

STREAM INVENTORY REPORT

Thompson Gulch

INTRODUCTION

A stream inventory was conducted from August 24 to August 25, 2010 on Thompson Gulch. The survey began at the confluence with Little North Fork Big River and extended upstream 1.1 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Thompson Gulch.

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

Thompson Gulch is a tributary to Little North Fork Big River, tributary to Big River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Thompson Gulch's legal description at the confluence with Little North Fork Big River is T17N R16W S18. Its location is 39.3412 north latitude and 123.6932 west longitude, LLID number 1236919393411. Thompson Gulch is a first order stream and has approximately 1.6 miles of blue line stream according to the USGS Mathison Peak 7.5 minute quadrangle. Thompson Gulch drains a watershed of approximately 0.95 square miles. Elevations range from about 50 feet at the mouth of the creek to 850 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is owned by Jackson Demonstration State Forest and California State Parks and is managed for timber production and recreation. Vehicle access exists via Highway 1 to Caspar Little Lake Road to Road 770. At the junction of Road 700 and Road 730, follow Road 730 to the confluence of Thompson Gulch and Little North Fork Big River.

METHODS

The habitat inventory conducted in Thompson Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The 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.

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

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

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5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Thompson Gulch, 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 Thompson Gulch, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Thompson Gulch, 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 Thompson Gulch, 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 Thompson Gulch 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 August 24 to August 25, 2010, was conducted by B. Leonard and A. Glasgow (WSP). The total length of the stream surveyed was 5,785 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.01 cfs on August 25, 2010.

Thompson Gulch is a G4 channel type for 5,785 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 55 to 59 degrees Fahrenheit. Air temperatures ranged from 56 to 75 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 32% flatwater units, 32% pool units, and 24% riffle units (Graph 1). Based on total length of Level II habitat types there were 41% flatwater units, 21% pool units, and 20% riffle units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 32%; low gradient riffle units, 23%; and run units, 18% (Graph 3). Based on percent total length, step run units made up 26%, mid-channel pool units 20%, low gradient riffle units 19%, and dry units 19%.

A total of 48 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (Graph 4), and comprised 100% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seven of the 48 pools (15%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 47 pool tail-outs measured, 2 had a value of 1 (4.3%); 21 had a value of 2 (44.7%); 16 had a value of 3 (34%); 7 had a value of 4 (14.9%); 1 had a value of 5 (2.1%) (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

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assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 37, flatwater habitat types had a mean shelter rating of 4, and pool habitats had a mean shelter rating of 31 (Table 1). Main channel pools had a mean shelter rating of 31 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Thompson Gulch. Graph 7 describes the pool cover in Thompson Gulch. Small woody debris is the dominant pool cover type followed by undercut banks.

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 91% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 4% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Thompson Gulch was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 30% and 70%, respectively. Graph 9 describes the mean percent canopy in Thompson Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 92%. The dominant elements composing the structure of the stream banks consisted of 81% sand/silt/clay, 16% cobble/gravel, and 2% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 58% of the units surveyed. Additionally, 23% had brush as the dominant vegetation type, 9% of the units surveyed had grass and 9% had deciduous trees as the dominant vegetation type (Graph 11).

DISCUSSION

Thompson Gulch is a G4 channel type for the entire 5,785 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 August 24 to August 25, 2010, ranged from 55 to 59 degrees Fahrenheit. Air temperatures ranged from 56 to 75 degrees Fahrenheit. This is a suitable water temperature range for salmonids. 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 41% of the total length of this survey, riffles 20%, and pools 21%. Seven of the 48 (15%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40%

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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 large wood that will increase or deepen pool habitat is recommended.

Twenty-three of the 47 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-three of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Thompson Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Forty-five of the 47 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 is 31. The shelter rating in the flatwater habitats is 4. 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 Thompson Gulch. Small woody debris is the dominant cover type in pools followed by undercut banks. 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 97%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 93% and 92%, 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) Thompson Gulch 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.

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- 4) 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.
- 5) Modify the log debris accumulation at 896' to provide fish passage.

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 Little North Fork Big River. The channel type is a G4 for the entire length of the survey, 5,785 feet.
177	0007.00	Road 730 crosses the channel. The crossing is a 15' wide x 11' high x 26' long railcar bridge.
619	0019.00	Road 730 crosses the channel. The crossing is a 23' wide x 11' high x 11' wide redwood log bridge that has collapsed on one side. It is a possible barrier to salmonids.
896	0027.00	Log debris accumulation (LDA) #01 contains seven pieces of large woody debris (LWD) and measures 6' high x 22' wide x 11' long. Water does not flow through it and there are no visible gaps in the LDA. Retained sediment ranges from sand to gravel and measures 10' wide x 10' long x 1' deep. It is a possible barrier to juvenile and adult salmonids. No fish were observed above the LDA.
978	0031.00	There is a 3' high plunge.
4702	0120.00	An erosion site on the right bank measures 40' x 50'.
5307	0136.00	A tributary enters on the right bank.
5433	0140.00	There is a 4' high plunge into a 1' deep pool.
5621	0146.00	LDA #02 contains five pieces of LWD and measures 6' high x 16' wide x 12' long. Water does not flow through it and there are no visible gaps in the LDA. Retained sediment ranges from silt to large cobble and measures 5' wide x 7' long x 2' deep. It is a possible barrier to juvenile and adult salmonids.

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5785 0148.00 End of survey due to diminished habitat. The gradient has increased to approximately 12% and there is a 7' high plunge. An erosion site on the left bank measures 40' high x 50' long. An erosion site on the right bank measures 15' high x 20' long.

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: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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
18	0	DRY	12.2	60	1089	18.8									
47	7	FLATWATER	31.8	50	2373	41.0	4.1	0.3	0.7	204	9583	72	3365		4
48	48	POOL	32.4	25	1191	20.6	7.0	0.7	1.6	170	8156	150	7207	127	31
35	8	RIFFLE	23.6	32	1132	19.6	4.5	0.3	0.6	102	3579	35	1213		37
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
148	63				5785					21318			11785		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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 (%)
34	7	LGR	23.0	33	1112	19.2	4	0.3	0.8	85	2905	24	812		21	98
1	1	HGR	0.7	20	20	0.3	11	0.5	0.9	220	220	110	110		150	98
27	3	RUN	18.2	31	845	14.6	4	0.3	0.7	131	3540	40	1091		3	98
20	4	SRN	13.5	76	1528	26.4	4	0.4	1.3	259	5170	95	1900		5	98
47	47	MCP	31.8	25	1153	19.9	7	0.7	3.3	169	7939	150	7034	127	31	97
1	1	STP	0.7	38	38	0.7	6	0.7	1.6	217	217	173	173	152	50	98
18	0	DRY	12.2	60	1089	18.8										98

Total Units
148

Total Units Fully Measured
63

Total Length (ft.)
5785

Total Area (sq.ft.)
19990

Total Volume (cu.ft.)
11120

Stream Name:	Thompson Gulch	LLID:	1236919393411	Drainage:	Big River
Survey Dates:	8/24/2010 to 8/25/2010				
Confluence Location:	Quad: MATHISON PEAK	Legal Description:	T17NR16WS18	Latitude:	39:20:28.0N
				Longitude:	123:41:31.0W

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
48	48	MAIN	100	25	1191	100	7.0	0.7	170	8156	127	6109	31

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
48	48	1191	8156	6109

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

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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
47	MCP	98	2	4	38	81	5	11	2	4	0	0
1	STP	2	0	0	1	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
48	2	4	39	81	5	10	2	4	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Dry Units: 18

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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
34	7	LGR	7	61	14	0	4	0	0	13	0
1	1	HGR	0	50	50	0	0	0	0	0	0
35	8	TOTAL RIFFLE	6	60	19	0	4	0	0	11	0
27	3	RUN	0	50	0	0	0	0	0	50	0
20	4	SRN	0	100	0	0	0	0	0	0	0
47	7	TOTAL FLAT	0	80	0	0	0	0	0	20	0
47	47	MCP	28	36	25	7	0	0	0	4	0
1	1	STP	0	30	25	0	0	0	0	45	0
48	48	TOTAL POOL	27	36	25	7	0	0	0	5	0
148	63	TOTAL	22	43	22	5	1	0	0	7	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Dry Units: 18

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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
34	7	LGR	0	0	57	43	0	0	0
1	1	HGR	0	0	0	100	0	0	0
27	3	RUN	0	0	100	0	0	0	0
20	4	SRN	0	0	100	0	0	0	0
47	47	MCP	2	9	87	0	0	2	0
1	1	STP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	70	30	0	93	92

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: Thompson Gulch		LLID: 1236919393411		Drainage: Big River
Survey Dates: 8/24/2010 to 8/25/2010		Survey Length (ft.): 5785	Main Channel (ft.): 5785	Side Channel (ft.): 0
Confluence Location: Quad: MATHISON PEAK		Legal Description: T17NR16WS18	Latitude: 39:20:28.0N	Longitude: 123:41:31.0W

STREAM REACH: 1									
Channel Type: G4			Canopy Density (%): 97.4				Pools by Stream Length (%): 20.6		
Reach Length (ft.): 5785			Coniferous Component (%): 69.5				Pool Frequency (%): 32.4		
Riffle/Flatwater Mean Width (ft.): 4.3			Hardwood Component (%): 30.5				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Coniferous Trees				< 2 Feet Deep: 85		
Range (ft.): 8 to 23			Vegetative Cover (%): 92.8				2 to 2.9 Feet Deep: 10		
Mean (ft.): 15			Dominant Shelter: Small Woody Debris				3 to 3.9 Feet Deep: 4		
Std. Dev.: 4			Dominant Bank Substrate Type: Sand/Silt/Clay				>= 4 Feet Deep: 0		
Base Flow (cfs.): 0.0			Occurrence of LWD (%): 20				Mean Max Residual Pool Depth (ft.): 1.6		
Water (F): 55 - 59			Air (F): 56 - 75				LWD per 100 ft.:		
Dry Channel (ft): 1089			Riffles: 3				Mean Pool Shelter Rating: 31		
			Pools: 5						
			Flat: 2						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 2 Gravel: 91 Sm Cobble: 4 Lg Cobble: 0 Boulder: 2 Bedrock: 0									
Embeddedness Values (%): 1. 4.3 2. 44.7 3. 34.0 4. 14.9 5. 2.1									

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

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	2	1	2.3
Boulder	0	0	0.0
Cobble / Gravel	13	8	16.4
Sand / Silt / Clay	49	55	81.3

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	6	6	9.4
Brush	19	11	23.4
Hardwood Trees	8	4	9.4
Coniferous Trees	31	43	57.8
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

3

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

StreamName: Thompson Gulch

LLID: 1236919393411

Drainage: Big River

Survey Dates: 8/24/2010 to 8/25/2010

Confluence Location: Quad: MATHISON PEAK

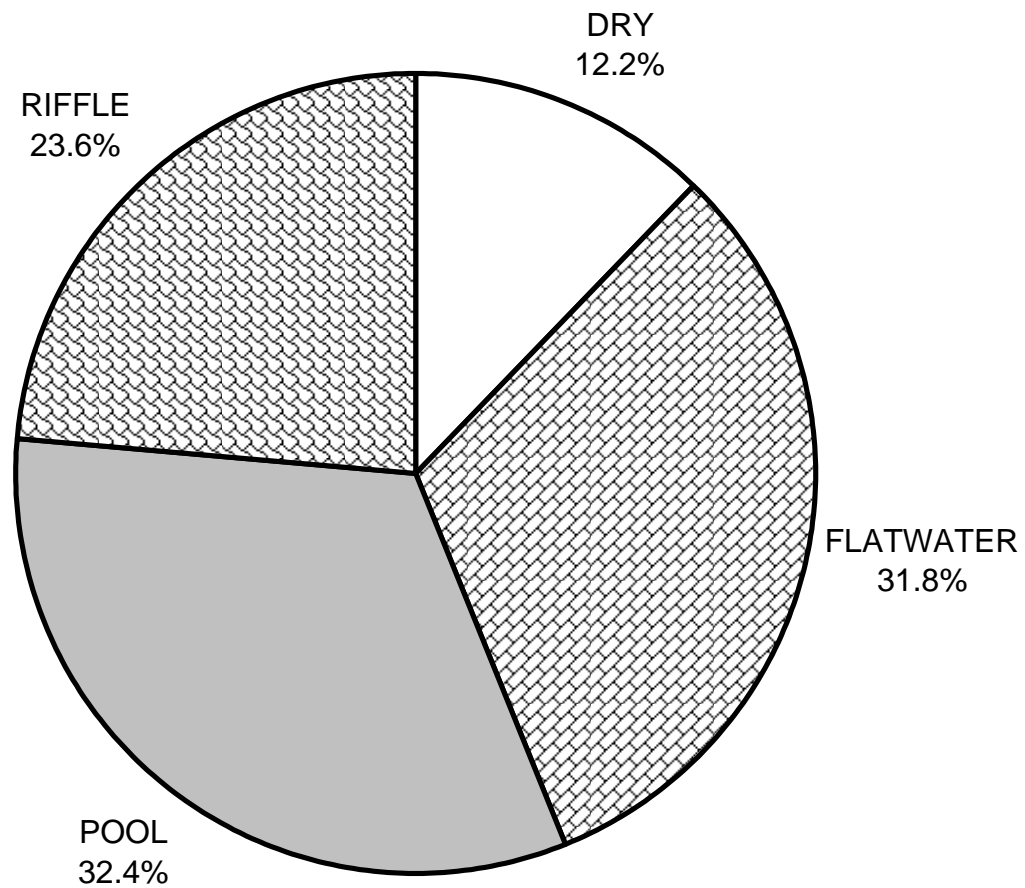
Legal Description: T17NR16WS18

Latitude: 39:20:28.0N

Longitude: 123:41:31.0W

	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	6	0	27
SMALL WOODY DEBRIS (%)	60	80	36
LARGE WOODY DEBRIS (%)	19	0	25
ROOT MASS (%)	0	0	7
TERRESTRIAL VEGETATION (%)	4	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	11	20	5
BEDROCK LEDGES (%)	0	0	0

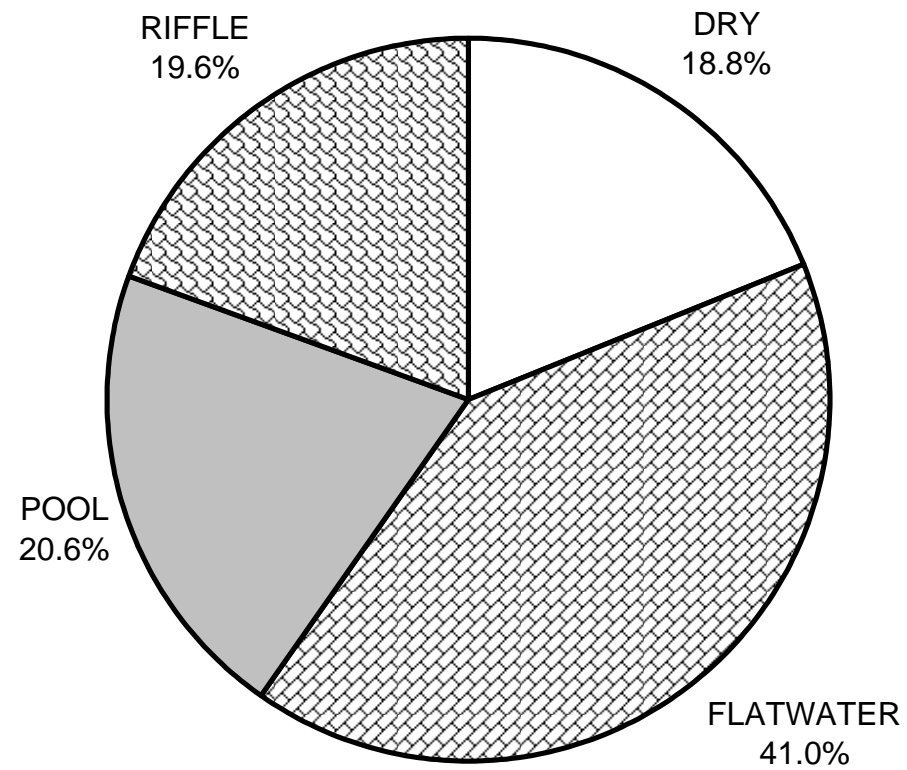
THOMPSON GULCH 2010 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

THOMPSON GULCH 2010

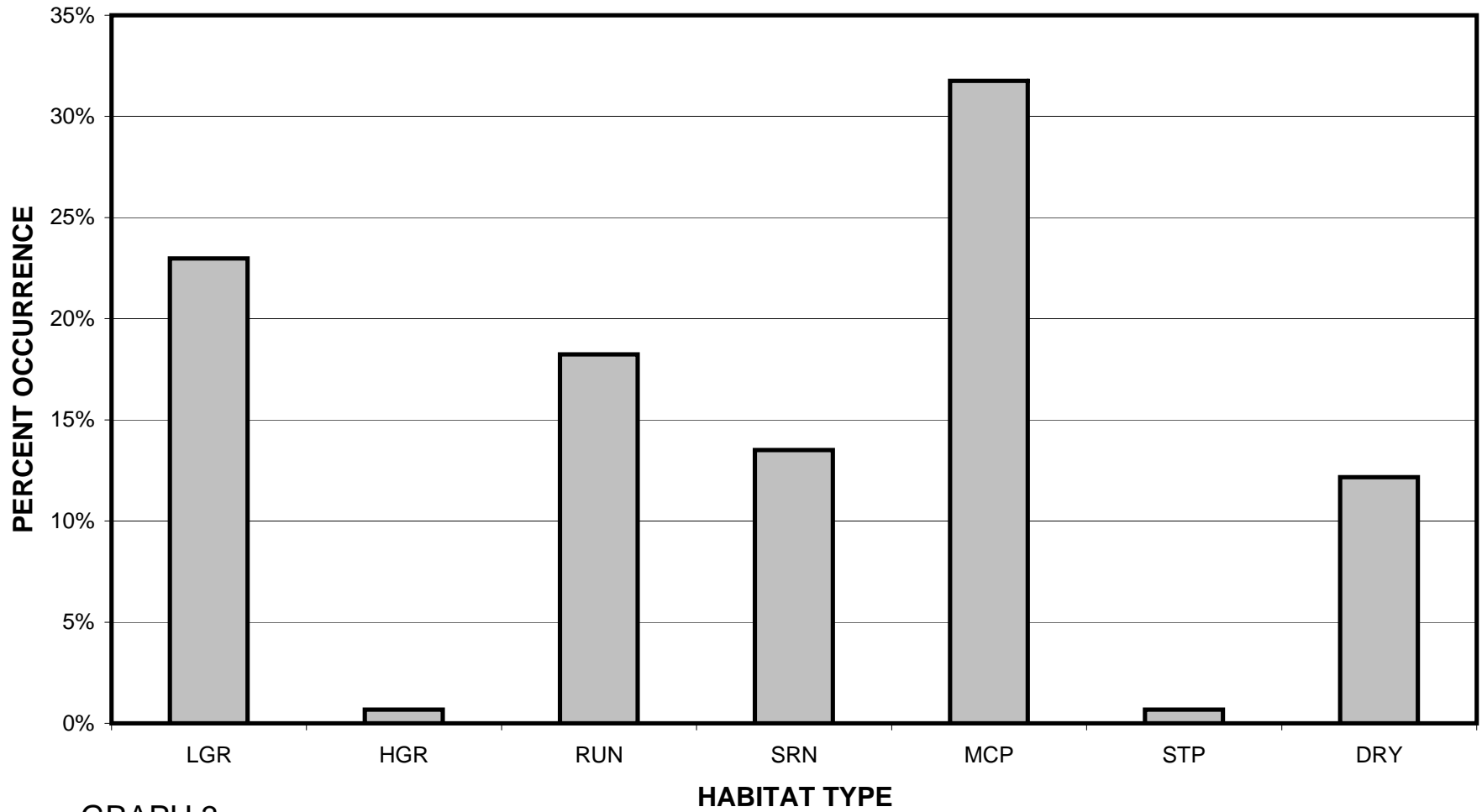
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

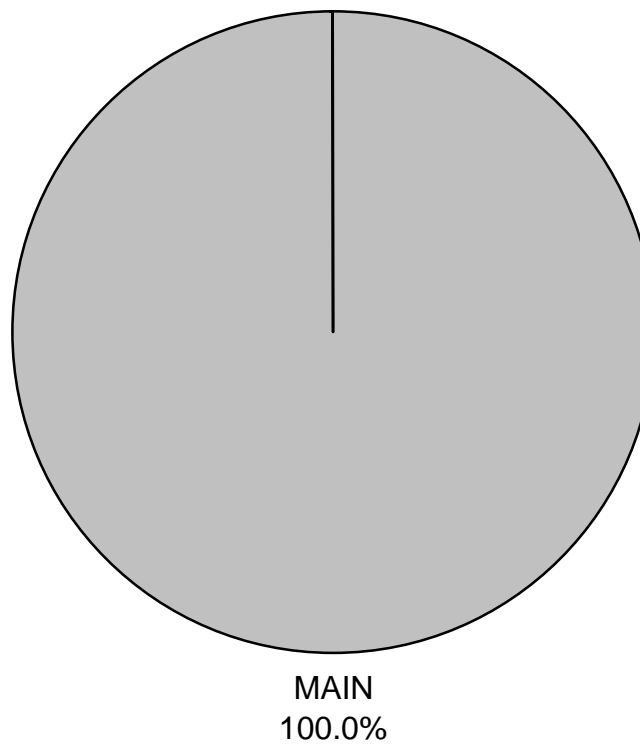
THOMPSON GULCH 2010

HABITAT TYPES BY PERCENT OCCURRENCE



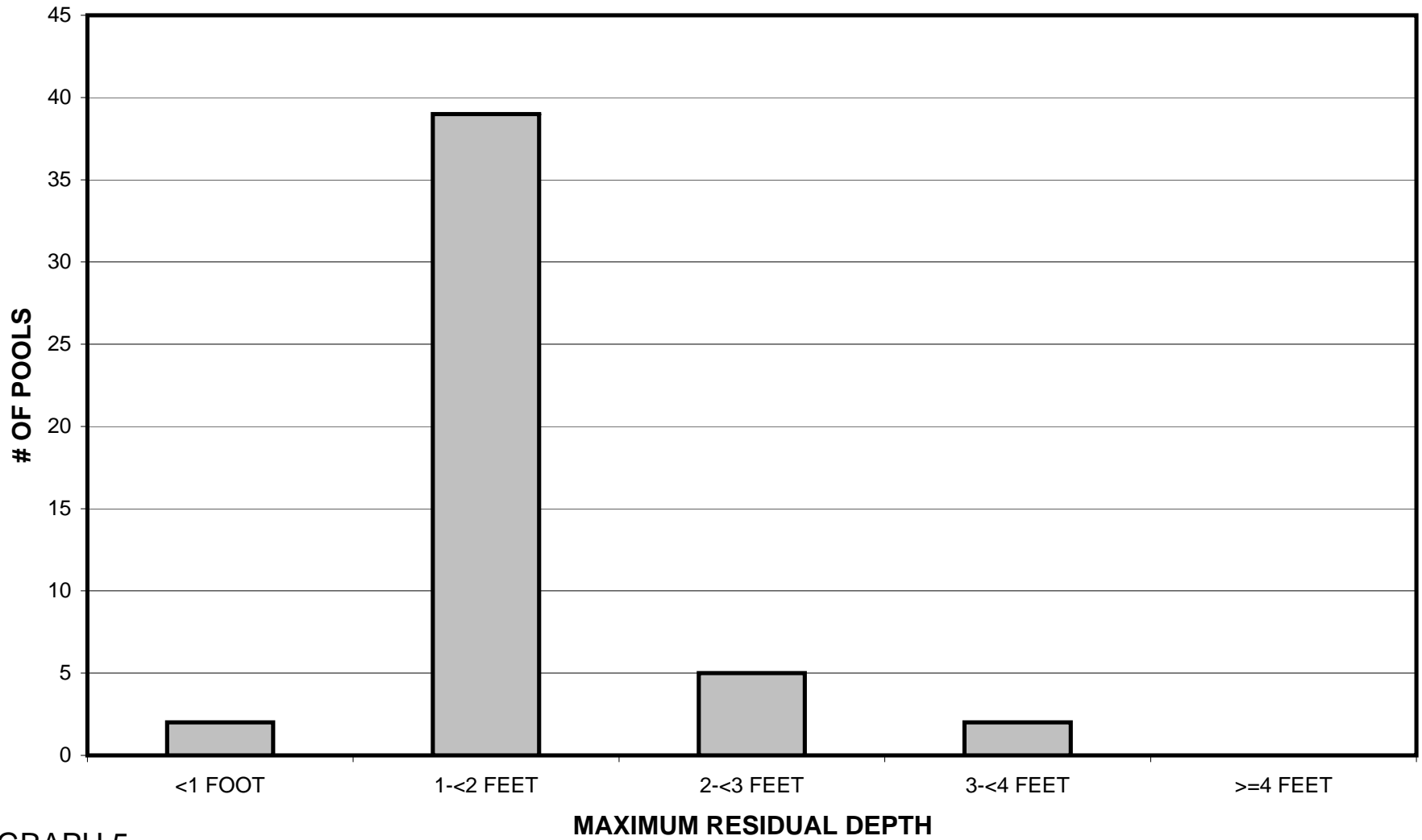
GRAPH 3

**THOMPSON GULCH 2010
POOL TYPES BY PERCENT OCCURRENCE**



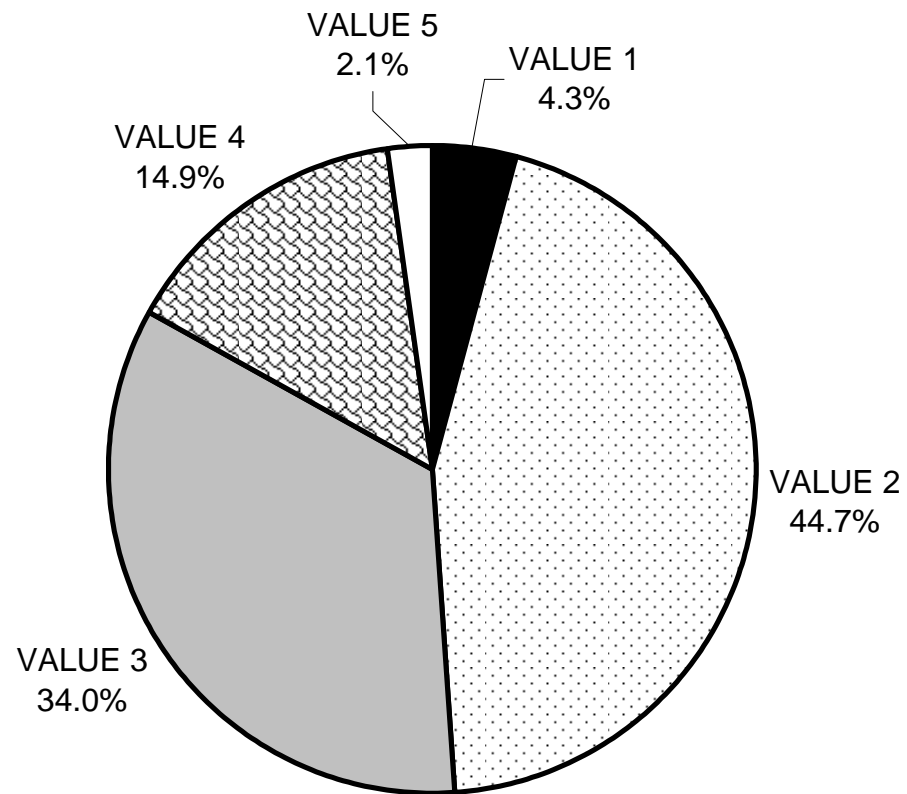
GRAPH 4

THOMPSON GULCH 2010 MAXIMUM DEPTH IN POOLS



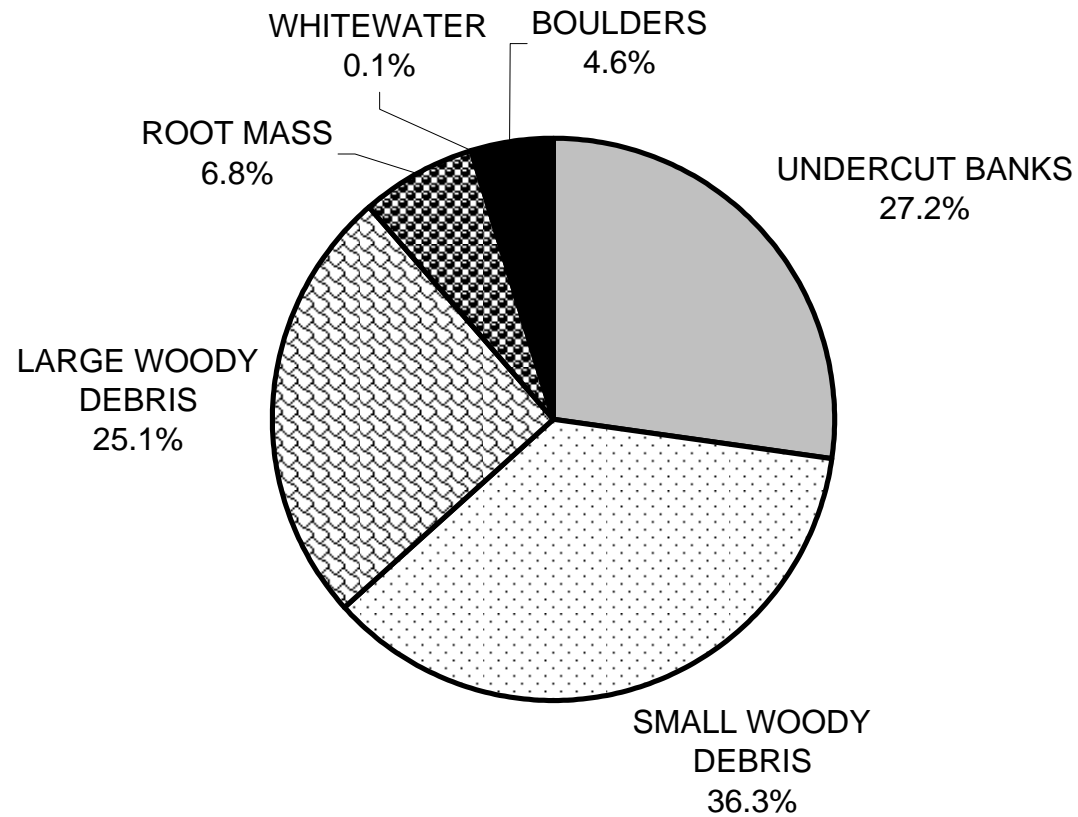
GRAPH 5

THOMPSON GULCH 2010 PERCENT EMBEDDEDNESS



GRAPH 6

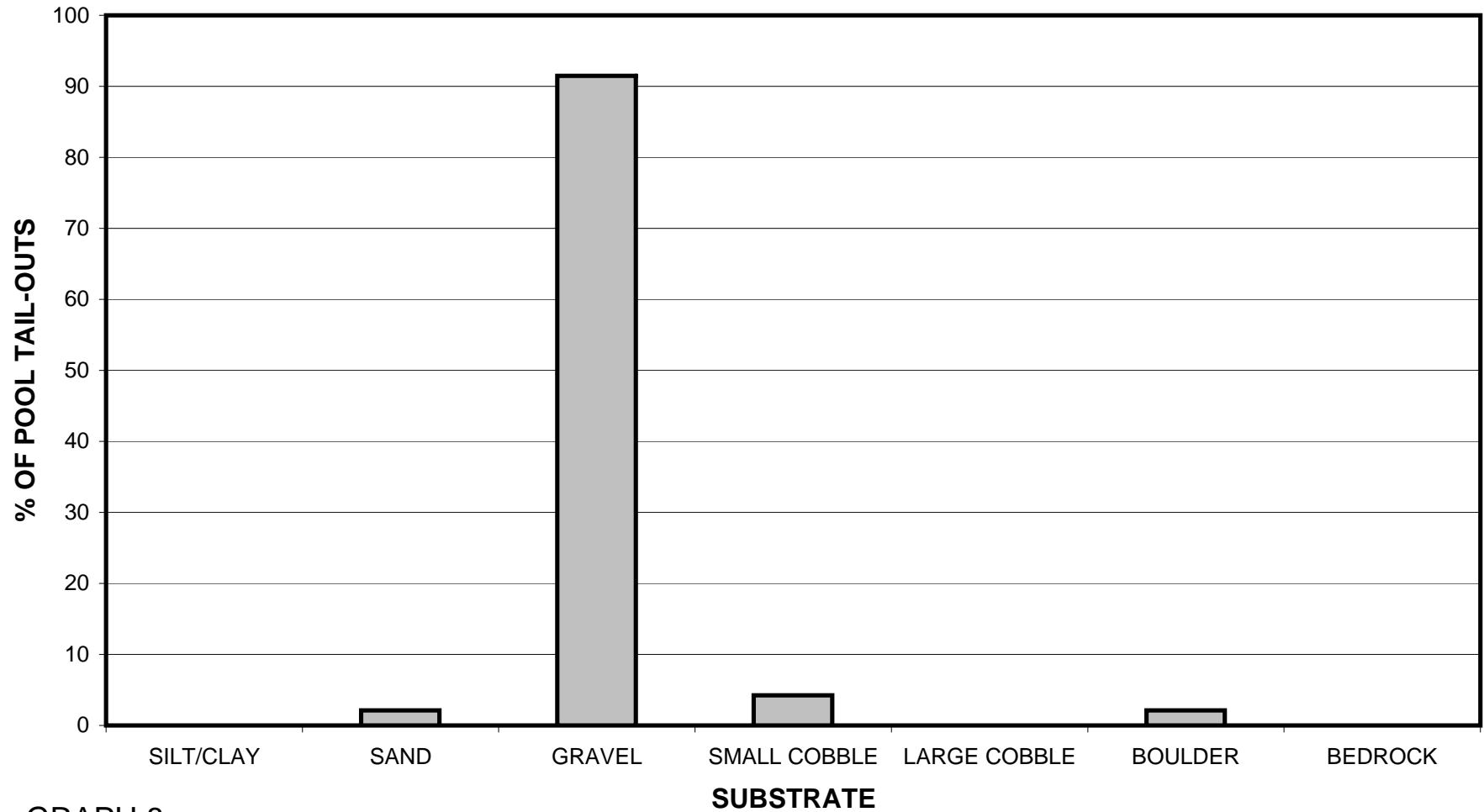
THOMPSON GULCH 2010 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

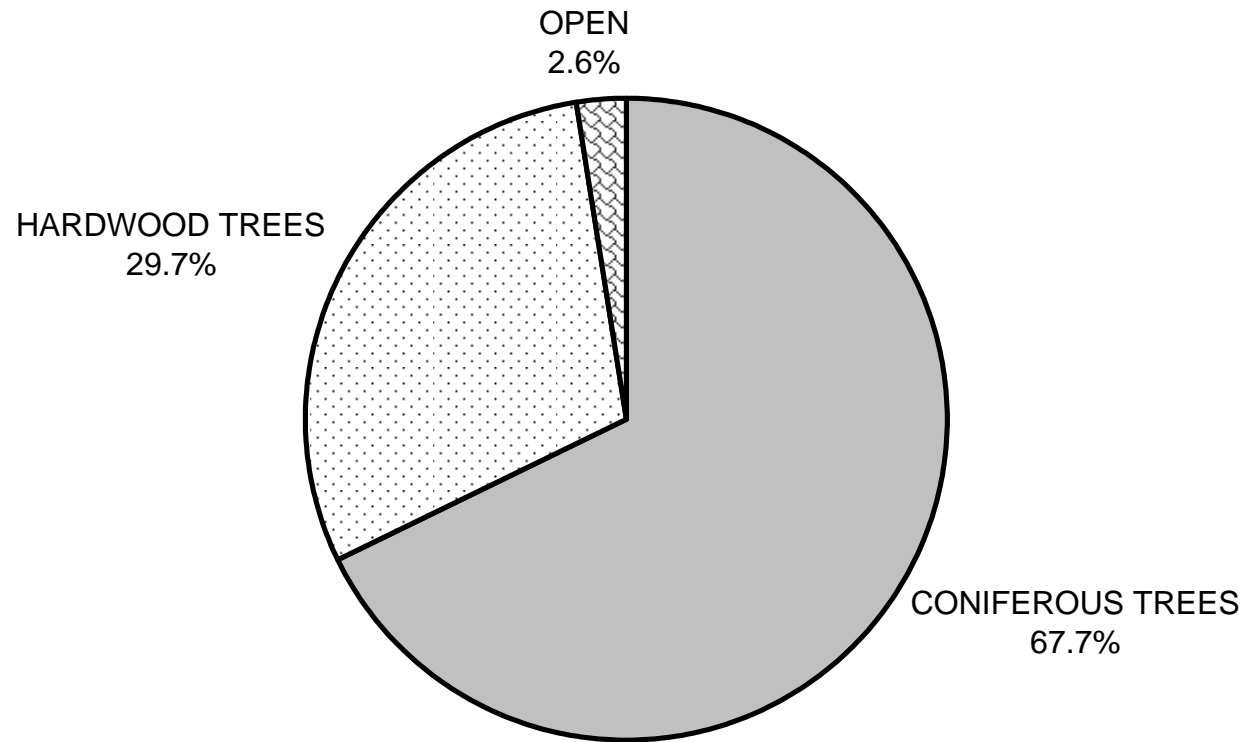
THOMPSON GULCH 2010

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



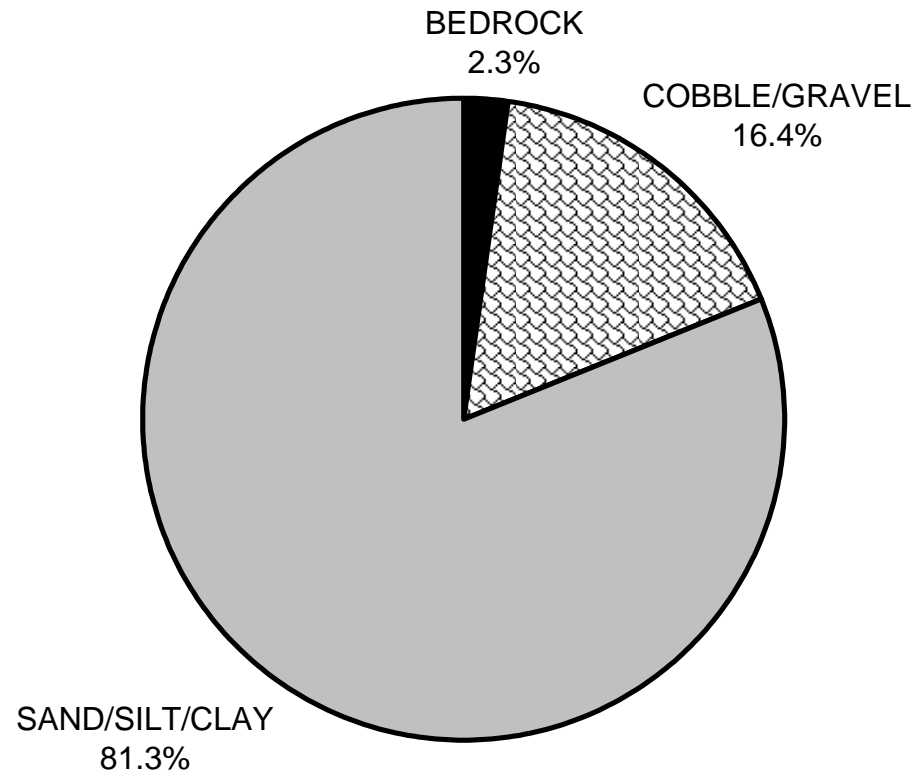
GRAPH 8

THOMPSON GULCH 2010 MEAN PERCENT CANOPY



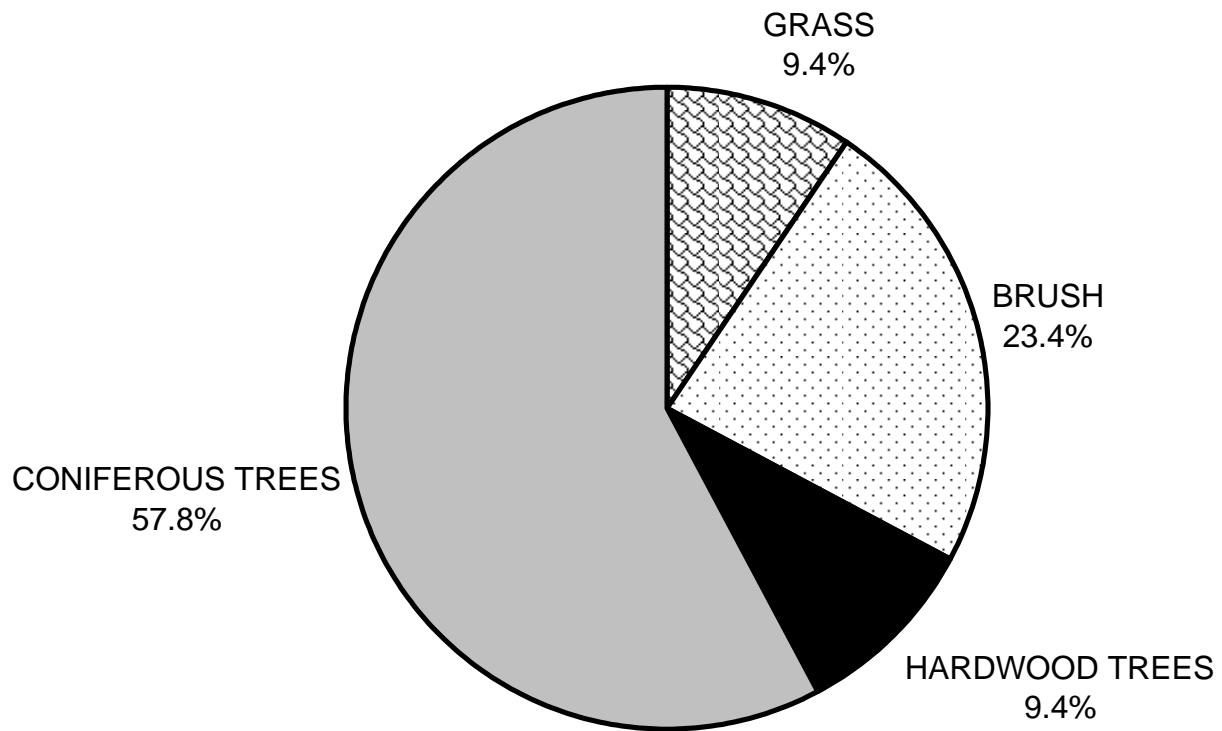
GRAPH 9

**THOMPSON GULCH 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH**



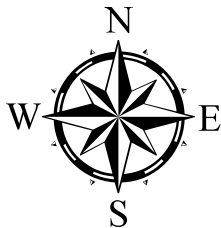
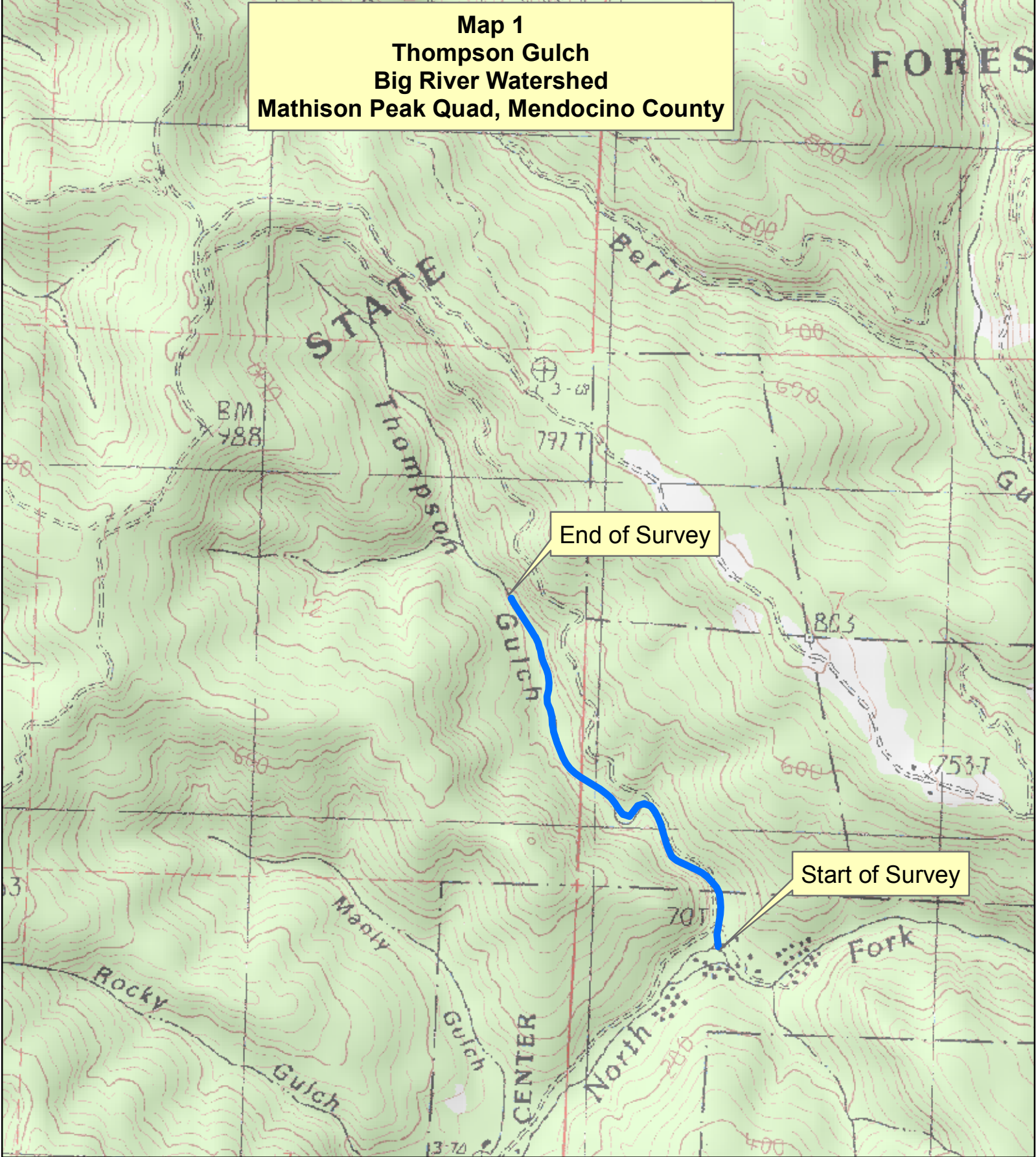
GRAPH 10

THOMPSON GULCH 2010
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Thompson Gulch
Big River Watershed
Mathison Peak Quad, Mendocino County



Legend

— Reach 1, G4 Channel Type

0 1,000 2,000 Feet

Reach lengths approximate

