

STREAM INVENTORY REPORT

Wildcat Creek

INTRODUCTION

A stream inventory was conducted during July 24, 2007 to August 2, 2007 on Wildcat Creek. The survey began at the confluence with South Fork Eel River and extended upstream 2.3 miles.

The Wildcat Creek inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Wildcat Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Wildcat Creek is a tributary to the South Fork Eel River, is a tributary to the Eel River which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Wildcat Creek's legal description at the confluence with South Fork Eel River is T24N R17W S20. Its location is 39.9127 north latitude and 123.7588 west longitude, LLID number 1237590399127. Wildcat Creek is a first order stream and has approximately 1.9 miles of blue line stream according to the USGS Piercy 7.5 minute quadrangle. Wildcat Creek drains a watershed of approximately 6.0 square miles. Elevations range from about 590 feet at the mouth of the creek to 1,750 feet in the headwater areas. Second growth redwood forest dominates the watershed. The watershed is entirely privately owned by the Redwood Forest Foundation, Inc. Vehicle access exists from either Hawthorn Campbell Timber Company's private road system or from Highway 101 near Leggett, at mile marker #98.70. Then proceed by foot and cross the South Fork Eel River to the mouth of Wildcat Creek.

METHODS

The habitat inventory conducted in Sample 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 Wildcat 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". Wildcat 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 Wildcat 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 Wildcat 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 Wildcat 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 Wildcat 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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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.

10. Average Bankfull Width:

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

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Wildcat Creek. In addition, underwater observations were made by snorkel survey at fourteen sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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 Wildcat 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 24, 2007 to August 2, 2007 was conducted by B. Rahn and J. Pixley (WSP). The total length of the stream surveyed was 12,207 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.7 cfs on July 26, 2007.

Wildcat Creek is a B3 channel type for 12,207 feet of the stream surveyed (Reach 1). B3 channel types are moderately entrenched, moderate gradient, riffle dominated channels consisting of infrequently spaced pools, very stable plan and profile, stable banks and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 65 degrees Fahrenheit. Air temperatures ranged from 63 to 75 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% riffle units, 34% flatwater units and 30% pool units (Graph 1). Based on total length of Level II habitat types there were 41% flatwater units, 37% riffle units and 22% pool units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 35% low gradient riffle units, 22% mid-channel pool units and 18% step run units (Graph 3). Based on percent total length, low gradient riffle units made up 37%, step run units 30%, and mid-channel pool units 14%.

A total of 49 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 80% (Graph 4), and comprised 86% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-eight of the 49 pools (78%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 49 pool tail-outs measured, 36 had a value of 1 (73.5%); 10 had a value of 2 (20.4%); 2 had a value of 3 (4.1%); 1 had a value of 5 (2%) (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 99, flatwater habitat types had a mean shelter rating of 74, and pool habitats had a mean shelter rating of 54 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 37 and main channel pools had a mean shelter rating of 58 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Wildcat Creek. Graph 7 describes the pool cover in Wildcat Creek. Bedrock ledges are the dominant pool cover type followed by boulders.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was observed in 78% of pool tail-outs and small cobble was observed in 14% of pool tail-outs.

The mean percent canopy density for the surveyed length of Wildcat Creek was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 89% and 11%, respectively. Graph 9 describes the mean percent total canopy in Wildcat Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 84%. The mean percent left bank vegetated was 86%. The dominant elements composing the structure of the stream banks consisted of 57% bedrock, 38% cobble/gravel, 4% boulder and 1% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 89% of the units surveyed. Additionally, 74.2% of the units surveyed had hardwood trees as the dominant vegetation type, and 24.2% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A snorkel survey was conducted at fourteen sites for species composition and distribution in Wildcat Creek on September 27, 2007. Water temperatures taken during the electrofishing period of 1000 to 1400 hours ranged from 54 to 54 degrees Fahrenheit. The sites were sampled by B. Rahn, R. Marsh (WSP), and T. Tollefson (DFG).

In reach 1, which comprised 12,207 feet of stream surveyed, fourteen sites were sampled. The reach sites yielded 210 young-of-the-year steelhead/rainbow trout (SH/RT), 13 age 1+ SH/RT and 108 coho.

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The following chart displays the information yielded from these sites:

2007 Wildcat Creek Underwater Observations.

Date	Site #	Habitat Unit #	Habitat Type	Approx. Dist. From Mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
9/27/07	1	004	5.6	121	3	0	35	2	0
9/27/07	2	008	4.2	554	0	0	40	1	0
9/27/07	3	010	4.2	804	0	0	17	0	0
9/27/07	4	012	4.2	856	2	0	15	0	0
9/27/07	5	014	3.4	948	0	0	7	1	0
9/27/07	6	015	4.2	1031	4	0	18	0	0
9/27/07	7	019	4.2	1341	4	0	25	1	0
9/27/07	8	056	4.2	3883	25	0	10	1	0
9/27/07	9	114	5.6	8425	10	0	15	1	0
9/27/07	10	115	5.6	8457	20	0	12	1	0
9/27/07	11	120 (bank obs.)	3.3	8795	NA	0	NA	2	NA
9/27/07	12	121	5.5	8826	10	0	3	0	0
9/27/07	13	123	4.2	8979	15	0	3	1	0
9/27/07	14	131	5.4	9678	15	0	10	2	0

DISCUSSION

Wildcat Creek is a B3 channel type for the entire 12,207 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: B3 channel types are excellent for plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days July 24, 2007 to August 2, 2007, ranged from 56 to 65 degrees Fahrenheit. Air temperatures ranged from 63 to 75 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 41% of the total length of this survey, riffles 37% and pools 22%. The pools are relatively deep, with 38 of the 49 (78%) pools having a maximum residual

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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.

Forty-six of the 49 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. One 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.

Forty-five of the 49 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 54. The shelter rating in the flatwater habitats was 74. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Wildcat Creek. Bedrock ledges are the dominant cover type in pools followed by boulders. 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.

Reach 1 had a mean canopy density of 94%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 84% and 86%, 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) Wildcat Creek should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from bedrock ledges. 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.

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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 the South Fork Eel River.
213	0004.00	Deep pool with plunge height of 5.5'.
246	0005.00	Out of influence of the South Fork Eel River.
389	0006.00	Erosion on left bank estimated to be about 50' high.
554	0008.00	Young-of-the-year (YOY) salmonids were observed from the stream bank.
948	0014.00	Stream channel breaks into two at low flows.
1460	0021.00	The left bank erosion was contributing fine sediments estimated to be about 30' wide x 50' high.
1704	0025.00	There was a log structure out of water on the left bank.
1789	0027.00	There was a structure on the right bank.
1929	0028.00	Left bank erosion contributed large-fine sediments approximately 80' high x 50' wide.
2228	0031.00	There was a boulder structure buried in sediment.
2295	0032.00	There was erosion on the right bank.
2645	0037.00	There was an old structure at the top of the pool.
2692	0038.00	There was erosion on the left bank.
2765	0039.00	There was a structure creating a pile up of small and large woody debris.
3031	0041.00	A large log spanned the stream channel and nearly blocked the flow.
3722	0052.00	There was a log structure spanning the stream channel causing subsurface flow.
3782	0054.00	There was erosion observed on the right bank estimated to be about 90' high x 40' wide that was partially revegetated.

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3937	0058.00	There was a log structure accumulating small woody debris.
4822	0063.00	There was a seep on the left bank.
5579	0075.00	There was a large wood structure on the right bank.
5746	0077.00	Unnamed tributary #1 on the right bank flowed at an estimated 0.01 cfs that contributed an estimated less than 1% to the downstream flow. The tributary temperature was 58 degrees Fahrenheit. Temperatures were 59 degrees Fahrenheit upstream and downstream of the tributary. The tributary could be accessible to fish in high flows, although the slope was measured with a clinometer at 32%. No fish were observed in the tributary from the confluence upstream 100'.
5969	0079.00	There was a blown out log debris accumulation (LDA) composed of old growth redwood logs and log structures resulting in an accumulation of small woody debris on the right bank.
6170	0082.00	LDA #1 was about 5' high x 25' wide x 10' long with approximately 4 pieces of LWD. There were visible gaps in the LDA with water flowing through it. There was sediment retention consisting of gravel-small cobble substrates estimated at 20' wide x 120' long x 3' deep. Salmonids were observed above the LDA.
6343	0085.00	Unnamed tributary #2 was flowing at an estimated 0.5 cfs and contributed an estimated 30% to the downstream flow. The temperature of the tributary was 58 degrees Fahrenheit, downstream of the tributary was 62 degrees Fahrenheit and upstream of the tributary was 60 degrees Fahrenheit. The slope was measured with a clinometer and was 4%. No fish were observed from the confluence upstream approximately 250'. The tributary stream channel was highly entrenched and appeared to be actively eroding.
6468	0087.00	There was a series of wing deflector log structures capturing sediment.
6468	0087.00	Erosion was observed on the left bank.
6658	0089.00	A seep was cascading down the left bank. A 6" fish was observed from the stream bank.
7117	0094.00	LDA #2 was approximately 4' high x 19' wide x 10' long with 1 piece of large wood. There were visible gaps in the LDA and water was flowing through it. There was also sediment retention consisting of gravel substrate approximately 18' wide x 70' long x 2' high. Fish were observed above the LDA.
7683	0102.00	Erosion was observed on the right and left bank.

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7735	0104.00	There was an active erosion site observed on the right bank contributing cobble and gravel substrates estimated to be approximately 200' high x 40' wide.
7949	0108.00	There was a log structure on the right bank.
8138	0110.00	LDA #3 was approximately 10' high x 33' wide x 54' long with approximately 12 pieces of large wood. There were visible gaps in the LDA and water was flowing through it. There was sediment retention consisting of gravel to silt substrates approximately 20' wide x 100' long x 3' deep.
8188	0111.00	Unnamed tributary #3 entered from the right bank. The flow was an estimated 0.3 cfs and contributed an estimated 10% to the downstream flow. The temperature of the tributary was 56 degrees Fahrenheit. Temperatures both upstream and downstream were 59 degrees Fahrenheit. The tributary was accessible to fish for approximately 100' then there was a 12' waterfall, however, no fish were observed. The slope was measured with a clinometer to be approximately 7%.
8425	0114.00	There was erosion on the left bank that contributed gravel dominant substrates approximately 250' high x 40' long.
8425	0114.00	There was a 1.5' plunge into the 7.3' deep pool.
8457	0115.00	There was a 3.5' high plunge.
8846	0122.00	There was active erosion on the right bank depositing sediment, large wood and boulders estimated to be approximately 50' high x 350' long.
8846	0122.00	There was a large deposit of both sediment and small wood that resulted in a partial blockage of stream flow; possibly an old LDA site.
9326	0126.00	There were logs placed along the right bank.
9967	0135.00	There was an unnamed tributary #4 on the right bank. The flow was estimated to be less than 1 cfs and it contributed an estimated 2% to the downstream flow. The temperature of the tributary was 57 degrees Fahrenheit. Temperatures both upstream and downstream were 61 degrees Fahrenheit. The tributary could be accessible to fish at high flows, although no fish were observed. The slope was measured with a clinometer to be approximately 12%.
10402	0139.00	There was a seep on the right bank.
10454	0140.00	Unnamed tributary #5 entered from the left bank. The flow was estimated to be approximately 0.5 cfs and it contributed an estimated 35% to the downstream flow. The temperature of the tributary was 56 degrees Fahrenheit. The temperature was 61 degrees Fahrenheit both

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upstream and downstream of the tributary. The tributary was accessible to fish due to a 4% slope for the first 100' and salmonids were observed. After that, the tributary became highly entrenched with an increasingly steep gradient.

10578	0142.00	A accumulation of small woody debris was creating a buildup of gravel upstream.
10784	0145.00	There was active erosion on the left bank estimated to be approximately 150' high x 30' wide.
11190	0150.00	There was evidence of remnant redds in the long pool tail-out.
11617	0156.00	There was erosion on the right bank estimated to be approximately 25' high x 100' long.
11995	0158.00	LDA #4 was approximately 10' high x 38' wide x 20' long with 6 pieces of large wood. The LDA did not have visible gaps, although water was flowing through it. There was sediment retention consisting of gravel approximately 38' wide x 128' long x 5' deep. Salmonids were observed above the LDA.
12109	0160.00	The pool was deep and narrow, as there was large wood trapped between bedrock, partially forming an obstruction of flow at the top of the habitat unit.
12207	0162.00	The survey ended due to an 18' bedrock-sheet waterfall and no fish were observed above it. The waterfall could possibly be the end of anadromy. YOY and 1-2+ salmonids were consistently observed by the surveyors from the stream bank throughout the stream survey; with the exception of habitat unit #162.

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]	

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

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0

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
55	8	FLATWATER	34.0	90	4976	40.8	16.8	0.8	1.6	1273	70036	930	51164		74
49	49	POOL	30.2	55	2677	21.9	16.8	1.1	3.2	882	43224	1339	65597	1019	54
58	7	RIFFLE	35.8	79	4554	37.3	14.6	0.5	1.0	801	46463	400	23184		99
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
162	64				12207					159722			139945		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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 (%)
56	6	LGR	34.6	80	4505	36.9	13	0.5	1.3	886	49627	447	25031		96	95
2	1	HGR	1.2	24	49	0.4	22	0.4	0.9	290	581	116	232		120	70
26	3	RUN	16.0	51	1324	10.8	17	0.8	2.1	1021	26536	796	20690		90	93
29	5	SRN	17.9	126	3652	29.9	17	0.7	2.6	1425	41326	1011	29318		64	96
35	35	MCP	21.6	49	1725	14.1	16	1.0	6.8	756	26458	1061	37124	791	54	95
4	4	STP	2.5	141	564	4.6	18	0.9	4.6	2241	8964	2821	11284	2002	89	93
4	4	LSBk	2.5	53	213	1.7	14	1.0	5.1	803	3213	1055	4220	750	23	97
2	2	LSBo	1.2	19	38	0.3	12	0.4	2.5	211	422	228	456	82	35	98
4	4	PLP	2.5	34	137	1.1	31	2.7	9.5	1042	4167	3128	12513	2769	53	77

Total Units
162

Total Units Fully Measured
64

Total Length (ft.)
12207

Total Area (sq.ft.)
161293

Total Volume (cu.ft.)
140868

Table 3 - Summary of Pool Types

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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
39	39	MAIN	80	59	2289	86	15.8	1.0	908	35422	915	35687	58
10	10	SCOUR	20	39	388	14	20.6	1.6	780	7802	1424	14241	37
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
49	49				2677				43224			49927	

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

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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
35	MCP	71	0	0	10	29	13	37	7	20	5	14
4	STP	8	0	0	0	0	2	50	1	25	1	25
4	LSBk	8	0	0	0	0	2	50	1	25	1	25
2	LSBo	4	0	0	1	50	1	50	0	0	0	0
4	PLP	8	0	0	0	0	0	0	0	0	4	100

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
49	0	0	11	22	18	37	9	18	11	22

Mean Maximum Residual Pool Depth (ft.): 3.2

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Dry Units: 0

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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
56	6	LGR	0	35	5	0	5	0	10	45	0
2	1	HGR	0	0	0	0	10	20	10	60	0
58	7	TOTAL RIFFLE	0	30	4	0	6	3	10	47	0
26	3	RUN	0	20	42	15	5	0	0	18	0
29	5	SRN	0	44	9	1	2	0	4	34	6
55	8	TOTAL FLAT	0	35	21	6	3	0	3	28	4
35	35	MCP	2	12	10	4	1	0	2	33	35
4	4	STP	10	15	18	4	0	0	5	23	26
4	4	LSBk	8	13	0	0	0	0	0	10	70
2	2	LSBo	0	10	15	0	0	0	10	60	5
4	4	PLP	0	4	6	6	4	0	38	8	35
49	49	TOTAL POOL	3	12	10	4	1	0	6	29	36
162	64	TOTAL	2	17	11	4	2	0	6	31	28

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Dry Units: 0

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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
56	6	LGR	0	0	50	17	17	17	0
2	1	HGR	0	0	0	0	0	100	0
26	3	RUN	0	0	100	0	0	0	0
29	5	SRN	0	0	60	0	40	0	0
35	35	MCP	0	6	74	11	3	0	6
4	4	STP	0	0	50	50	0	0	0
4	4	LSBk	0	0	75	0	25	0	0
2	2	LSBo	0	50	0	50	0	0	0
4	4	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	11	89	0	84	86

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: Wildcat Creek	LLID: 1237590399127	Drainage: Eel River - South Fork
Survey Dates: 7/24/2007 to 8/2/2007	Survey Length (ft.): 12207	Main Channel (ft.): 12207
		Side Channel (ft.): 0
Confluence Location: Quad: PIERCY	Legal Description: T24NR17WS20	Latitude: 39:54:46.0N
		Longitude: 123:45:32.0W

STREAM REACH: 1									
Channel Type: B3			Canopy Density (%): 93.8				Pools by Stream Length (%): 21.9		
Reach Length (ft.): 12207			Coniferous Component (%): 11.3				Pool Frequency (%): 30.2		
Riffle/Flatwater Mean Width (ft.): 15.7			Hardwood Component (%): 88.7				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Hardwood Trees				< 2 Feet Deep: 22		
Range (ft.): 15 to 36			Vegetative Cover (%): 85.0				2 to 2.9 Feet Deep: 37		
Mean (ft.): 23			Dominant Shelter: Boulders				3 to 3.9 Feet Deep: 18		
Std. Dev.: 4			Dominant Bank Substrate Type: Bedrock				>= 4 Feet Deep: 22		
Base Flow (cfs.): 0.7			Occurrence of LWD (%): 11				Mean Max Residual Pool Depth (ft.): 3.2		
Water (F): 56 - 65			Air (F): 63 - 75		LWD per 100 ft.:		Mean Pool Shelter Rating: 54		
Dry Channel (ft): 0			Riffles: 1						
			Pools: 3						
			Flat: 2						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 4 Gravel: 78 Sm Cobble: 14 Lg Cobble: 2 Boulder: 0 Bedrock: 2									
Embeddedness Values (%): 1. 73.5 2. 20.4 3. 4.1 4. 0.0 5. 2.0									

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

Legal Description: T24NR17WS20

Latitude: 39:54:46.0N

Longitude: 123:45:32.0W

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	35	38	57.0
Boulder	1	4	3.9
Cobble / Gravel	27	22	38.3
Sand / Silt / Clay	1	0	0.8

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	0	0	0.0
Brush	1	1	1.6
Hardwood Trees	50	45	74.2
Coniferous Trees	13	18	24.2
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 1

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

StreamName: Wildcat Creek

LLID: 1237590399127

Drainage: Eel River - South Fork

Survey Dates: 7/24/2007 to 8/2/2007

Confluence Location: Quad: PIERCY

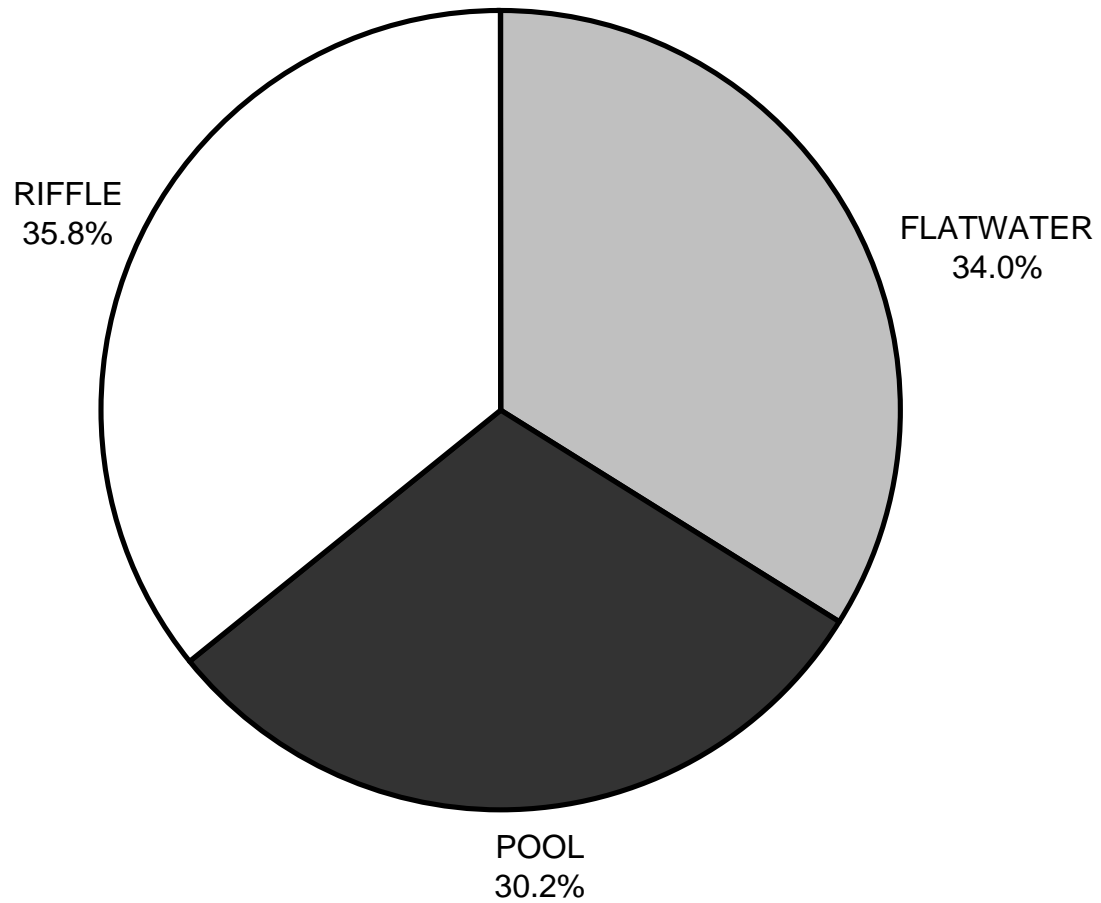
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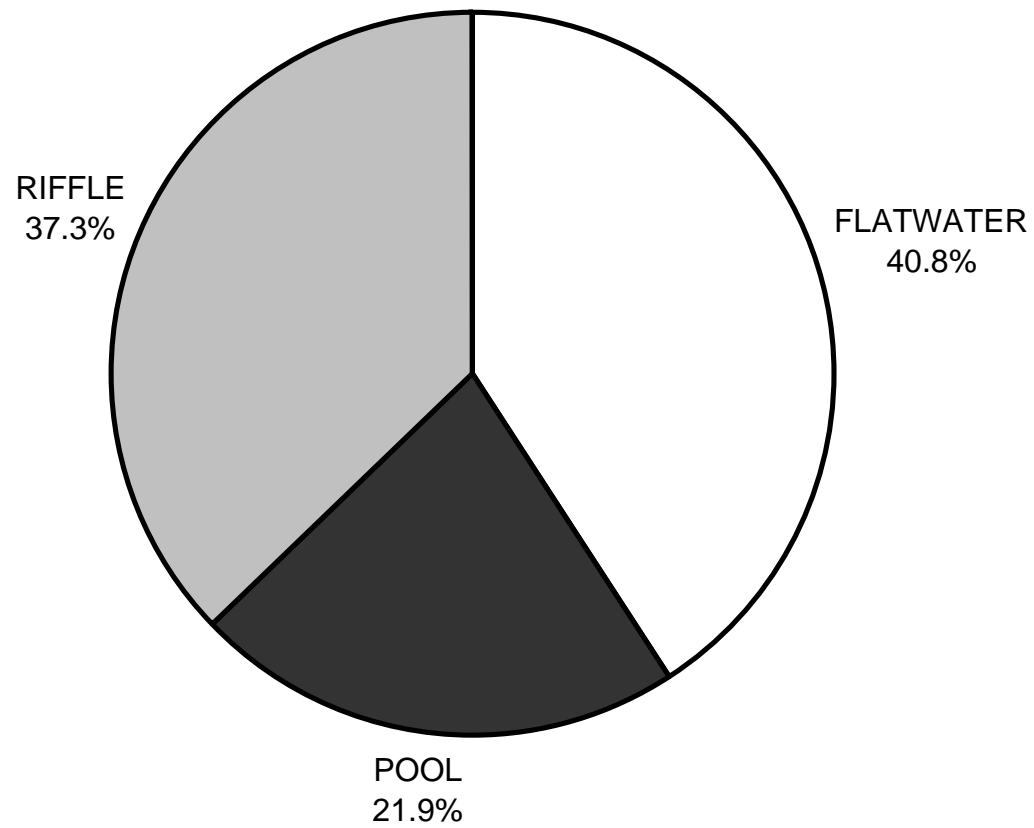
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	3
SMALL WOODY DEBRIS (%)	30	35	12
LARGE WOODY DEBRIS (%)	4	21	10
ROOT MASS (%)	0	6	4
TERRESTRIAL VEGETATION (%)	6	3	1
AQUATIC VEGETATION (%)	3	0	0
WHITEWATER (%)	10	3	6
BOULDERS (%)	47	28	29
BEDROCK LEDGES (%)	0	4	36

WILDCAT CREEK 2007
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

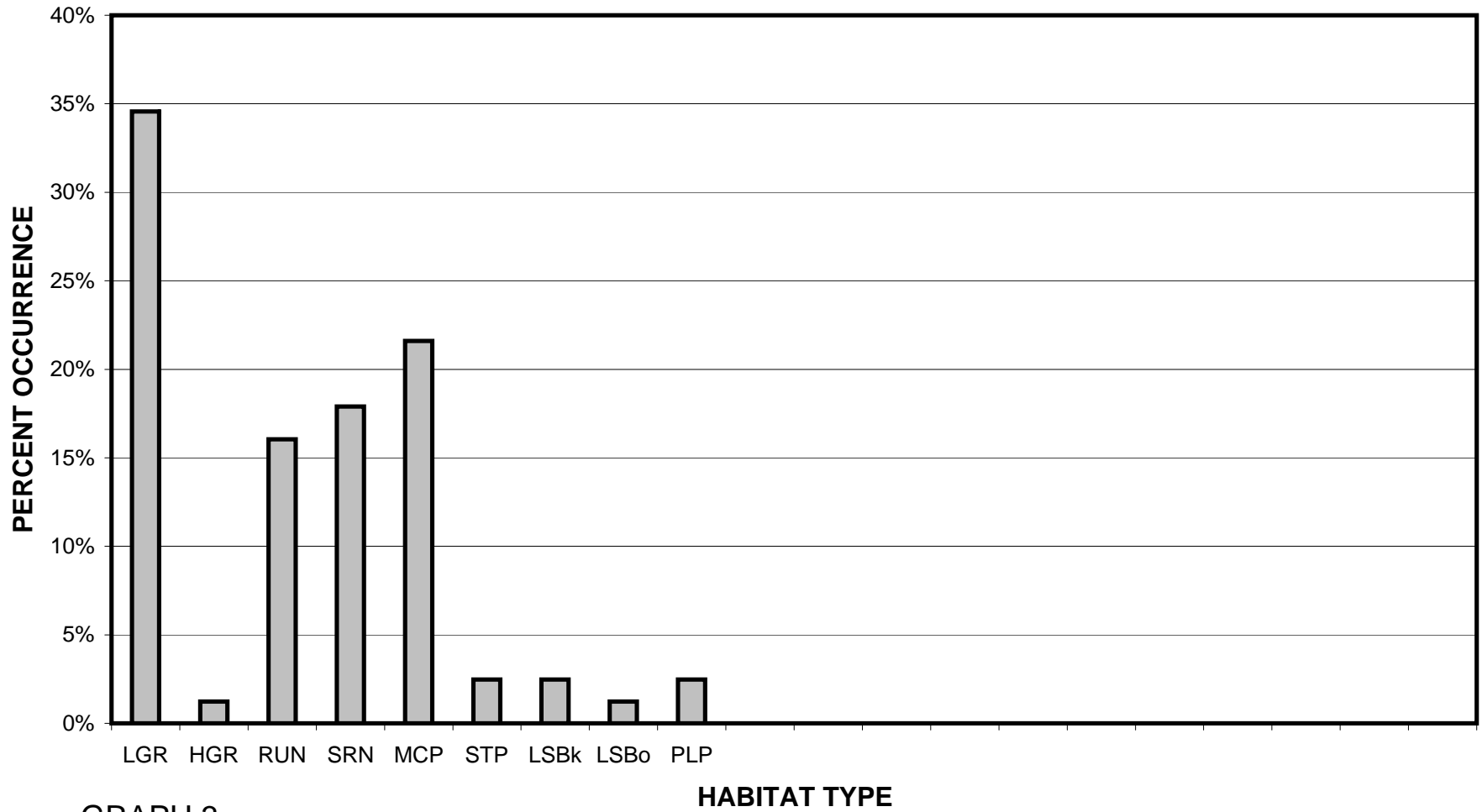
WILDCAT CREEK 2007
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

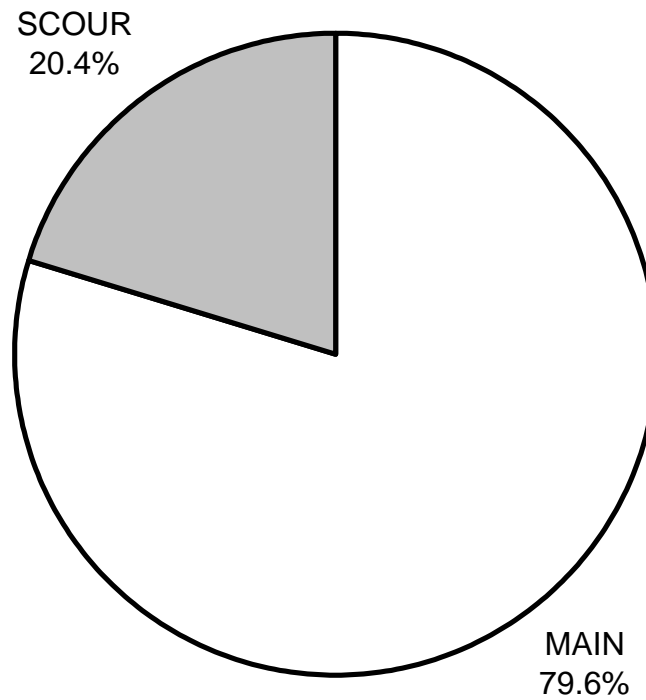
WILDCAT CREEK 2007

HABITAT TYPES BY PERCENT OCCURRENCE



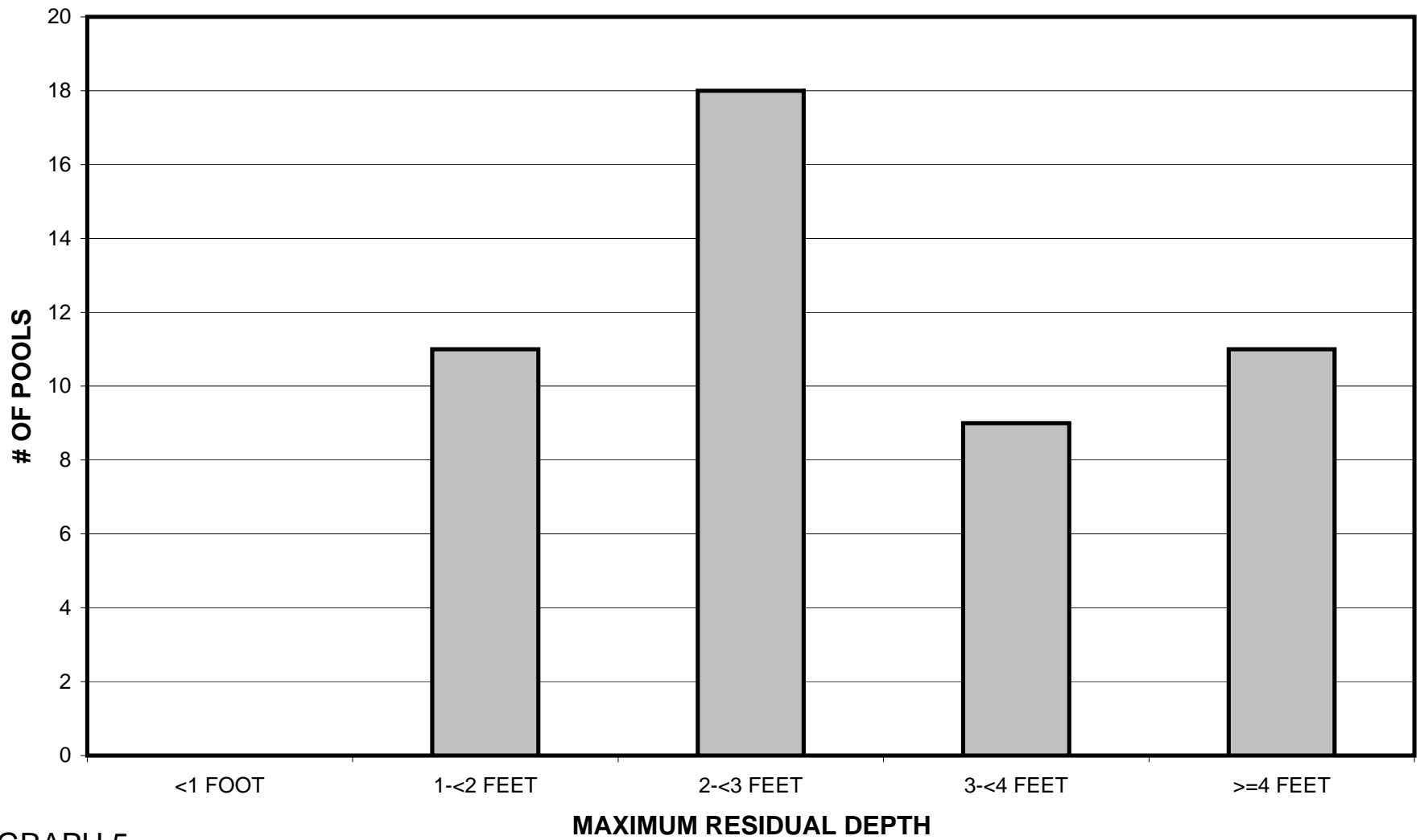
GRAPH 3

WILDCAT CREEK 2007
POOL TYPES BY PERCENT OCCURRENCE



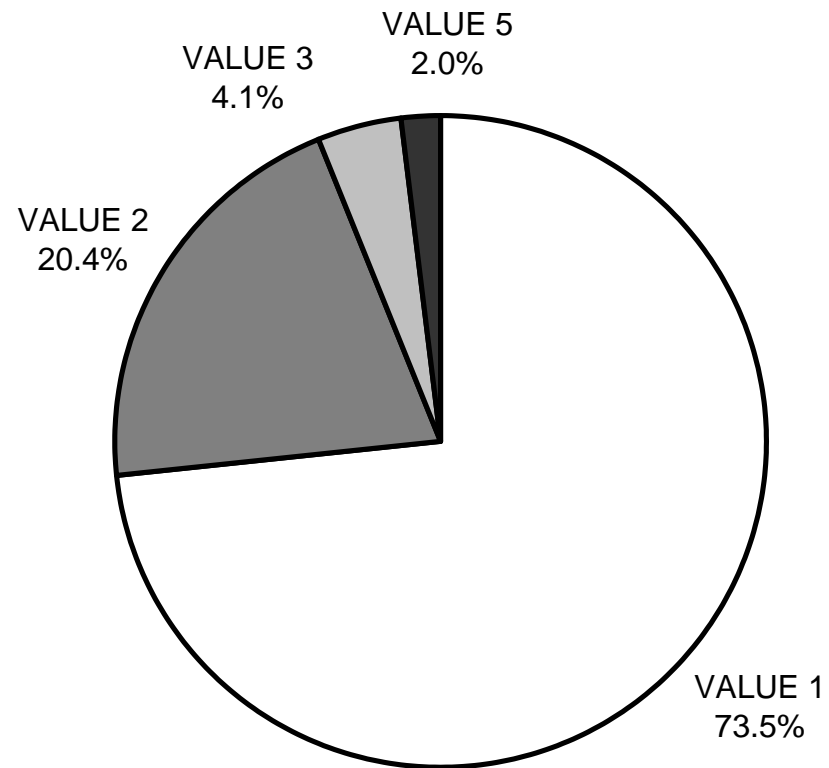
GRAPH 4

WILDCAT CREEK 2007 MAXIMUM DEPTH IN POOLS



GRAPH 5

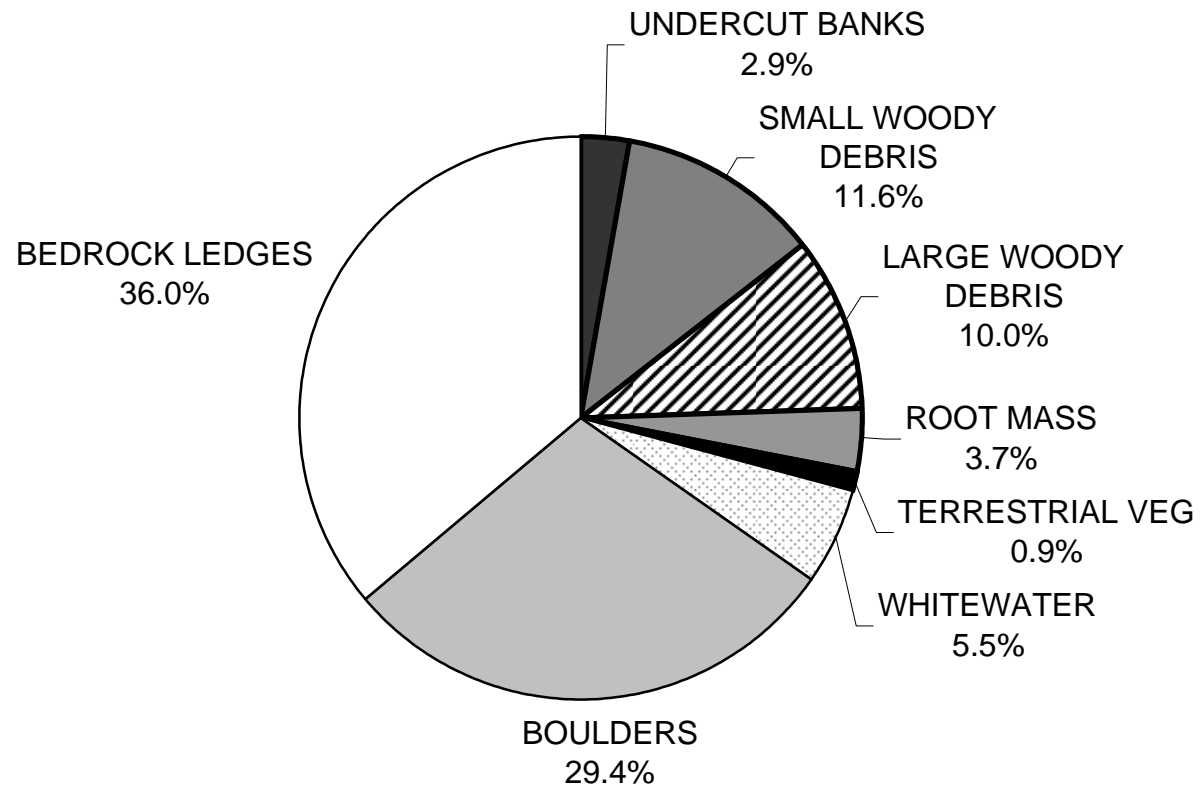
WILDCAT CREEK 2007 PERCENT EMBEDDEDNESS



GRAPH 6

WILDCAT CREEK 2007

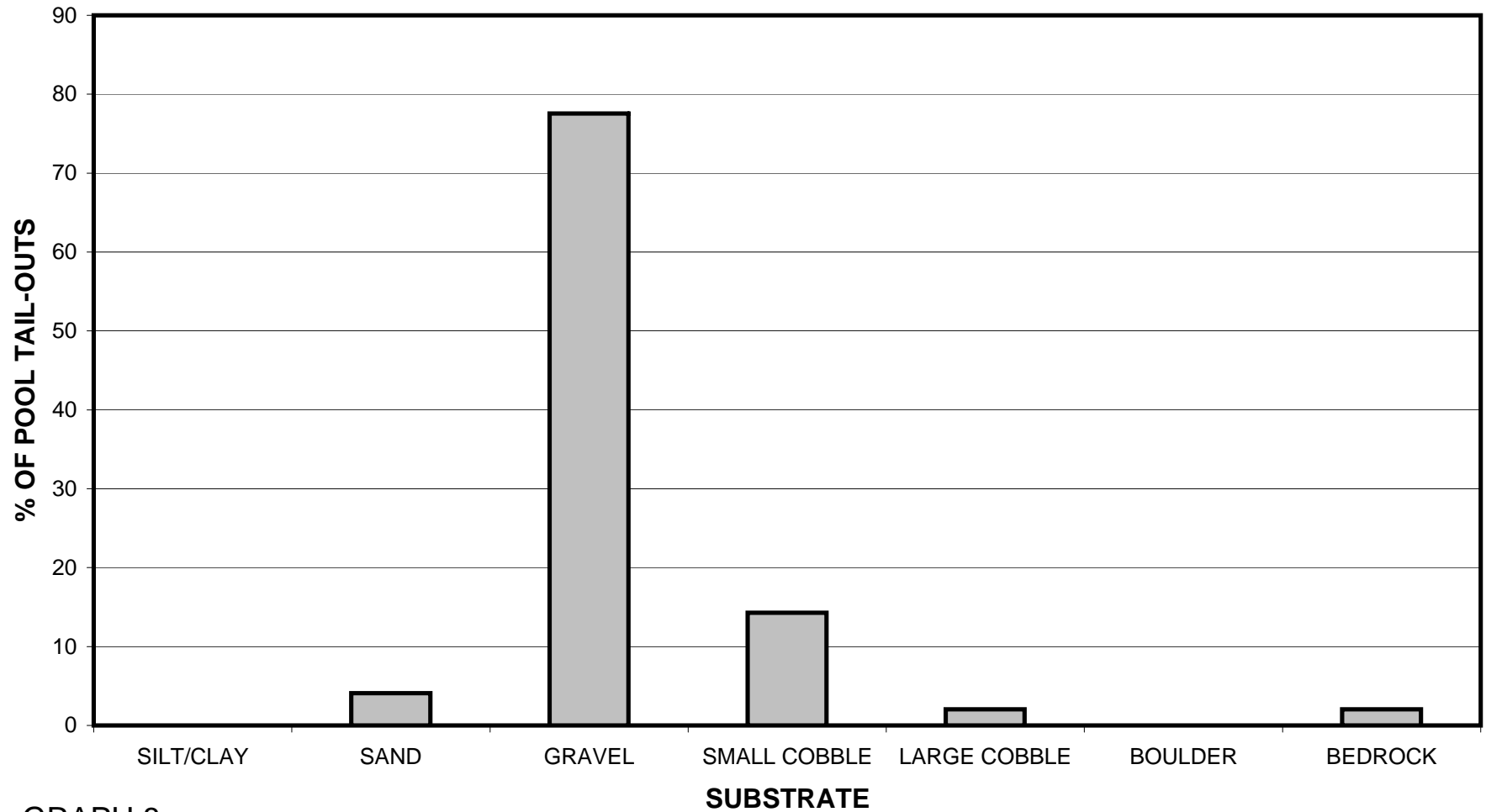
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

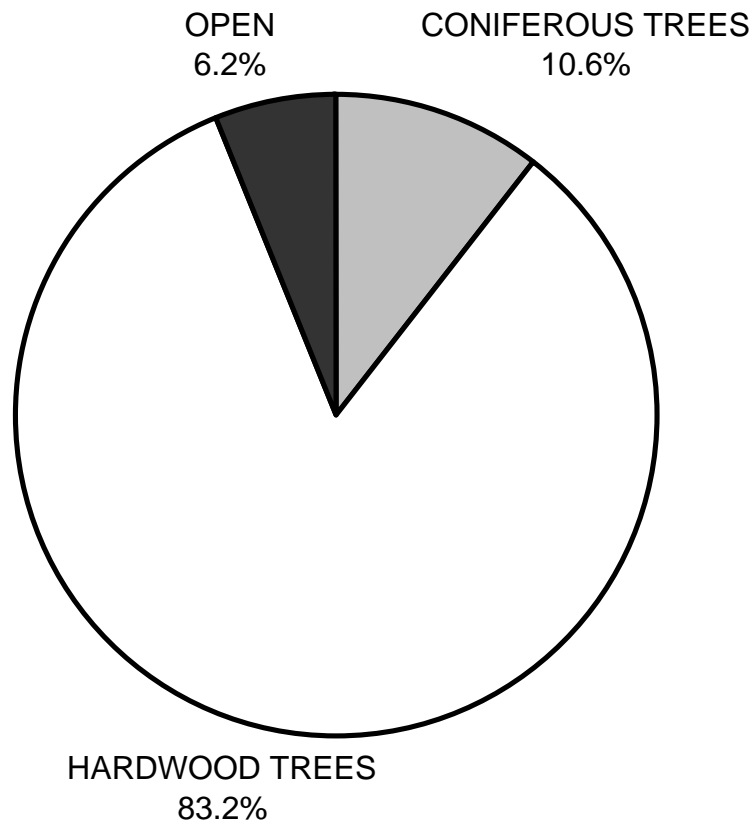
WILDCAT CREEK 2007

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



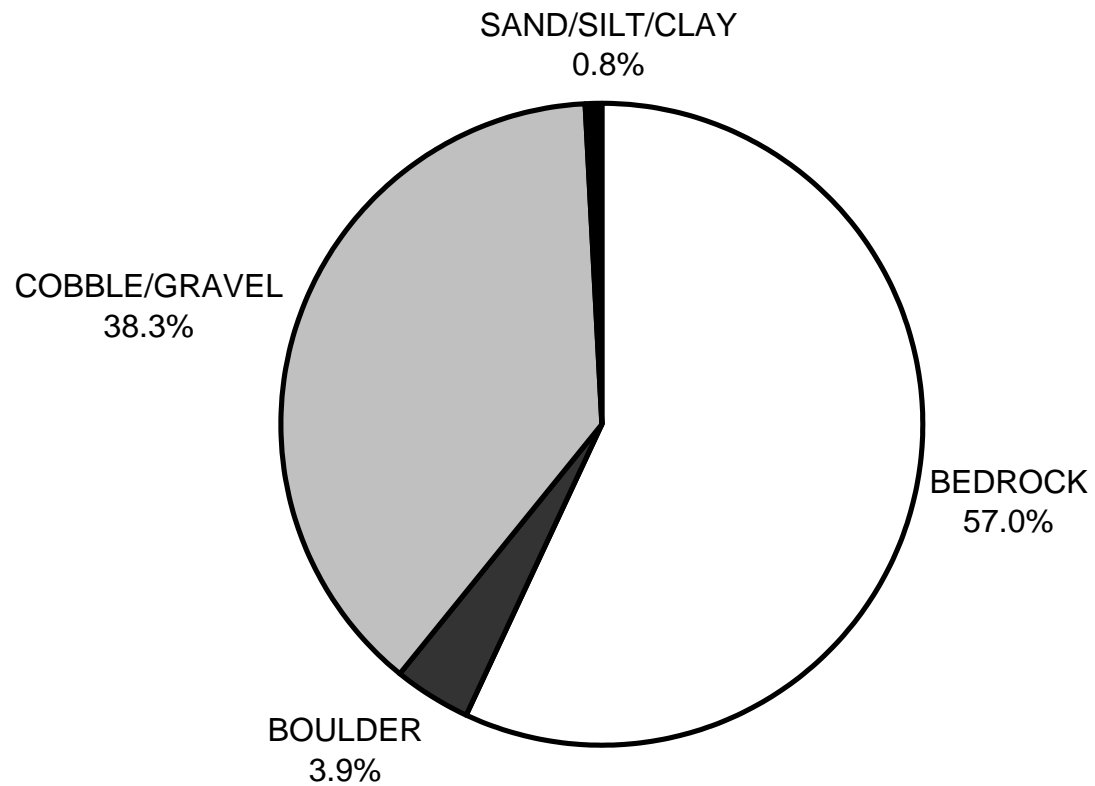
GRAPH 8

WILDCAT CREEK 2007 MEAN PERCENT CANOPY



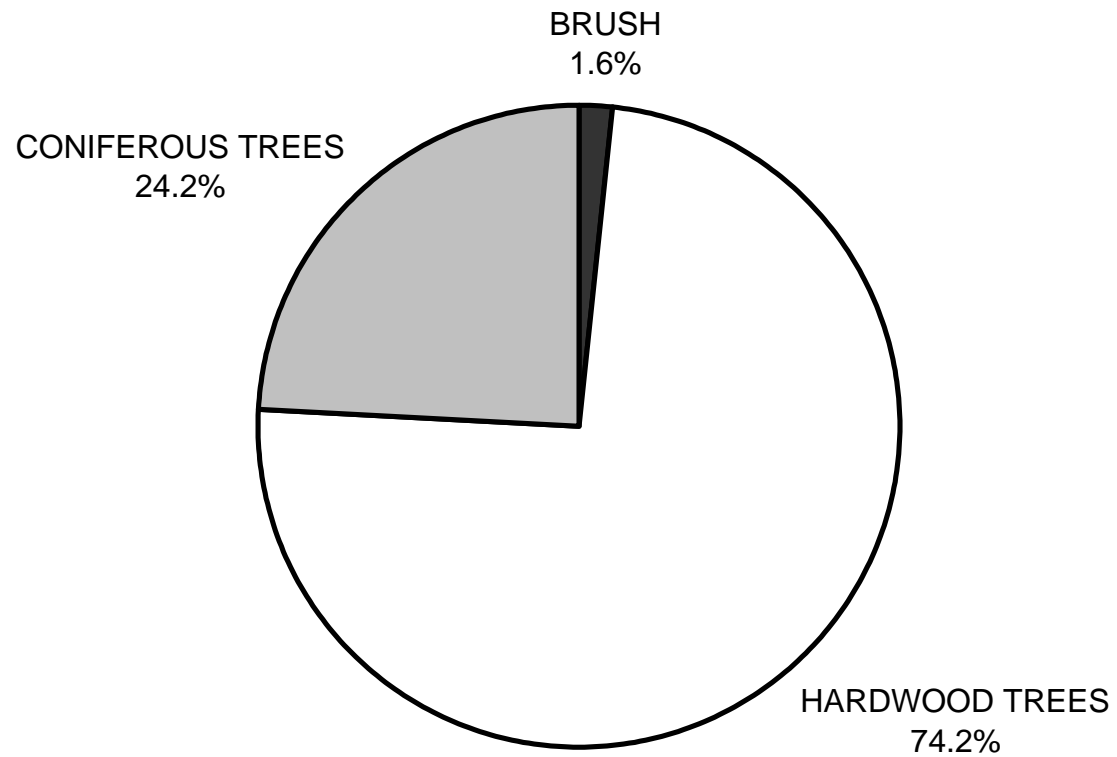
GRAPH 9

WILDCAT CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

WILDCAT CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Wildcat Creek 2007
South Fork Eel Watershed
Piercy Quad, Mendocino County

Start of Survey


End of Survey

**STANDISH-HICKEY
STATE REC AREA**

Riverdale



Legend

 Reach 1, B3 Channel Type

0 1,650 3,300 6,600 Feet



**Supplemental Map
Wildcat Creek 2007
South Fork Eel Watershed
Piercy Quad, Mendocino County**

Start of Survey

Tributary #2

Tributary #1

LDA #2

LDA #1

LDA #3

Tributary #3

Tributary #4

LDA #4

Tributary #5

End of Survey

Legend

— Reach 1, B3 Channel Type

0 1,200 2,400 4,800 Feet

