

STREAM INVENTORY REPORT

Leggett Creek

INTRODUCTION

A stream inventory was conducted during September 5, 2007 to September 17, 2007 on Leggett Creek. The survey began at the confluence with South Fork Eel River and extended upstream 3.2 miles.

The Leggett 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 Leggett 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

Leggett Creek is a tributary to South Fork Eel River, tributary to the Eel River which drains to the Pacific Ocean, located in Humboldt County, California (Map 1). Leggett Creek's legal description at the confluence with South Fork Eel River is T4S R3E S11. Its location is 40.1299 north latitude and 123.8223 west longitude, LLID number 1238210401299. Leggett Creek is a second order stream and has approximately 8.7 miles of blue line stream according to the USGS Miranda 7.5 minute quadrangle. Leggett Creek drains a watershed of approximately 5.2 square miles. Elevations range from about 250 feet at the mouth of the creek to 1,000 feet in the headwater areas. Hardwood forest dominates the watershed. The watershed is primarily privately owned. Vehicle access exists via Highway 101 to the Redway Exit; from the town of Redway take Briceland Road west; cross the South Fork Eel River and turn right onto Humboldt State Parks Road at approximately 1,000 feet; follow Humboldt State Parks Road to the end at a YMCA camp; follow foot trails along South Fork Eel River to the mouth of Leggett Creek.

METHODS

The habitat inventory conducted in Leggett 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.

Leggett Creek

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 Leggett 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". Leggett 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.

Leggett Creek

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 Leggett 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 Leggett 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 Leggett 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 Leggett 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.

Leggett Creek

10. Large Woody Debris Count:

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

11. Average Bankfull Width:

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

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Leggett Creek. In addition, underwater observations were made at ten 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

Leggett Creek

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Leggett 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 September 5, 2007 to September 17, 2007 was conducted by T. Chapple, and B. Rahn (WSP). The total length of the stream surveyed was 17,137 feet with an additional 126 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.45 cfs on September 5, 2007.

Leggett Creek is a F4 channel type for the entire 17,137 feet of the stream surveyed.

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 66 degrees Fahrenheit. Air temperatures ranged from 58 to 75 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% riffle units, 35% flatwater units, 20% pool units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 49% riffle units, 33% flatwater units, 17% pool units, and 1% dry units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were 35% low gradient riffle units, 31% run units, and 16% mid-channel pool units (Graph 3). Based on percent total length, low gradient riffle units made up 39%, run units 26%, and mid-channel pool units 14%.

A total of 75 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 85% (Graph 4), and comprised 85% of the total length of all pools (Table 3).

Leggett Creek

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirty-nine of the 75 pools (52%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 75 pool tail-outs measured, 16 had a value of 1 (21.3%); 26 had a value of 2 (34.7%); 18 had a value of 3 (24%); 15 had a value of 4 (20%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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 7, flatwater habitat types had a mean shelter rating of 12, and pool habitats had a mean shelter rating of 23 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 19 while main-channel pools had a mean shelter rating of 24 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Small cobble was observed in 53% of pool tail-outs, and gravel was observed in 40% of pool tail-outs.

The mean percent canopy density for the surveyed length of Leggett Creek was 88%. Twelve percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 68% and 32%, respectively. Graph 9 describes the mean percent canopy in Leggett Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 94%. The mean percent left bank vegetated was 93%. The dominant elements composing the structure of the stream banks consisted of 56% cobble/gravel, 26% bedrock, 12% sand/silt/clay, and 5% boulder (Graph 10). Hardwood trees were the dominant vegetation type observed in 58.8% of the units surveyed. Additionally, 22.7% of the units surveyed had coniferous trees as the dominant vegetation type, and 13.4% were dominated by grass (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Ten sites were surveyed using snorkel surveys for species composition and distribution in Leggett Creek on September 25, 2007. Water temperatures taken during the survey period, 0950 am to 1145 am ranged from 53 to 58 degrees Fahrenheit. Air temperatures ranged from 52 to 61 degrees Fahrenheit. The sites were sampled by S. Monday (DFG), T. Chapple (WSP), and R. Marsh (CCC).

In reach 1, which comprised the entire 17,137 feet of stream surveyed, ten sites were sampled. The reach sites yielded 252 young-of-the-year steelhead/rainbow trout (SH/RT), seven age 1+ SH/RT, and 84 young-of-the-year coho salmon.

Leggett Creek

The following chart displays the information yielded from these sites:

2007 Leggett Creek Underwater Observations:

Date	Site #	Habitat Unit #	Habitat Type	Approx. distance from mouth (ft.)	Coho		SH/RT		
					YOY	1+	YOY	1+	2+
Reach 1: F4 Channel Type									
9/25/07	1	004	5.4	237	4	0	50	0	0
9/25/07	2	008	4.2	355	10	0	5	0	0
9/25/07	3	016	4.2	667	20	0	20	1	0
9/25/07	4	035	4.2	1,302	50	0	30	2	0
9/25/07	5	057	4.2	2,511	0	0	100	1	0
9/25/07	6	083	1.2	3,745	0	0	30	1	0
9/25/07	7	102	5.6	4,631	0	0	14	0	0
9/25/07	8	108	4.4	4,971	0	0	2	0	0
9/25/07	9	134	5.3	5,972	0	0	1	0	0
9/25/07	10	138	4.2	6,102	0	0	0	2	0

DISCUSSION

Leggett Creek is an F4 channel type for the entire 17,137 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channels are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days September 5, 2007 to September 17, 2007, ranged from 56 to 66 degrees Fahrenheit. Air temperatures ranged from 58 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 33% of the total length of this survey, riffles 49%, and pools 17%. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

Leggett Creek

Forty-two of the 75 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirty-three of the pool tail-outs had embeddedness ratings of 3 or 4. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Seventy of the 75 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 23. The shelter rating in the flatwater habitats was 12. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in Leggett Creek. Large woody debris is the dominant cover type in pools followed by small woody debris.

The mean percent canopy density for the stream was 88%. 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 94% and 93%, 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) Leggett Creek should be managed as an anadromous, natural production stream.
- 2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from terrestrial vegetation. Adding high quality complexity with woody cover in the pools is desirable.
- 3) 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.
- 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.

Leggett Creek

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	The survey began at the confluence with the South Fork Eel River. Reach 1 was a F4 channel type.
464	0011.00	Log debris accumulation (LDA) #1 measured 6' high x 27' wide x 18' long with 6 pieces of large woody debris (LWD). No water flows through the LDA and there were no visible gaps. There was sediment retained in the size range from sand to small cobble, the sediment measured approximately 20' wide x 30' long x 3' deep. This LDA is not a barrier, and fish were seen above.
703	0017.00	LDA #2 measured 10' high x 48' wide x 60' long with approximately 20 pieces of LWD. Water flowed through the LDA, and there were visible gaps. Sediment was being retained in the dimensions of 38' wide x 100' long x 8' deep and ranged in size from sand to small cobble. Fish were seen above the LDA..
945	0025.00	Bridge #1 was a metal ATV bridge measuring 8' wide x 20' high x 79' long.
1043	0029.00	There was erosion on the right bank measuring 20' high x 20' wide.
1101	0031.00	A channel type was taken here.
2036	0048.00	Young-of the-year salmonids were observed in this unit.
2314	0054.00	LDA #3 extends through habitat unit #056. It measured 16' high x 50' wide x 68' long with ~30 pieces of large wood. Water flows through, with no visible gaps. There was sediment retention ranging in size from silt to small cobble, and measuring 40' wide x 300' long x 12' deep. No coho salmon were observed above this LDA.
4256	0093.00	Tributary #1 (Panther Creek) entered on the right bank. It had an estimated flow of 0.1 cubic feet per second (cfs) and was contributing to ~10% of Leggett Creek's flow. The temperature of the tributary was 56 degrees Fahrenheit, the temperature of Leggett creek upstream and downstream of the tributary was 62 and 60 degrees Fahrenheit, respectively. The creek is only accessible for 150', after that there is a 15' waterfall. Fish were not observed in the tributary.
5100	0113.00	LDA #4 was 16' high x 30' wide x 197' long and contained at least 52 pieces of large wood. Water flowed through and there were no visible

Leggett Creek

gaps. The sediment retained ranged in size from silt to small cobble, and measured 21' wide x 200' long x 6' high. Fish were seen above. The LDA extended through habitat unit #118.

5506	0124.00	Young-of-the-year salmonids were observed in this unit.
5506	0124.00	LDA #5 was 17' high x 30' wide x 25' long, with 18 pieces of large wood. Water did not flow through it and there were no visible gaps. The retained sediment ranged in size from silt to small cobble and measured 30' wide x 300' long x 10' high. Fish were seen above.
6473	0144.00	Young-of-the-year salmonids were observed.
6785	0151.00	LDA #6 was 8' high x 25' wide x 18' long, with ~20 pieces of large wood. Water flowed through and there were no visible gaps. Retained sediment ranged in size from silt to small cobble and measured 20' wide x 100' long x 5' high. Fish were seen above.
7760	0170.00	Tributary #2 entered on the right bank. Flow is ~0.05 cfs, contributing to 2% of Leggett Creek's flow. The tributary's temperature was 58 degrees Fahrenheit; Leggett Creek's temperature downstream of the tributary was 60 degrees Fahrenheit, upstream was 59 degrees Fahrenheit. The tributary was not accessible to fish due to a 20' waterfall 75' upstream of the mouth. No fish were observed in the tributary. The slope was 4% for first 75 feet.
8090	0177.00	There was erosion on both banks contributing silt and gravel to the creek. The right bank erosion was 8' high; the left bank erosion was 5' high. Both erosion sites were 200' long and extend through habitat unit #180.
8537	0186.00	Tributary #3 entered from the right bank. The flow of the tributary was ~0.05 cfs and contributed to 2% of Leggett Creek's flow. The tributary's temperature was 58 degrees Fahrenheit; Leggett Creek's temperature upstream and downstream of the tributary was both 59 degrees Fahrenheit. The tributary was not accessible to fish, due to woody debris and the tributary's flow stopped 100' upstream of the mouth.
10420	0212.00	Young-of-the-year, one year plus and two plus year old salmonids were observed.
11351	0232.00	Bridge #2 was an ATV bridge that measured 5' wide x 7' tall x 85' long. It was made of pressure treated wood.
11708	0239.00	LDA #7 was 14' high x 60' wide x 130' long with approximately 20 pieces of large wood. Water did not flow through. There were no visible gaps. The retained sediment ranged in size from sand to small cobble, and measured 40' wide x 400' long x 5' high.

Leggett Creek

12374	0250.00	There was a slide on the right bank it measured approximately 80' high x 100' long. The slide was contributing silt, sand, clay and gravel.
12440	0252.00	Tributary #4 entered Leggett Creek on the right bank. Flow is estimated at 0.1 cfs and contributed to 15% of Leggett Creek's flow. The tributary had a slope of 2% and was accessible to fish. The tributary was checked 300' upstream, and salmonids were observed in it.
12467	0253.00	There was a ford for ATVs that measured 6' wide x 12' long.
13382	0275.00	LDA #8 was 10' high x 20' wide x 65' long with 25 pieces of large wood. Water flowed through it and gaps were visible. The sediment retained ranged in size from silt to large cobble and measured 20' wide x 150' long x 6' tall. Fish were seen above the LDA. This LDA extended through habitat unit #278.
13582	0285.00	LDA #9 was 6' high x 17' wide x 9' long with 4 pieces of large wood. Water flowed through it and there were no visible gaps. The retained sediment ranged in size from silt to large cobble and measured 12' wide x 50' long x 5' high
13682	0290.00	The gradient of the stream around this unit was 5%.
13682	0290.00	There was a left bank slide measuring approximately 150' high x 70' long; and was contributing sediment in the size range of fines to boulders.
13800	0293.00	There was a slide on the right bank measuring approximately 70' high x 70' long; and was contributing sediment in the size range of fines to small cobbles.
14765	0320.00	Tributary #5 entered from the left bank. The flow was estimated at 0.05 cfs and contributed to 5% of Leggett Creek's flow. The tributary's temperature was 56 degrees Fahrenheit, the temperature of Leggett upstream of the tributary was 57 degrees Fahrenheit, and downstream it was 56 degrees Fahrenheit. The tributary was not accessible to fish due to a bedrock sheet waterfall ~100' up creek and a 9% slope. No fish were observed in the tributary.
15054	0326.00	There was a plunge height of 3 feet.
16055	0357.00	There were young-of-the-year salmonids observed in this unit.
16444	0365.00	There was a one plus salmonid observed in this unit.
16454	0366.00	Tributary #6 entered from the left bank. The tributary's flow was estimated at 0.1 cfs and was contributing to 25% of Leggett Creek's flow. The water temperature of the tributary was 60 degrees Fahrenheit,

Leggett Creek

Leggett Creek's temperature downstream of the tributary was 60 degrees Fahrenheit, and upstream was 62 degrees Fahrenheit. One 5" salmonid was observed in the tributary. The tributary's slope was 13% and is accessible for at least 200'. After that there was a cascade of 25'.

16953	0373.00	There was right bank erosion measuring approximately 15' tall x 100' long. The eroding bank was contributing fine sediment to gravel.
17072	0377.00	The gradient had increased to 20% slope.
17137	0378.00	End of survey due to high gradient riffle and cascade units continuing for the next 300', blocking passage of adult and juvenile salmonids.

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.

Leggett 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 }

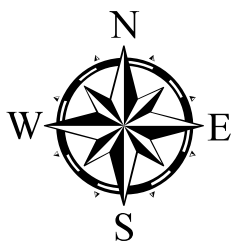
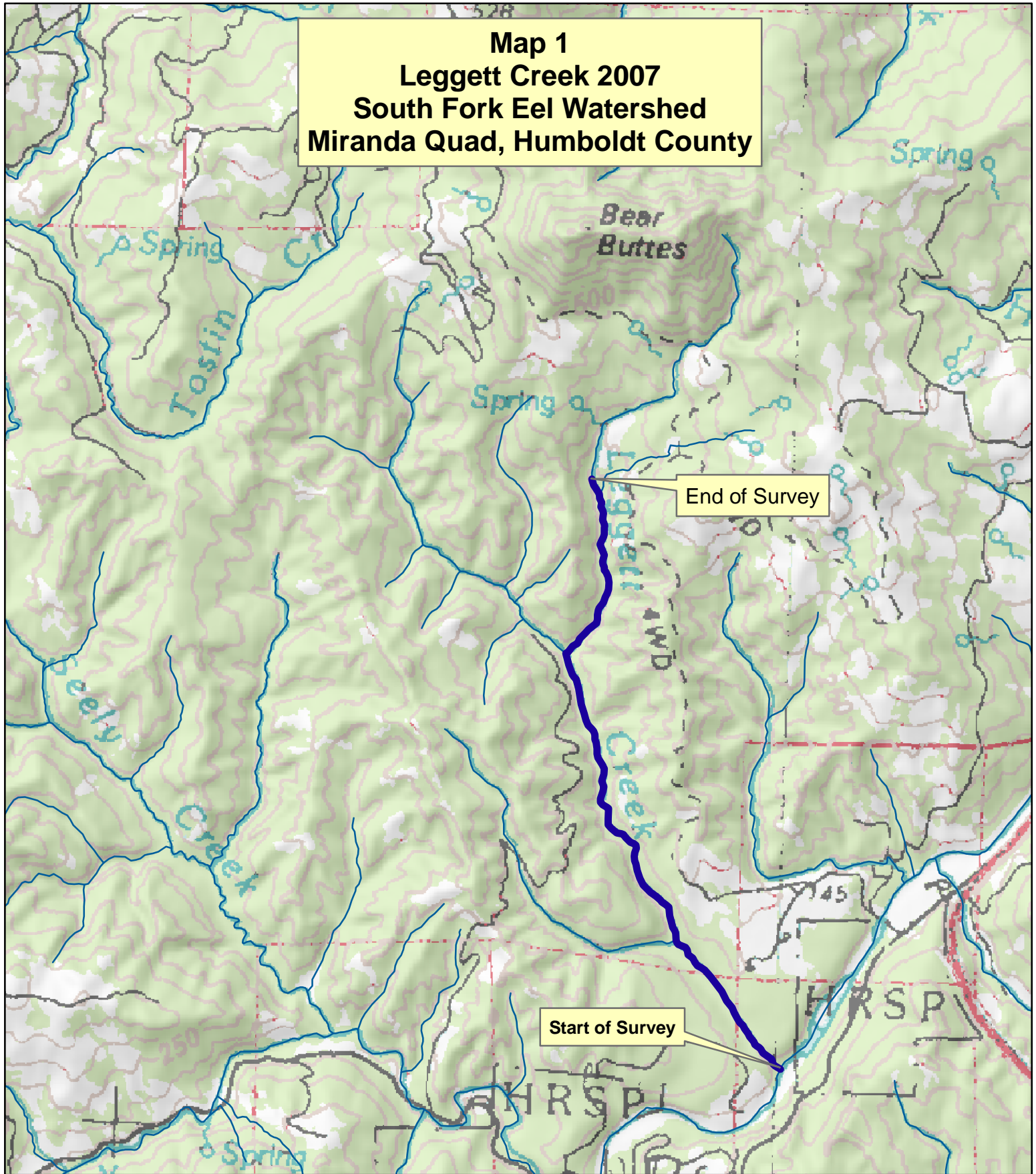
BACKWATER POOLS

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]	

Map 1
Leggett Creek 2007
South Fork Eel Watershed
Miranda Quad, Humboldt County



Legend

 Reach 1, F4 Channel Type

0 1,250 2,500 5,000 Feet




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

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0

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
5	0	DRY	1.3	42	211	1.2									
135	11	FLATWATER	35.2	42	5628	32.6	7.5	0.6	1.0	295	39848	192	25945		12
2	0	NOSURVEY	0.5	19	38	0.2									
75	75	POOL	19.6	38	2870	16.6	10.2	0.8	2.1	391	29322	464	34825	352	23
166	22	RIFFLE	43.3	51	8516	49.3	5.4	0.3	0.5	225	37330	74	12242		7
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
383	108				17263					106500			73013		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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 (%)
134	15	LGR	35.0	50	6680	38.7	6	0.2	0.6	220	29450	50	6726		1	84
29	6	HGR	7.6	61	1779	10.3	5	0.5	1.3	264	7662	138	4012		11	94
3	1	CAS	0.8	19	57	0.3	3	0.6	1.1	66	197	39	118		60	100
5	2	GLD	1.3	51	256	1.5	10	0.9	1.3	604	3018	522	2610		3	100
117	8	RUN	30.5	39	4569	26.5	7	0.6	1.6	210	24589	120	14075		15	89
13	1	SRN	3.4	62	803	4.7	8	0.3	0.6	358	4659	108	1398		0	88
63	63	MCP	16.4	38	2406	13.9	10	0.8	4.7	399	25116	489	30832	374	24	88
1	1	STP	0.3	21	21	0.1	10	0.7	1.4	189	189	170	170	132	10	89
1	1	LSL	0.3	51	51	0.3	8	0.5	1.5	388	388	271	271	194	5	70
2	2	LSR	0.5	50	100	0.6	14	0.6	2.4	676	1353	534	1068	367	25	61
5	5	LSBk	1.3	47	237	1.4	8	0.7	2.2	360	1801	339	1696	242	9	89
3	3	PLP	0.8	18	55	0.3	9	1.0	2.1	159	476	263	789	199	35	93
5	0	DRY	1.3	42	211	1.2										
2	0	NS	0.5	19	38	0.2										

Total Units
383

Total Units Fully Measured
108

Total Length (ft.)
17263

Total Area (sq.ft.)
98896

Total Volume (cu.ft.)
63765

Table 3 - Summary of Pool Types

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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
64	64	MAIN	85	38	2427	85	10.3	0.8	395	25305	370	23704	24
11	11	SCOUR	15	40	443	15	9.3	0.7	365	4017	248	2733	19

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
75	75	2870	29322	26437

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

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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
63	MCP	84	0	0	28	44	25	40	6	10	4	6
1	STP	1	0	0	1	100	0	0	0	0	0	0
1	LSL	1	0	0	1	100	0	0	0	0	0	0
2	LSR	3	0	0	1	50	1	50	0	0	0	0
5	LSBk	7	0	0	3	60	2	40	0	0	0	0
3	PLP	4	1	33	1	33	1	33	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
75	1	1	35	47	29	39	6	8	4	5

Mean Maximum Residual Pool Depth (ft.): 2.1

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Dry Units: 5

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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
134	14	LGR	0	100	0	0	0	0	0	0	0
29	6	HGR	0	9	3	0	0	0	19	69	0
3	1	CAS	0	70	30	0	0	0	0	0	0
166	21	TOTAL RIFFLE	0	42	4	0	0	0	12	42	0
5	2	GLD	23	0	13	50	0	0	0	15	0
117	8	RUN	9	16	13	6	14	0	0	29	14
13	1	SRN	0	0	0	0	0	0	0	0	0
135	11	TOTAL FLAT	12	12	13	16	11	0	0	26	11
63	63	MCP	1	17	44	14	2	0	0	9	13
1	1	STP	0	20	60	10	0	0	0	0	10
1	1	LSL	0	30	70	0	0	0	0	0	0
2	2	LSR	0	5	35	50	0	0	0	10	0
5	5	LSBk	0	9	23	10	3	0	0	8	49
3	3	PLP	0	0	37	0	0	0	42	22	0
75	75	TOTAL POOL	1	15	43	14	1	0	2	9	14
2	0	NS									
383	107	TOTAL	2	18	36	12	2	0	3	15	12

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Dry Units: 5

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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
134	15	LGR	0	0	60	40	0	0	0
29	6	HGR	0	0	17	0	0	83	0
3	1	CAS	0	0	100	0	0	0	0
5	2	GLD	50	0	0	50	0	0	0
117	8	RUN	13	0	63	25	0	0	0
13	1	SRN	0	0	100	0	0	0	0
63	63	MCP	21	27	51	0	0	2	0
1	1	STP	0	0	100	0	0	0	0
1	1	LSL	0	0	100	0	0	0	0
2	2	LSR	0	0	100	0	0	0	0
5	5	LSBk	0	20	80	0	0	0	0
3	3	PLP	0	0	67	0	0	33	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
88	32	68	0	94	93

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: Leggett Creek	LLID: 1238210401299	Drainage: Eel River - South Fork
Survey Dates: 9/5/2007 to 9/17/2007	Survey Length (ft.): 17263	Main Channel (ft.): 17137
		Side Channel (ft.): 126
Confluence Location: Quad: MIRANDA	Legal Description: T04SR03ES11	Latitude: 40:07:48.0N
		Longitude: 123:49:16.0W

STREAM REACH: 1											
Channel Type:			F4	Canopy Density (%):			87.6	Pools by Stream Length (%):		16.6	
Reach Length (ft.):			17137	Coniferous Component (%):			31.9	Pool Frequency (%):		19.6	
Riffle/Flatwater Mean Width (ft.):			6.1	Hardwood Component (%):			68.1	Residual Pool Depth (%):			
BFW:				Dominant Bank Vegetation:			Hardwood Trees	< 2 Feet Deep:		48	
Range (ft.):			9 to 27	Vegetative Cover (%):			93.1	2 to 2.9 Feet Deep:		39	
Mean (ft.):			19	Dominant Shelter:			Large Woody Debris	3 to 3.9 Feet Deep:		8	
Std. Dev.:			5	Dominant Bank Substrate Type:			Cobble/Gravel	>= 4 Feet Deep:		5	
Base Flow (cfs.):			0.5	Occurrence of LWD (%):			30	Mean Max Residual Pool Depth (ft.):		2.1	
Water (F):			56 - 66	Air (F):	58 - 75	LWD per 100 ft.:		Mean Pool Shelter Rating:		23	
Dry Channel (ft):			211	Riffles:			2				
				Pools:			6				
				Flat:			3				
Pool Tail Substrate (%):			Silt/Clay: 0	Sand: 1	Gravel: 40	Sm Cobble: 53	Lg Cobble: 5	Boulder: 0	Bedrock: 0		
Embeddedness Values (%):			1. 21.3	2. 34.7	3. 24.0	4. 20.0	5. 0.0				

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

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	33	24	26.4
Boulder	6	5	5.1
Cobble / Gravel	57	65	56.5
Sand / Silt / Clay	12	14	12.0

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	15	14	13.4
Brush	4	7	5.1
Hardwood Trees	67	60	58.8
Coniferous Trees	22	27	22.7
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Leggett Creek

LLID: 1238210401299

Drainage: Eel River - South Fork

Survey Dates: 9/5/2007 to 9/17/2007

Confluence Location: Quad: MIRANDA

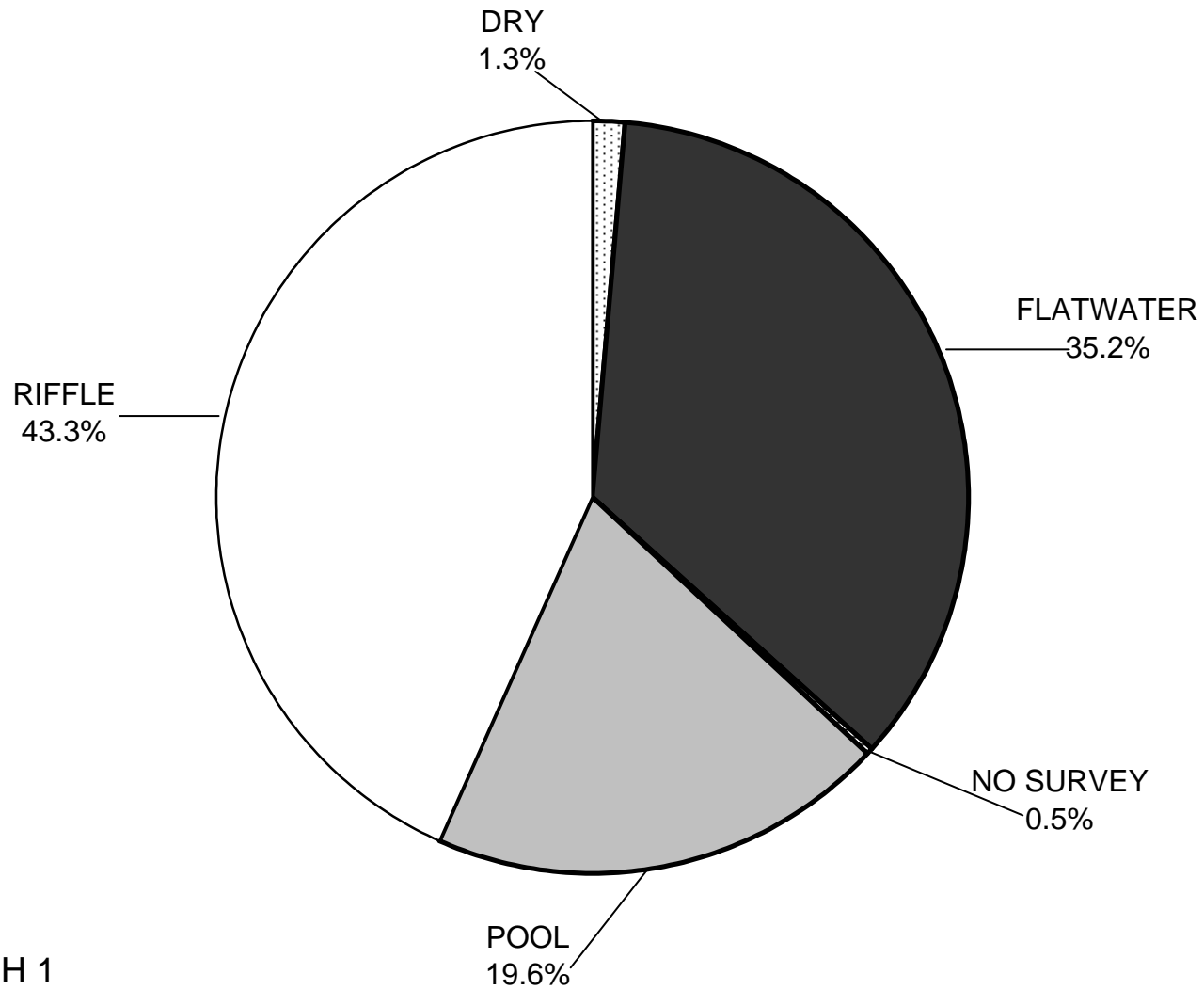
Legal Description: T04SR03ES11

Latitude: 40:07:48.0N

Longitude: 123:49:16.0W

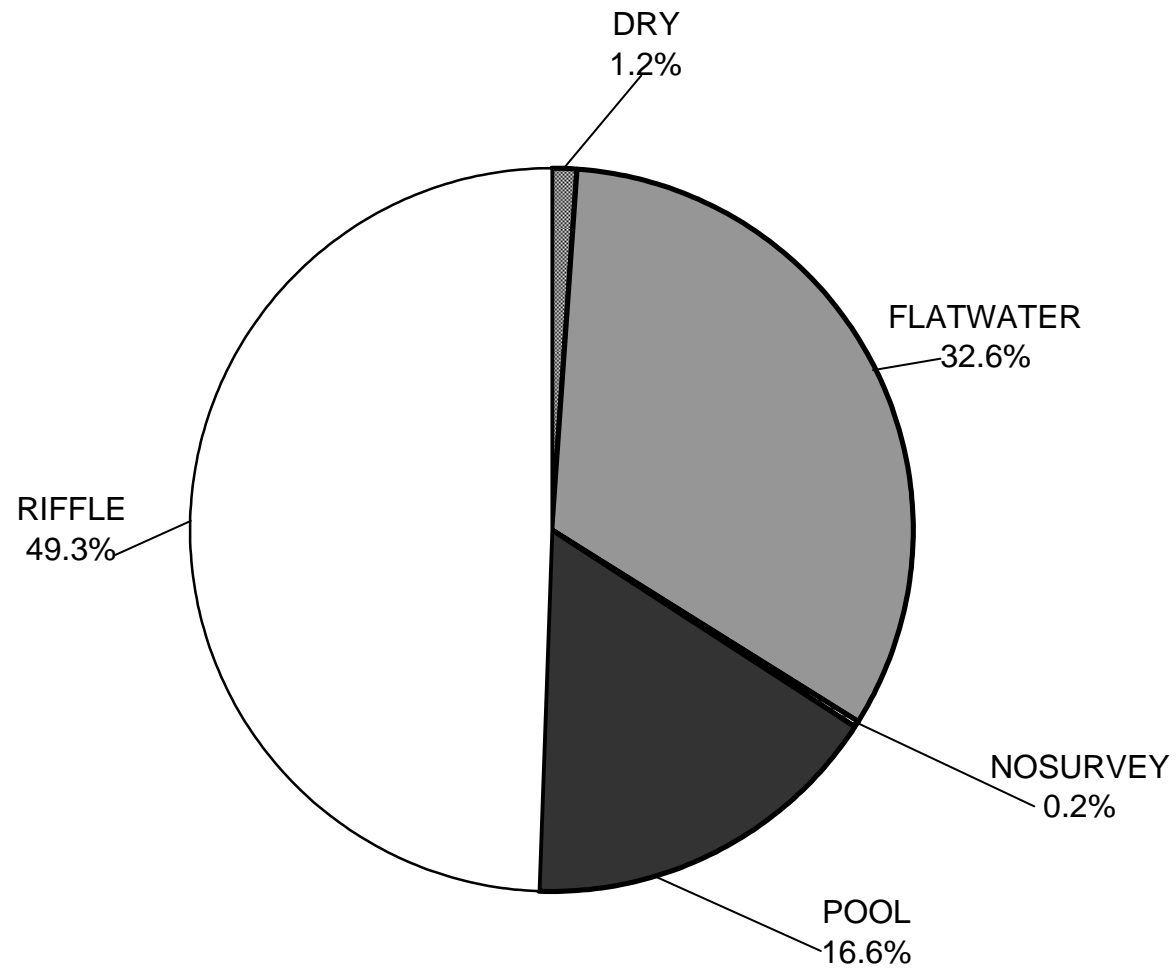
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	12	1
SMALL WOODY DEBRIS (%)	42	12	15
LARGE WOODY DEBRIS (%)	4	13	43
ROOT MASS (%)	0	16	14
TERRESTRIAL VEGETATION (%)	0	11	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	12	0	2
BOULDERS (%)	42	26	9
BEDROCK LEDGES (%)	0	11	14

LEGGETT CREEK 2007 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

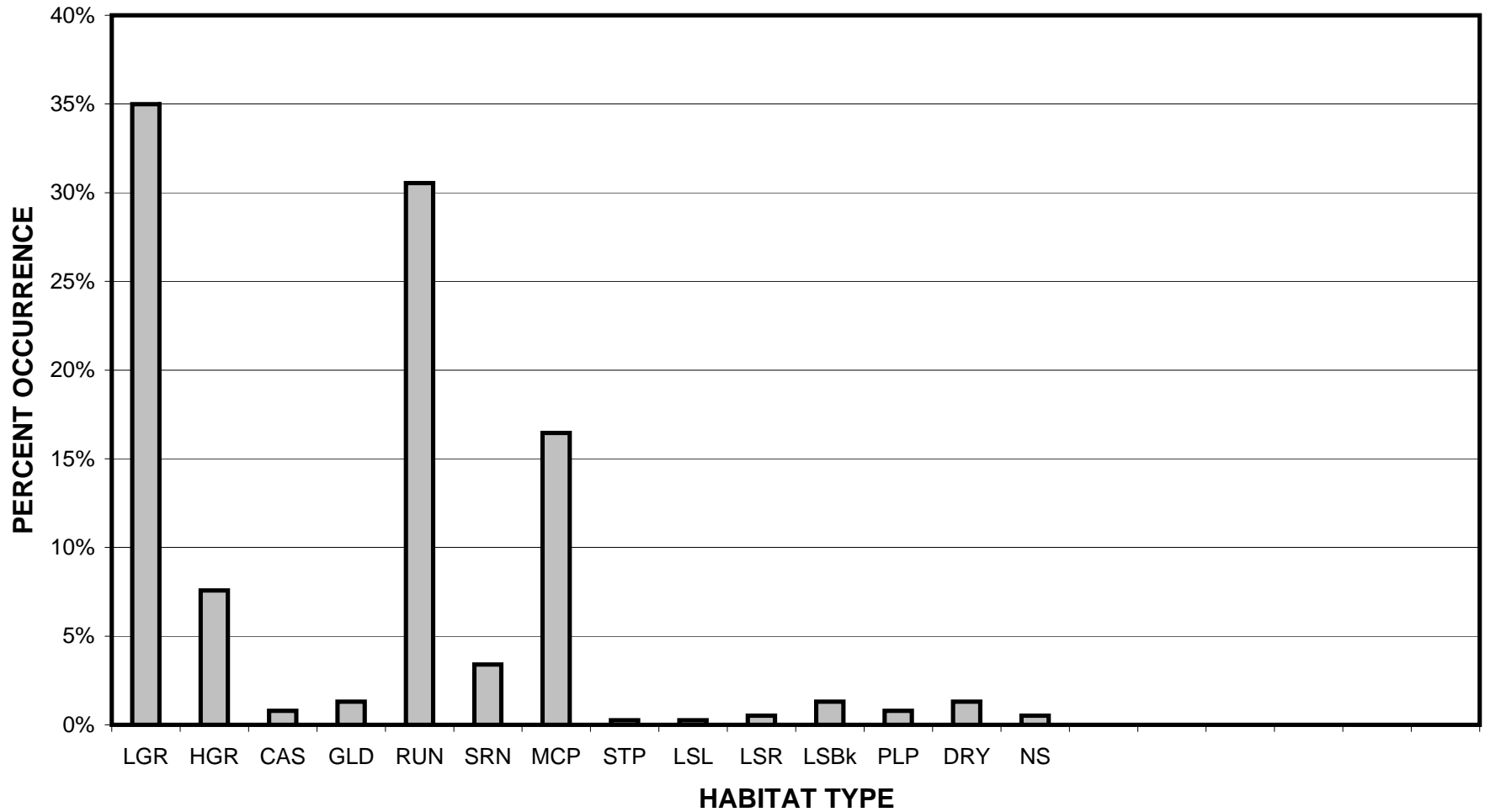
LEGGETT CREEK 2007 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

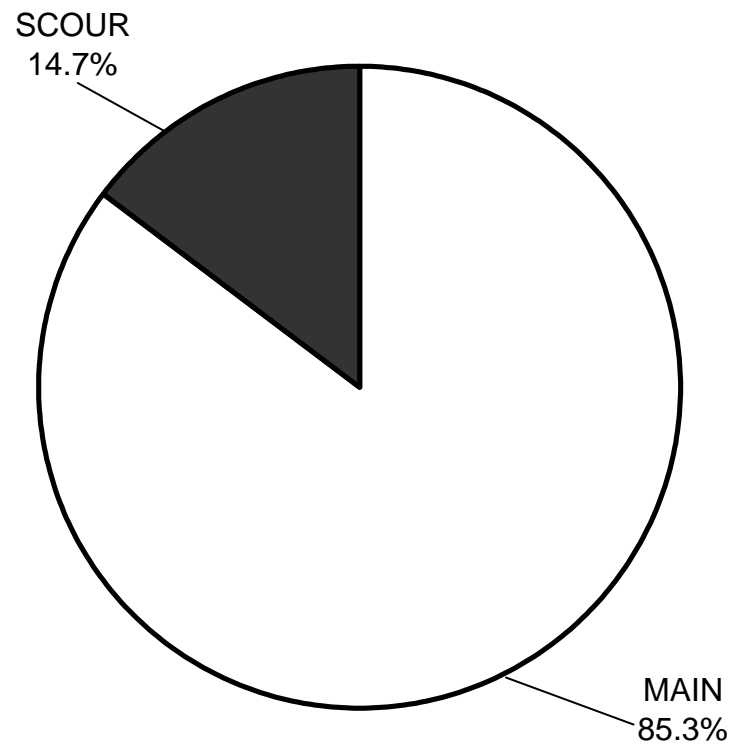
LEGGETT CREEK 2007

HABITAT TYPES BY PERCENT OCCURRENCE



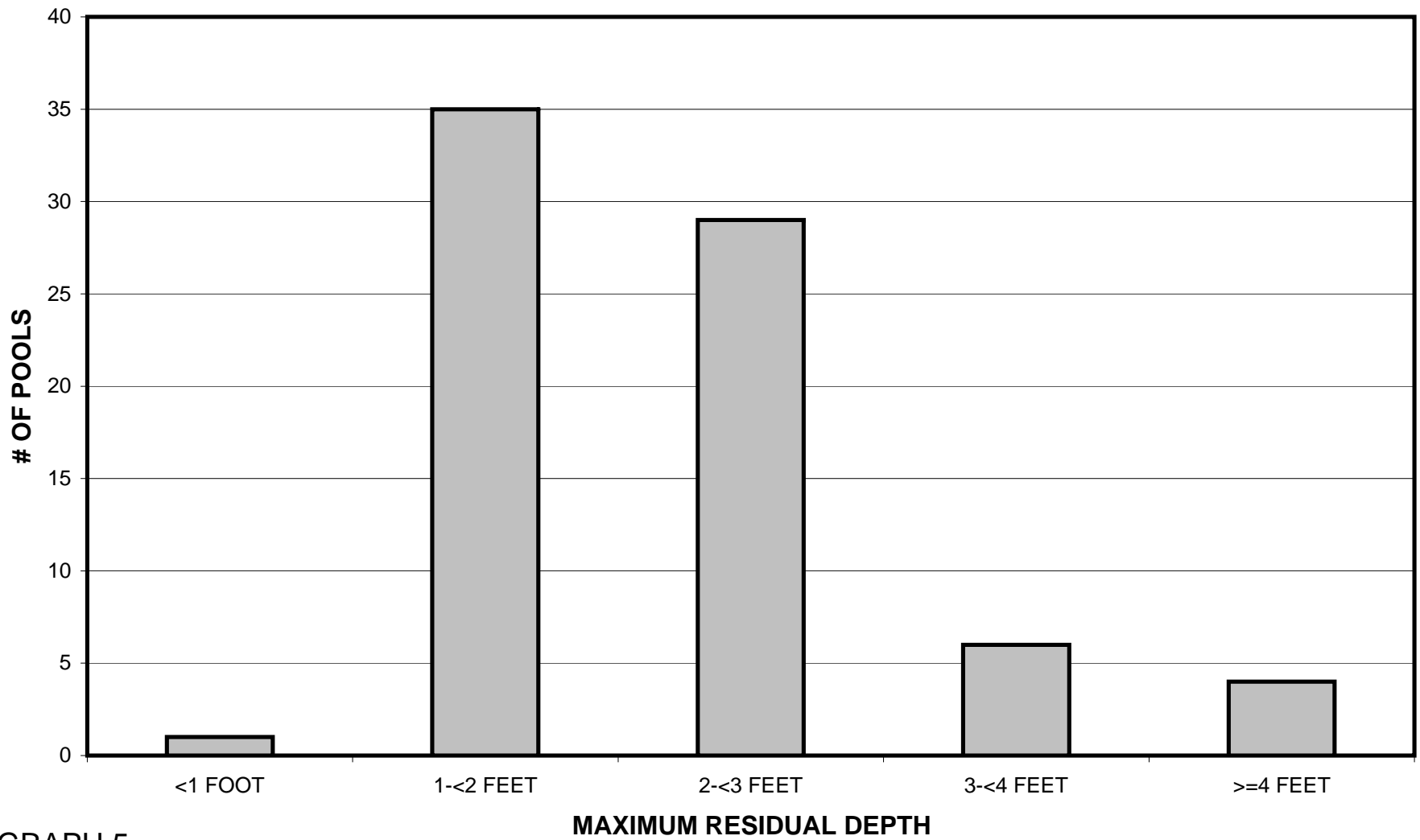
GRAPH 3

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



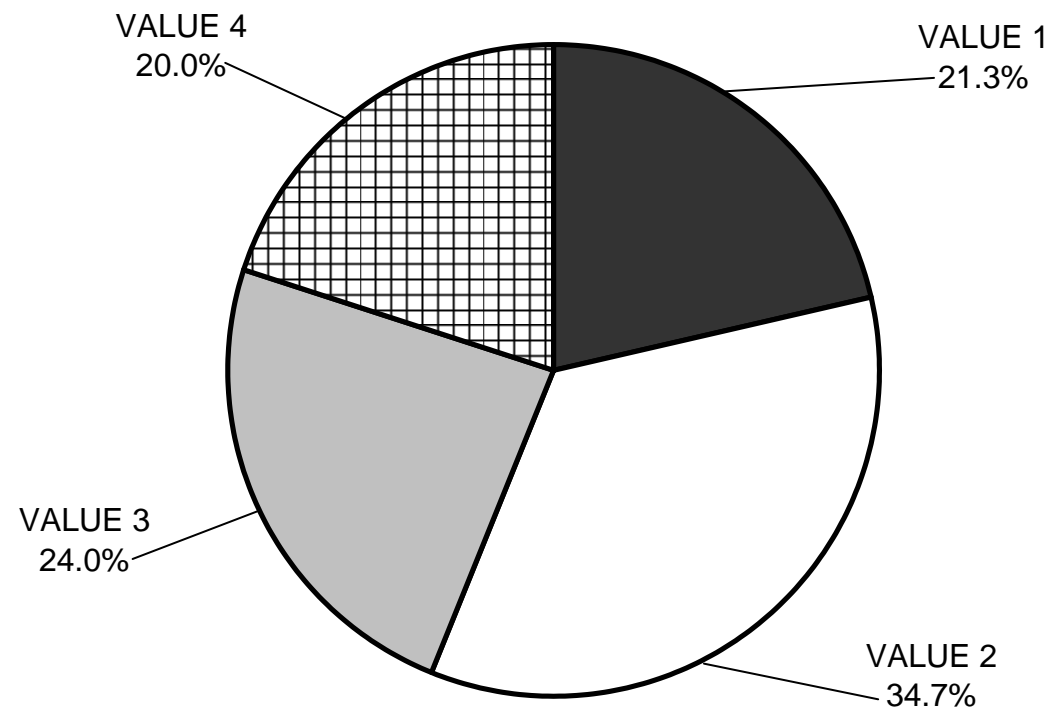
GRAPH 4

LEGGETT CREEK 2007 MAXIMUM DEPTH IN POOLS



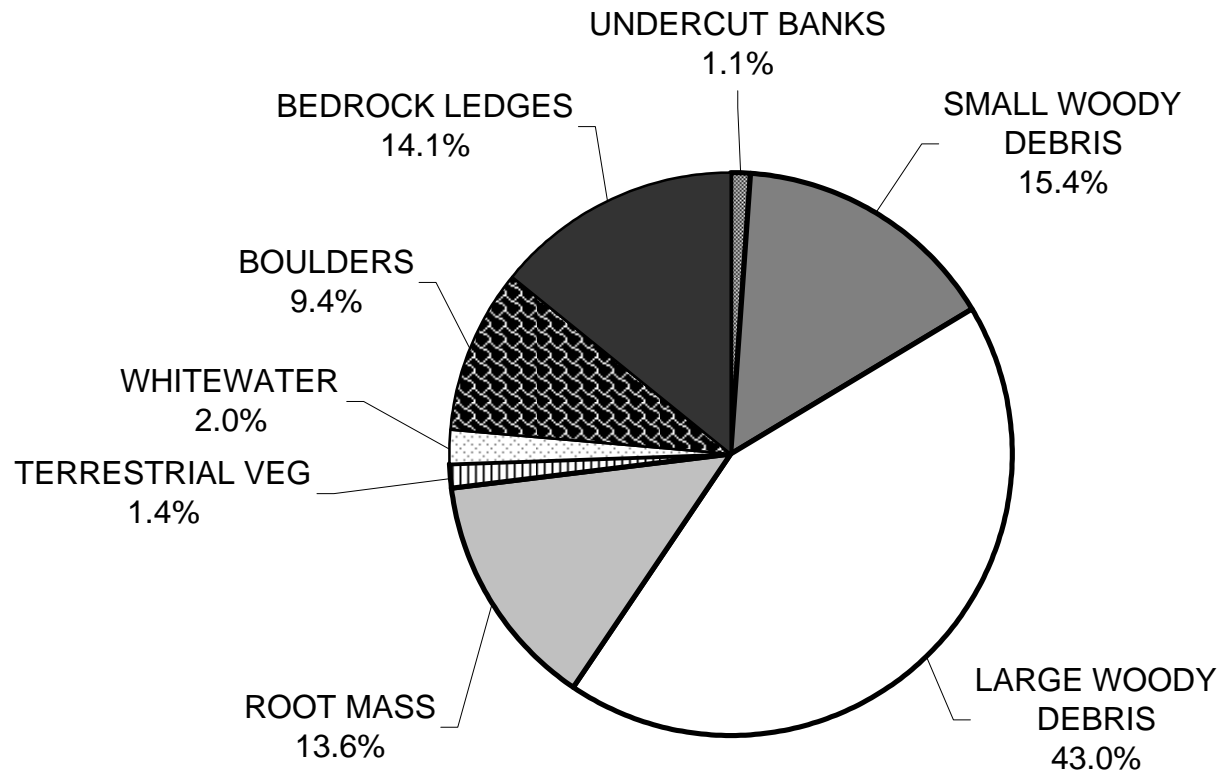
GRAPH 5

LEGGETT CREEK 2007 PERCENT EMBEDDEDNESS



GRAPH 6

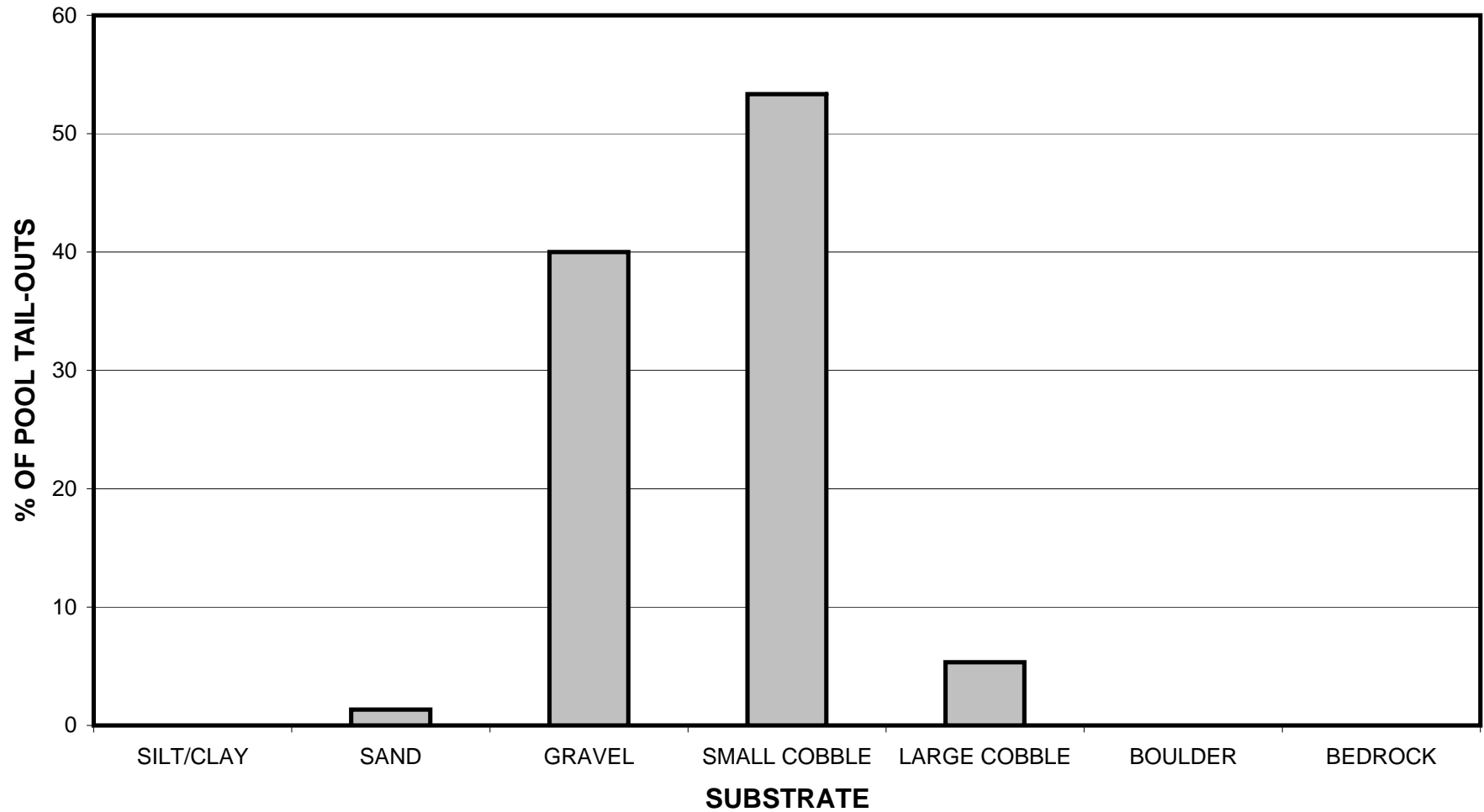
LEGGETT CREEK 2007 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

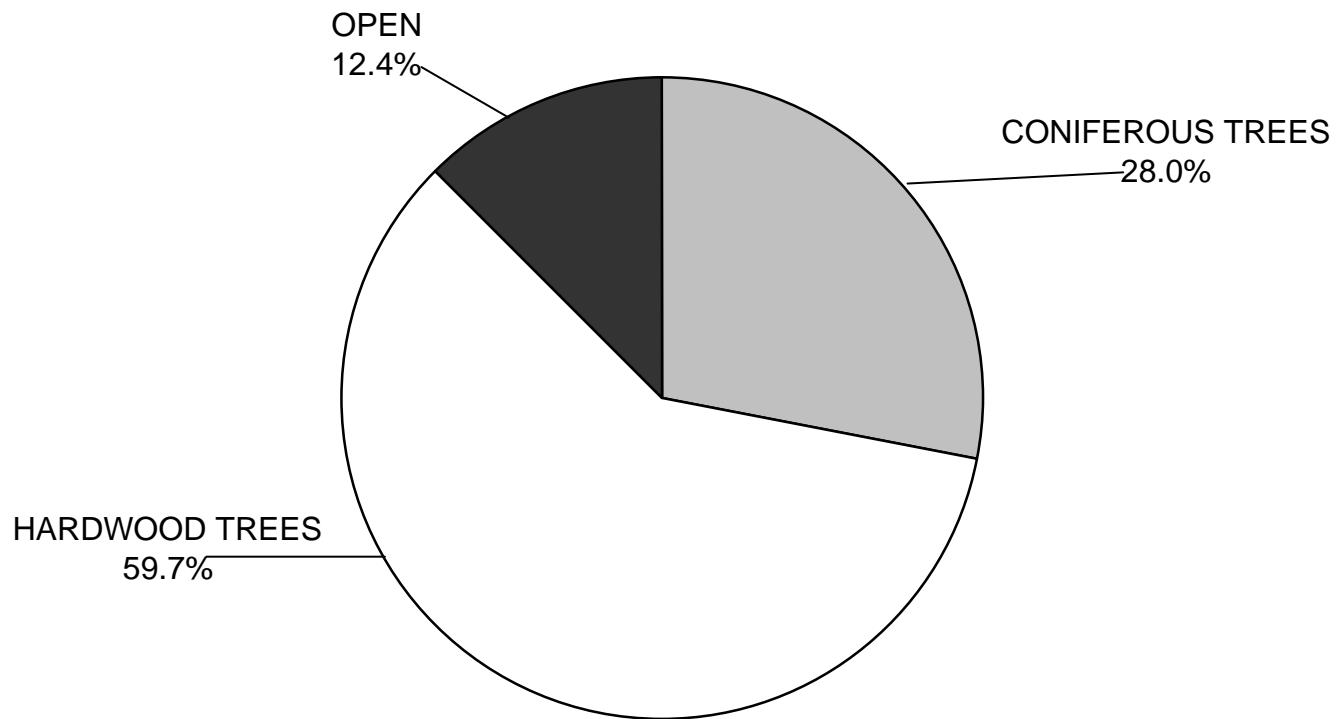
LEGGETT CREEK 2007

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



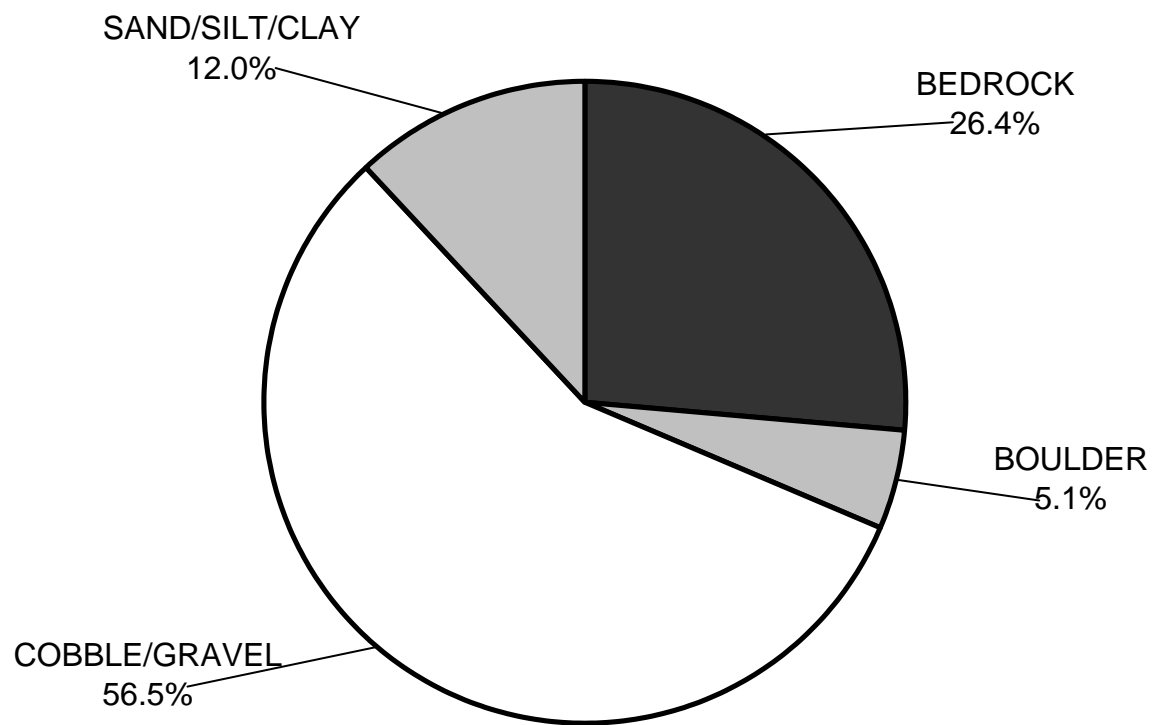
GRAPH 8

LEGGETT CREEK 2007 MEAN PERCENT CANOPY



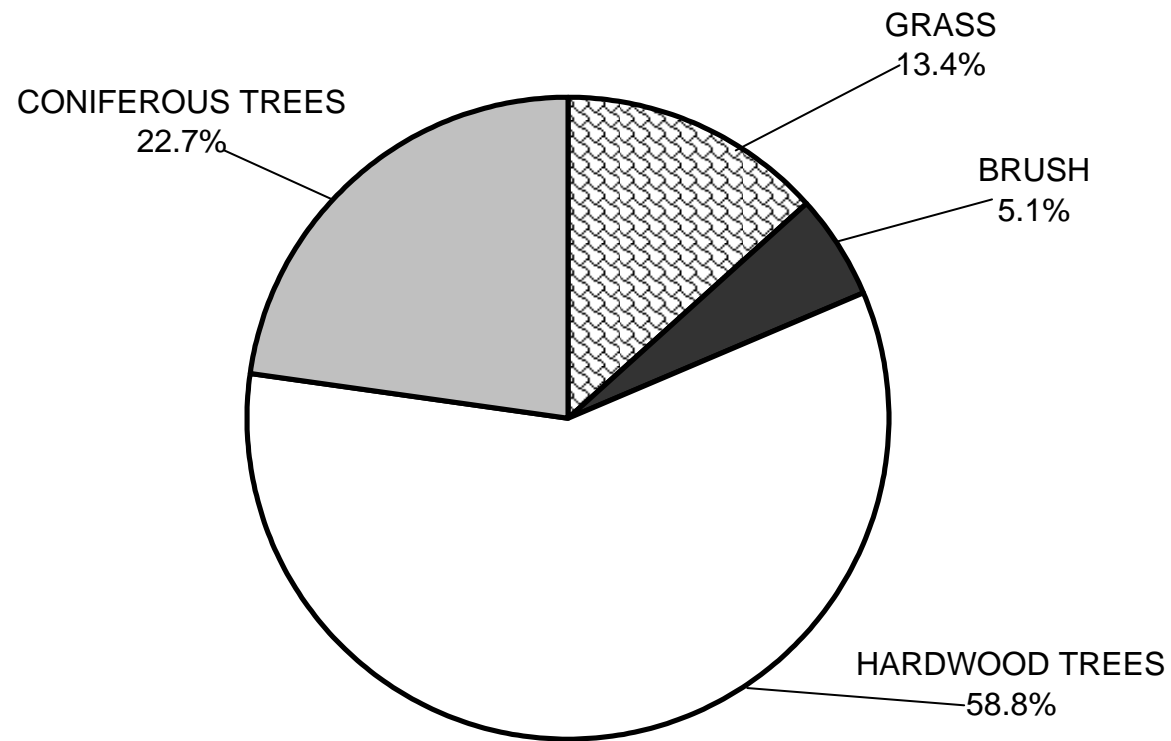
GRAPH 9

LEGGETT CREEK 2007
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

LEGGETT CREEK 2007
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11