

# STREAM INVENTORY REPORT

## “Lost Lake Creek”

### INTRODUCTION

A stream inventory was conducted May 25, 2011 on an unnamed tributary to Chamberlain Creek commonly known as, and hereinafter referred to, as Lost Lake Creek. The survey began at the confluence with Chamberlain Creek and extended upstream 0.4 miles.

The Lost Lake 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 Lost Lake 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 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

Lost Lake Creek is a tributary to Chamberlain Creek, tributary to North Fork Big River, tributary to Big River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Lost Lake Creek's legal description at the confluence with Chamberlain Creek is T18N R15W S28. Its location is 39.3863 degrees north latitude and 123.5492 degrees west longitude, LLID number 1235479393863. Lost Lake Creek is a first order stream and has approximately 0.28 miles of blue line stream according to the USGS Northspur 7.5 minute quadrangle. Lost Lake Creek drains a watershed of approximately 0.58 square miles. Elevations range from about 490 feet at the mouth of the creek to 1,200 feet in the headwater areas. Mixed conifer forest dominates the watershed. Vehicle access exists via State Route 20.

### METHODS

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

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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 Lost Lake 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". Lost Lake 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 Lost Lake Creek, embeddedness was

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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 not suitable 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. In Lost Lake 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. Next, 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent 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 Lost Lake 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 Lost Lake 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.

### 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

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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 Lost Lake Creek. In addition, underwater observations were made at 10 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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Lost Lake 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

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- 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 May 25, 2011 was conducted by I. Mikus, M. Groff, and B. Williams (DFG). The total length of the stream surveyed was 1,990 feet.

Stream flow was estimated to be 0.5 cfs on May 25, 2011.

Lost Lake Creek is an A4 channel type for 1,990 feet of the stream surveyed. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 51 to 52 degrees Fahrenheit. Air temperatures ranged from 52 to 55 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 46% riffle units, 31% flatwater units, and 23% pool units (Graph 1). Based on total length of Level II habitat types there were 60% riffle units, 29% flatwater units, and 11% 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%; step run units, 19%; and high gradient riffle units, 17% (Graph 3). Based on percent total length, low gradient riffle units made up 46%, step run units 23%, and high gradient riffle units 14%.

A total of 16 pools were identified (Table 3). Main channel pools were the most frequently encountered at 75% (Graph 4), and comprised 79% 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. None of the 16 pools had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 16 pool tail-outs measured, 10 had a value of 1 (62.5%), 4 had a value of 2 (25%), and 2 had a value of 3 (12.5%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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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 5, flatwater habitat types had a mean shelter rating of 2, and pool habitats had a mean shelter rating of 15 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 29. Main channel pools had a mean shelter rating of 10 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Lost Lake Creek. Graph 7 describes the pool cover in Lost Lake Creek. Small woody debris is 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 the dominant substrate observed in 69% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 31% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Lost Lake Creek was 96%. Four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 39% and 61%, respectively. Graph 9 describes the mean percent canopy in Lost Lake Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 89%. The dominant elements composing the structure of the stream banks consisted of 70% sand/silt/clay, 18% cobble/gravel, and 12% boulder (Graph 10). Coniferous trees were the dominant vegetation type observed in 60% of the units surveyed. Additionally, 26% of the units surveyed had deciduous trees as the dominant vegetation type, and 8% had brush as the dominant vegetation type (Graph 11).

## **BIOLOGICAL INVENTORY RESULTS**

Survey teams conducted a snorkel survey at 10 sites for species composition and distribution in Lost Lake Creek on July 12, 2011. The water temperature taken during the sampling period of 1030 hours to 1105 hours was 55 degrees Fahrenheit. The air temperature was 60 degrees Fahrenheit. The sites were sampled by I. Mikus and M. Groff (DFG).

The survey started at the confluence with Chamberlain Creek and continued upstream 1,236 feet. The reach sites yielded one age 1+ steelhead/rainbow trout (SH/RT)

The following chart displays the information yielded from these sites:

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2011 Lost Lake Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
A4 Channel Type									
07/12/11	1	004	Step-run	208	0	0	0	0	0
07/12/11	2	008	Pool	326	0	0	0	0	0
07/12/11	3	013	Pool	407	0	0	0	0	0
07/12/11	4	016	Pool	469	0	0	0	0	0
07/12/11	5	019	Pool	527	0	0	0	0	0
07/12/11	6	020	Pool	546	0	0	0	0	0
07/12/11	7	022	Pool	605	0	0	0	0	0
07/12/11	8	023	Riffle	627	0	1	0	0	0
07/12/11	9	042	Pool	1,160	0	0	0	0	0
07/12/11	10	044	Pool	1,247	0	0	0	0	0

## DISCUSSION

Lost Lake Creek is an A4 channel type for 1,990 feet of the stream surveyed. A4 channel types are generally not suitable for fish habitat improvement structures.

The water temperatures recorded on the survey days May 25, 2011, ranged from 51 to 52 degrees Fahrenheit. Air temperatures ranged from 52 to 55 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 29% of the total length of this survey, riffles 60%, and pools 11%. None of the 16 (0%) 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 structures that will increase or deepen pool habitat is not recommended in A4 channel types.

Fourteen of the 16 pool tail-outs measured had embeddedness ratings of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. None 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.

All of the 16 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

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The mean shelter rating for pools is 15. The shelter rating in the flatwater habitats is 2. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Lost Lake Creek. Small woody debris is 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 96%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 97% and 89%, 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) Lost Lake 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 small woody debris. Adding high quality complexity with woody cover in the pools is desirable.

### 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 Chamberlain Creek. The channel is an A4 for the entire length of the survey.
208	0005.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 7' high x 10' wide x 18' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble and measures 8' wide x 20' long x 2' deep.



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326	0009.00	LDA #02 contains two pieces of LWD and measures 5' high x 10' wide x 15' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to cobble and measures 8' wide x 8' long x 3' deep.
427	0015.00	There is a 2' high plunge over a log.
513	0019.00	There are erosion sites on the right and left banks. The left bank erosion site measures approximately 30' long x 10' high.
638	0025.00	LDA #03 contains six pieces of LWD and measures 6' high x 15' wide x 13' long. Water flows through the LDA and there are no visible gaps in it. The LDA is not retaining sediment. A landslide on the left bank is contributing to the LDA. It measures approximately 40' long x 25' high and is contributing silt to the channel.
959	0035.00	A landslide on the left bank measures approximately 50' long x 25' high and is contributing sediment ranging in size from silt to gravel.
1247	0045.00	Woody debris is accumulating in the channel; it spans three-quarters of the width. One-third of the water flows around the accumulation. An erosion site on the left bank measures approximately 60' long x 15' high; is it contributing silt to the channel
1715	0059.00	LDA #04 contains seven pieces of LWD and measures 6' high x 12' wide x 14' long. Water flows through the LDA and there are visible gaps in it. The LDA is not retaining sediment.
1765	0062.00	There is a 3' high plunge over a log.
1936	0068.00	Tributary #01 enters on the right bank. It contributes to approximately 5% of Lost Lake Creek's flow. The water temperature downstream and upstream of the tributary is 53 degrees Fahrenheit; the water temperature of the tributary is 51 degrees Fahrenheit. The slope of the tributary is approximately 12%.
1990	0070.00	End of survey due to a 5.5' high waterfall with a 0.9' deep pool below. The plunge is over roots and rocks.

## 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: 1235479393863 LLID: 1235479393863 Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR Legal Description: T18NR15WS28 Latitude: 39:23:11.0N Longitude: 123:32:52.0

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
22	3	FLATWATER	31.4	26	581	29.2	5.0	0.4	0.7	93	2037	40	874		2
16	16	POOL	22.9	13	212	10.7	6.2	0.5	1.1	79	1271	63	1001	44	15
32	6	RIFFLE	45.7	37	1197	60.2	7.8	0.4	0.8	234	7493	97	3095		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
70	25				1990					10802			4969		

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

Stream Name: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

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 (%)
20	3	LGR	28.6	46	913	45.9	9	0.4	1	366	7323	144	2874		3	94
12	3	HGR	17.1	24	284	14.3	6	0.5	1.2	102	1226	50	596		7	96
9	2	RUN	12.9	14	125	6.3	4	0.4	0.7	82	737	31	280		0	98
13	1	SRN	18.6	35	456	22.9	6	0.5	1	114	1482	57	741		5	97
10	10	MCP	14.3	12	117	5.9	6	0.5	1.9	69	691	52	523	36	9	97
2	2	STP	2.9	25	50	2.5	5	0.5	0.9	126	251	88	176	58	20	96
4	4	PLP	5.7	11	45	2.3	8	0.8	1.9	82	329	76	302	57	29	98

Total Units	Total Units Fully Measured
70	25

Total Length (ft.)
1990

Total Area (sq.ft.)
12039

Total Volume (cu.ft.)
5492

Stream Name:	1235479393863	LLID:	1235479393863	Drainage:	Big River
Survey Dates:	5/25/2011 to 5/25/2011				
Confluence Location:	Quad: NORTHSPUR	Legal Description:	T18NR15WS28	Latitude:	39:23:11.0N
				Longitude:	123:32:52.0W

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
16	16	212	1271	701

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

Stream Name: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

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
10	MCP	63	5	50	5	50	0	0	0	0	0	0
2	STP	13	2	100	0	0	0	0	0	0	0	0
4	PLP	25	0	0	4	100	0	0	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
16	7	44	9	56	0	0	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.1

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

Stream Name: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Dry Units: 0

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

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
20	3	LGR	0	50	0	0	0	0	15	35	0
12	3	HGR	0	0	0	0	0	0	20	80	0
32	6	TOTAL RIFFLE	0	33	0	0	0	0	17	50	0
9	2	RUN	0	0	0	0	0	0	0	0	0
13	1	SRN	0	100	0	0	0	0	0	0	0
22	3	TOTAL FLAT	0	100	0	0	0	0	0	0	0
10	10	MCP	9	33	26	0	2	0	7	23	0
2	2	STP	0	33	0	0	0	0	33	35	0
4	4	PLP	16	30	26	1	0	0	6	20	0
16	16	TOTAL POOL	10	32	22	0	1	0	10	24	0
70	25	TOTAL	8	36	18	0	1	0	11	27	0

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

Stream Name: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Dry Units: 0

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

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
20	3	LGR	0	0	67	33	0	0	0
12	3	HGR	0	0	67	0	0	33	0
9	2	RUN	0	0	50	50	0	0	0
13	1	SRN	0	0	100	0	0	0	0
10	10	MCP	0	0	90	0	10	0	0
2	2	STP	0	0	100	0	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: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
96	61	39	0	97	89

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:	1235479393863	LLID:	1235479393863	Drainage:	Big River		
Survey Dates:	5/25/2011 to 5/25/2011	Survey Length (ft.):	1990	Main Channel (ft.):	1990	Side Channel (ft.):	0
Confluence Location:	Quad: NORTHSPUR	Legal Description:	T18NR15WS28	Latitude:	39:23:11.0N	Longitude:	123:32:52.0W

[illegible]

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

Stream Name: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

Latitude: 39:23:11.0N

Longitude: 123:32:52.0W

**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	0	0.0
Boulder	2	4	12.0
Cobble / Gravel	6	3	18.0
Sand / Silt / Clay	17	18	70.0

**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	1	0	2.0
Brush	3	1	8.0
Hardwood Trees	4	9	26.0
Coniferous Trees	17	13	60.0
No Vegetation	0	2	4.0

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: 1235479393863

LLID: 1235479393863

Drainage: Big River

Survey Dates: 5/25/2011 to 5/25/2011

Confluence Location: Quad: NORTHSPUR

Legal Description: T18NR15WS28

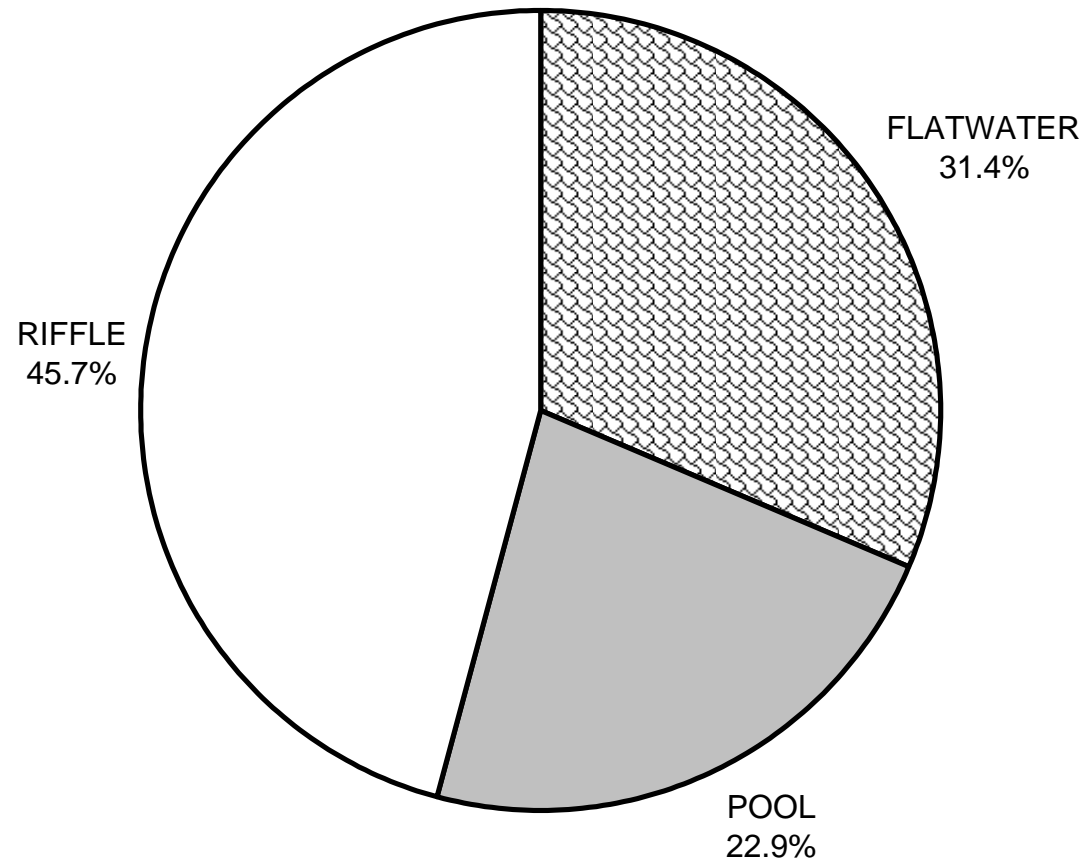
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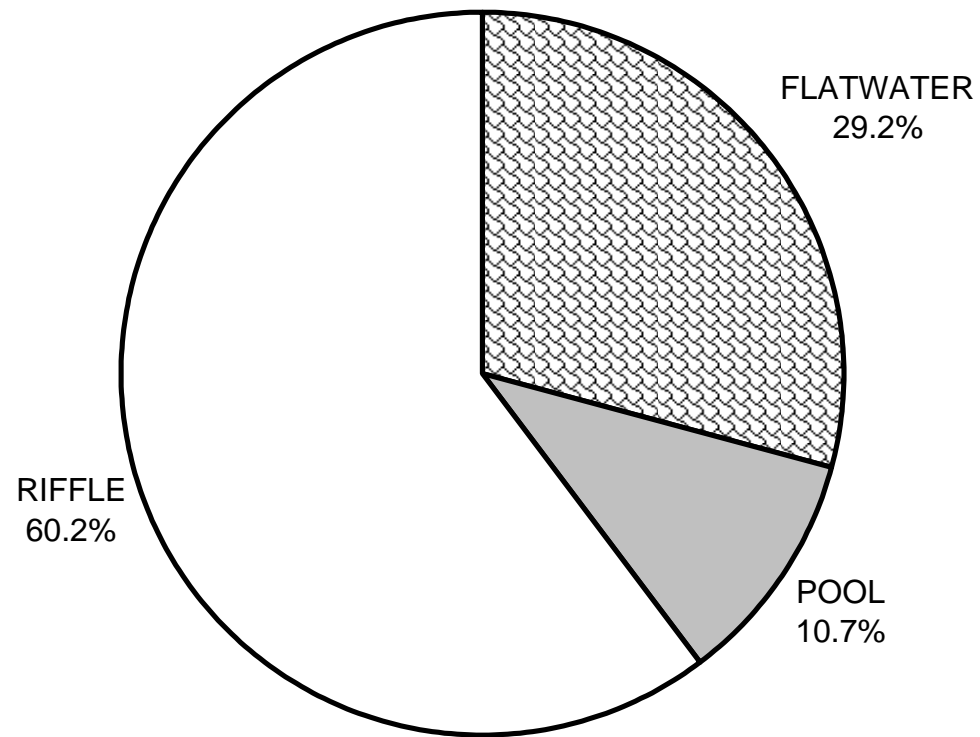
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	10
SMALL WOODY DEBRIS (%)	33	100	32
LARGE WOODY DEBRIS (%)	0	0	22
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	0	0	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	17	0	10
BOULDERS (%)	50	0	24
BEDROCK LEDGES (%)	0	0	0

# LOST LAKE CREEK 2011 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

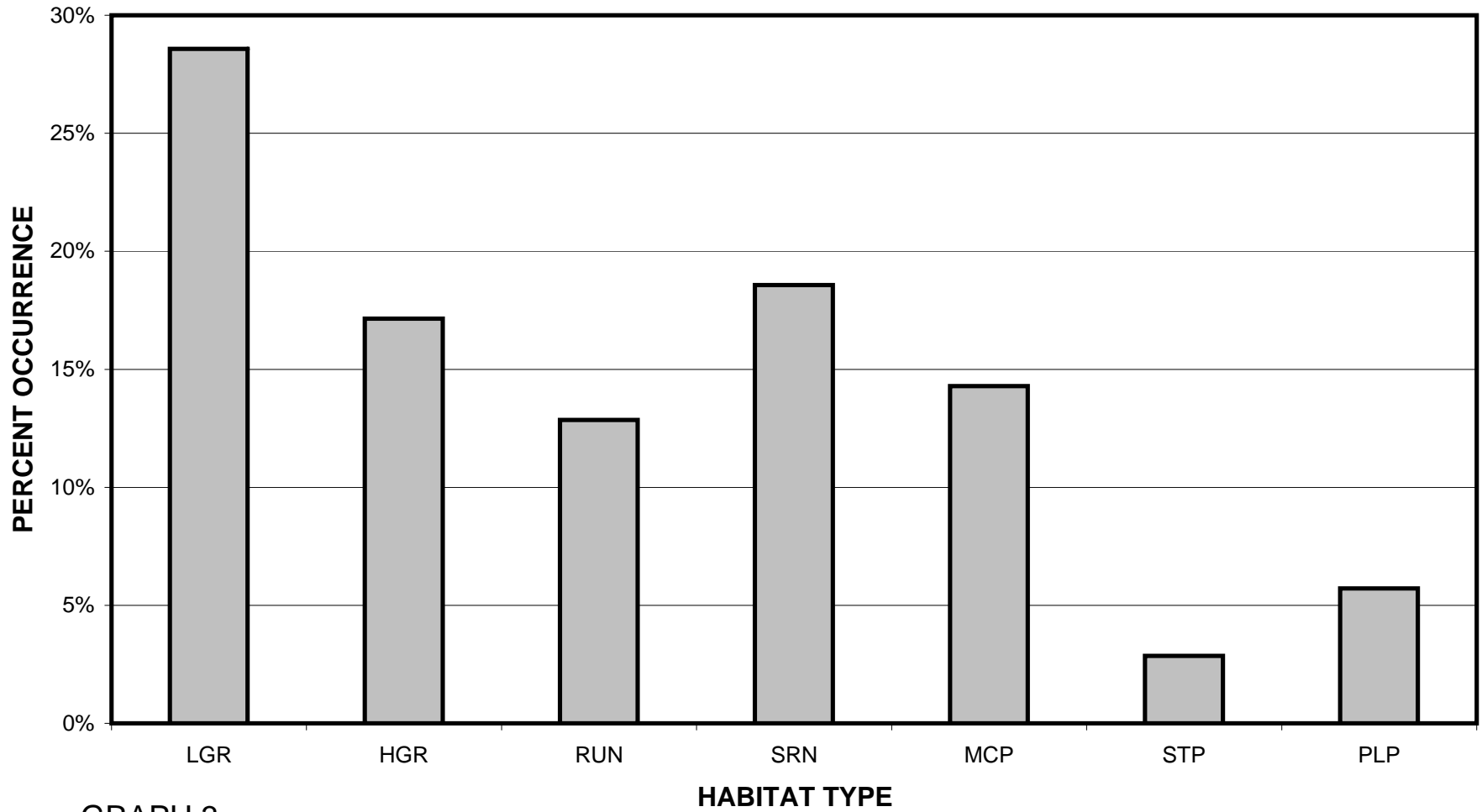
**LOST LAKE CREEK 2011  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

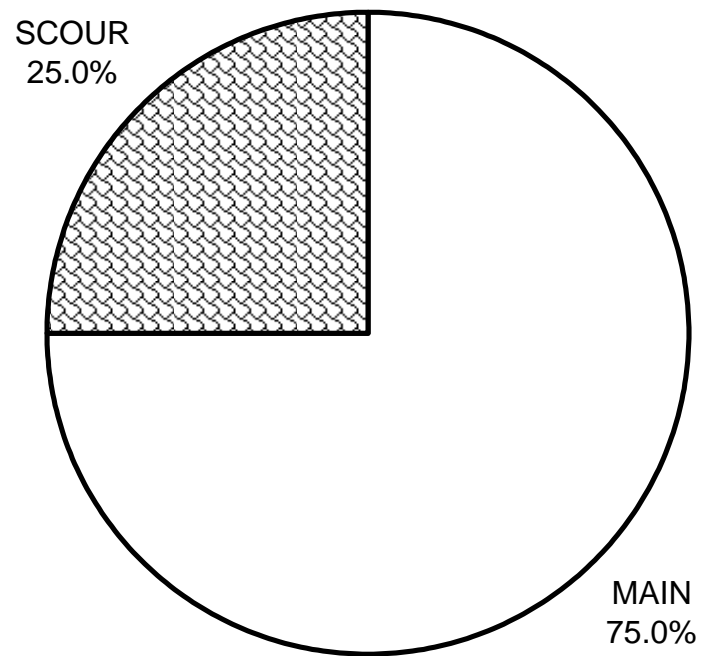
# LOST LAKE CREEK 2011

## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

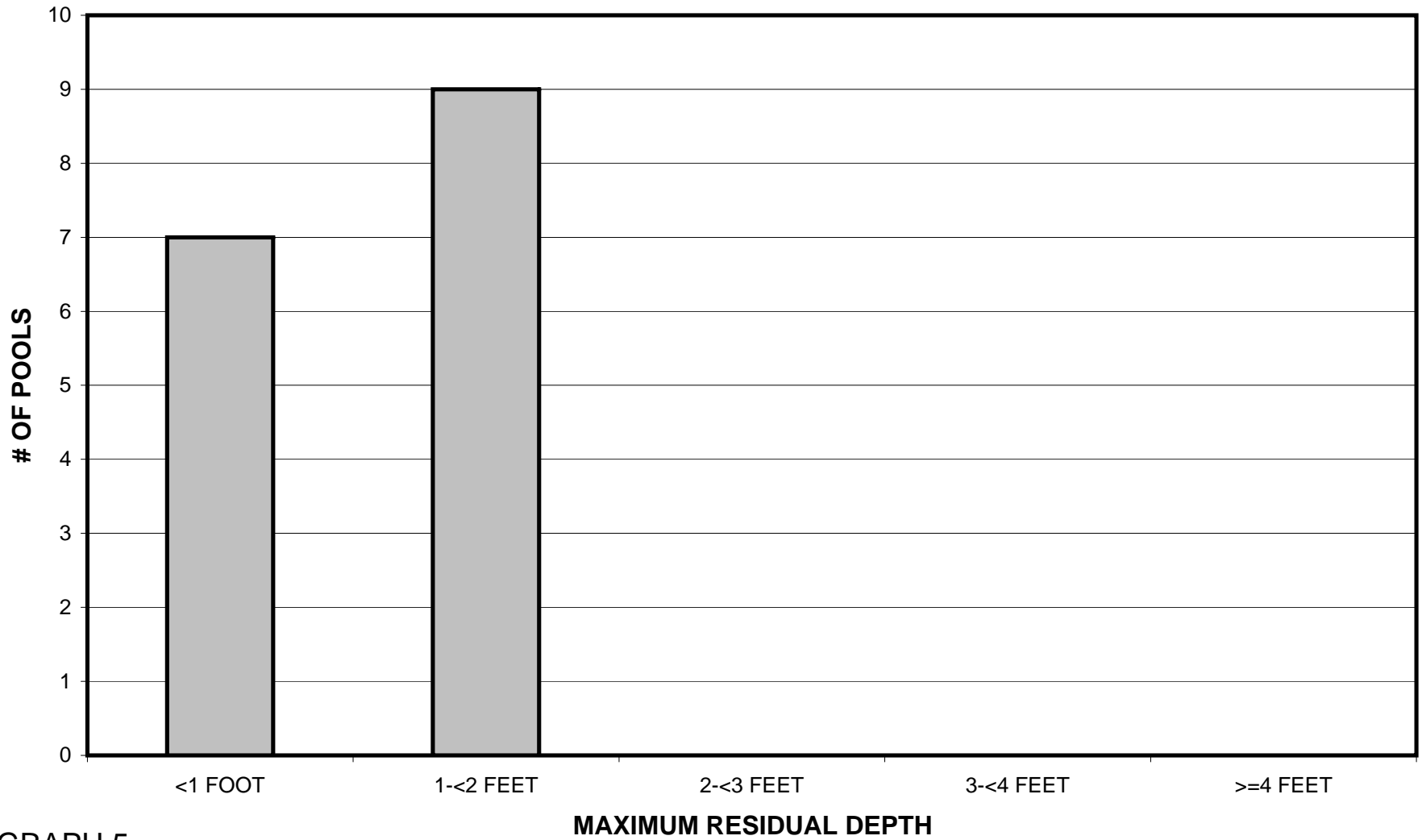
**LOST LAKE CREEK 2011  
POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

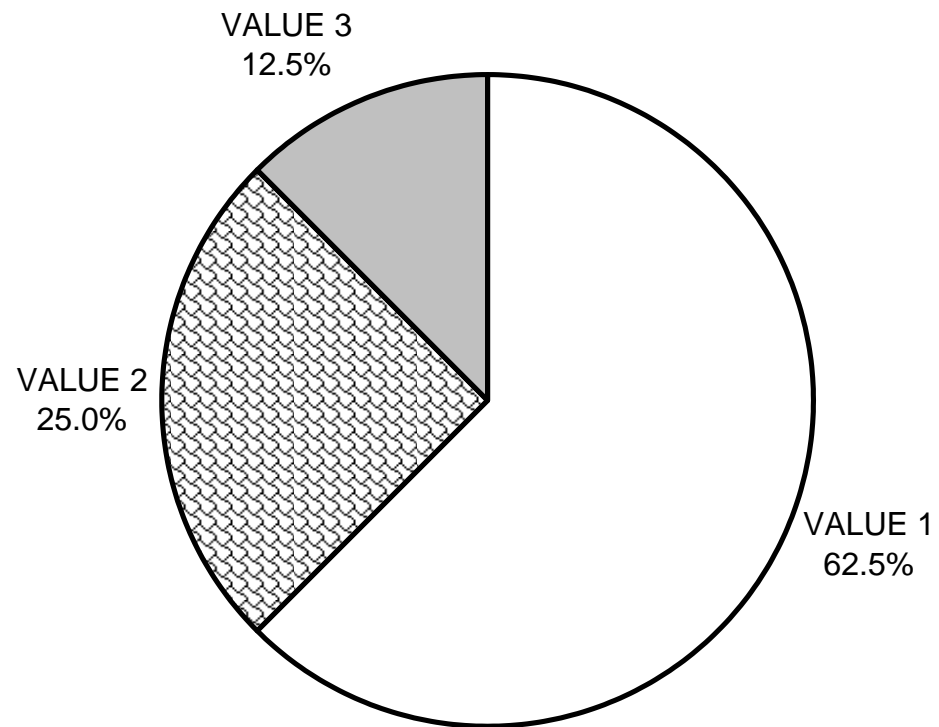


# LOST LAKE CREEK 2011 MAXIMUM DEPTH IN POOLS



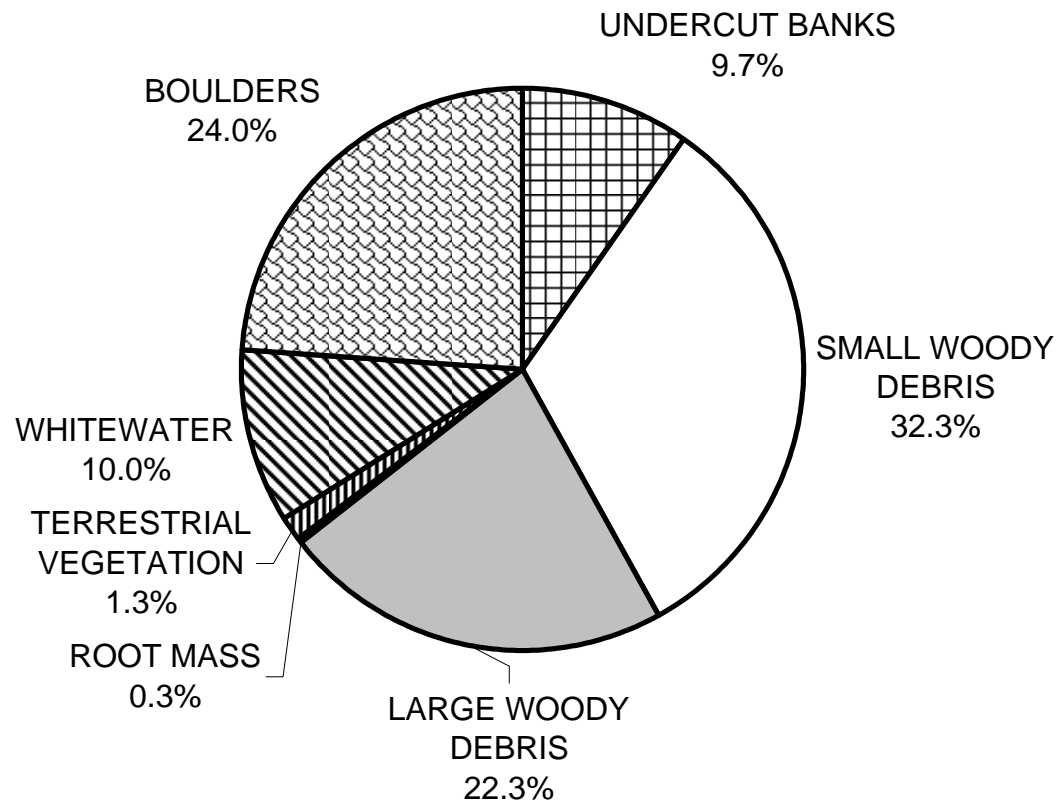
GRAPH 5

# LOST LAKE CREEK 2011 PERCENT EMBEDDEDNESS



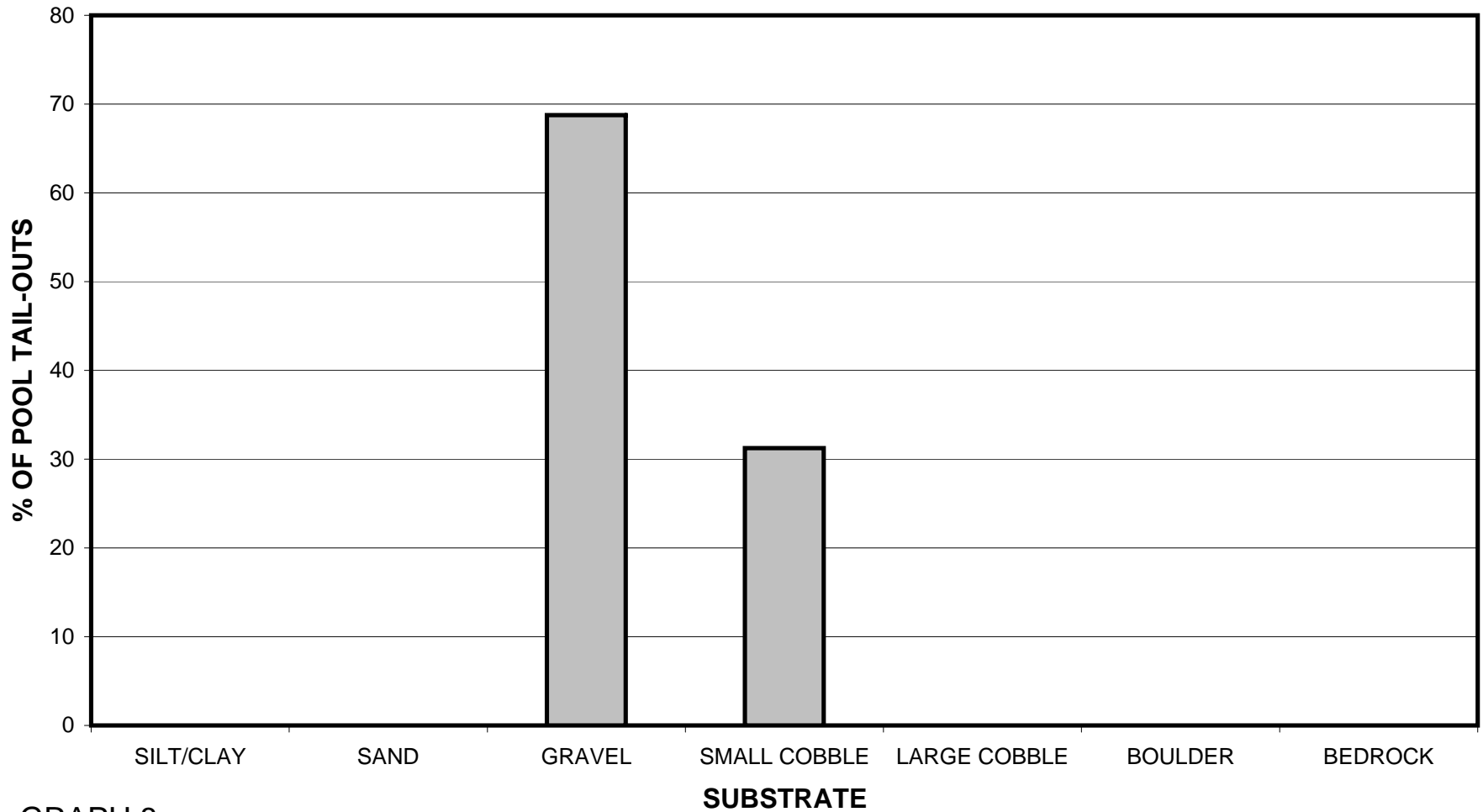
GRAPH 6

# LOST LAKE CREEK 2011 MEAN PERCENT COVER TYPES IN POOLS



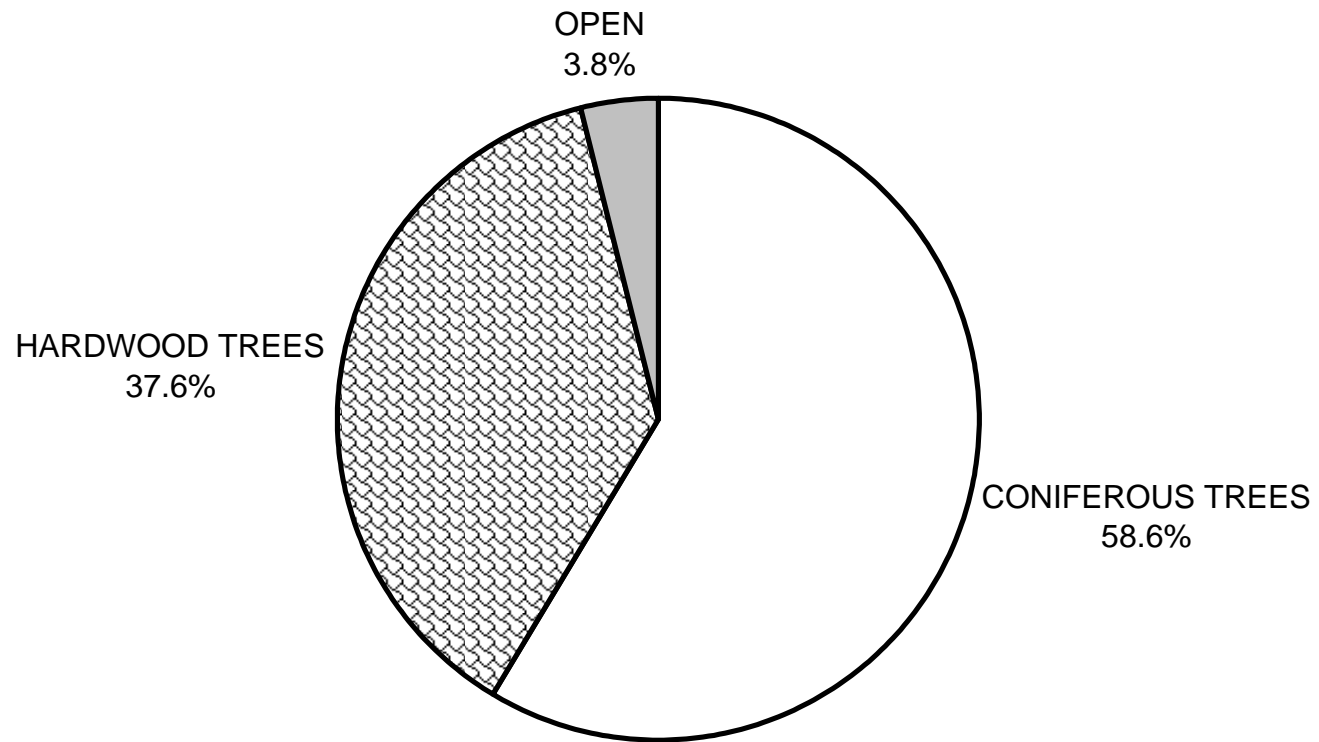
GRAPH 7

# LOST LAKE CREEK 2011 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



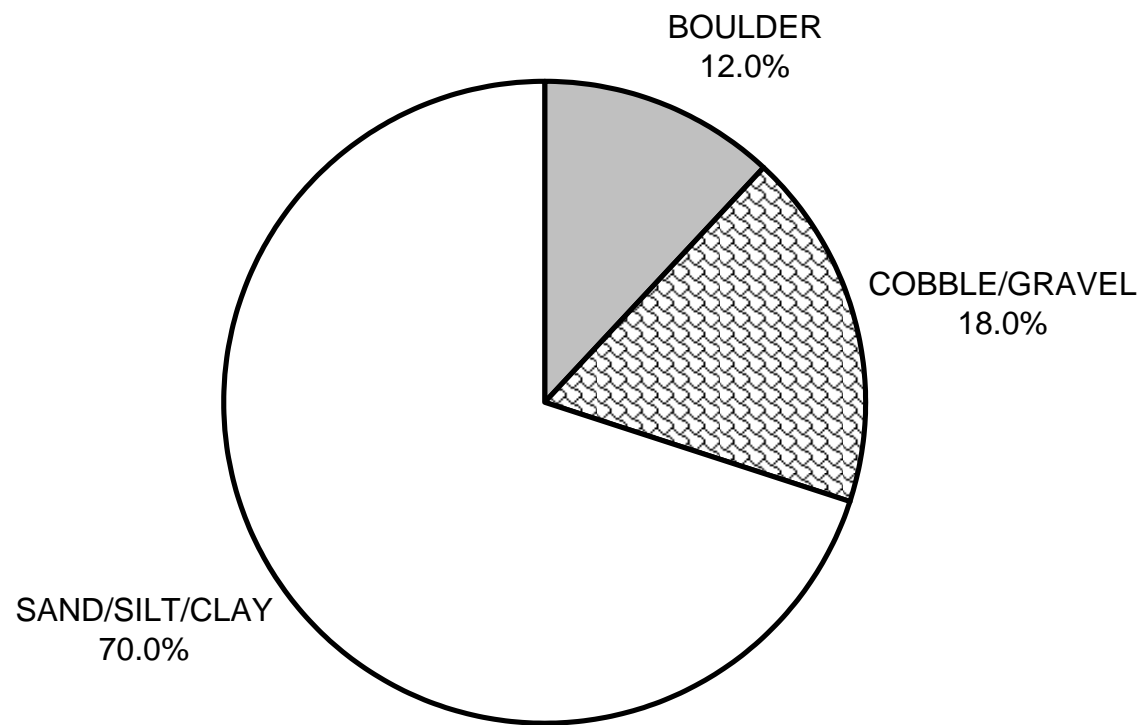
GRAPH 8

# LOST LAKE CREEK 2011 MEAN PERCENT CANOPY



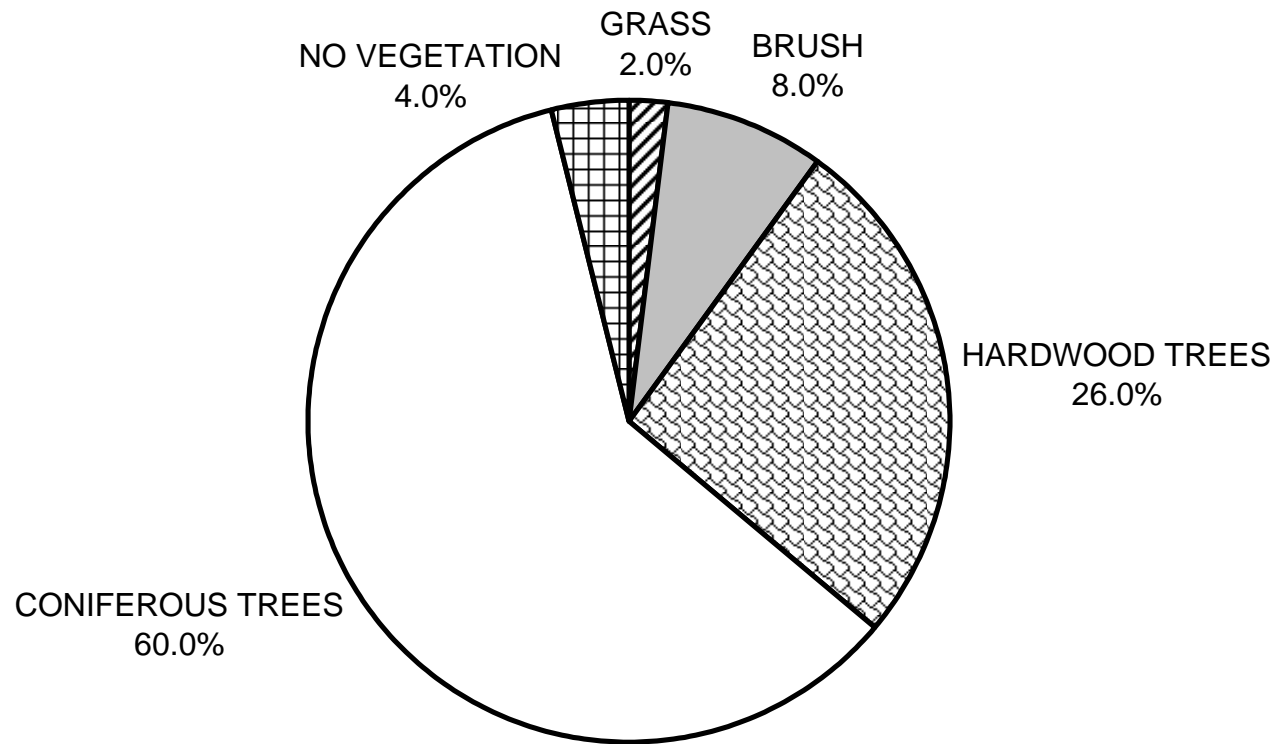
GRAPH 9

**LOST LAKE CREEK 2011  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



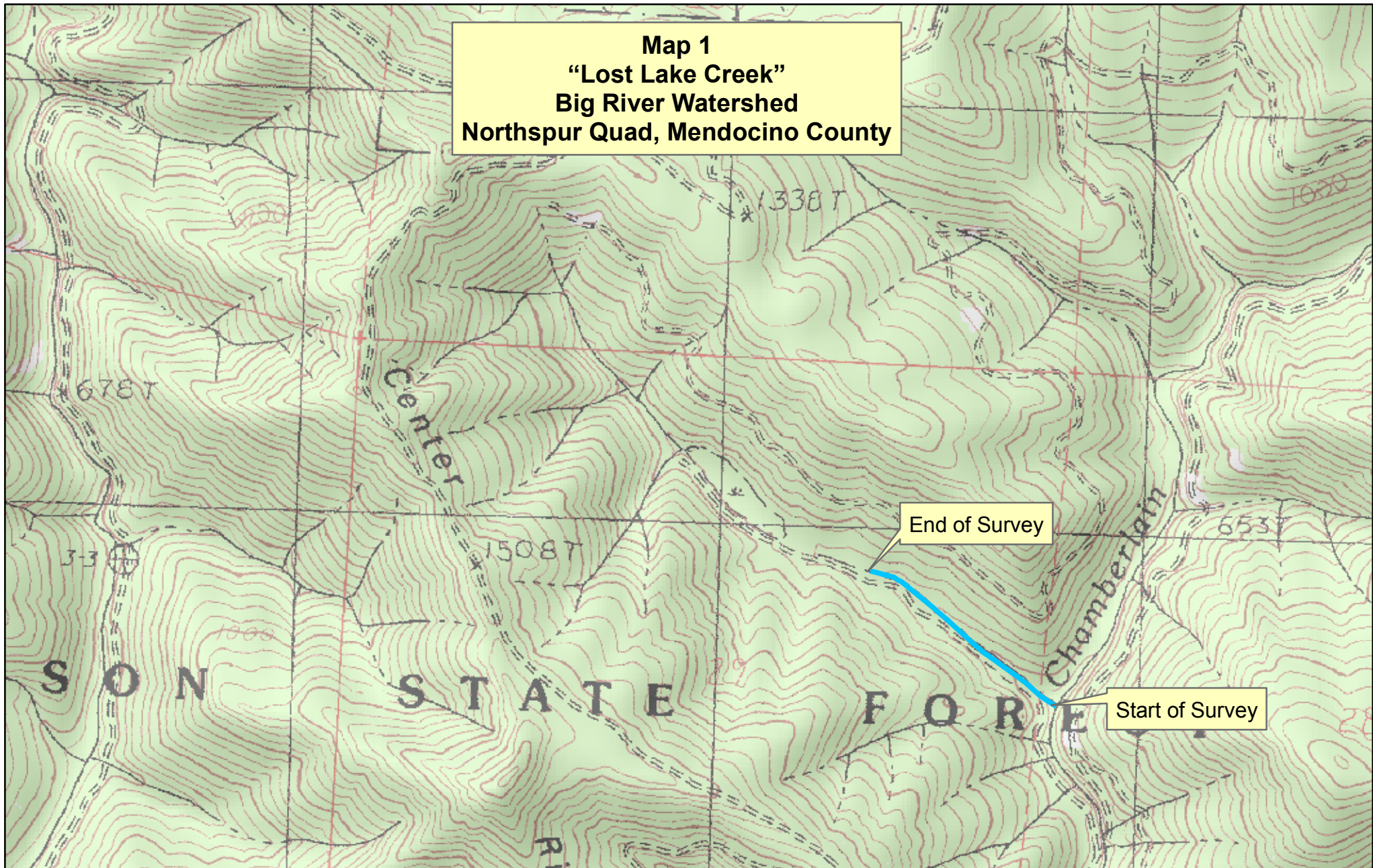
GRAPH 10

# LOST LAKE CREEK 2011 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

**Map 1**  
**"Lost Lake Creek"**  
**Big River Watershed**  
**Northspur Quad, Mendocino County**



## Legend

— Reach 1, A4 Channel Type

0 1,000 2,000 Feet

