

STREAM INVENTORY REPORT

“Panther Gulch”

INTRODUCTION

A stream inventory was conducted from July 22 to July 30, 2013 on an unnamed tributary to Hayworth Creek commonly known as, and herein after referred to as, Panther Gulch. The survey began at the confluence with Hayworth Creek and extended upstream 0.8 miles.

The Panther Gulch 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 Panther Gulch. 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

Panther Gulch is a tributary to Hayworth Creek, tributary to the North Fork Noyo River, tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Panther Gulch's legal description at the confluence with Hayworth Creek is T19N R15W S33. Its location is 39.4613 degrees north latitude and 123.5247 degrees west longitude, LLID number 1235235394614. Panther Gulch is an intermittent stream according to the USGS Northspur 7.5 minute quadrangle. Panther Gulch drains a watershed of approximately 0.7 square miles. Elevations range from about 490 feet at the mouth of the creek to 1,550 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Irmulco Road, seven miles west of Willits, CA.

METHODS

The habitat inventory conducted in Panther 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 Wildlife. 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 Panther 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". Panther 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 Panther 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 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is classified according to a list of nine cover types. In Panther 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. The shelter rating is then 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Panther 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 Panther 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.

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 Panther Gulch. In addition, underwater observations were made at six 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 Wildlife. 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Panther 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
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of July 22 to July 30, 2013 was conducted by B. Starks and K. Reddy (WSP). The total length of the stream surveyed was 4,326 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.01 cfs on July 30, 2013.

Panther Gulch is a G4 channel type for the entire length of the survey, 4,326 feet. 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 56 to 63 degrees Fahrenheit. Air temperatures ranged from 59 to 79 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% riffle units, 36% flatwater units, 24% pool units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 53% flatwater units, 30% riffle units, 17% pool units, and 1% dry units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 37%; mid-channel pool units, 22%; and run units, 21% (Graph 3). Based on percent total length, step run units made up 28%, low gradient riffle units 28%, and run units 24%.

A total of 53 pools were identified (Table 3). Main channel pools were the most frequently encountered at 96% (Graph 4), and comprised 96% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. One of the 53 pools (2%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 53 pool tail-outs measured, five had a value of 1 (9%); 30 had a value of 2 (57%); 16 had a value of 3 (30%); two had a value of 5 (4%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed not suitable 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 0, flatwater habitat types had a mean shelter rating of 14, and pool habitats had a mean shelter rating of 37 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 38. Scour pools had a mean shelter rating of 12 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 92% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Panther Gulch was 96%. Four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 53% and 47%, respectively. Graph 9 describes the mean percent canopy in Panther Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 97%. The mean percent left bank vegetated was 96%. The dominant elements composing the structure of the stream banks consisted of 82% sand/silt/clay, 11% cobble/gravel, 6% bedrock, and 2% boulders (Graph 10). Coniferous trees were the dominant vegetation type observed in 46% of the units surveyed. Additionally, 37% of the units surveyed had deciduous trees as the dominant vegetation type, and 17% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A survey team conducted a snorkel survey at six sites for species composition and distribution in Panther Gulch on July 30, 2013. The sites were sampled by S. Monday (CDFW).

The reach sites yielded five young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), one age 1+ SH/RT, and seven YOY coho salmon.

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The following chart displays the information yielded from these sites:

2013 Panther Gulch underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
G4 Channel Type									
07/30/13	1	105	Pool	2,131	2	0	0	1	0
	2	107	Pool	2,160	0	0	0	3	0
	3	114	Pool	2,305	1	0	0	1	0
	4	124	Pool	2,500	1	0	0	2	0
	5	131	Run	2,597	1	0	0	0	0
	6	138	Pool	2,743	0	1	0	0	0

DISCUSSION

Panther Gulch is a G4 channel type. The suitability of G4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days July 22 to July 30, 2013 ranged from 56 to 63 degrees Fahrenheit. Air temperatures ranged from 59 to 79 degrees Fahrenheit. This is a suitable water temperature range for salmonids. However, 60 degrees F, if sustained, is near the threshold stress level 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 53% of the total length of this survey, riffles 30%, and pools 17%. One of the 53 (2%) pools had a maximum residual depth greater than two 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 recommended.

Thirty-five of the 53 pool tail-outs measured had embeddedness ratings of 1 or 2. Sixteen of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered not suitable 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.

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Fifty of the 53 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 37. The shelter rating in the flatwater habitats is 14. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in Panther Gulch. Large woody debris is the dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover 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%. The percentage of right and left bank covered with vegetation was 97% and 96%, respectively.

RECOMMENDATIONS

- 1) Panther 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 large 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 Hayworth Creek. The channel is a G4 for the entire length of the survey.
79	0006.00	Log debris accumulation (LDA) #01 contains two pieces of large woody debris (LWD) and measures 4' high x 15' wide x 1.5' long. Water does not flow through the LDA; the flow is subsurface through it. There are no visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 13' wide x 12' long x 4' deep. Fish were observed above the LDA.

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372	0024.00	A logging road crosses the channel. The crossing is a 14' wide x 52' long x 5.1' high railcar bridge.
748	0040.00	Left bank eroding. LDA #02 contains three pieces of LWD and measures 2.5' high x 11' wide x 4' long. Water does not flow through the LDA; the flow is subsurface through it. There are no visible gaps in the LDA. Retained sediment ranges from gravel to small cobble and measures 6' wide x 8' long x 2' deep. Fish were observed above the LDA.
1014	0051.00	LDA #03 contains four pieces of LWD and measures 5.5' high x 11' wide x 8' long. Water does not flow through the LDA; the flow is subsurface through it. There are visible gaps in the LDA. Retained sediment ranges from sand to gravel and measures 6' wide x 15' long x 2.5' deep. Fish were observed above the LDA.
1127	0056.00	LDA #04 contains four pieces of LWD and measures 4' high x 8' wide x 5' long. Water does not flow through the LDA; the flow is subsurface through the LDA. There are no visible gaps in the LDA. Retained gravel measures 8' wide x 11' long x 3' deep. Fish were observed above the LDA.
2729	0138.00	LDA #05 contains four pieces of LWD and measures 6.5' high x 12' wide x 6' long. Water does not flow through the LDA; the flow is subsurface through it. There are no visible gaps in the LDA. Retained sediment ranges from sand to gravel and measures 8' wide x 14' long x 5' deep.
3245	0159.00	Last fish observed.
3341	0165.00	Tributary #01 enters on the right bank. Only the first 10' of the tributary are flowing. The water temperature of the tributary was 59 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 61 degrees Fahrenheit. The slope of the tributary is greater than 20%.
4046	0203.00	LDA #06 contains six pieces of LWD and measures 3' high x 8' wide x 1.5' long. Water does not flow through the LDA; the flow is subsurface through it. There are no visible gaps in the LDA. Retained sediment ranges from silt to gravel and measures 6' wide x 7' long x 2.6' deep.
4318	0220.00	End of survey.

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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: "Panther Gulch"

LLID: 1235235394614 Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR Legal Description: T19NR15WS33 Latitude: 39:27:41.0N Longitude: 123:31:25.0W

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
2	0	DRY	0.9	11	22	0.5									
79	7	FLATWATER	35.9	29	2279	52.7	4.3	0.3	0.7	112	8863	41	3203		14
53	53	POOL	24.1	14	740	17.1	6.7	0.6	1.3	91	4808	65	3463	55	37
86	11	RIFFLE	39.1	15	1285	29.7	3.5	0.2	0.3	49	4214	9	735		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
220	71				4326					17885			7400		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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 (%)
82	10	LGR	37.3	15	1221	28.2	3	0.2	0.4	51	4223	9	731		0	98
4	1	HGR	1.8	16	64	1.5	5	0.2	0.4	24	96	5	19		0	97
47	5	RUN	21.4	22	1049	24.2	4	0.3	1.1	106	4971	41	1944		19	97
32	2	SRN	14.5	38	1230	28.4	4	0.3	0.7	128	4104	38	1231		0	95
49	49	MCP	22.3	14	680	15.7	7	0.6	1.9	89	4364	62	3023	52	37	96
2	2	STP	0.9	16	33	0.8	8	0.7	1.5	125	251	104	207	78	45	99
2	2	PLP	0.9	14	27	0.6	7	1.0	2.3	97	194	116	232	103	13	96
2	0	DRY	0.9	11	22	0.5										

Total Units
220

Total Units Fully Measured
71

Total Length (ft.)
4326

Total Area (sq.ft.)
18202

Total Volume (cu.ft.)
7388

Table 3 - Summary of Pool Types

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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
51	51	MAIN	96	14	713	96	6.7	0.6	90	4614	53	2714	38
2	2	SCOUR	4	14	27	4	7.0	1.0	97	194	103	206	13

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
53	53	740	4808	2920

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

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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
49	MCP	92	9	18	40	82	0	0	0	0	0	0
2	STP	4	0	0	2	100	0	0	0	0	0	0
2	PLP	4	0	0	1	50	1	50	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
53	9	17	43	81	1	2	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Dry Units: 2

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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
82	10	LGR	0	0	0	0	0	0	0	0	0
4	1	HGR	0	0	0	0	0	0	0	0	0
86	11	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
47	5	RUN	75	0	10	15	0	0	0	0	0
32	2	SRN	0	0	0	0	0	0	0	0	0
79	7	TOTAL FLAT	75	0	10	15	0	0	0	0	0
49	49	MCP	17	37	39	6	1	0	0	0	0
2	2	STP	0	60	40	0	0	0	0	0	0
2	2	PLP	13	8	10	10	0	0	5	50	5
53	53	TOTAL POOL	16	36	37	6	1	0	0	2	0
220	71	TOTAL	19	34	36	7	1	0	0	2	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Dry Units: 2

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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
82	10	LGR	0	0	80	20	0	0	0
4	1	HGR	0	0	0	0	100	0	0
47	5	RUN	0	0	80	20	0	0	0
32	2	SRN	0	0	50	50	0	0	0
49	49	MCP	0	0	98	0	0	0	2
2	2	STP	0	0	50	0	0	50	0
2	2	PLP	0	0	50	0	0	0	50

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
96	47	53	0	97	96

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: "Panther Gulch" LLID: 1235235394614 Drainage: Noyo River
 Survey Dates: 7/22/2013 to 7/30/2013 Survey Length (ft.): 4326 Main Channel (ft.): 4326 Side Channel (ft.): 0
 Confluence Location: Quad: NORTHSPUR Legal Description: T19NR15WS33 Latitude: 39:27:41.0N Longitude: 123:31:25.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G4	Canopy Density (%): 96.1	Pools by Stream Length (%): 17.1
Reach Length (ft.): 4326	Coniferous Component (%): 47.0	Pool Frequency (%): 24.1
Riffle/Flatwater Mean Width (ft.): 3.8	Hardwood Component (%): 53.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 98
Range (ft.): 6 to 11	Vegetative Cover (%): 96.6	2 to 2.9 Feet Deep: 2
Mean (ft.): 8	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 24	Mean Max Residual Pool Depth (ft.): 1.3
Water (F): 56 - 63 Air (F): 59 - 79	LWD per 100 ft.:	Mean Pool Shelter Rating: 37
Dry Channel (ft): 22	Riffles: 2	
	Pools: 12	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 2 Gravel: 92 Sm Cobble: 2 Lg Cobble: 2 Boulder: 0 Bedrock: 2		
Embeddedness Values (%): 1. 9.4 2. 56.6 3. 30.2 4. 0.0 5. 3.8		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

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	4	4	5.6
Boulder	2	1	2.1
Cobble / Gravel	7	8	10.6
Sand / Silt / Clay	58	58	81.7

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	10	14	16.9
Hardwood Trees	26	26	36.6
Coniferous Trees	35	30	45.8
No Vegetation	0	1	0.7

Total Stream Cobble Embeddedness Values:

2

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

StreamName: "Panther Gulch"

LLID: 1235235394614

Drainage: Noyo River

Survey Dates: 7/22/2013 to 7/30/2013

Confluence Location: Quad: NORTHSPUR

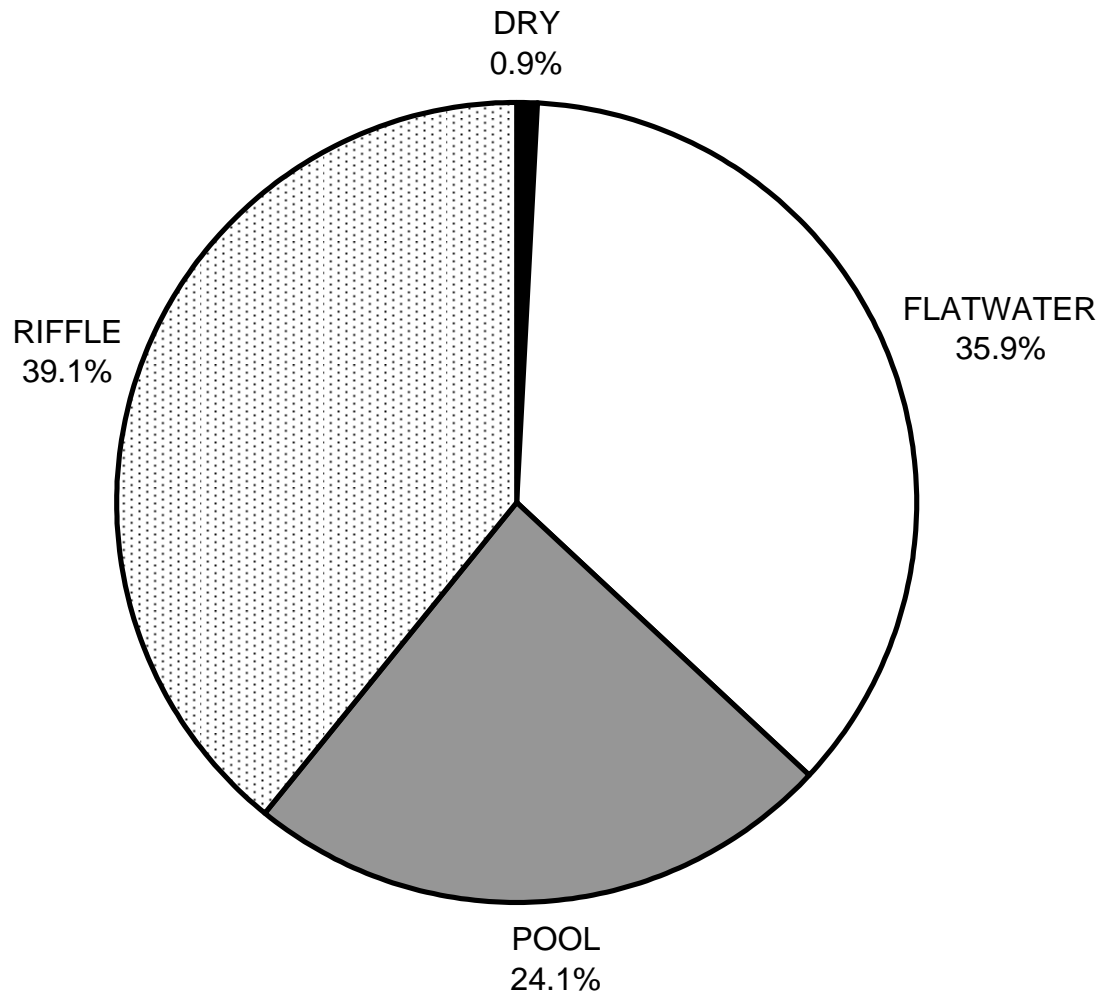
Legal Description: T19NR15WS33

Latitude: 39:27:41.0N

Longitude: 123:31:25.0W

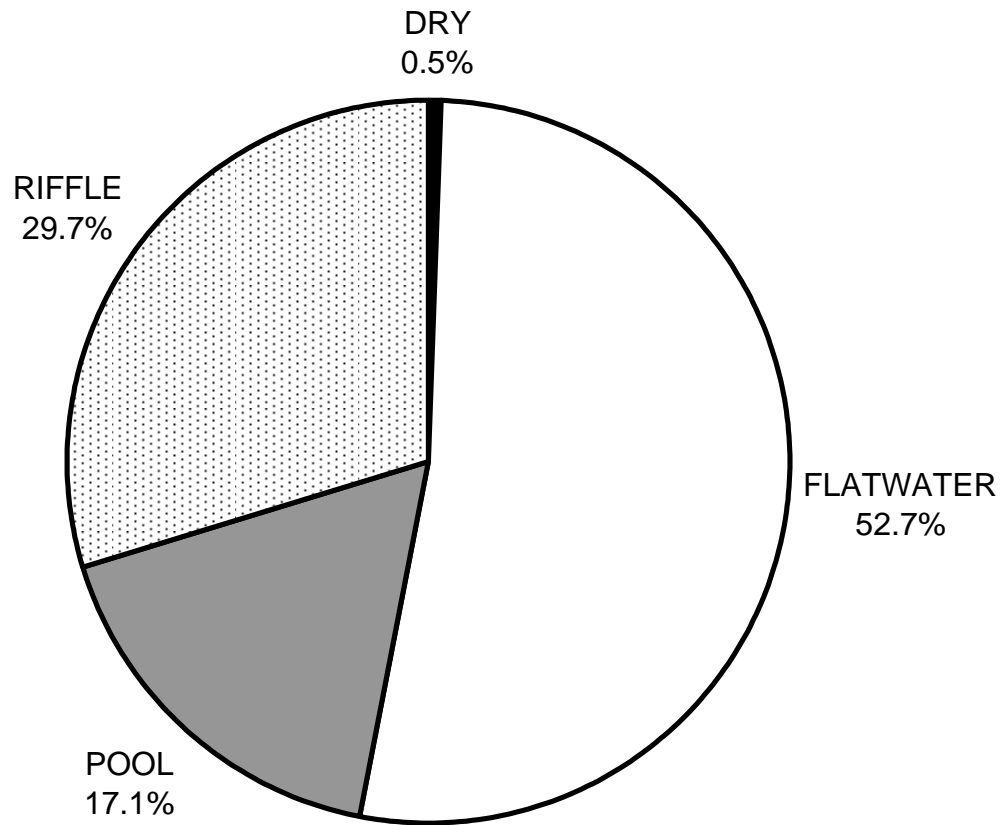
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	75	16
SMALL WOODY DEBRIS (%)	0	0	36
LARGE WOODY DEBRIS (%)	0	10	37
ROOT MASS (%)	0	15	6
TERRESTRIAL VEGETATION (%)	0	0	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	2
BEDROCK LEDGES (%)	0	0	0

"Panther Gulch" 2013 HABITAT TYPES BY PERCENT OCCURRENCE



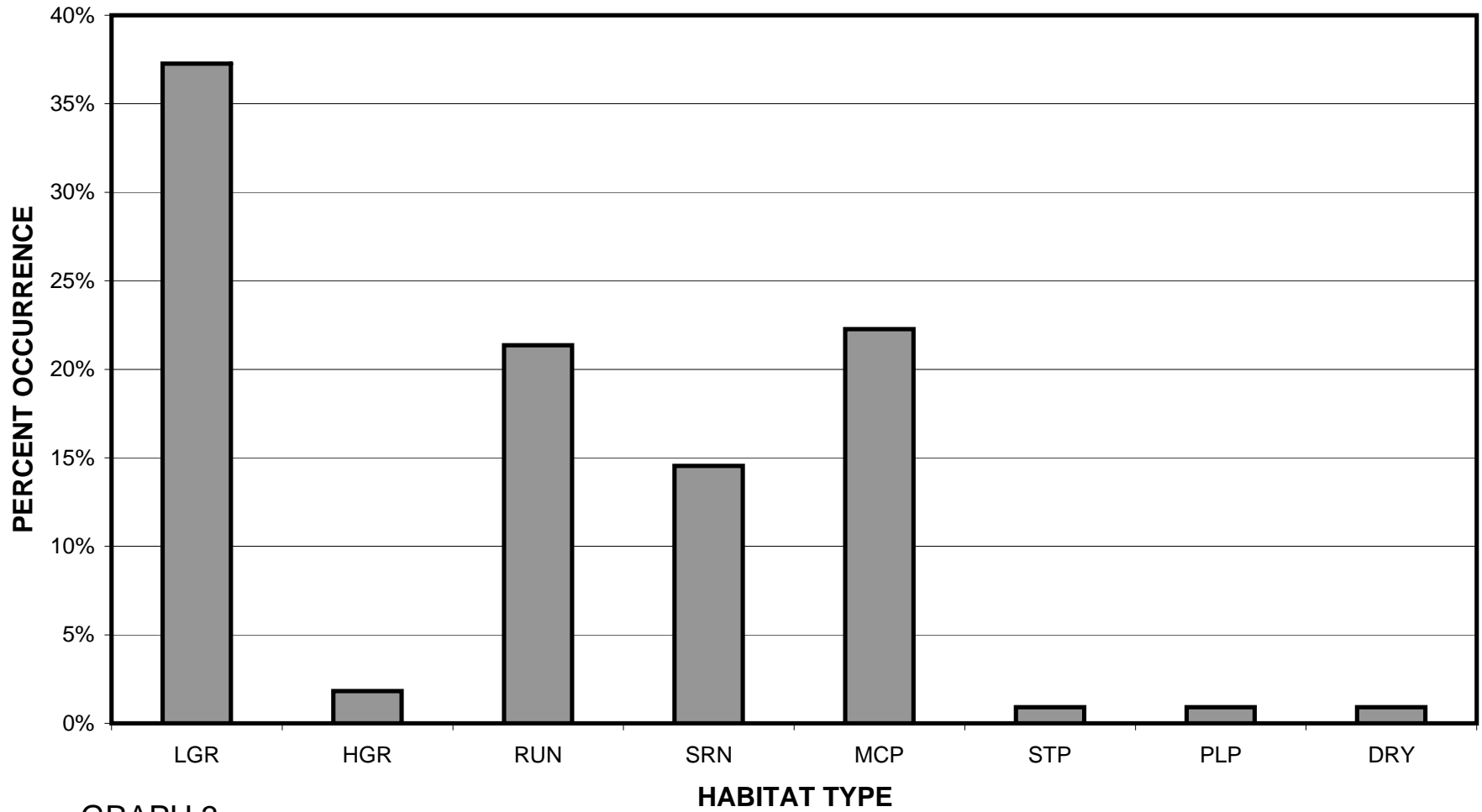
GRAPH 1

"Panther Gulch" 2013 HABITAT TYPES BY PERCENT TOTAL LENGTH



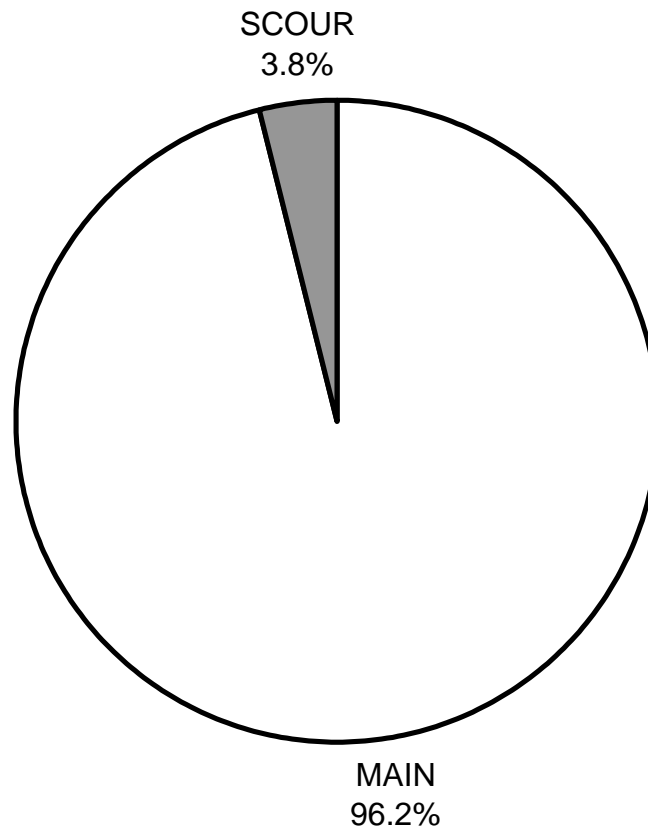
GRAPH 2

"Panther Gulch" 2013 HABITAT TYPES BY PERCENT OCCURRENCE



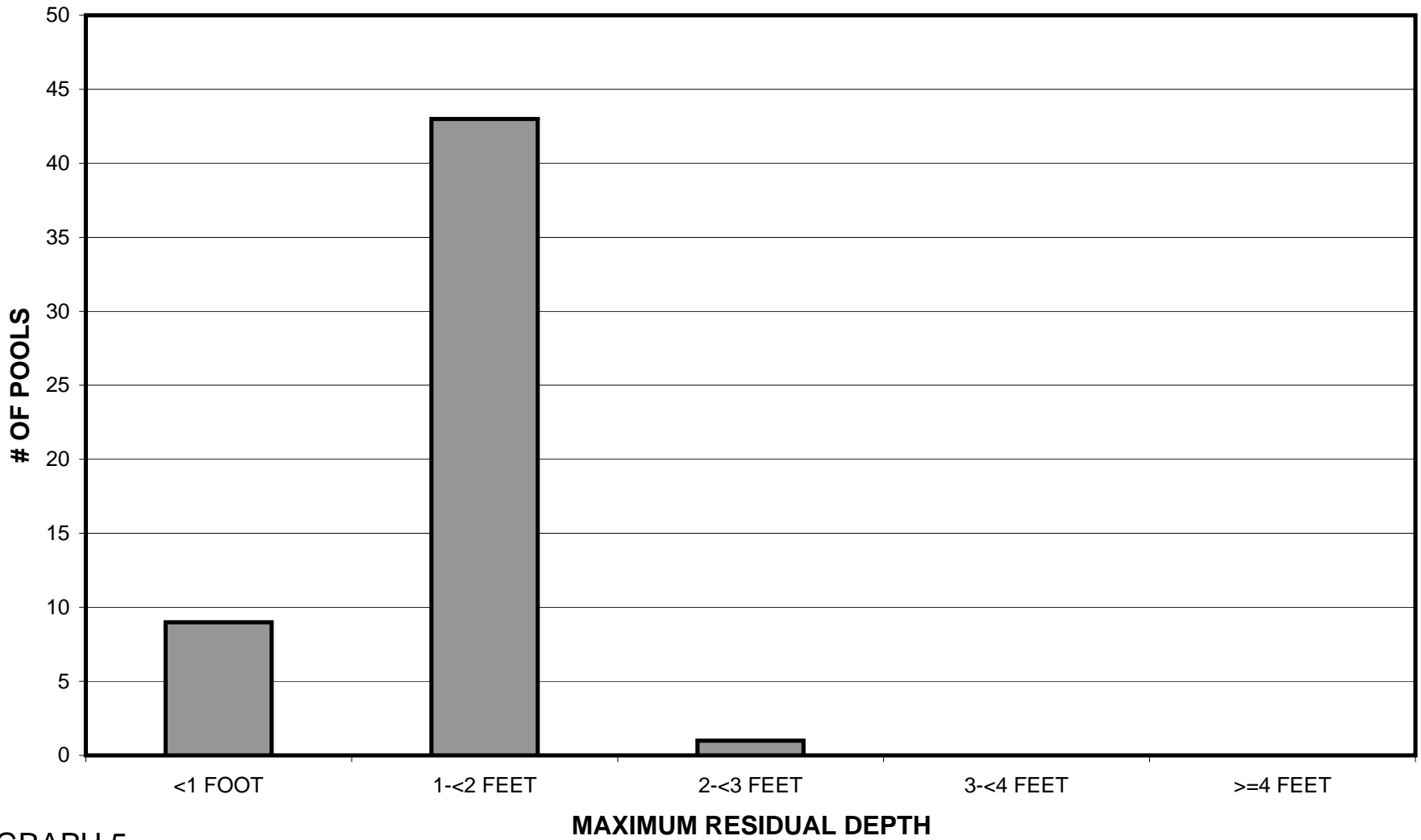
GRAPH 3

**"Panther Gulch" 2013
POOL TYPES BY PERCENT OCCURRENCE**



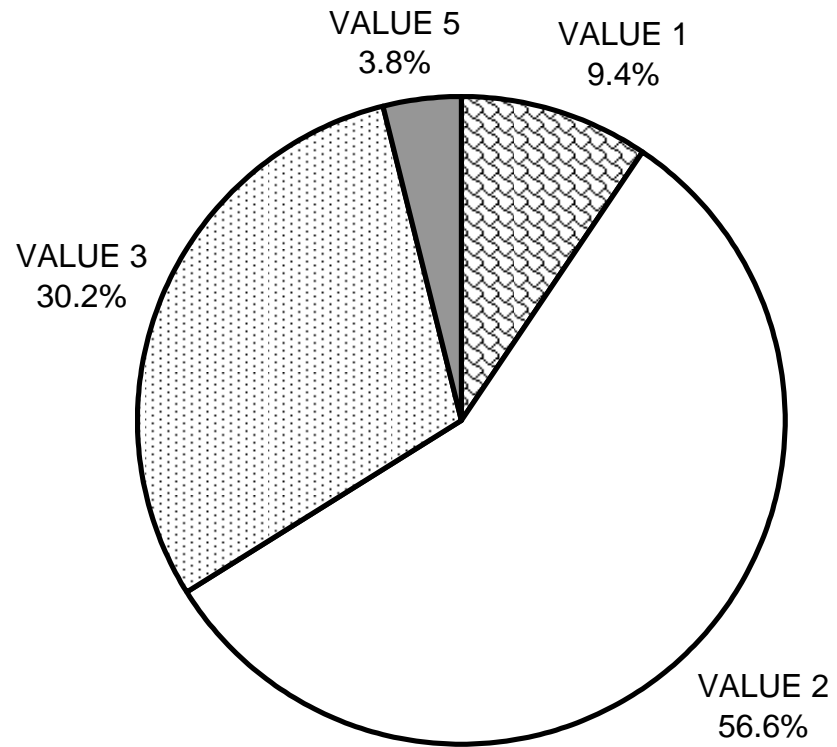
GRAPH 4

"Panther Gulch" 2013 MAXIMUM DEPTH IN POOLS



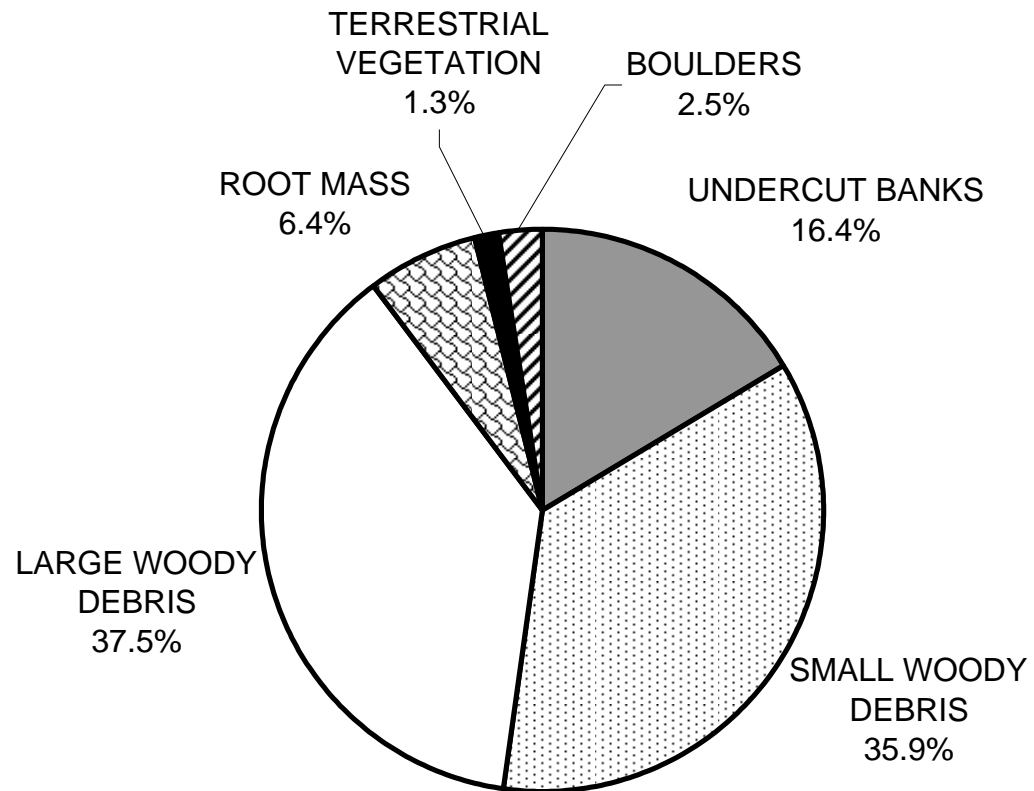
GRAPH 5

"Panther Gulch" 2013 PERCENT EMBEDDEDNESS



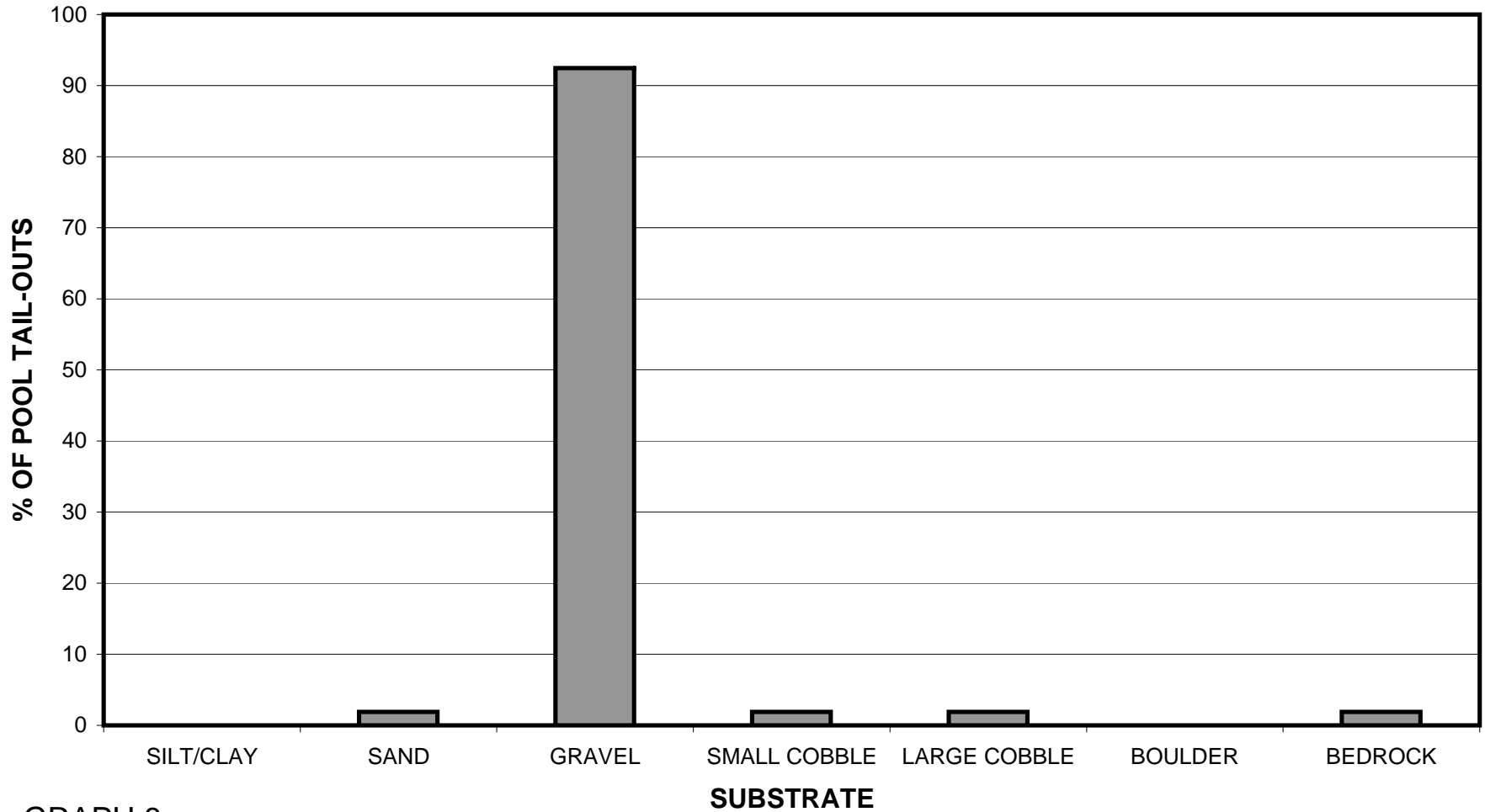
GRAPH 6

"Panther Gulch" 2013 MEAN PERCENT COVER TYPES IN POOLS



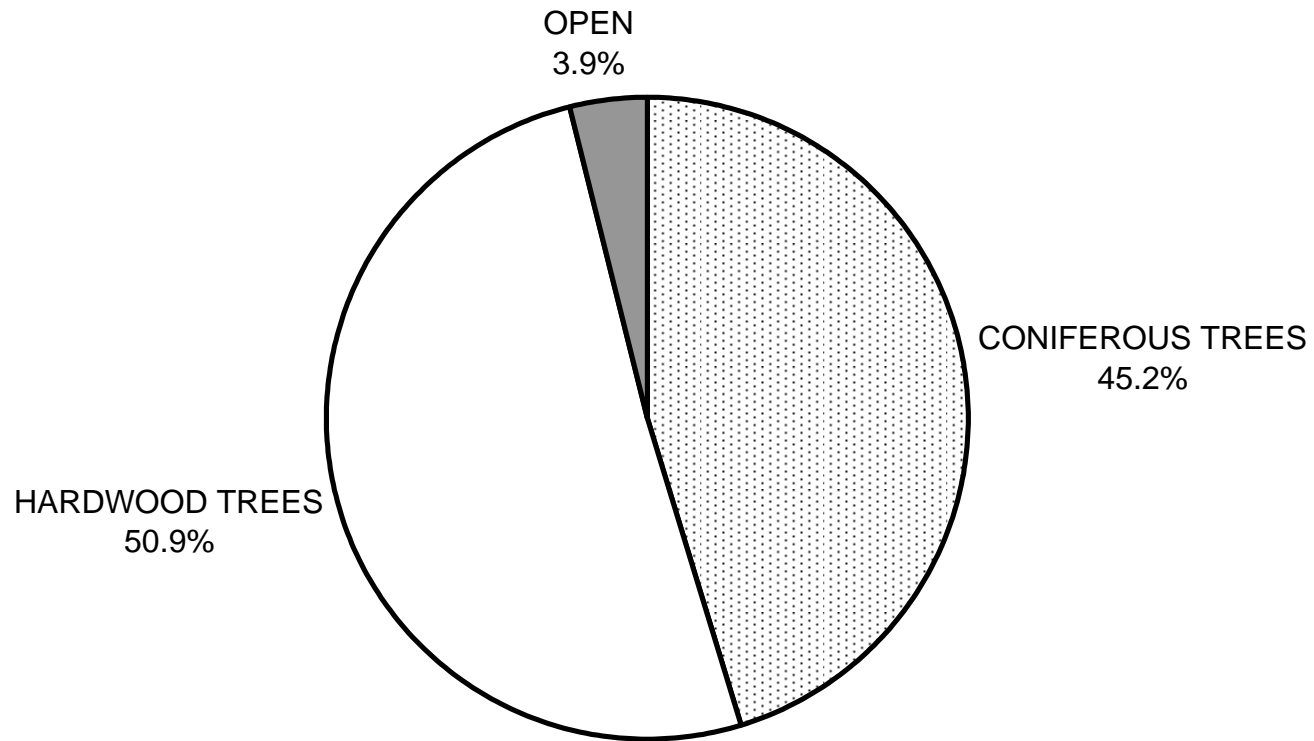
GRAPH 7

"Panther Gulch" 2013 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



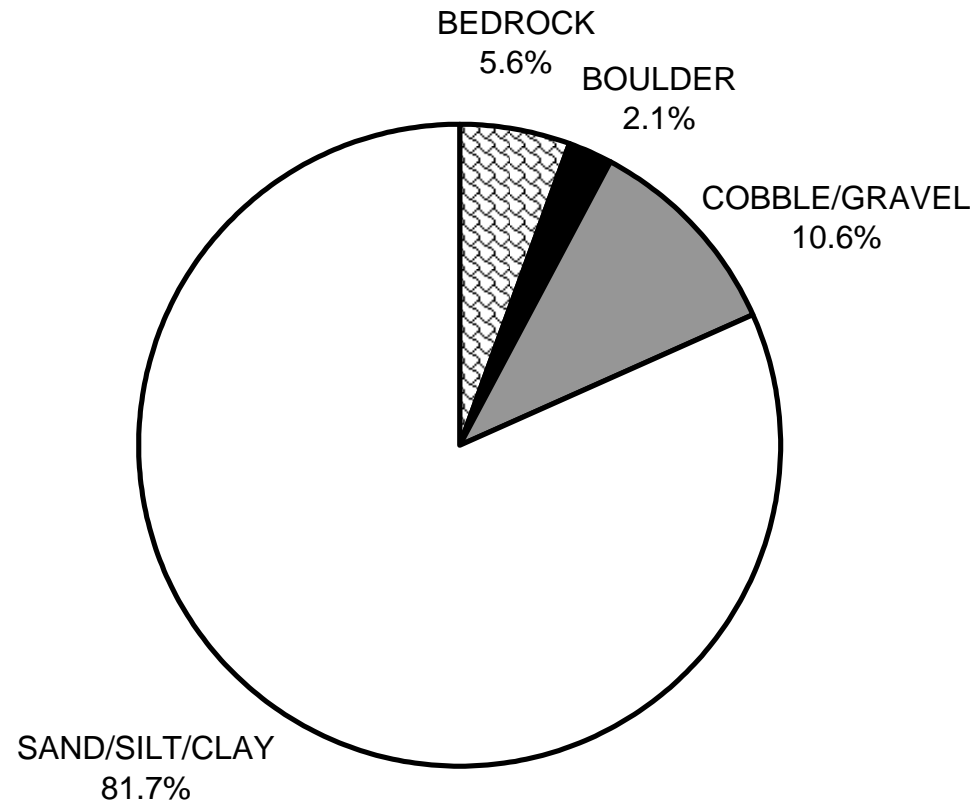
GRAPH 8

**"Panther Gulch" 2013
MEAN PERCENT CANOPY**



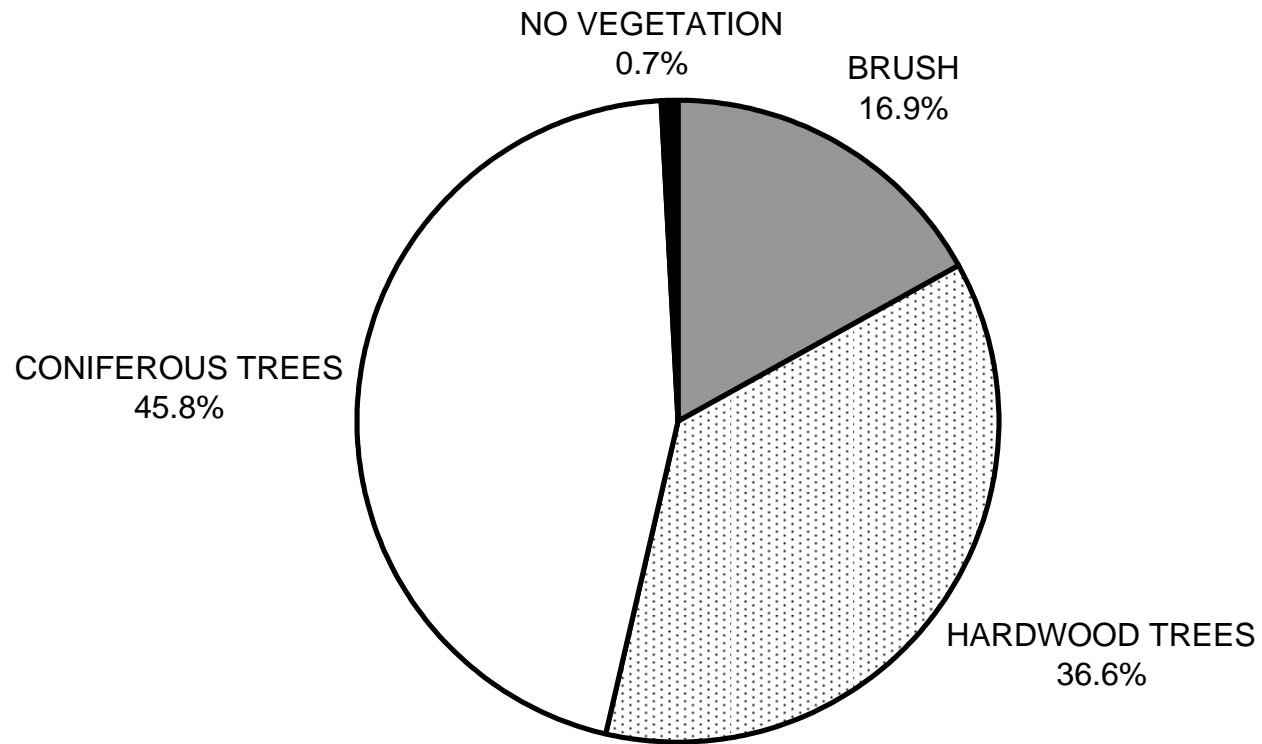
GRAPH 9

**"Panther Gulch" 2013
DOMINANT BANK COMPOSITION IN SURVEY REACH**



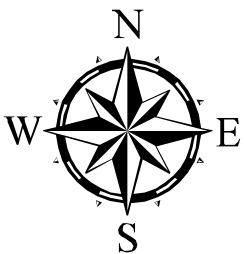
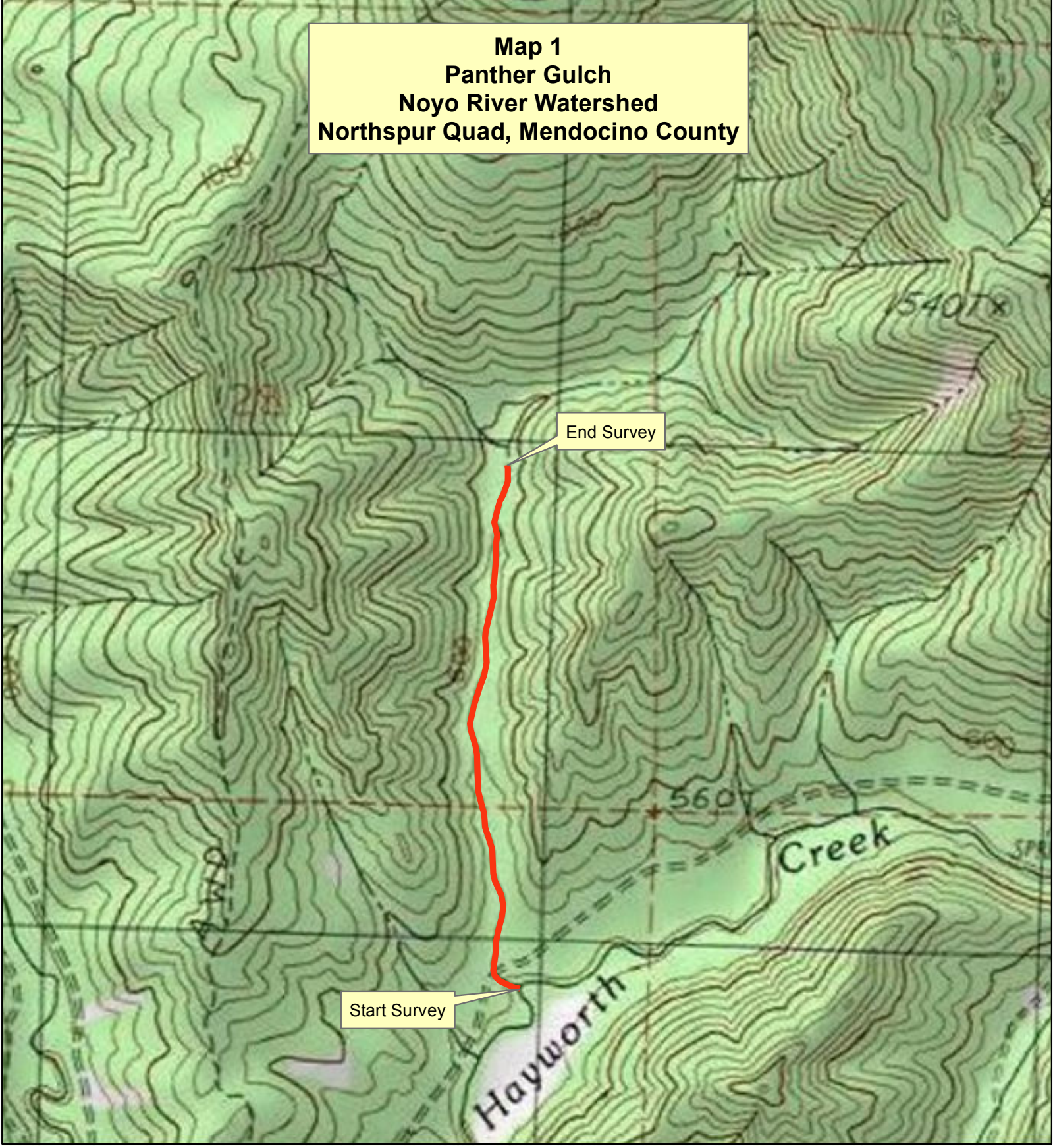
GRAPH 10

"Panther Gulch" 2013 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

**Map 1
Panther Gulch
Noyo River Watershed
Northspur Quad, Mendocino County**



 Channel Type G4

