Units	Total Units Fully Measured			Total Length (ft.)			Total Area (sq.ft.)			Total Volume (cu.ft.)			
124	124			4241			47635			42559			

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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

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
96	MCP	77	3	3	66	69	23	24	3	3	1	1
1	CCP	1	0	0	1	100	0	0	0	0	0	0
8	STP	6	0	0	6	75	2	25	0	0	0	0
7	LSBk	6	0	0	7	100	0	0	0	0	0	0
2	LSBo	2	0	0	2	100	0	0	0	0	0	0
9	PLP	7	0	0	7	78	0	0	1	11	1	11
1	DPL	1	0	0	0	0	0	0	1	100	0	0
Total Units			Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
124			3	2	89	72	25	20	5	4	2	2

Mean Maximum Residual Pool Depth (ft.): 1.7

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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Dry Units: 2

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

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
133	14	LGR	0	19	31	9	9	0	8	24	0
87	13	HGR	2	22	5	10	5	0	13	43	0
5	2	CAS	0	48	0	0	0	0	25	28	0
225	29	TOTAL RIFFLE	1	22	17	9	7	0	11	32	0
2	2	GLD	0	0	0	0	0	0	0	100	0
110	10	RUN	13	14	8	9	9	0	9	37	0
46	6	SRN	1	12	26	0	0	0	20	42	0
158	18	TOTAL FLAT	7	12	13	5	5	0	12	46	0
96	96	MCP	4	13	15	8	1	0	8	43	8
1	1	CCP	0	0	0	85	0	0	15	0	0
8	8	STP	3	6	16	8	1	0	14	49	4
7	7	LSBk	0	0	0	0	20	0	0	14	66
2	2	LSBo	0	0	0	0	0	0	0	100	0
9	9	PLP	0	7	28	0	3	0	34	17	11
1	1	DPL	0	0	0	60	0	0	0	40	0
124	124	TOTAL POOL	3	11	15	8	2	0	10	41	10
509	171	TOTAL	3	13	15	8	3	0	10	40	7

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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Dry Units: 2

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

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
133	14	LGR	0	0	21	43	21	14	0
87	13	HGR	0	0	8	23	15	54	0
5	2	CAS	0	0	0	0	0	50	50
2	2	GLD	0	0	50	50	0	0	0
110	10	RUN	0	0	30	40	20	10	0
46	6	SRN	0	0	50	17	0	17	17
96	96	MCP	1	2	46	18	7	24	2
1	1	CCP	0	0	100	0	0	0	0
8	8	STP	0	0	50	0	0	50	0
7	7	LSBk	0	0	57	43	0	0	0
2	2	LSBo	0	0	0	50	0	50	0
9	9	PLP	0	0	44	22	0	33	0
1	1	DPL	0	0	100	0	0	0	0

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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
82	22	78	0	83	83

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.

Stream Name: McCoy Creek	LLID: 1237786399572	Drainage: Eel River - South Fork
Survey Dates: 10/2/2007 to 10/24/2007	Survey Length (ft.): 24945	Main Channel (ft.): 24272
Confluence Location: Quad: PIERCY	Side Channel (ft.): 673	
	Legal Description: T24NR17WS06	Latitude: 39:57:26.0N
		Longitude: 123:46:43.0W

<b>STREAM REACH: 1</b>									
Channel Type: B2			Canopy Density (%): 86.6				Pools by Stream Length (%): 24.6		
Reach Length (ft.): 7231			Coniferous Component (%): 13.4				Pool Frequency (%): 28.8		
Riffle/Flatwater Mean Width (ft.): 10.0			Hardwood Component (%): 86.6				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Hardwood Trees				< 2 Feet Deep: 83		
Range (ft.): 15 to 40			Vegetative Cover (%): 79.4				2 to 2.9 Feet Deep: 15		
Mean (ft.): 28			Dominant Shelter: Boulders				3 to 3.9 Feet Deep: 2		
Std. Dev.: 6			Dominant Bank Substrate Type: Boulder				>= 4 Feet Deep: 0		
Base Flow (cfs.): 1.8			Occurrence of LWD (%): 4				Mean Max Residual Pool Depth (ft.): 1.5		
Water (F): 46 - 52			Air (F): 48 - 64		LWD per 100 ft.:		Mean Pool Shelter Rating: 33		
Dry Channel (ft): 88			Riffles: 1						
			Pools: 1						
			Flat: 1						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 21 Sm Cobble: 15 Lg Cobble: 11 Boulder: 51 Bedrock: 2									
Embeddedness Values (%): 1. 15.1 2. 11.3 3. 13.2 4. 11.3 5. 49.1									

Channel Type:	B3			Canopy Density (%):			78.8			Pools by Stream Length (%):			13.5							
Reach Length (ft.):	17041			Coniferous Component (%):			27.7			Pool Frequency (%):			21.8							
Riffle/Flatwater Mean Width (ft.):	9.4			Hardwood Component (%):			72.3			Residual Pool Depth (%):										
BFW:				Dominant Bank Vegetation:			Hardwood Trees			< 2 Feet Deep:			68							
Range (ft.):	9		to 49	Vegetative Cover (%):			85.3			2 to 2.9 Feet Deep:			24							
Mean (ft.):	25			Dominant Shelter:			Large Woody Debris			3 to 3.9 Feet Deep:			6							
Std. Dev.:	10			Dominant Bank Substrate Type:			Cobble/Gravel			>= 4 Feet Deep:			3							
Base Flow (cfs.):	1.8			Occurrence of LWD (%):			22			Mean Max Residual Pool Depth (ft.):			1.9							
Water (F):	46 - 53		Air (F):	42 - 61		LWD per 100 ft.:						Mean Pool Shelter Rating:			50					
Dry Channel (ft):	0			Riffles:			2													
				Pools:			4													
				Flat:			2													
Pool Tail Substrate (%):	Silt/Clay: 0		Sand:	0		Gravel:	69		Sm Cobble:	23		Lg Cobble:	3		Boulder:	4		Bedrock:	1	
Embeddedness Values (%):	1. 54.9		2.	19.7		3.	12.7		4.	8.5		5.	4.2							

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

Stream Name: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

Latitude: 39:57:26.0N

Longitude: 123:46:43.0W

**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	29	40	20.2
Boulder	31	36	19.6
Cobble / Gravel	78	57	39.5
Sand / Silt / Clay	33	38	20.8

**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	45	62	31.3
Brush	18	16	9.9
Hardwood Trees	96	74	49.7
Coniferous Trees	11	16	7.9
No Vegetation	1	3	1.2

**Total Stream Cobble Embeddedness Values:**

3



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

StreamName: McCoy Creek

LLID: 1237786399572

Drainage: Eel River - South Fork

Survey Dates: 10/2/2007 to 10/24/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS06

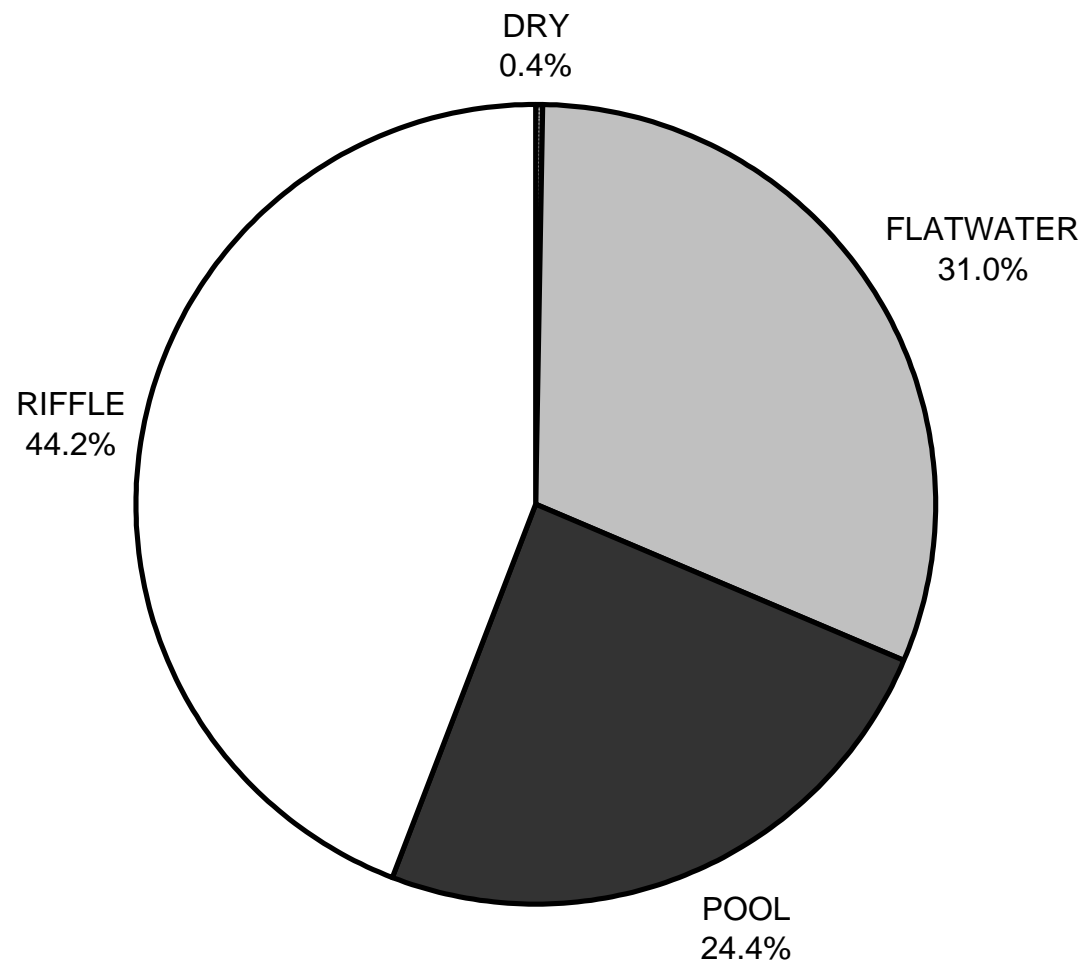
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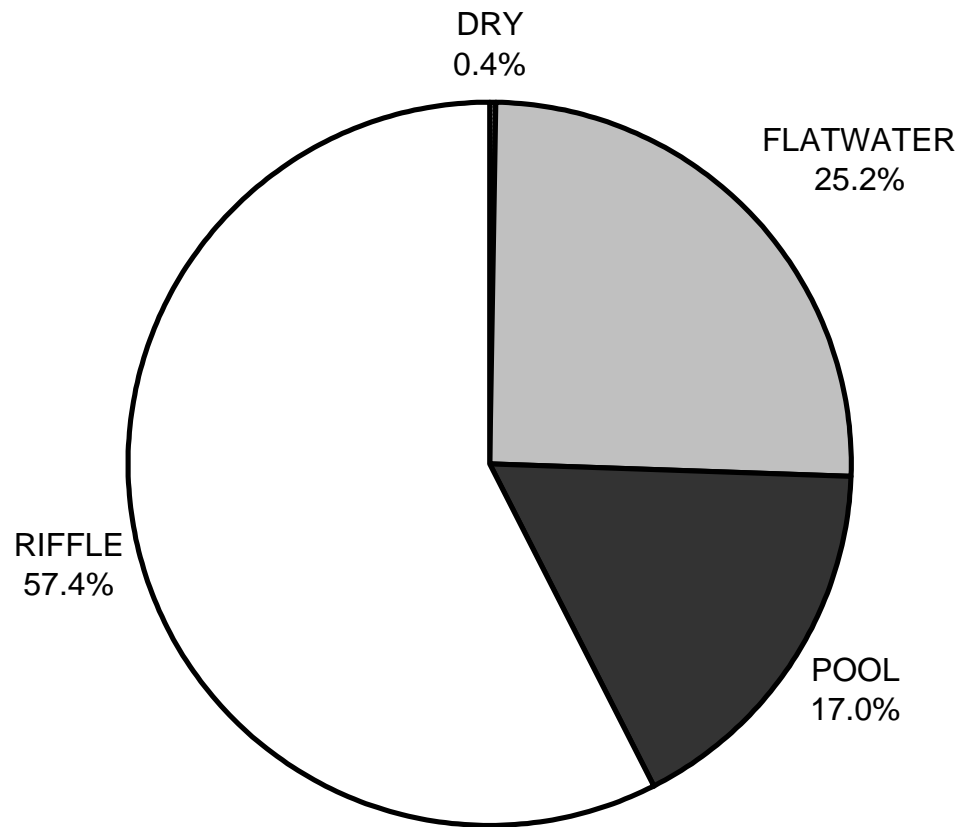
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	1	7	3
SMALL WOODY DEBRIS (%)	22	12	11
LARGE WOODY DEBRIS (%)	17	13	15
ROOT MASS (%)	9	5	8
TERRESTRIAL VEGETATION (%)	7	5	2
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	11	12	10
BOULDERS (%)	33	46	41
BEDROCK LEDGES (%)	0	0	10

**MCCOY CREEK 2007**  
**HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

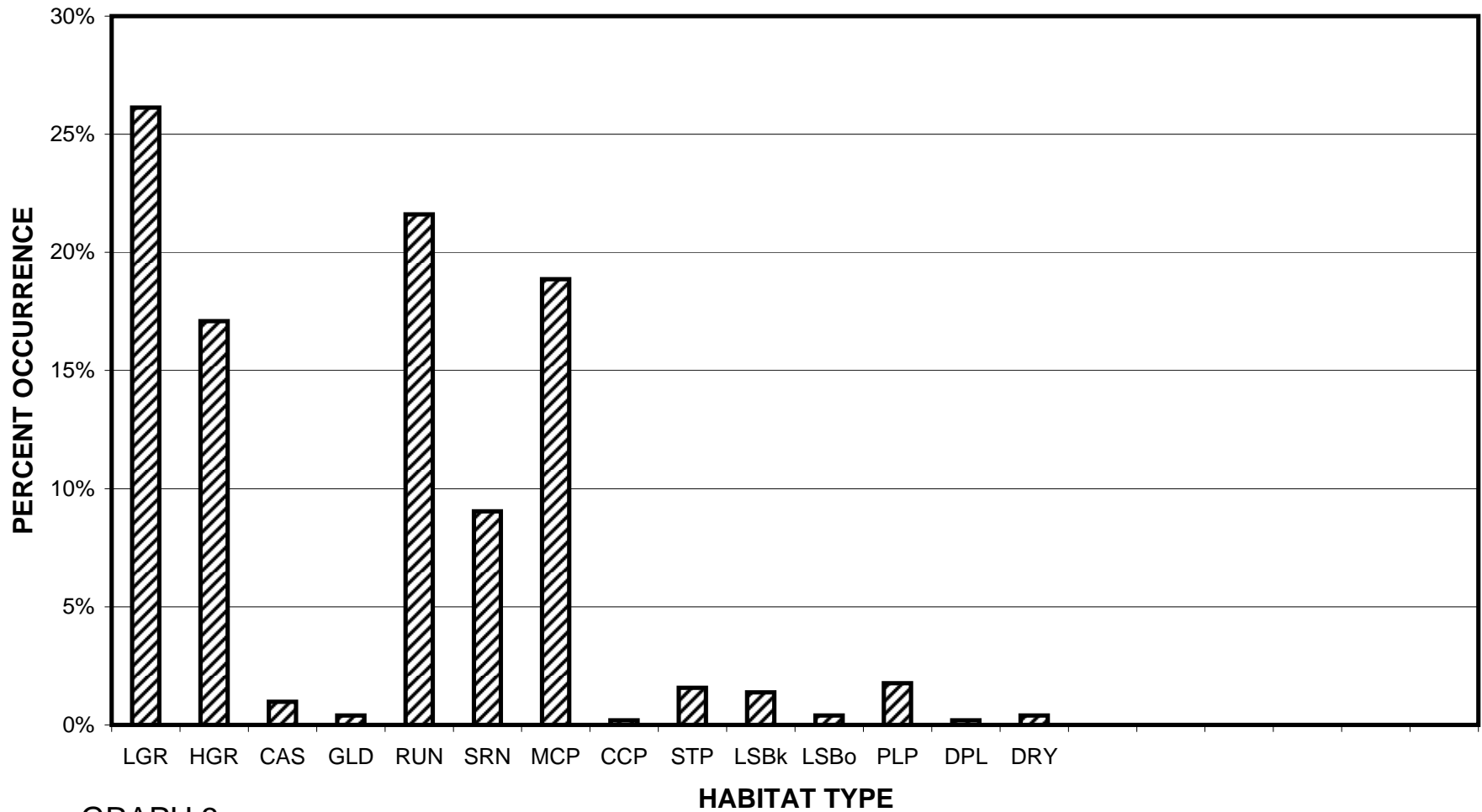
**MCCOY CREEK 2007**  
**HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

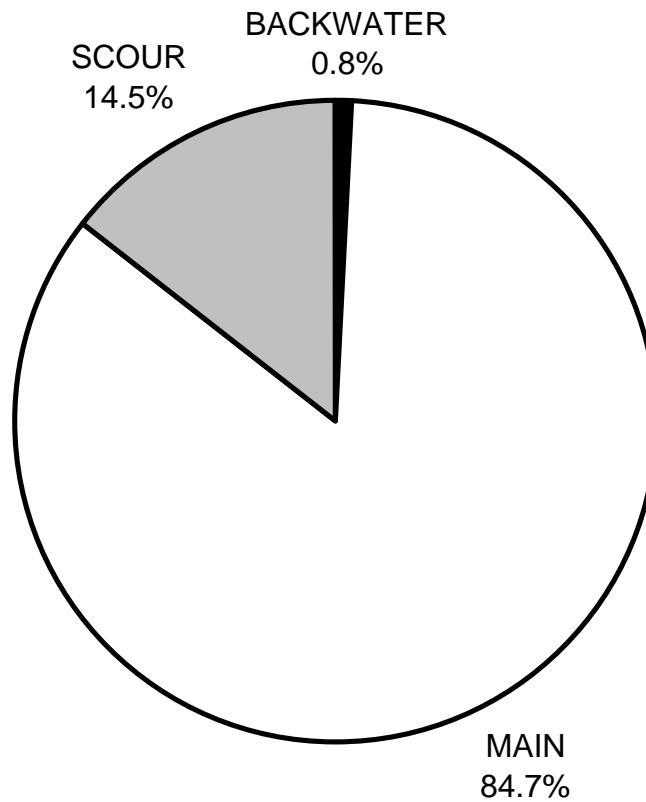
# MCCOY CREEK 2007

## HABITAT TYPES BY PERCENT OCCURRENCE



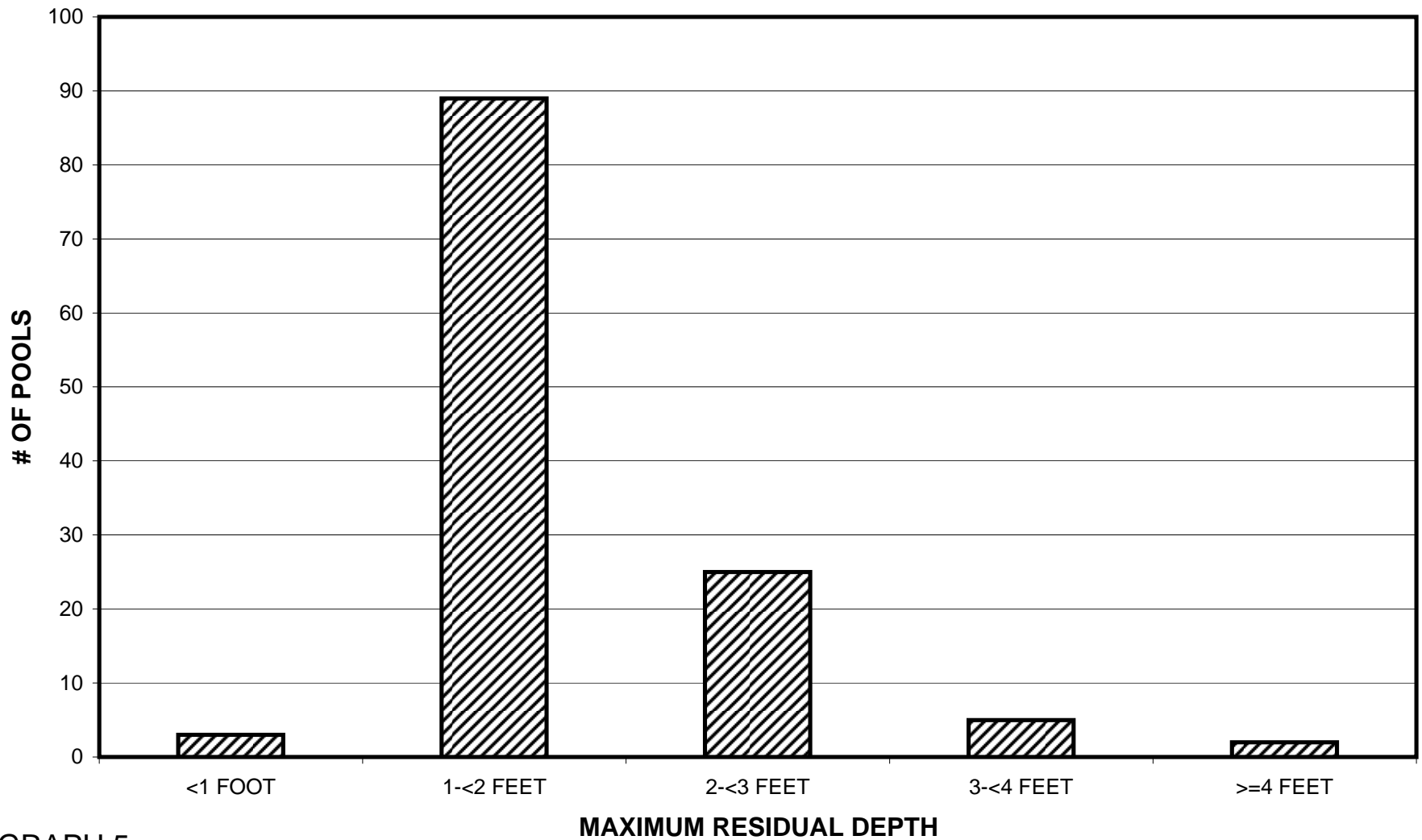
GRAPH 3

**MCCOY CREEK 2007**  
**POOL TYPES BY PERCENT OCCURRENCE**



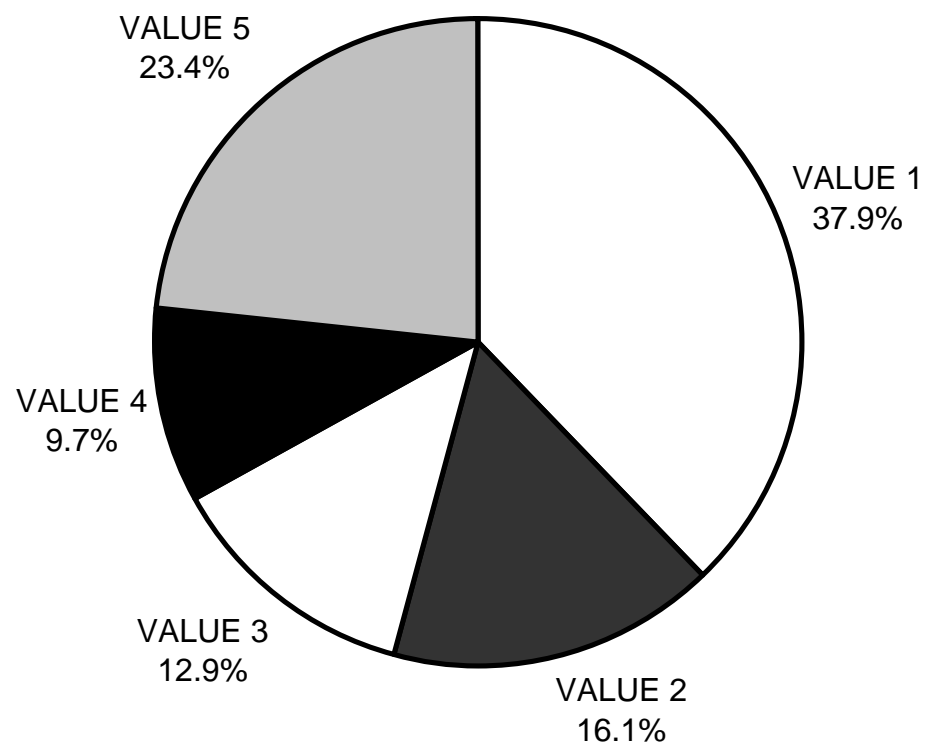
GRAPH 4

# MCCOY CREEK 2007 MAXIMUM DEPTH IN POOLS



GRAPH 5

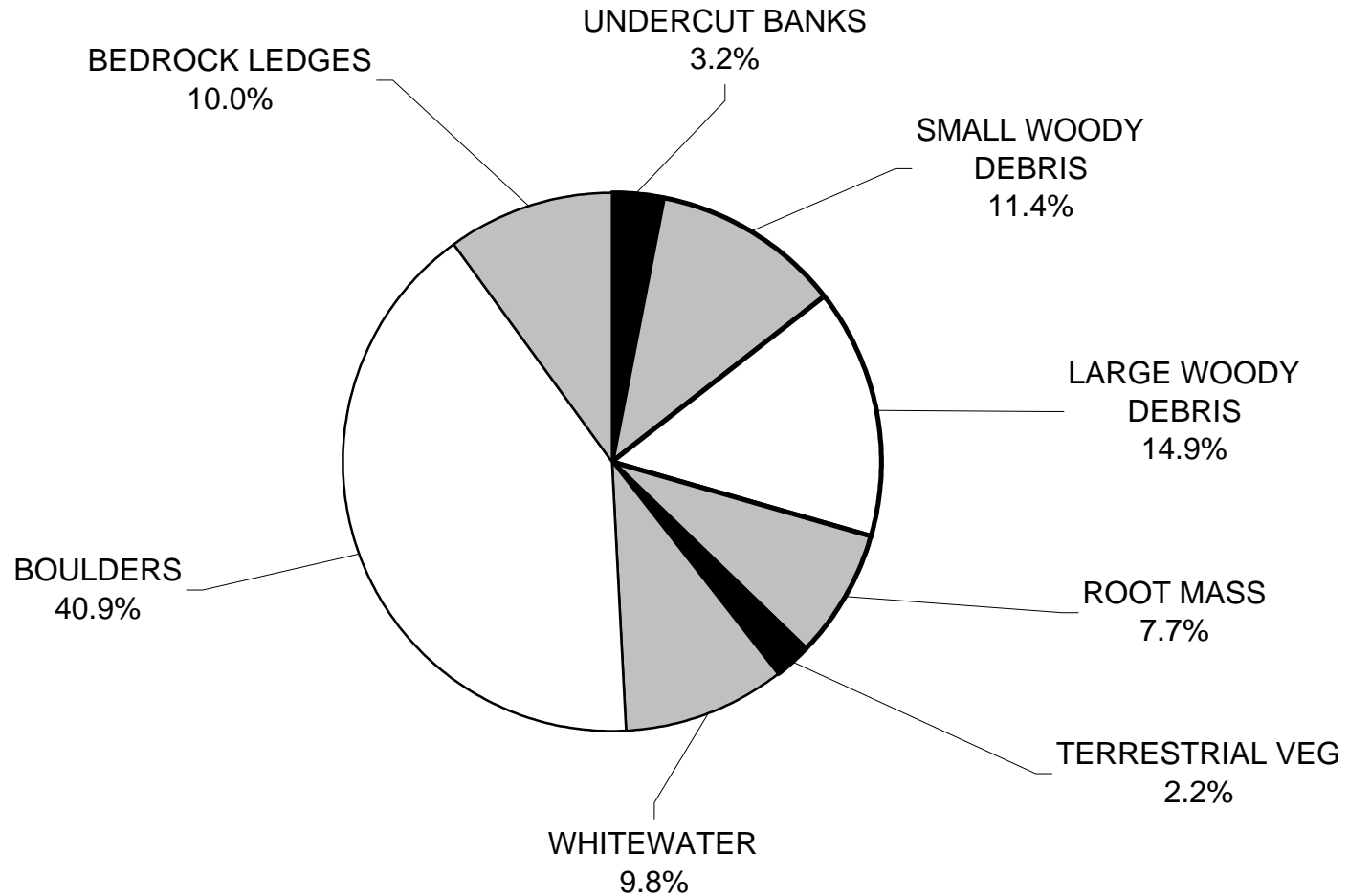
# MCCOY CREEK 2007 PERCENT EMBEDDEDNESS



GRAPH 6

# MCCOY CREEK 2007

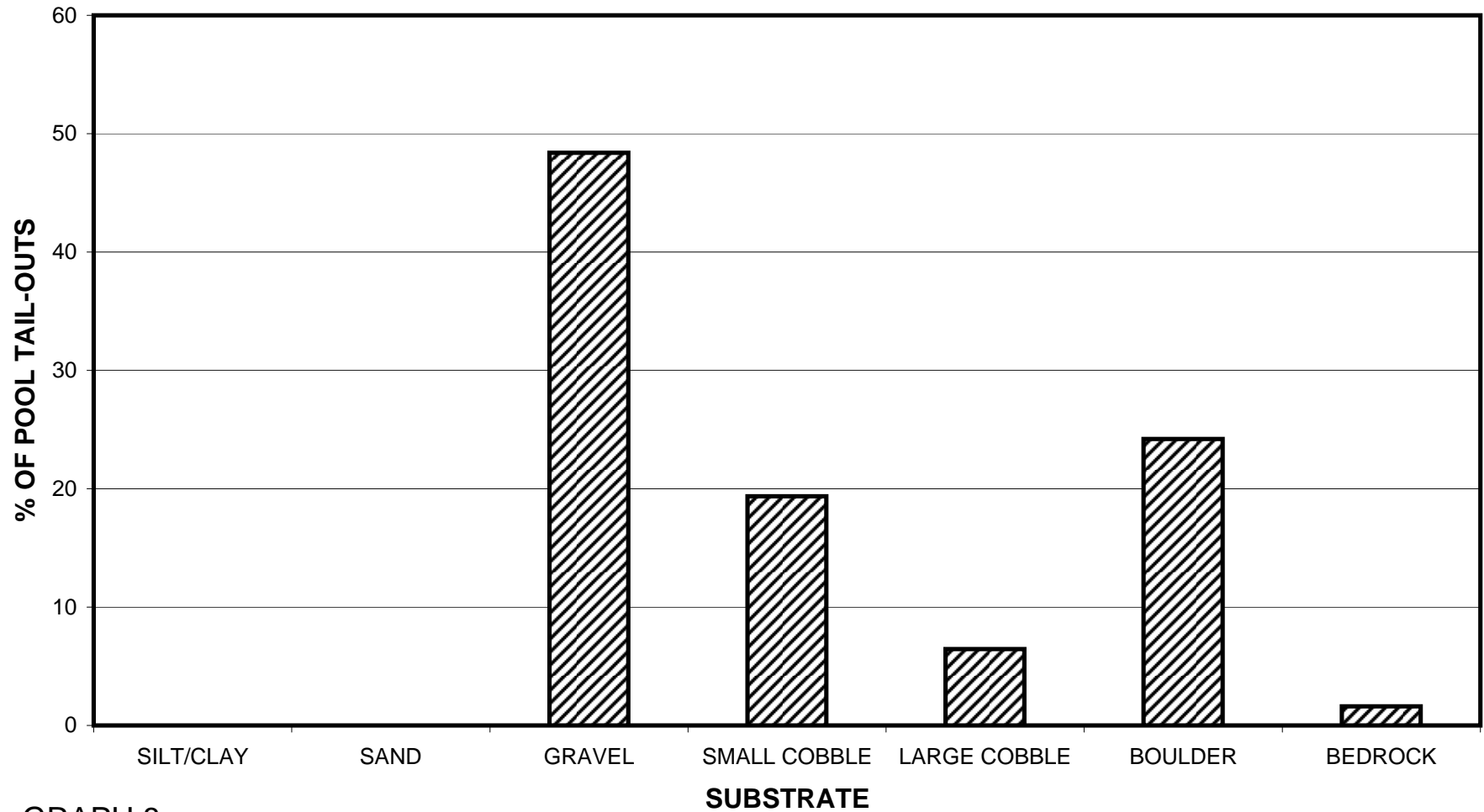
## MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

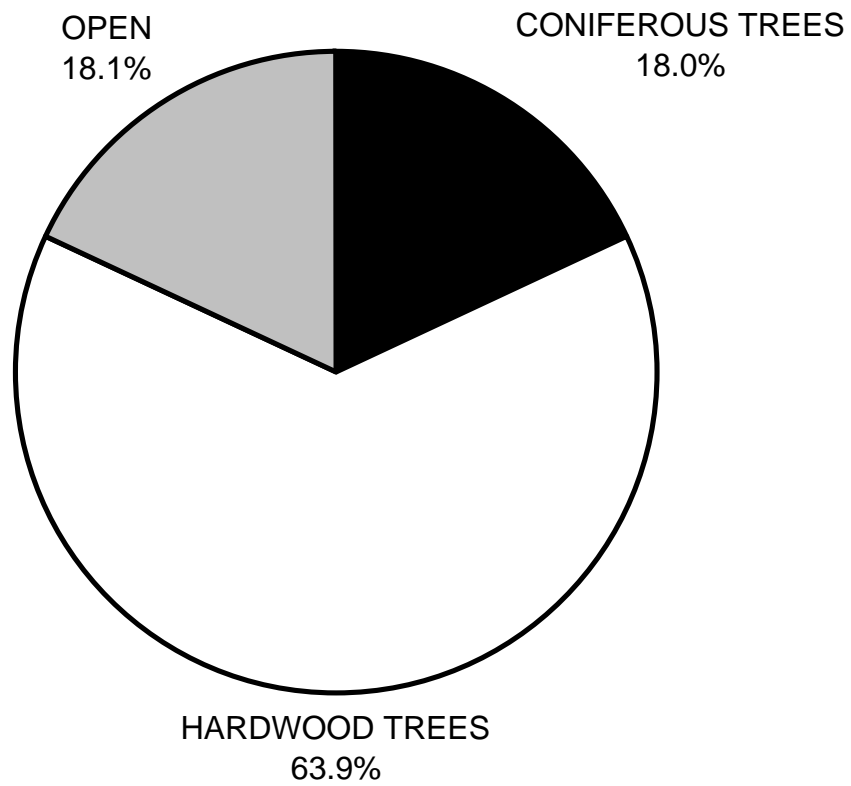


**MCCOY CREEK 2007**  
**SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



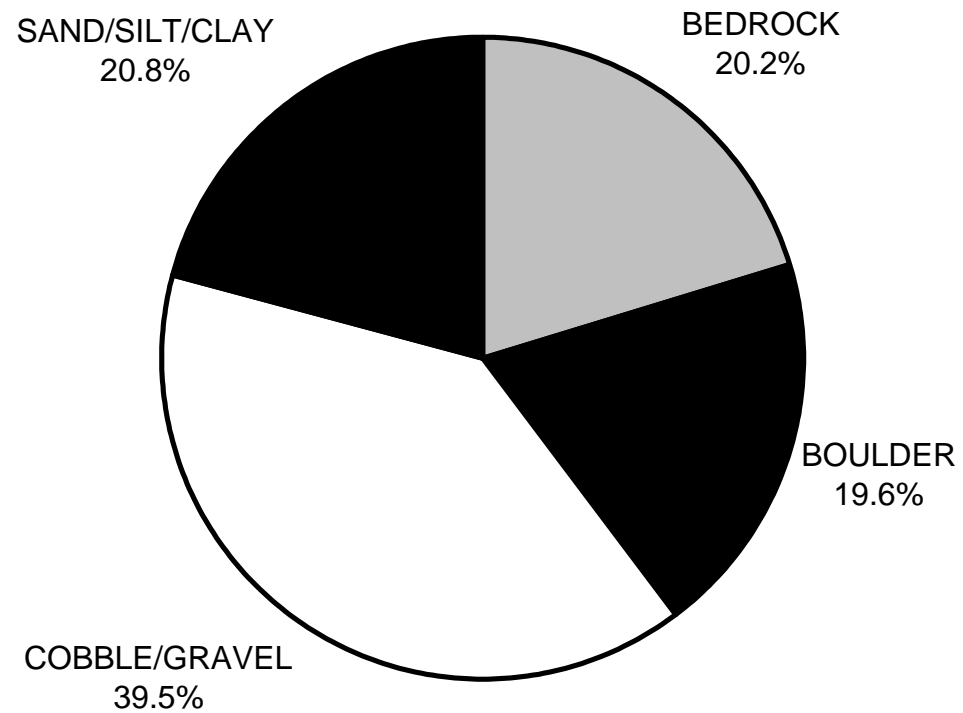
GRAPH 8

**MCCOY CREEK 2007  
MEAN PERCENT CANOPY**



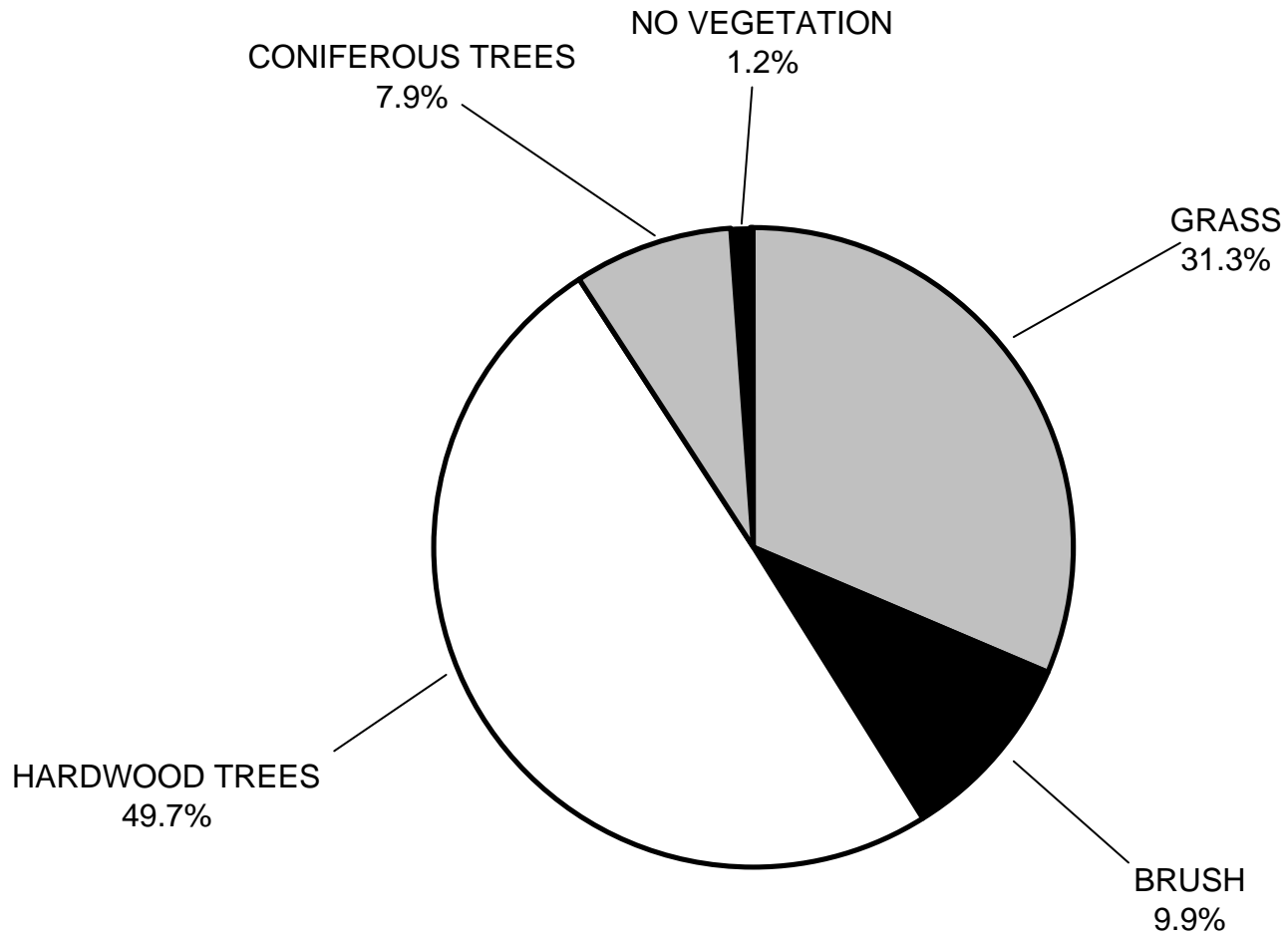
GRAPH 9

**MCCOY CREEK 2007**  
**DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**MCCOY CREEK 2007**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11