

# STREAM INVENTORY REPORT

## Rocky Gulch

### INTRODUCTION

A stream inventory was conducted August 30, 2010 on Rocky Gulch. The survey began at the confluence with Little North Fork Big River and extended upstream 0.2 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Rocky 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

Rocky 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). Rocky Gulch's legal description at the confluence with Little North Fork Big River is T17N R17W S13. Its location is 39.3337 north latitude and 123.7009 west longitude, LLID number 1236998393338. Rocky Gulch is an intermittent stream according to the USGS Mathison Peak 7.5 minute quadrangle. Rocky Gulch drains a watershed of approximately 0.33 square miles. Elevations range from about 50 feet at the mouth of the creek to 800 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 Rocky Gulch and Little North Fork Big River.

### METHODS

The habitat inventory conducted in Rocky 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 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

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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 Rocky 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". Rocky 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 Rocky 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 Rocky 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 Rocky 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 Rocky 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 Rocky 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 30, 2010, was conducted by A. Glasgow and B. Leonard (WSP). The total length of the stream surveyed was 1,125 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 30, 2010.

Rocky Gulch is an E4 channel type for 676 feet of the stream surveyed (Reach 1), and an A3 channel type for 449 feet of the stream surveyed (Reach 2). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-dominant substrates. A3 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 55 degrees Fahrenheit. Air temperatures ranged from 63 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 42% riffle units, 21% pool units, 21% dry units, 11% flatwater units, and 5% no survey units (Graph 1). Based on total length of Level II habitat types there were 57% dry units, 30% riffle units, 6% pool units, 3% flatwater units, and 3% no survey units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 26%; mid-channel pool units, 21%; dry units, 21%; and high gradient riffle units, 16% (Graph 3). Based on percent total length, dry units made up 57%, low gradient riffle units 18%, high gradient riffle units 11%, and mid-channel pool units 6%.

A total of 4 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. One of the 4 pools (25%) had a residual depth of two feet or greater (Graph 5).

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The depth of cobble embeddedness was estimated at pool tail-outs. Of the 4 pool tail-outs measured, 3 had a value of 1 (75%); 1 had a value of 2 (25%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 5, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 12 (Table 1). The main channel pools a mean shelter rating of 12 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Rocky Gulch. Graph 7 describes the pool cover in Rocky Gulch. Large 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 50% of the pool tail-outs. Small cobble was the dominant substrate type in remaining 50% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Rocky Gulch was 91%. Nine percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 11% and 89%, respectively. Graph 9 describes the mean percent canopy in Rocky Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 96%. The mean percent left bank vegetated was 92%. The dominant elements composing the structure of the stream banks consisted of 86% sand/silt/clay, 7% bedrock, and 7% cobble/gravel (Graph 10). Coniferous trees were the dominant vegetation type observed in 93% of the units surveyed. Additionally, 7% of the units surveyed had brush as the dominant vegetation type (Graph 11).

## DISCUSSION

Rocky Gulch is an E4 channel type for the first 676 feet of stream surveyed and an A3 channel type for the remaining 449 feet. The suitability of E4 and A3 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. A3 channel types are generally not suitable for fish habitat improvement structures.

The water temperatures recorded on August 30, 2010, ranged from 54 to 55 degrees Fahrenheit. Air temperatures ranged from 63 to 69 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 3% of the total length of this survey, riffles 30%, and pools 6%. One of the 4 (25%) pools had a maximum residual depth greater than 2 feet. In general,

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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 large wood that will increase or deepen pool habitat is recommended for the E4 channel type.

All 4 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.

All 4 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 12. The shelter rating in the flatwater habitats is 0. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Rocky Gulch. Large 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 91%. Reach 1 had a canopy density of 89%, Reach 2 had a canopy density of 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 96% 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) Rocky 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 in Reach 1. 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 Little North Fork Big River. The channel is an E4. Road 730 crosses the channel. The crossing is a 20' wide x 3' high x 13' log stringer bridge.
98	0005.00	Five salmonid young-of-the-year (YOY) observed.
187	0007.00	Manly Gulch enters from the left bank. It is not flowing.
309	0011.00	This is the first unit out of the influence with Little North Fork Big River.
676	0015.00	The channel changes from an E4 to an A3.
736	0016.00	There is a 6' high plunge.
1125	0019.00	End of survey due to a 4' high plunge over a concrete and boulder dam. The channel is dry for 150' above the dam and the gradient is approaching 45 degrees.

### 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: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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
4	0	DRY	21.1	162	646	57.4									
2	1	FLATWATER	10.5	20	39	3.5	4.0	0.3	0.5	100	200	30	60		0
1	0	NOSURVEY	5.3	39	39	3.5									
4	4	POOL	21.1	17	68	6.0	6.5	0.8	1.6	125	500	106	424	101	13
8	2	RIFFLE	42.1	42	333	29.6	3.5	0.3	0.6	109	868	30	238		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
19	7				1125					1568			722		

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

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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 (%)
5	1	LGR	26.3	41	205	18.2	4	0.2	0.3	55	275	11	55		0	97
3	1	HGR	15.8	43	128	11.4	3	0.3	0.8	162	486	49	146		10	96
2	1	RUN	10.5	20	39	3.5	4	0.3	0.5	100	200	30	60		0	93
4	4	MCP	21.1	17	68	6.0	6	0.8	2	125	500	106	424	101	13	87
4	0	DRY	21.1	162	646	57.4										
1	0	NS	5.3	39	39	3.5										

Total Units  
19

Total Units Fully Measured  
7

Total Length (ft.)  
1125

Total Area (sq.ft.)  
1461

Total Volume (cu.ft.)  
685

Table 3 - Summary of Pool Types

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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
4	4	MAIN	100	17	68	100	6.5	0.8	125	500	101	405	13

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
4	4	68	500	405

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

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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	100	0	0	3	75	1	25	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
4	0	0	3	75	1	25	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.5

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

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Dry Units: 4

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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
5	1	LGR	0	0	0	0	0	0	0	0	0
3	1	HGR	0	0	0	0	0	0	0	0	0
8	2	TOTAL RIFFLE	0	0	0	0	0	0	0	100	0
2	1	RUN	0	0	0	0	0	0	0	0	0
2	1	TOTAL FLAT	0	0	0	0	0	0	0	0	0
4	4	MCP	35	5	45	3	13	0	0	0	0
4	4	TOTAL POOL	35	5	45	3	13	0	0	0	0
1	0	NS									
19	7	TOTAL	23	3	30	2	8	0	0	33	0

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

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Dry Units: 4

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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
5	1	LGR	0	0	100	0	0	0	0
3	1	HGR	0	0	0	0	0	100	0
2	1	RUN	0	0	100	0	0	0	0
4	4	MCP	0	0	50	50	0	0	0

**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
91	89	11	0	96	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.



Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Survey Length (ft.): 1125

Main Channel (ft.): 1125

Side Channel (ft.): 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: E4

Reach Length (ft.): 676

Riffle/Flatwater Mean Width (ft.): 4.0

BFW:

Range (ft.): 8 to 11

Mean (ft.): 9

Std. Dev.: 1

Base Flow (cfs.): 0.0

Water (F): 54 - 55

Air (F): 63 - 69

Dry Channel (ft): 325

Canopy Density (%): 89.7

Coniferous Component (%): 87.5

Hardwood Component (%): 12.5

Dominant Bank Vegetation: Coniferous Trees

Vegetative Cover (%): 95.4

Dominant Shelter: Large Woody Debris

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 15

LWD per 100 ft.:

Riffles: 0

Pools: 1

Flat: 0

Pools by Stream Length (%): 10.1

Pool Frequency (%): 28.6

Residual Pool Depth (%):

< 2 Feet Deep: 75

2 to 2.9 Feet Deep: 25

3 to 3.9 Feet Deep: 0

>= 4 Feet Deep: 0

Mean Max Residual Pool Depth (ft.): 1.6

Mean Pool Shelter Rating: 13

Pool Tail Substrate (%): Silt/Clay: 0

Sand: 0

Gravel: 50

Sm Cobble: 50

Lg Cobble: 0

Boulder: 0

Bedrock: 0

Embeddedness Values (%): 1. 75.0

2. 25.0

3. 0.0

4. 0.0

5. 0.0

STREAM REACH: 2

Channel Type: A3

Reach Length (ft.): 449

Riffle/Flatwater Mean Width (ft.): 3.0

BFW:

Range (ft.): 11 to 11

Mean (ft.): 11

Std. Dev.: 0

Base Flow (cfs.): 0.0

Water (F): 54 - 54

Air (F): 69 - 69

Dry Channel (ft): 321

Canopy Density (%): 96.0

Coniferous Component (%): 100.0

Hardwood Component (%): 0.0

Dominant Bank Vegetation: Coniferous Trees

Vegetative Cover (%): 85.0

Dominant Shelter: Boulders

Dominant Bank Substrate Type: Bedrock

Occurrence of LWD (%): 0

LWD per 100 ft.:

Riffles: 0

Pools:

Flat:

Pools by Stream Length (%): 0.0

Pool Frequency (%): 0.0

Residual Pool Depth (%):

< 2 Feet Deep:

2 to 2.9 Feet Deep:

3 to 3.9 Feet Deep:

>= 4 Feet Deep:

Mean Max Residual Pool Depth (ft.):

Mean Pool Shelter Rating:

Pool Tail Substrate (%): Silt/Clay:

Sand:

Gravel:

Sm Cobble:

Lg Cobble:

Boulder:

Bedrock:

Embeddedness Values (%): 1.

2.

3.

4.

5.

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

Stream Name: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

**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	1	0	7.1
Boulder	0	0	0.0
Cobble / Gravel	0	1	7.1
Sand / Silt / Clay	6	6	85.7

**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	1	7.1
Hardwood Trees	0	0	0.0
Coniferous Trees	7	6	92.9
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 1

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

StreamName: Rocky Gulch

LLID: 1236998393338

Drainage: Big River

Survey Dates: 8/30/2010 to 8/30/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR17WS13

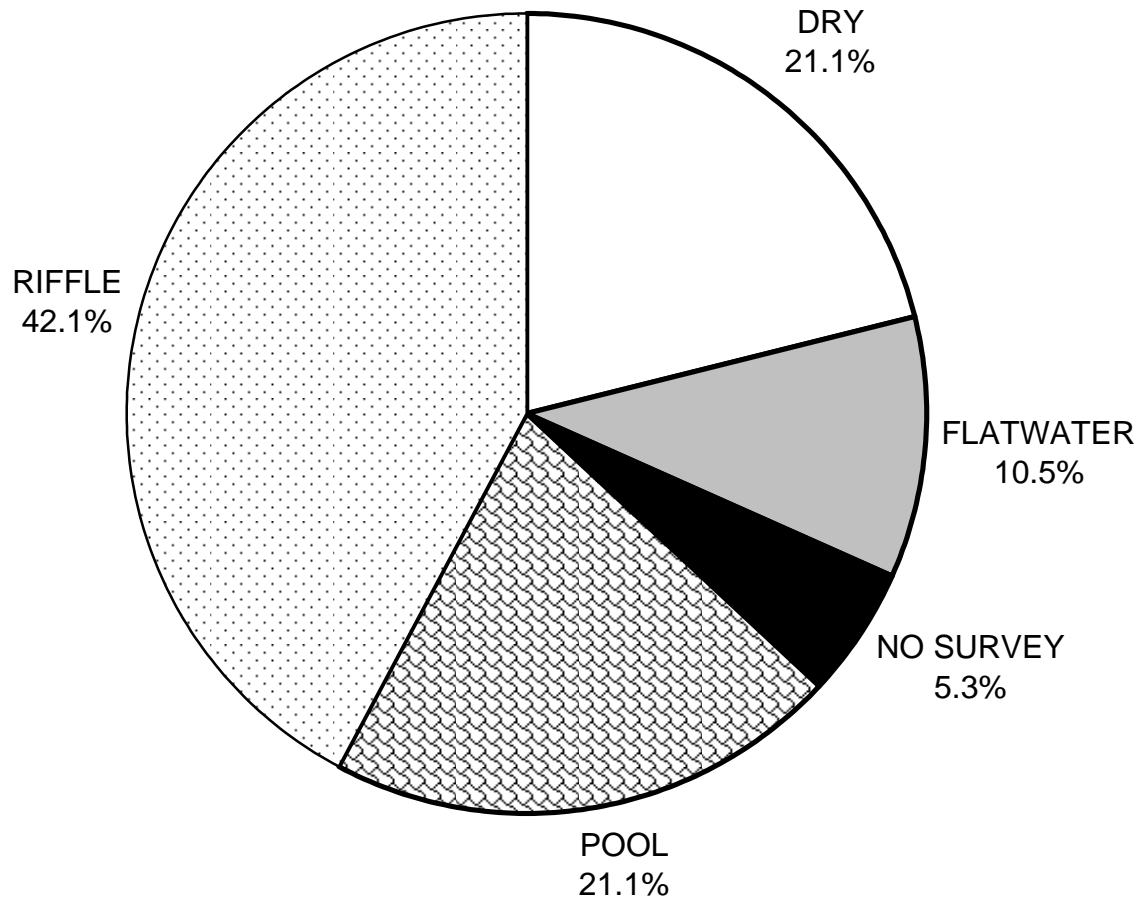
Latitude: 39:20:02.0N

Longitude: 123:41:59.0W

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	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	0	35
SMALL WOODY DEBRIS (%)	0	0	5
LARGE WOODY DEBRIS (%)	0	0	45
ROOT MASS (%)	0	0	3
TERRESTRIAL VEGETATION (%)	0	0	13
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	100	0	0
BEDROCK LEDGES (%)	0	0	0

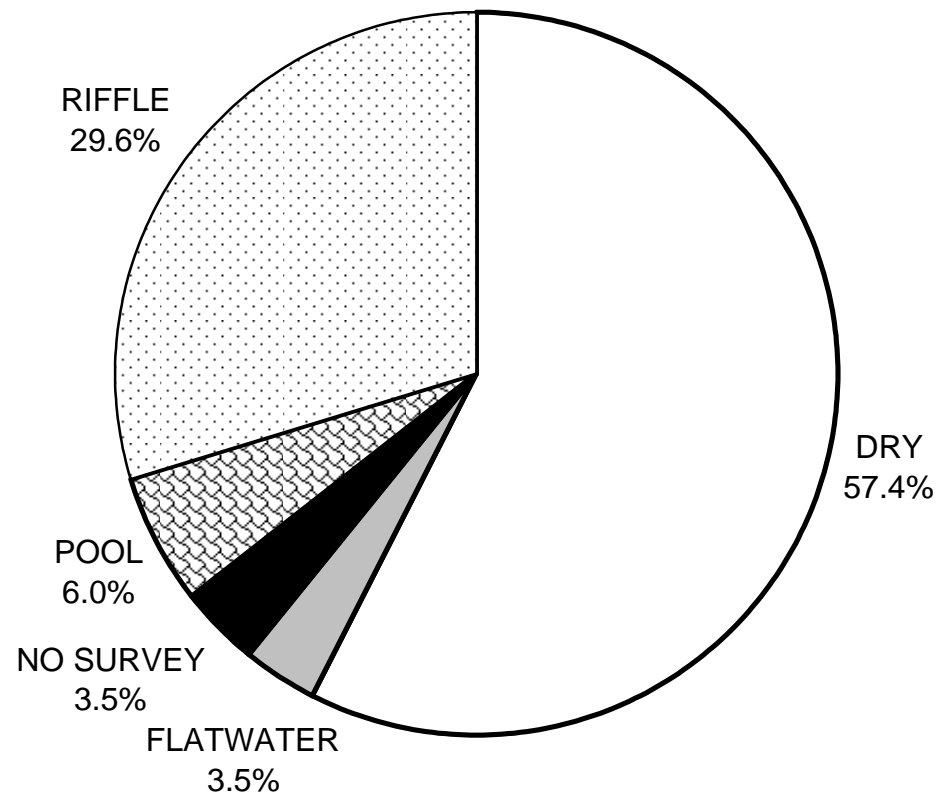
**ROCKY GULCH 2010**  
**HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

# ROCKY GULCH 2010

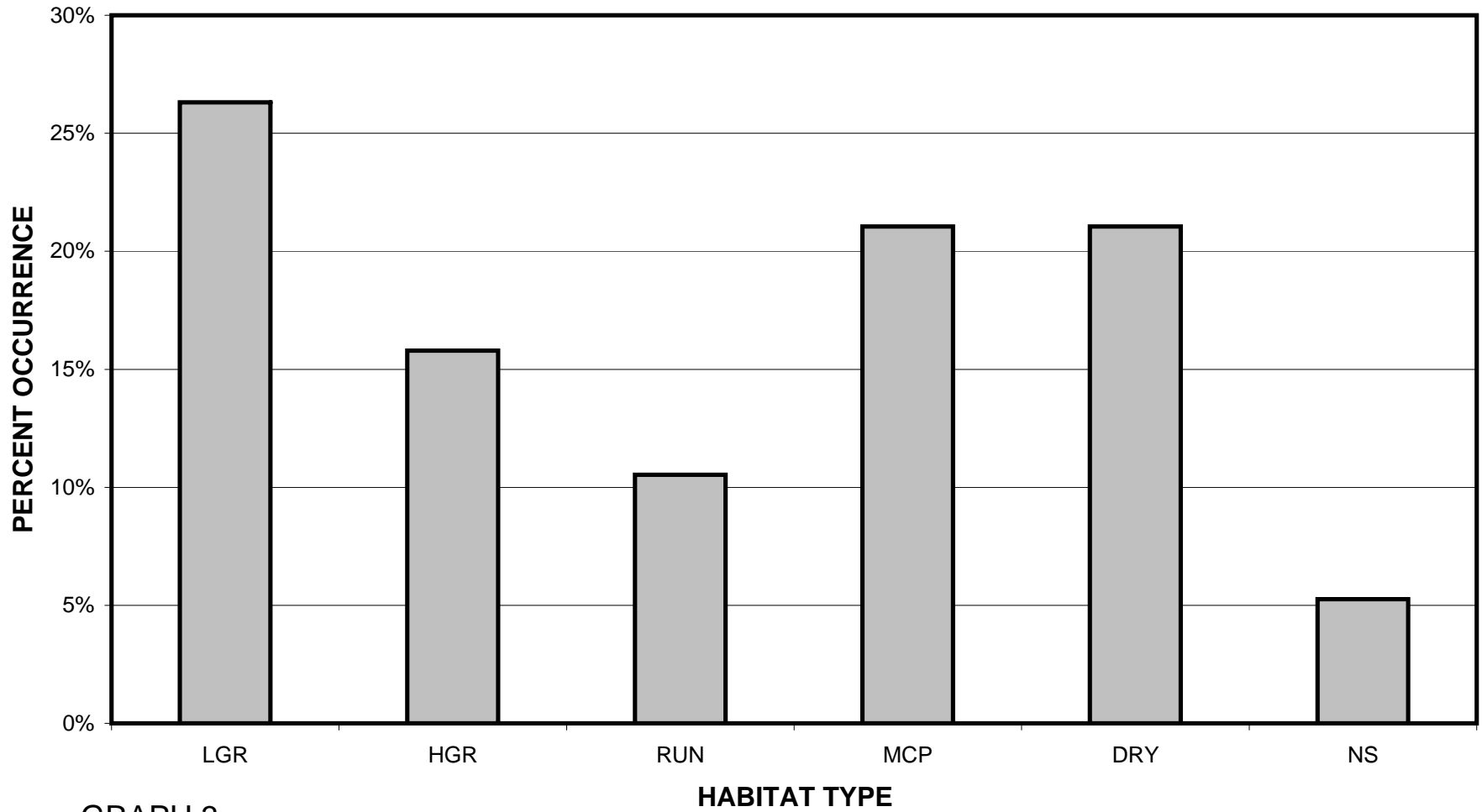
## HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

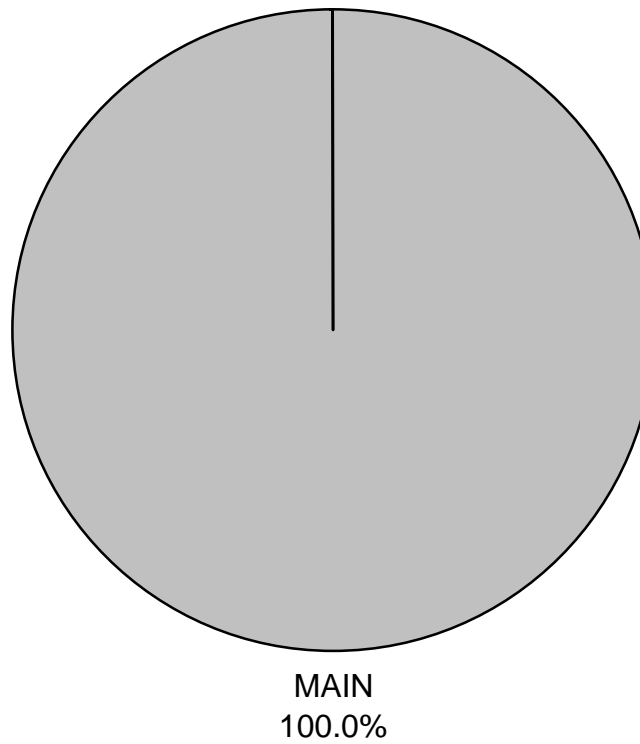
# ROCKY GULCH 2010

## HABITAT TYPES BY PERCENT OCCURRENCE



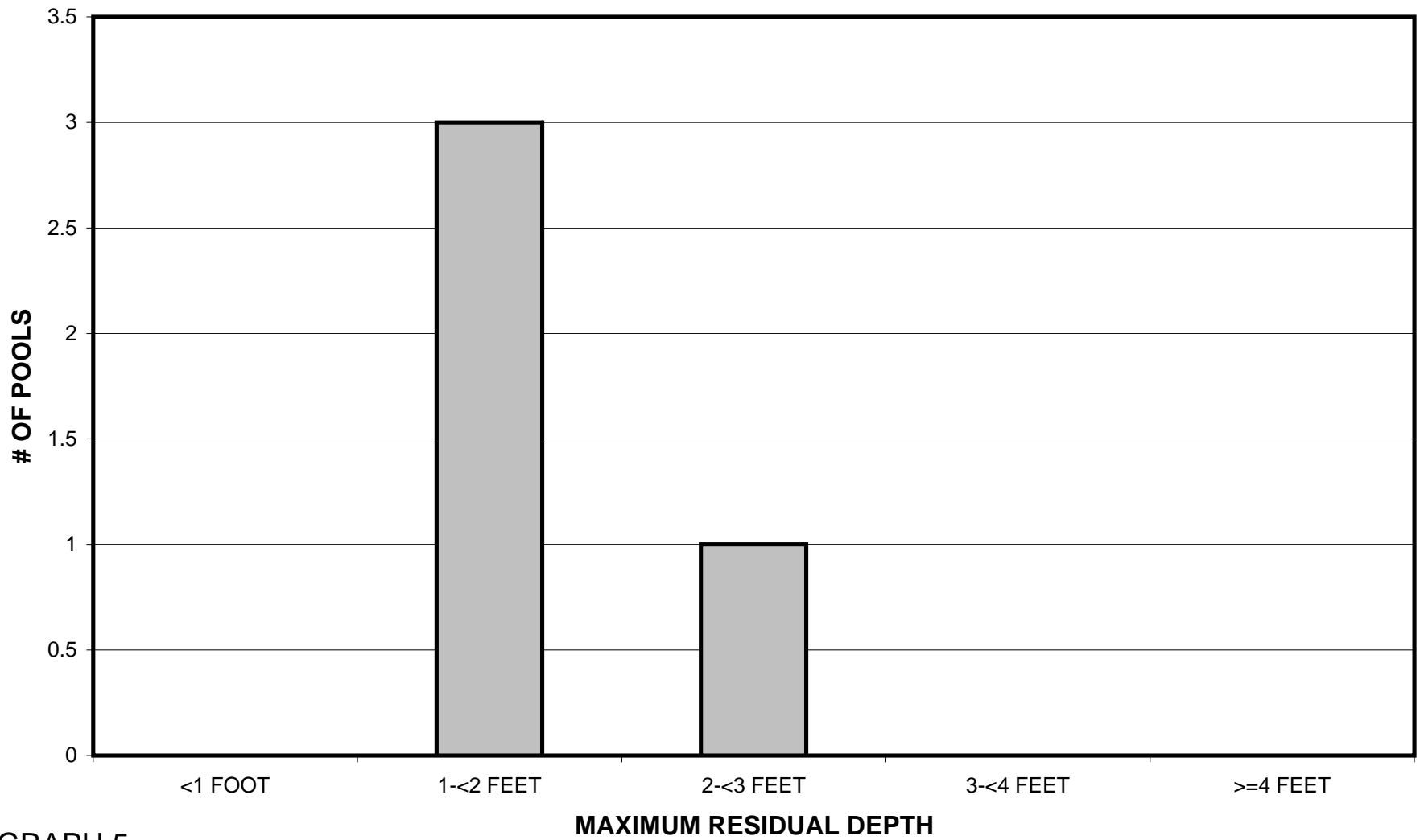
GRAPH 3

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



GRAPH 4

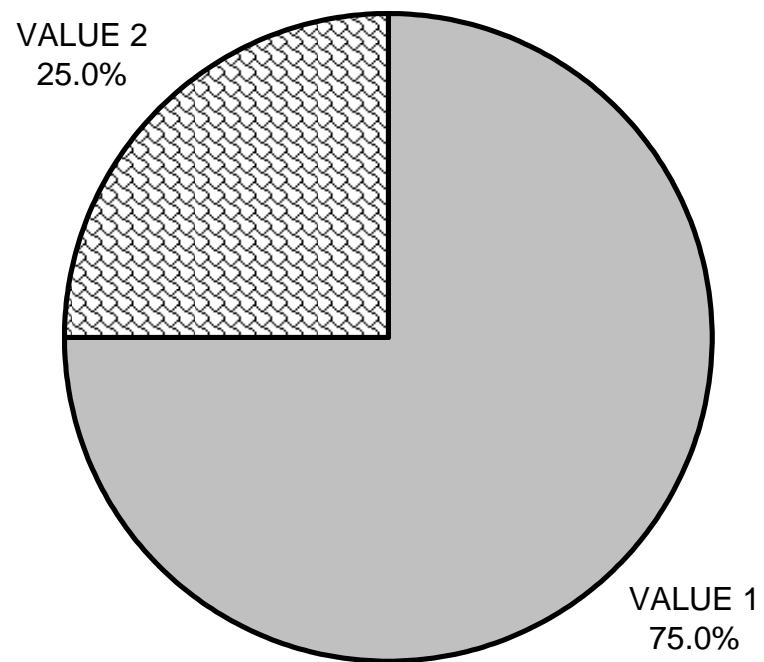
# ROCKY GULCH 2010 MAXIMUM DEPTH IN POOLS



GRAPH 5



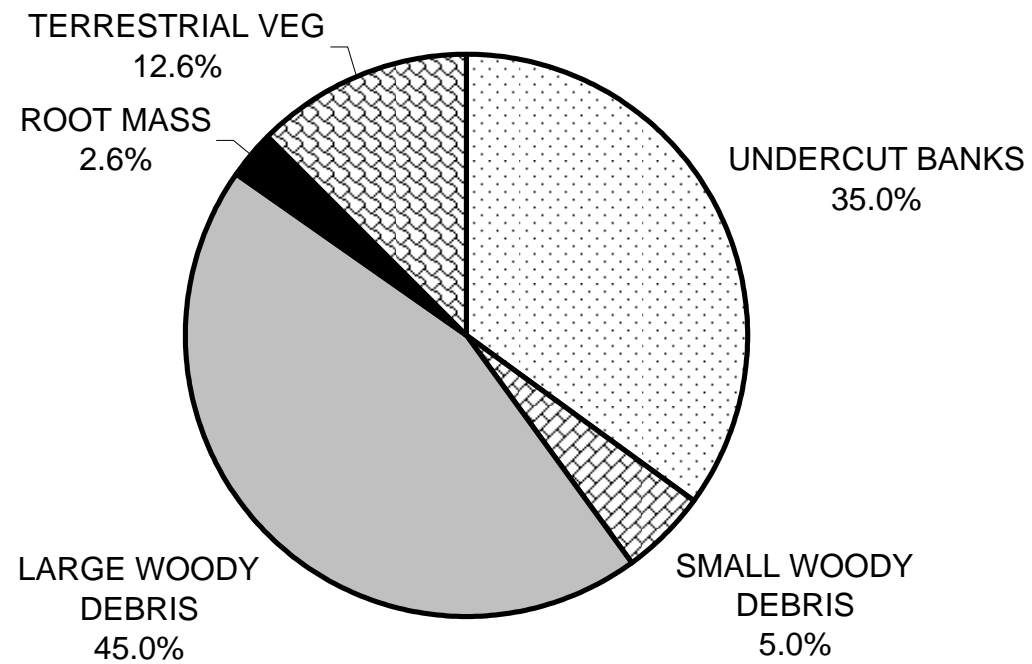
# ROCKY GULCH 2010 PERCENT EMBEDDEDNESS



GRAPH 6

# ROCKY GULCH 2010

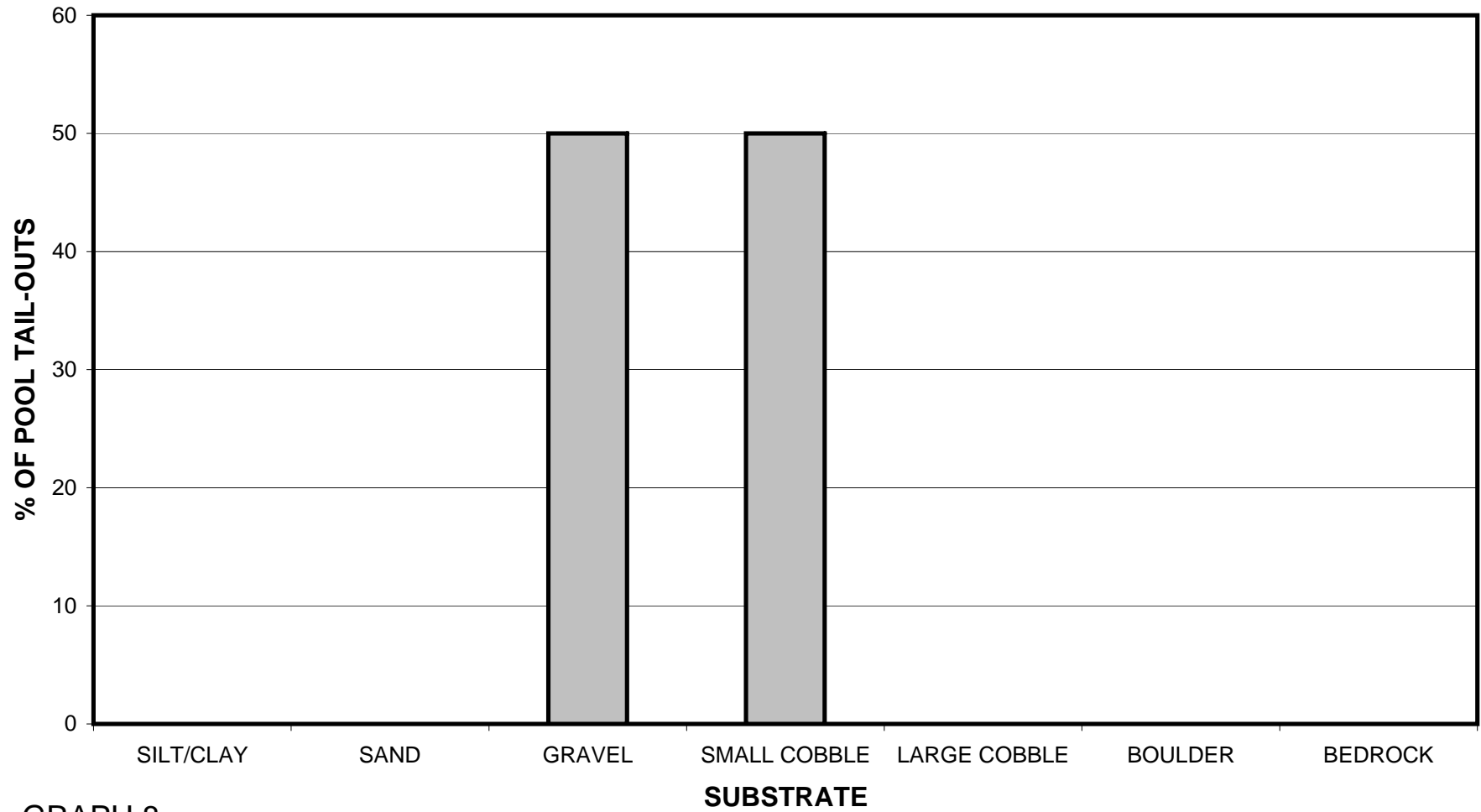
## MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

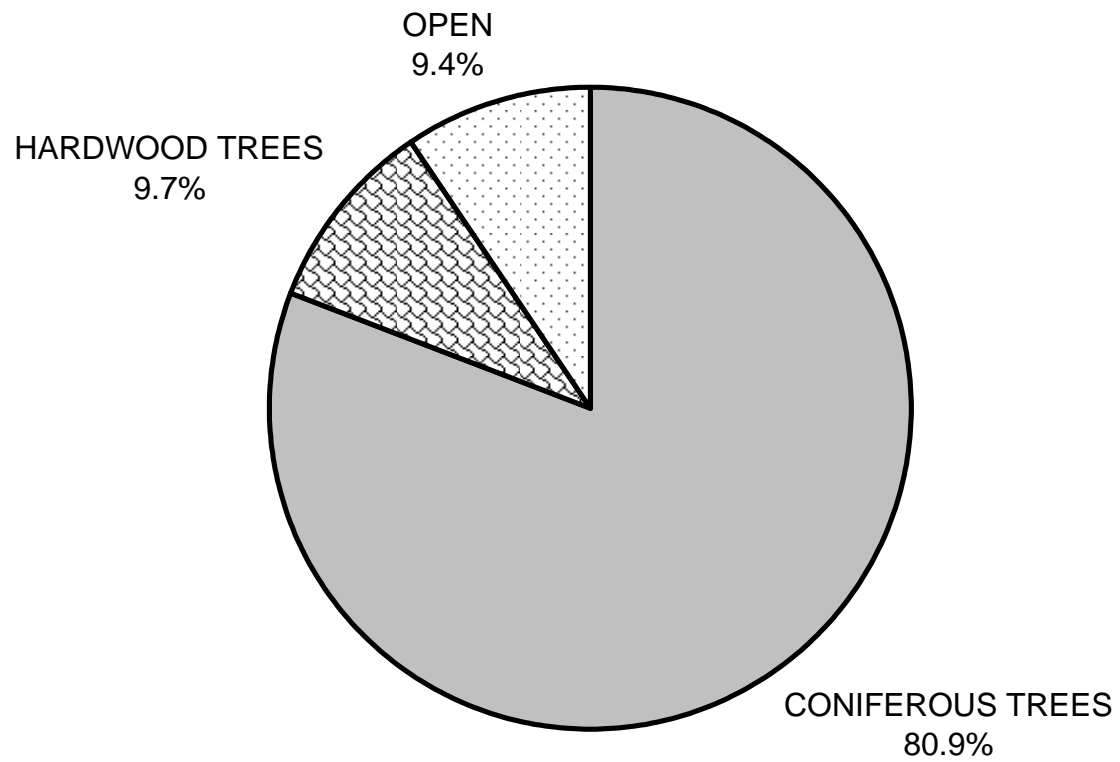
# ROCKY GULCH 2010

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



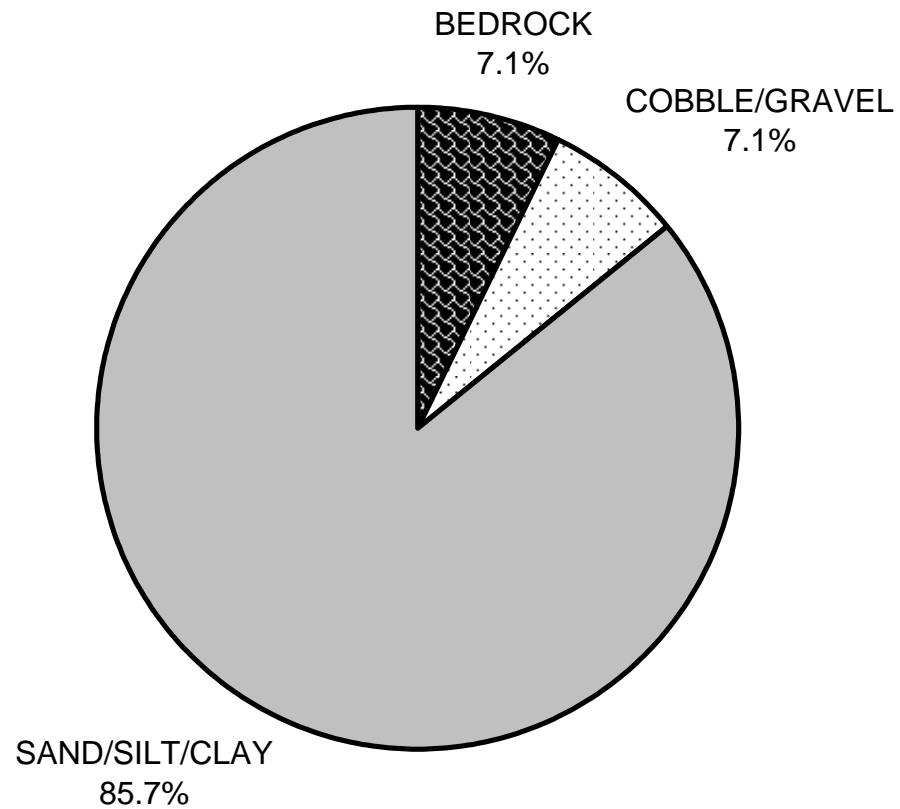
GRAPH 8

**ROCKY GULCH 2010  
MEAN PERCENT CANOPY**



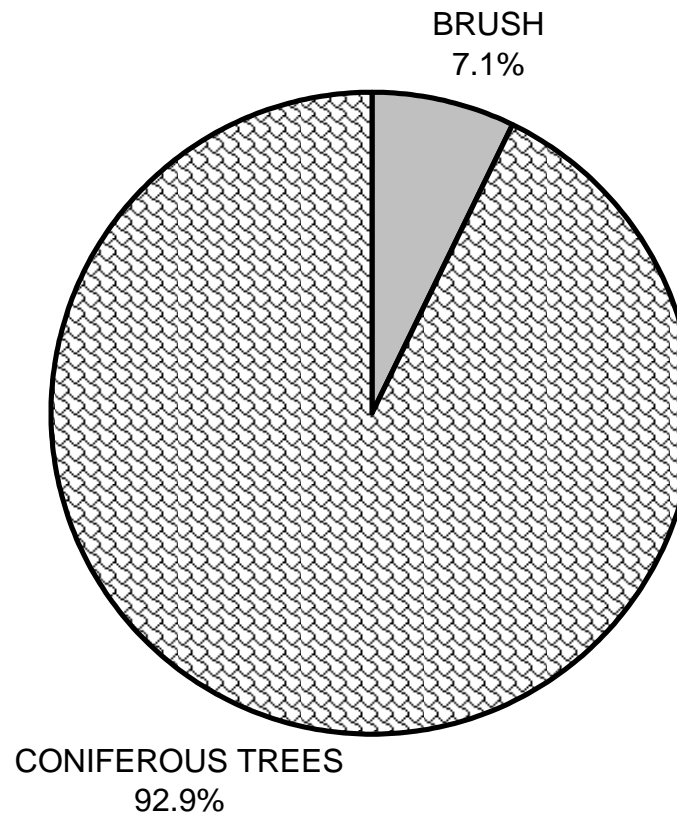
GRAPH 9

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



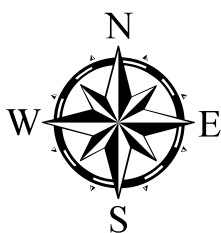
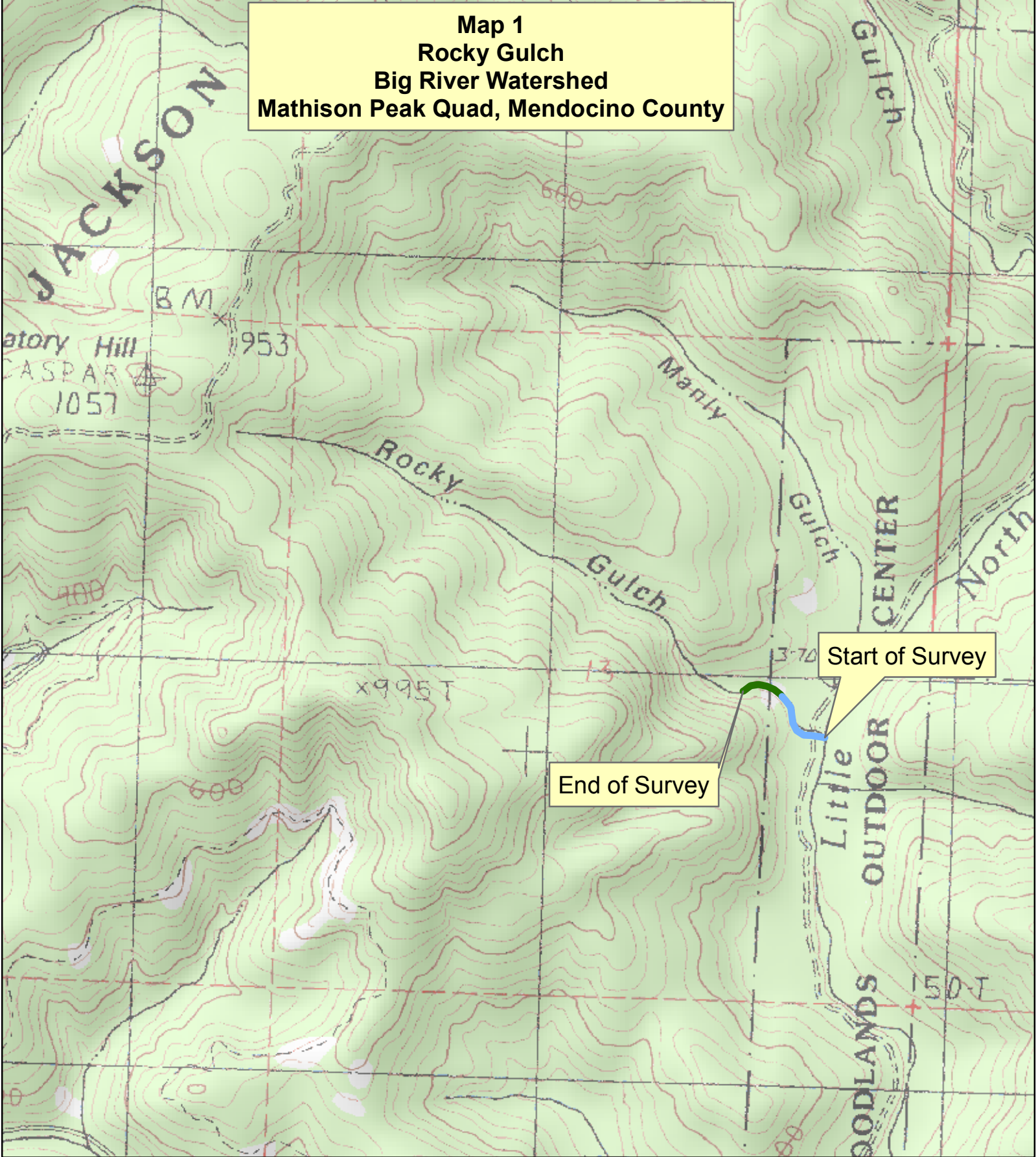
GRAPH 10

**ROCKY GULCH 2010**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**



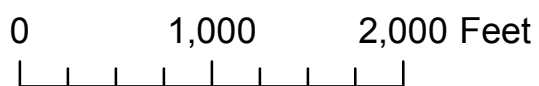
GRAPH 11

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



Legend

- Reach 1, E4 Channel Type
- Reach 2, A3 Channel Type



Reach lengths approximate

