

STREAM INVENTORY REPORT

Little Bear Creek

INTRODUCTION

A stream inventory was conducted July 27, 2006 on Little Bear Creek. The survey began at the confluence with Usal Creek and extended upstream 0.3 miles.

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

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for 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

Little Bear Creek is a tributary to Usal Creek, is a tributary to Pacific Ocean, located in Mendocino County, California (Map 1). Little Bear Creek's legal description at the confluence with Usal Creek is T23N R18W. Its location is 39.8625 north latitude and 123.8413 west longitude, LLID number 1238415398624. Little Bear Creek is a first order stream and has approximately 1.5 miles of blue line stream according to the USGS Piercy 7.5 minute quadrangle. Little Bear Creek drains a watershed of approximately 0.7 square miles. Elevations range from about 100 feet at the mouth of the creek to 1,800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Foot access exists upstream of the M&M road crossing at Usal Creek.

METHODS

The habitat inventory conducted in Little Bear Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians 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.

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

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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 Little Bear 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". Little Bear Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Little Bear Creek, embeddedness

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

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10. Large Woody Debris Count:

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

11. Average Bankfull Width:

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

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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Little Bear 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

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- 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 27, 2006, was conducted by J. Caldwell and J. Beck (PSMFC). The total length of the stream surveyed was 1,336 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.1 cfs on July 27, 2006.

Little Bear Creek is a G4 channel type for 1,336 feet of the stream surveyed. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width /depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 58 to 59 degrees Fahrenheit. Air temperatures ranged from 59 to 61 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 32% pool units, 29% riffle units, 21% flatwater units and 18% dry units (Graph 1). Based on total length of Level II habitat types there were 36% riffle units, 35% dry units, 17% flatwater units, and 12% pool units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 29%; dry units, 18%; and mid-channel pool units, 14% (Graph 3). Based on percent total length, low gradient riffle units made up 36%, dry units 35%, and step run units 13%.

A total of 9 pools were identified (Table 3). Main channel pools were the most frequently encountered at 67% (Graph 4), and comprised 76% 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. Two of the 9 pools (22%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 9 pool tail-outs measured, 1 had a value of 1 (11.1%); 8 had a value of 2 (88.9%) (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.

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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 17, flatwater habitat types had a mean shelter rating of 18, and pool habitats had a mean shelter rating of 53 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 69. Scour pools had a mean shelter rating of 20 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 100% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Little Bear Creek was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 50% and 50%, respectively. Graph 9 describes the mean percent canopy in Little Bear Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 86%. The dominant elements composing the structure of the stream banks consisted of 93% sand/silt/clay and 7% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 57% of the units surveyed. Additionally, 39% of the units surveyed had hardwood trees as the dominant vegetation type (Graph 11).

DISCUSSION

Little Bear Creek is a G4 channel type for 1,336 feet of the stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days July 27, 2006, ranged from 58 to 59 degrees Fahrenheit. Air temperatures ranged from 59 to 61 degrees Fahrenheit. To make any 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 17% of the total length of this survey, riffles 36%, and pools 12%. Two of the 9 (22%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structure that will increase or deepen pool habitat is recommended.

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All of the 9 pool tail-outs measured had embeddedness ratings of 1 or 2. 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 Little Bear Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

All of the 9 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 53. The shelter rating in the flatwater habitats was 18. 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 Little Bear Creek. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover 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 98%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 98% 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) Little Bear 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) 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.
- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from root mass. Adding high quality complexity with woody cover in the pools is desirable.

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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 Usal Creek.
428	0010.00	Log debris accumulation (LDA) at the top of the unit. Possible migration barrier.
779	0018.00	LDA at the top of the unit. No fish observed above this LDA.
1318	0028.00	LDA at the top of the unit. Possible barrier.
1336	0028.00	End of survey due to the numerous LDA's.

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: Little Bear Creek

LLID: 1238415398624 Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating
5	1	DRY	17.9	93	464	34.7	8.0								
6	2	FLATWATER	21.4	38	229	17.1	6.0	0.5	1.2	428	2568	209	1254		18
9	9	POOL	32.1	18	166	12.4	9.4	0.9	1.7	175	1576	187	1679	154	53
8	3	RIFFLE	28.6	60	477	35.7	5.7	0.4	0.9	306	2449	122	980		17
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
28	15				1336					6593			3913		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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 (%)
8	3	LGR	28.6	60	477	35.7	6	0.4	1	306	2449	122	980		17	100
3	1	RUN	10.7	16	49	3.7	5	0.4	0.8	100	300	40	120		5	98
3	1	SRN	10.7	60	180	13.5	7	0.5	1.5	756	2268	378	1134		30	99
4	4	MCP	14.3	16	64	4.8	9	0.8	1.9	152	606	142	568	112	63	93
2	2	STP	7.1	31	62	4.6	10	0.8	1.5	282	563	282	564	225	83	98
3	3	PLP	10.7	13	40	3.0	10	1.1	2.7	135	406	183	548	162	20	99
5	1	DRY	17.9	93	464	34.7	8			0	0					99

Total Units
28

Total Units Fully Measured
15

Total Length (ft.)
1336

Total Area (sq.ft.)
6593

Total Volume (cu.ft.)
3913

Table 3 - Summary of Pool Types

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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
6	6	MAIN	67	21	126	76	9.2	0.8	195	1170	150	897	69
3	3	SCOUR	33	13	40	24	10.0	1.1	135	406	162	485	20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
9	9	166	1576	1382

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

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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
4	MCP	44	0	0	4	100	0	0	0	0	0	0
2	STP	22	0	0	2	100	0	0	0	0	0	0
3	PLP	33	0	0	1	33	2	67	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
9	0	0	7	78	2	22	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Dry Units: 5

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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
8	3	LGR	0	7	30	0	0	0	0	63	0
8	3	TOTAL RIFFLE	0	7	30	0	0	0	0	63	0
3	1	RUN	40	30	25	0	0	0	0	5	0
3	1	SRN	0	20	60	5	5	0	0	10	0
6	2	TOTAL FLAT	20	25	43	3	3	0	0	8	0
4	4	MCP	8	25	65	0	3	0	0	0	0
2	2	STP	10	30	40	0	0	0	0	20	0
3	3	PLP	5	17	63	5	0	0	0	0	10
9	9	TOTAL POOL	7	23	59	2	1	0	0	4	3
28	14	TOTAL	8	20	50	1	1	0	0	18	2

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Dry Units: 5

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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
8	3	LGR	0	0	67	0	33	0	0
3	1	RUN	0	0	100	0	0	0	0
3	1	SRN	0	0	100	0	0	0	0
4	4	MCP	0	0	100	0	0	0	0
2	2	STP	0	0	100	0	0	0	0
3	3	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	50	50	0	98	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.

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

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	0	2	7.1
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	14	12	92.9

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	0	0	0.0
Hardwood Trees	4	7	39.3
Coniferous Trees	10	6	57.1
No Vegetation	0	1	3.6

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Little Bear Creek

LLID: 1238415398624

Drainage: Rockport

Survey Dates: 7/27/2006 to 7/27/2006

Confluence Location: Quad: PIERCY

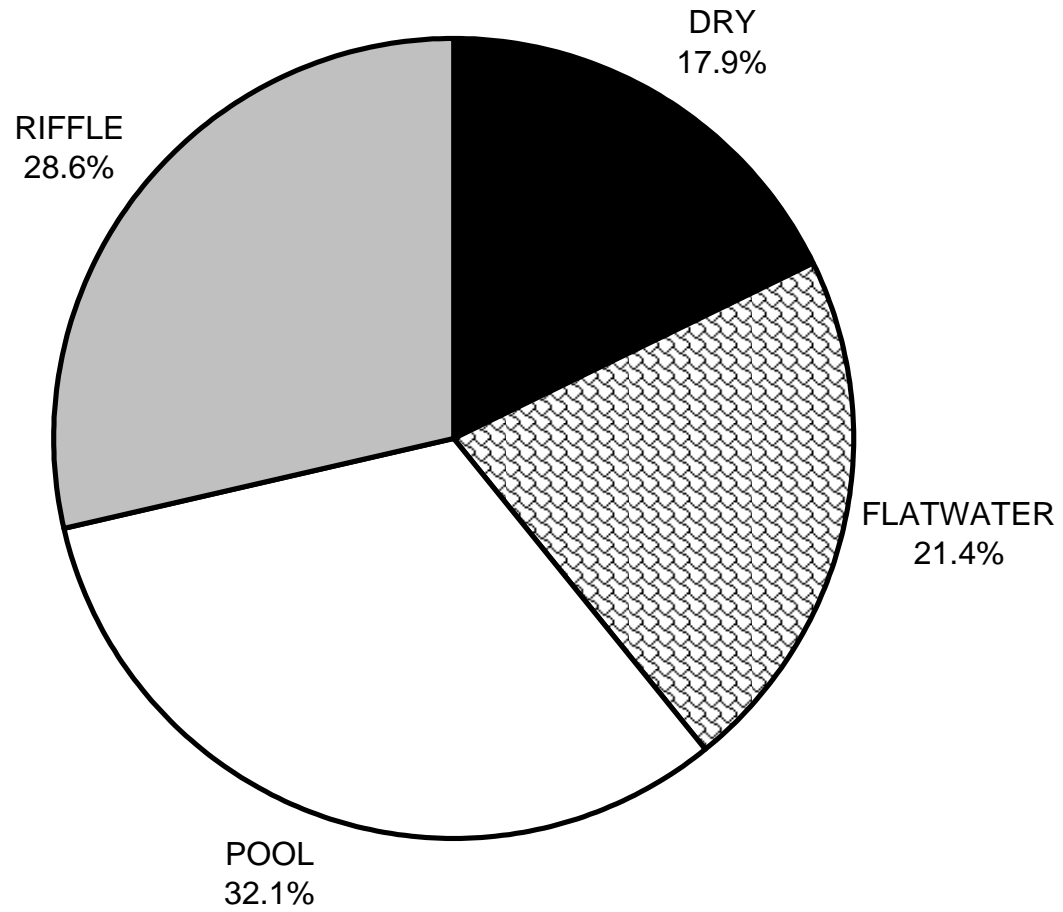
Legal Description: T000R000S00

Latitude: 39:51:45.0N

Longitude: 123:50:29.0W

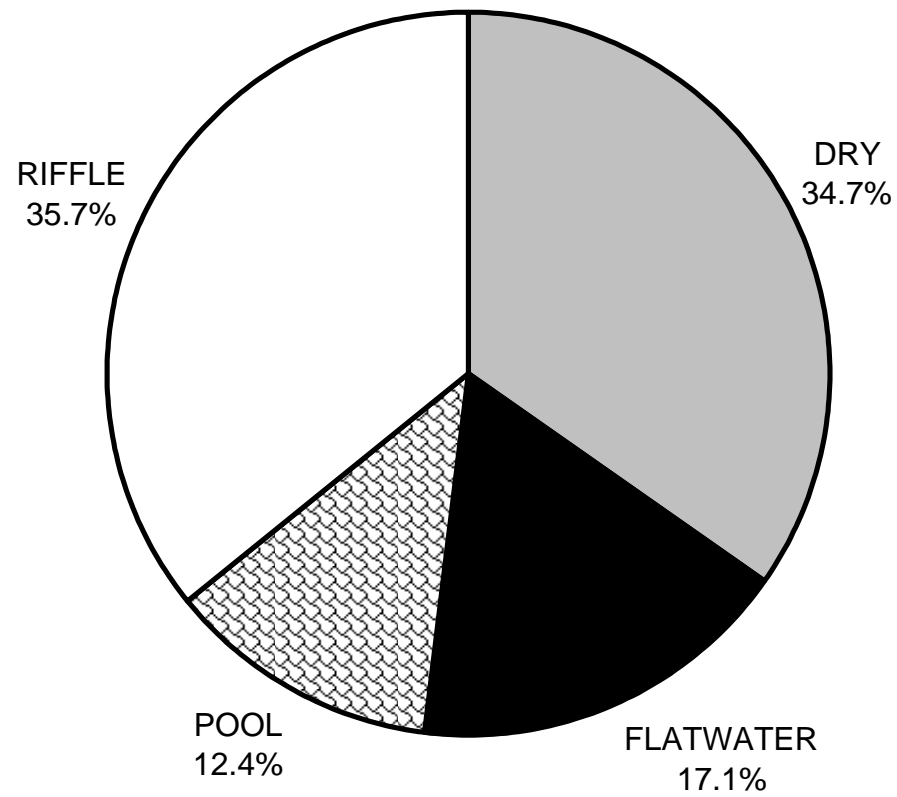
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	20	7
SMALL WOODY DEBRIS (%)	7	25	23
LARGE WOODY DEBRIS (%)	30	43	59
ROOT MASS (%)	0	3	2
TERRESTRIAL VEGETATION (%)	0	3	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	63	8	4
BEDROCK LEDGES (%)	0	0	3

LITTLE BEAR CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



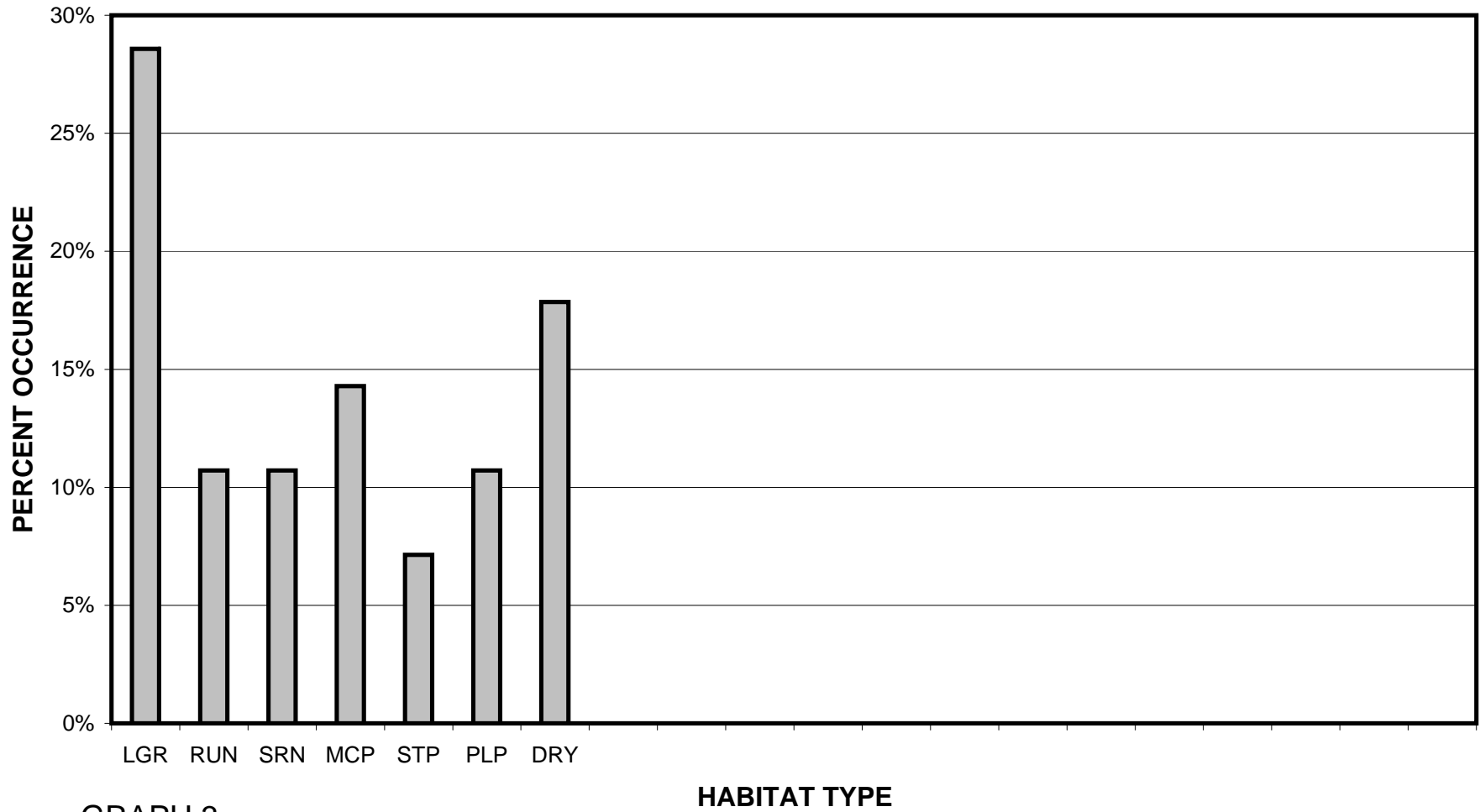
GRAPH 1

LITTLE BEAR CREEK 2006 HABITAT TYPES BY PERCENT TOTAL LENGTH



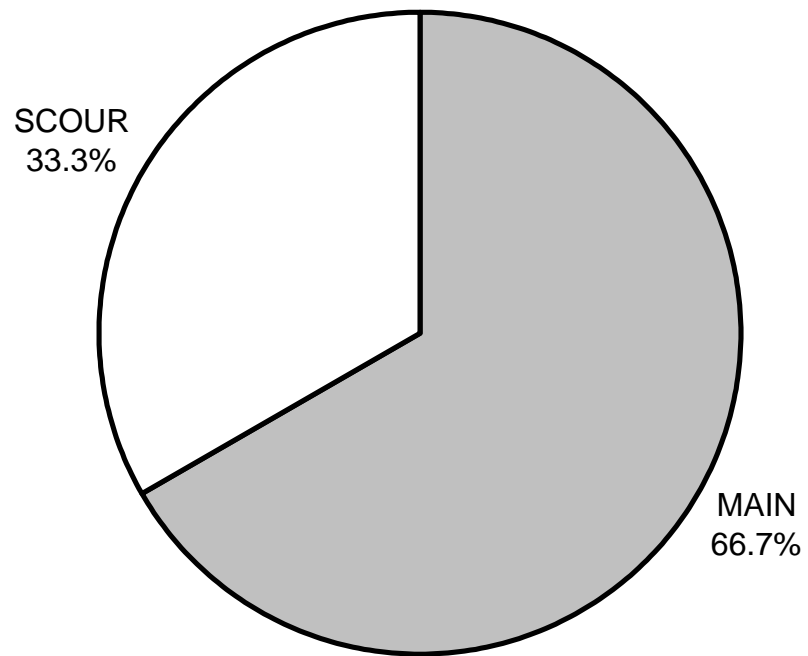
GRAPH 2

LITTLE BEAR CREEK 2006 HABITAT TYPES BY PERCENT OCCURRENCE



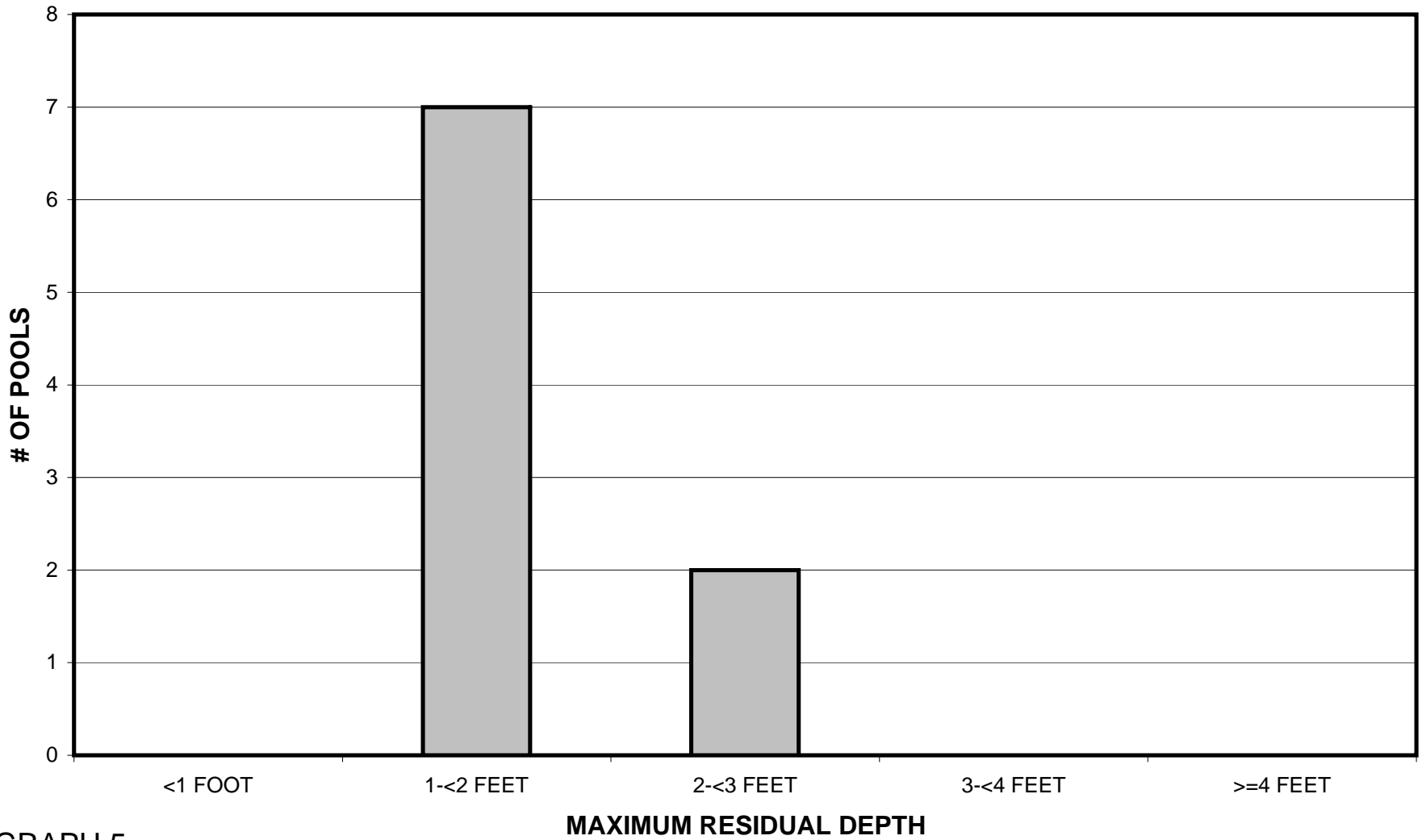
GRAPH 3

**LITTLE BEAR CREEK 2006
POOL TYPES BY PERCENT OCCURRENCE**



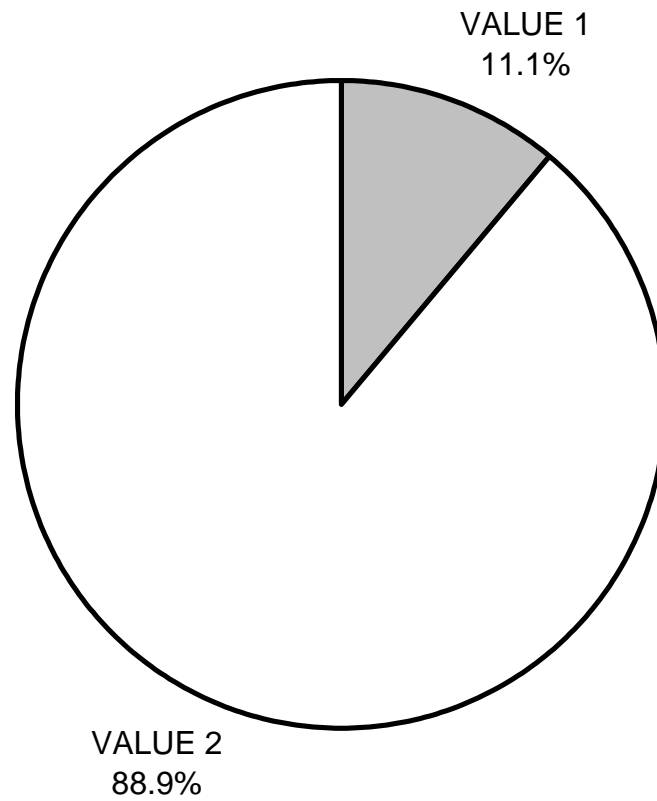
GRAPH 4

LITTLE BEAR CREEK 2006 MAXIMUM DEPTH IN POOLS



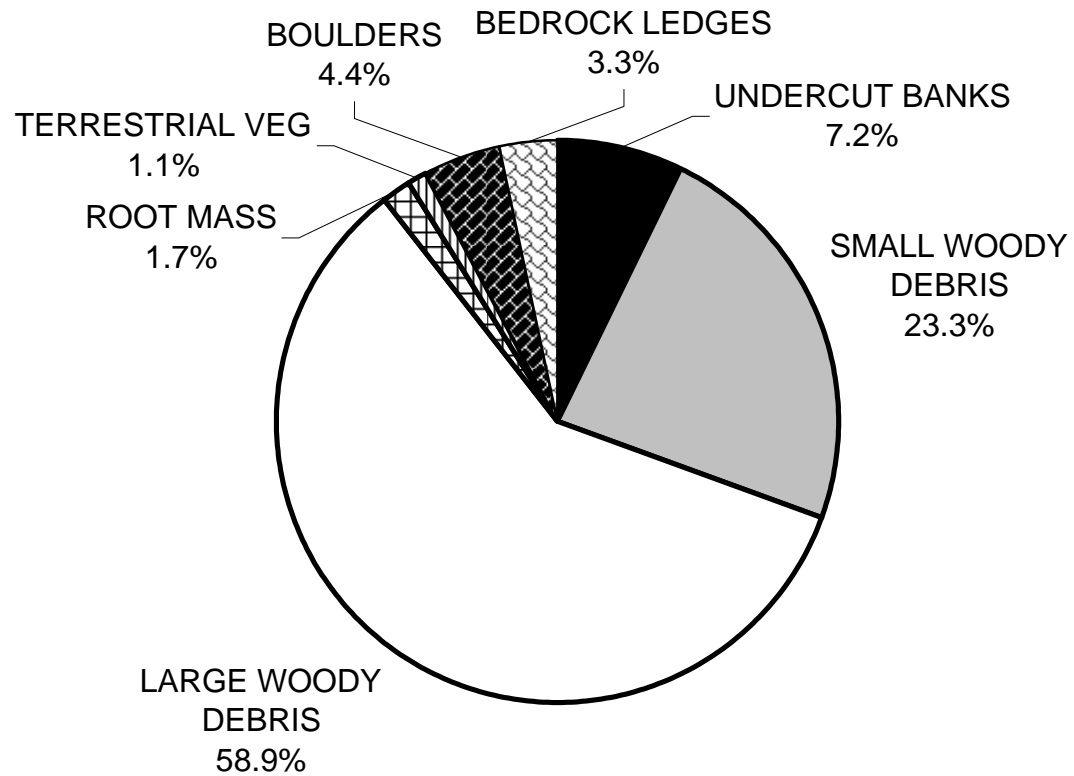
GRAPH 5

LITTLE BEAR CREEK 2006 PERCENT EMBEDDEDNESS



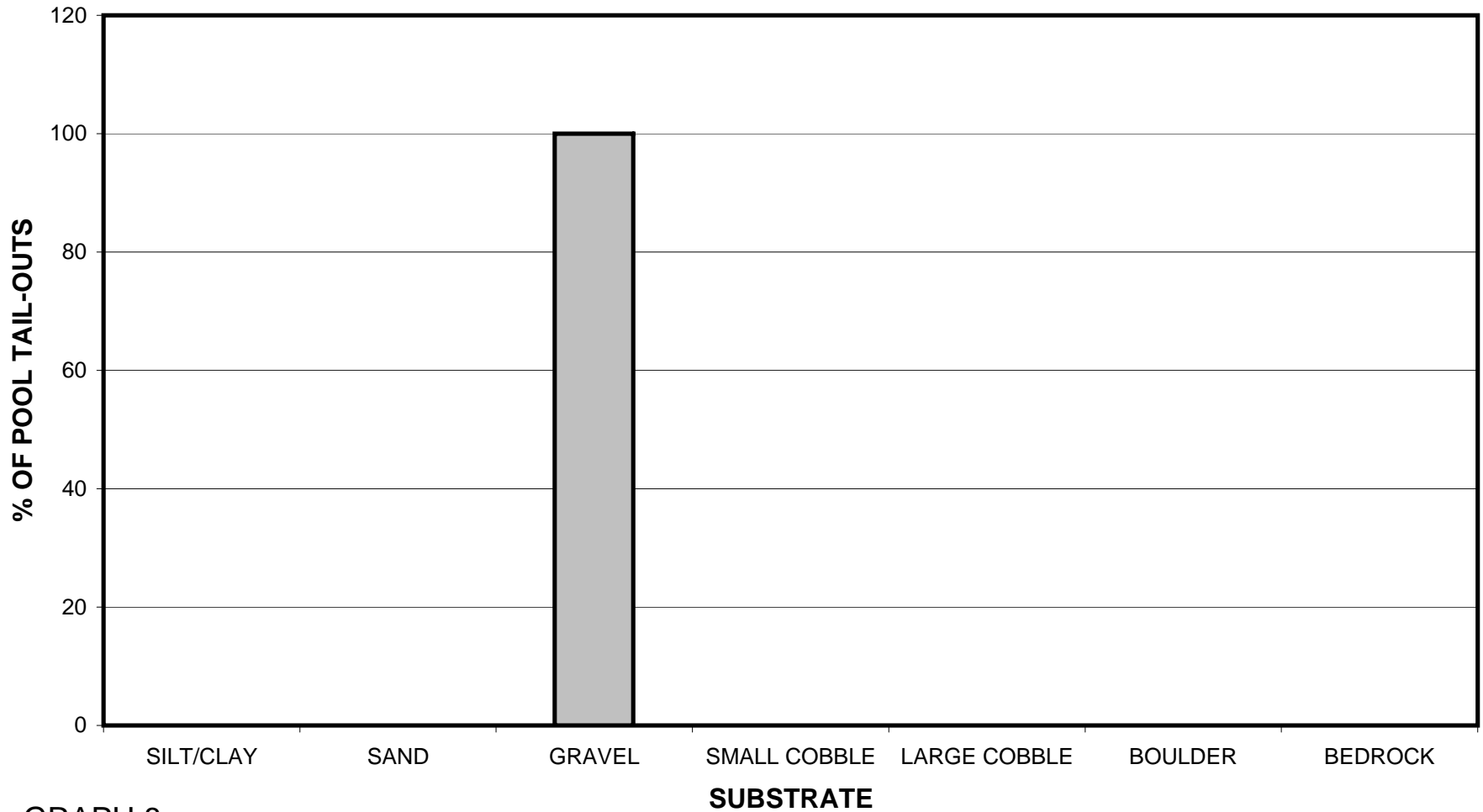
GRAPH 6

LITTLE BEAR CREEK 2006 MEAN PERCENT COVER TYPES IN POOLS



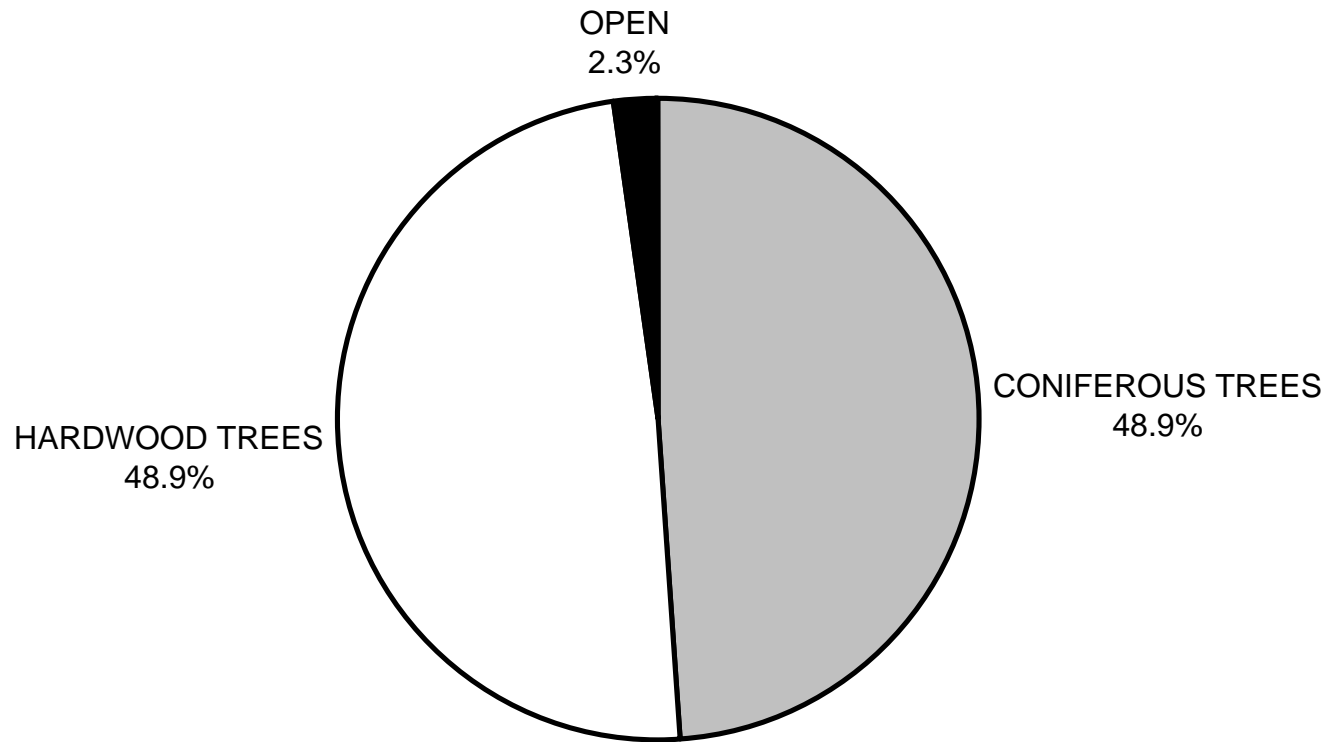
GRAPH 7

LITTLE BEAR CREEK 2006 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



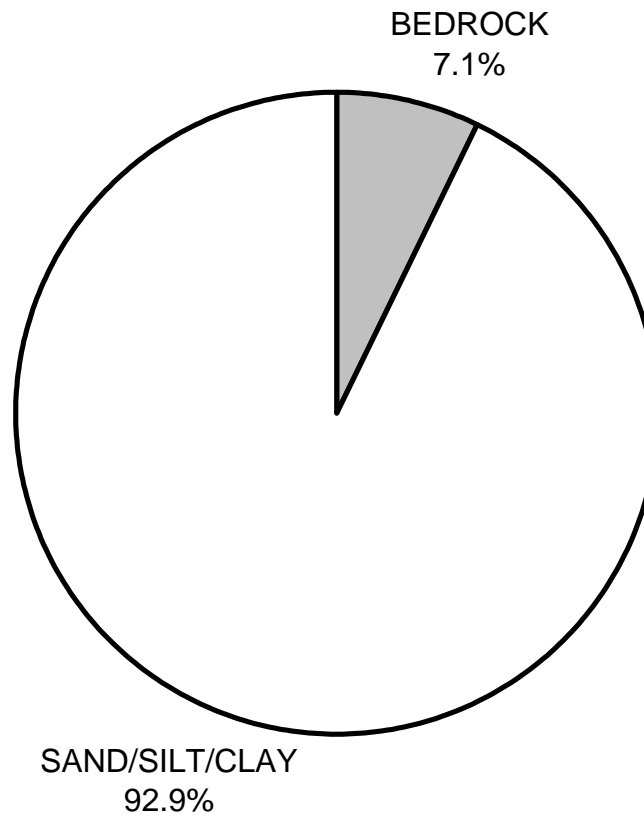
GRAPH 8

LITTLE BEAR CREEK 2006 MEAN PERCENT CANOPY



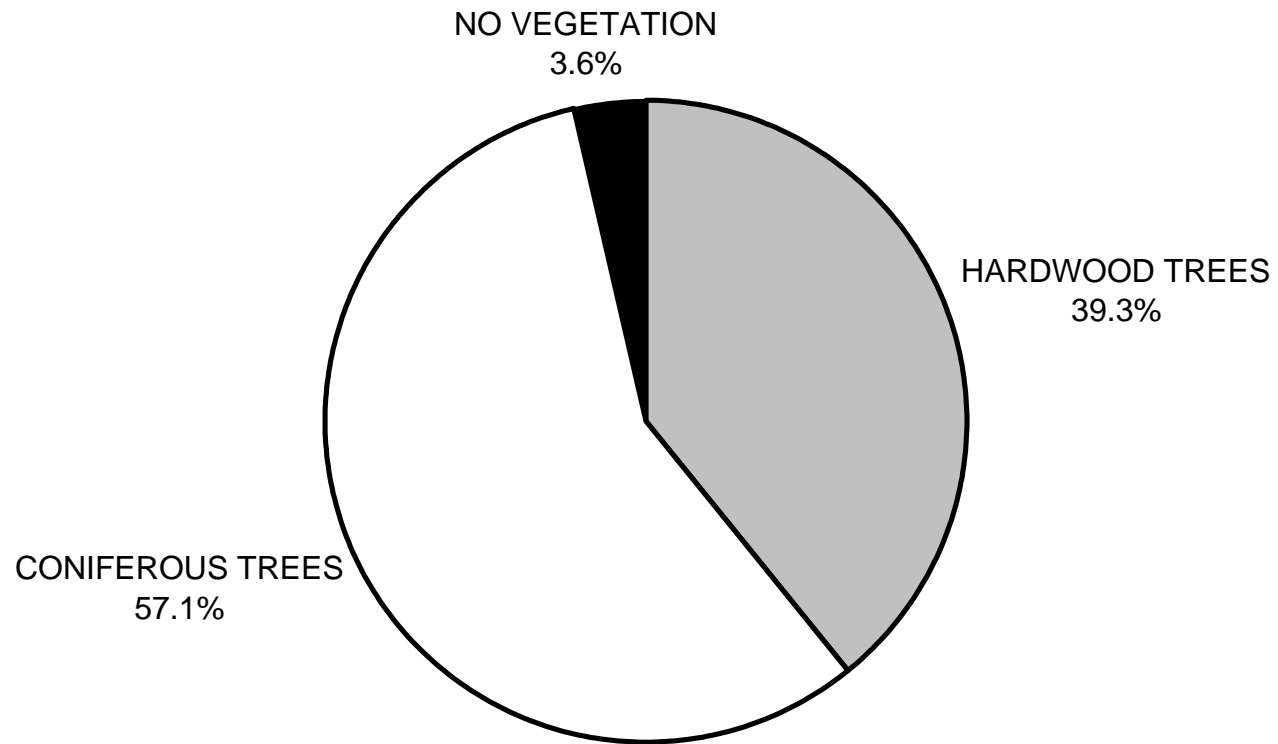
GRAPH 9

**LITTLE BEAR CREEK 2006
DOMINANT BANK COMPOSITION IN SURVEY REACH**



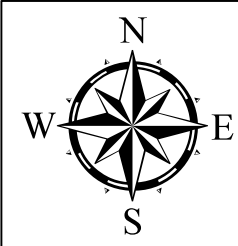
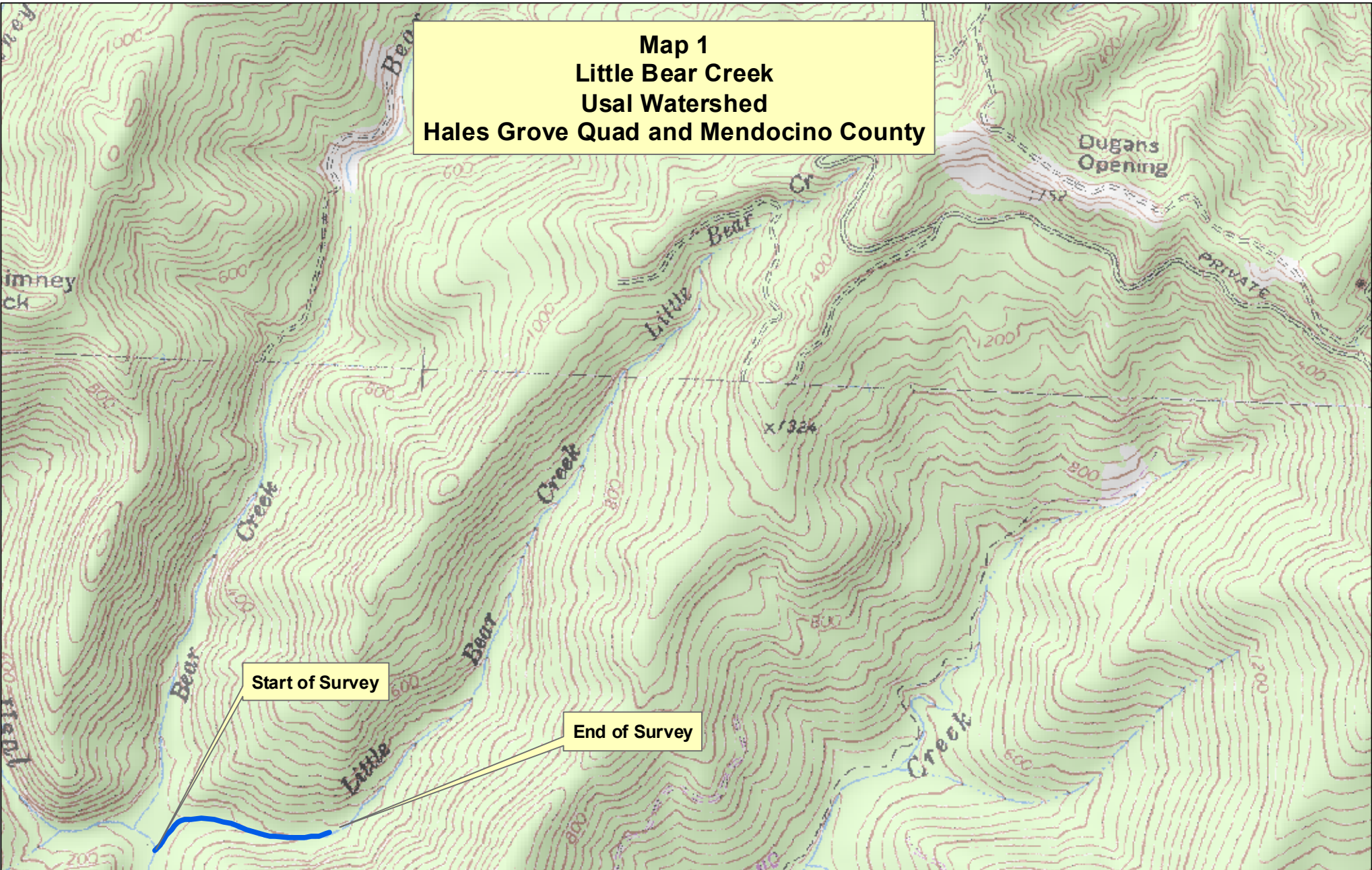
GRAPH 10

LITTLE BEAR CREEK 2006 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

**Map 1
Little Bear Creek
Usal Watershed
Hales Grove Quad and Mendocino County**



Legend

 Little Bear Creek Survey

