

STREAM INVENTORY REPORT

“23 Gulch”

INTRODUCTION

A stream inventory was conducted from June 14 to June 15, 2010 on an unnamed tributary to the South Fork Noyo River commonly known and herein after referred to as 23 Gulch. The survey began at the confluence with the South Fork Noyo River and extended upstream 0.3 miles.

The 23 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 23 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

23 Gulch is a tributary to the South Fork Noyo River, a tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). 23 Gulch's legal description at the confluence with the South Fork Noyo River is T17N R16W S04. Its location is 39.36880 degrees north latitude and 123.65900 degrees west longitude, LLID number 1236578393689. 23 Gulch is an intermittent stream according to the USGS Mathison Peak 7.5 minute quadrangle. 23 Gulch drains a watershed of approximately 0.65 square miles. Elevations range from about 175 feet at the mouth of the creek to 800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely located within Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via California Department of Forestry and Fire Protection (CDF) Road 320 to Road 300.

METHODS

The habitat inventory conducted in 23 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

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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 23 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". 23 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 23 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. 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 23 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In 23 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 23 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 23 Gulch. In addition, underwater observations were made at 13 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for 23 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 June 14 to June 15, 2010, was conducted by J. Coombes and A. Villalobos (WSP), and S. McSmith (DFG). The total length of the stream surveyed was 1,614 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.41 cfs on June 15, 2010.

23 Gulch is an F4 channel type for 1,314 feet of the stream surveyed (Reach 1), and an A4 channel type for 300 feet of the stream surveyed (Reach 2). F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 54 degrees Fahrenheit. Air temperatures ranged from 56 to 63 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 40% pool units, 29% flatwater units, 27% riffle units, and 4% no survey units (Graph 1). Based on total length of Level II habitat types there were 44% flatwater units, 27% riffle units, 27% pool units, and 1% no survey units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 35%; low gradient riffle units, 27%; and step run units, 19% (Graph 3). Based on percent total length, step run units made up 31%, low gradient riffle units 27%, and mid-channel pool unit 22%.

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A total of 19 pools were identified (Table 3). Main channel pools were the most frequently encountered at 95% (Graph 4), and comprised 95% 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. Six of the 19 pools (32%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 19 pool tail-outs measured, 2 had a value of 2 (10.5%); 7 had a value of 3 (36.8%); 9 had a value of 4 (47.4%); 1 had a value of 5 (5.3%) (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 2, flatwater habitat types had a mean shelter rating of 60, and pool habitats had a mean shelter rating of 81 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 83. Scour pools had a mean shelter rating of 45 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in 23 Gulch. Graph 7 describes the pool cover in 23 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 and sand were the dominant substrate types, each observed in 47% of the pool tail-outs.

The mean percent canopy density for the surveyed length of 23 Gulch was 93%. Seven percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 18% and 82%, respectively. Graph 9 describes the mean percent canopy in 23 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 100% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 77.1% of the units surveyed. Additionally, 16.7% of the units surveyed had deciduous trees as the dominant vegetation type, and 6.3% had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 13 sites for species composition and distribution in 23 Gulch on June 16, 2010. Water temperatures taken during the survey period of 1105 hours to

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1226 hours ranged from 52 to 53 degrees Fahrenheit. Air temperatures ranged from 52 to 59 degrees Fahrenheit. The sites were sampled by S. McSmith (DFG), and J. Coombes (WSP).

In reach 1, which comprised the first 1,326 feet of stream, 10 sites were sampled. The reach sites yielded 3 young-of-the-year steelhead/rainbow trout (SH/RT), 2 age 1+ SH/RT, and 3 sculpin.

In reach 2, 3 sites were sampled starting approximately 1,470 from the confluence with South Fork Noyo River and continuing upstream 144 feet. No fish were observed.

The following chart displays the information yielded from these sites:

2010 23 Gulch underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: F4 Channel Type									
06/16/10	1	004	Pool	138	0	1	0	0	0
	2	006	Pool	202	1	0	0	0	0
	3	008	Pool	254	0	0	0	0	0
	4	010	Pool	310	0	0	0	0	0
	5	012	Pool	392	2	0	0	0	0
	6	019	Pool	670	0	0	0	0	0
	7	021	Pool	761	0	0	0	0	0
	8	023	Pool	829	0	1	0	0	0
	9	027	Pool	969	0	0	0	0	0
	10	029	Pool	1014	0	0	0	0	0
Reach 2: A4 Channel Type									
	11	044	Pool	1470	0	0	0	0	0
	12	046	Pool	1562	0	0	0	0	0
	13	048	Pool	1614	0	0	0	0	0

DISCUSSION

23 Gulch is an F4 channel type for the first 1,314 feet of stream surveyed and an A4 channel type for the remaining 300 feet. The suitability of F4 and A4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. A4 channel types are generally not suitable for fish habitat improvement structures.

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The water temperatures recorded on the survey days June 14 to June 15, 2010, ranged from 52 to 54 degrees Fahrenheit. Air temperatures ranged from 56 to 63 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 44% of the total length of this survey, riffles 27%, and pools 27%. Six of the 19 (32%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

Two of the 19 pool tail-outs measured had embeddedness ratings of 1 or 2. Sixteen 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 23 Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Ten of the 19 pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools is 81. The shelter rating in the flatwater habitats is 60. 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 23 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 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 93%. Reach 1 had a canopy density of 93% and Reach 2 had a canopy density of 92%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 97% and 96%, 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) 23 Gulch should be managed as an anadromous, natural production stream.

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- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.
- 3) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

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 confluence with the South Fork Noyo River.
100	0003.00	Out of the influence of the South Fork Noyo River.
202	0007.00	Bridge #01 is a wooden footbridge. It is 3.5' above the creek, 8' wide x 3.5' wide.
609	0017.00	Log debris accumulation (LDA) #01 contains 4 pieces of large woody debris (LWD) and measures 6' high x 26' wide x 16' long. Water flows through visible gaps in the LDA. Retained sediment ranges from sand to large cobble and measures 5' wide x 10' long x 2' deep. Fish are present above the LDA.
829	0024.00	LDA #02 contains 3 pieces of LWD and measures 5' high x 8' wide x 15' long. Water flows through visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 4' wide x 15' long x 3' deep. It is a possible barrier to juvenile and adult salmonids due to small wood strainer. Fish are not present above the LDA.
1314	0041.00	The channel type changes from F4 to an A4.
1326	0042.00	LDA #03 contains 2 pieces of LWD and measures 3' high x 8' wide x 8' long. Water flows through visible gaps in the LDA. Retained sediment ranges from silt to small cobble and measures 6' wide x 20' long x 3' deep. It is a possible barrier to juvenile and adult salmonids due to small wood strainer. Fish are not present above the LDA.

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- 1590 0048.00 LDA #04 contains 4 pieces of LWD and measures 6' high x 10' wide x 10' long. Water flows through though the LDA and there are no visible gaps in it. Retained sediment ranges from silt to small cobble and measures 6' wide x 10' long x 6' deep. It is a possible barrier to juvenile and adult salmonids. Fish are not present above the LDA.
- 1590 0048.00 Left bank erosion measures 6.5' high x 15' wide depositing fines to small cobble. It's 1% vegetated.
- 1614 0048.00 End of survey due to LDA causing a low and high flow barrier. There is a 6' jump barrier. The pool has a maximum depth of 2.7' however that point is 6' away from the jump. The maximum depth with 5' of the jump is 0.1'.

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: 1236578393689

LLID: 1236578393689 Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK Legal Description: T17NR16WS04 Latitude: 39:22:08.0N Longitude: 123:39:28.0W

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
14	2	FLATWATER	29.2	51	708	43.9	5.0	0.4	0.9	127	1784	51	708		60
2	0	NOSURVEY	4.2	12	24	1.5									
19	19	POOL	39.6	23	443	27.4	7.4	0.4	1.6	174	3301	110	2082	89	81
13	3	RIFFLE	27.1	34	439	27.2	5.5	0.1	0.4	95	1241	10	124		2
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
48	24				1614					6325			2914		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

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 (%)
13	3	LGR	27.1	34	439	27.2	6	0.1	0.6	95	1241	10	124		2	96
5	1	RUN	10.4	41	204	12.6	4	0.2	0.7	87	437	17	87		0	95
9	1	SRN	18.8	56	504	31.2	6	0.5	1.1	167	1507	84	753		120	96
17	17	MCP	35.4	21	362	22.4	7	0.4	2.6	154	2619	89	1520	70	84	92
1	1	STP	2.1	58	58	3.6	10	0.8	2.4	551	551	496	496	441	60	94
1	1	LSR	2.1	23	23	1.4	6	0.4	1.5	131	131	66	66	52	45	98
2	0	NS	4.2	12	24	1.5										

Total Units
48

Total Units Fully Measured
24

Total Length (ft.)
1614

Total Area (sq.ft.)
6485

Total Volume (cu.ft.)
3047

Table 3 - Summary of Pool Types

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

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
18	18	MAIN	95	23	420	95	7.5	0.4	176	3170	92	1558	83
1	1	SCOUR	5	23	23	5	6.0	0.4	131	131	52	52	45

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
19	19	443	3301	1610

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

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

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
17	MCP	89	2	12	10	59	5	29	0	0	0	0
1	STP	5	0	0	0	0	1	100	0	0	0	0
1	LSR	5	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
19	2	11	11	58	6	32	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Dry Units: 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

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
13	3	LGR	0	0	90	0	10	0	0	0	0
13	3	TOTAL RIFFLE	0	0	90	0	10	0	0	0	0
5	1	RUN	0	0	0	0	0	0	0	0	0
9	1	SRN	20	10	70	0	0	0	0	0	0
14	2	TOTAL FLAT	20	10	70	0	0	0	0	0	0
17	17	MCP	8	34	53	2	1	0	2	0	0
1	1	STP	10	50	30	0	10	0	0	0	0
1	1	LSR	0	0	0	50	50	0	0	0	0
19	19	TOTAL POOL	8	33	49	5	4	0	2	0	0
2	0	NS									
48	24	TOTAL	8	30	52	4	4	0	2	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Dry Units: 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

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
13	3	LGR	0	0	67	33	0	0	0
5	1	RUN	0	0	100	0	0	0	0
9	1	SRN	0	0	100	0	0	0	0
17	17	MCP	0	6	76	18	0	0	0
1	1	STP	0	0	100	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
93	83	18	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: 1236578393689 LLID: 1236578393689 Drainage: Noyo River
 Survey Dates: 6/14/2010 to 6/15/2010 Survey Length (ft.): 1614 Main Channel (ft.): 1614 Side Channel (ft.): 0
 Confluence Location: Quad: MATHISON PEAK Legal Description: T17NR16WS04 Latitude: 39:22:08.0N Longitude: 123:39:28.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4	Canopy Density (%): 93.1	Pools by Stream Length (%): 25.0
Reach Length (ft.): 1314	Coniferous Component (%): 82.8	Pool Frequency (%): 37.5
Riffle/Flatwater Mean Width (ft.): 5.3	Hardwood Component (%): 17.3	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 73
Range (ft.): 6 to 26	Vegetative Cover (%): 97.5	2 to 2.9 Feet Deep: 27
Mean (ft.): 12	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 8	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.4	Occurrence of LWD (%): 44	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 52 - 54 Air (F): 56 - 63	LWD per 100 ft.:	Mean Pool Shelter Rating: 72
Dry Channel (ft): 0	Riffles: 3	
	Pools: 8	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 47 Gravel: 47 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 7		
Embeddedness Values (%): 1. 0.0 2. 13.3 3. 33.3 4. 46.7 5. 6.7		

STREAM REACH: 2

Channel Type: A4	Canopy Density (%): 92.0	Pools by Stream Length (%): 38.3
Reach Length (ft.): 300	Coniferous Component (%): 81.3	Pool Frequency (%): 50.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%): 18.8	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 50
Range (ft.): 6 to 6	Vegetative Cover (%): 90.6	2 to 2.9 Feet Deep: 50
Mean (ft.): 6	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.4	Occurrence of LWD (%): 50	Mean Max Residual Pool Depth (ft.): 1.9
Water (F): 52 - 52 Air (F): 63 - 63	LWD per 100 ft.:	Mean Pool Shelter Rating: 116
Dry Channel (ft): 0	Riffles: 2	
	Pools: 8	
	Flat: 1	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 50 Gravel: 50 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 0.0 3. 50.0 4. 50.0 5. 0.0		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

Legal Description: T17NR16WS04

Latitude: 39:22:08.0N

Longitude: 123:39:28.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	24	24	100.0

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	3	0	6.3
Hardwood Trees	3	5	16.7
Coniferous Trees	18	19	77.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: 1236578393689

LLID: 1236578393689

Drainage: Noyo River

Survey Dates: 6/14/2010 to 6/15/2010

Confluence Location: Quad: MATHISON PEAK

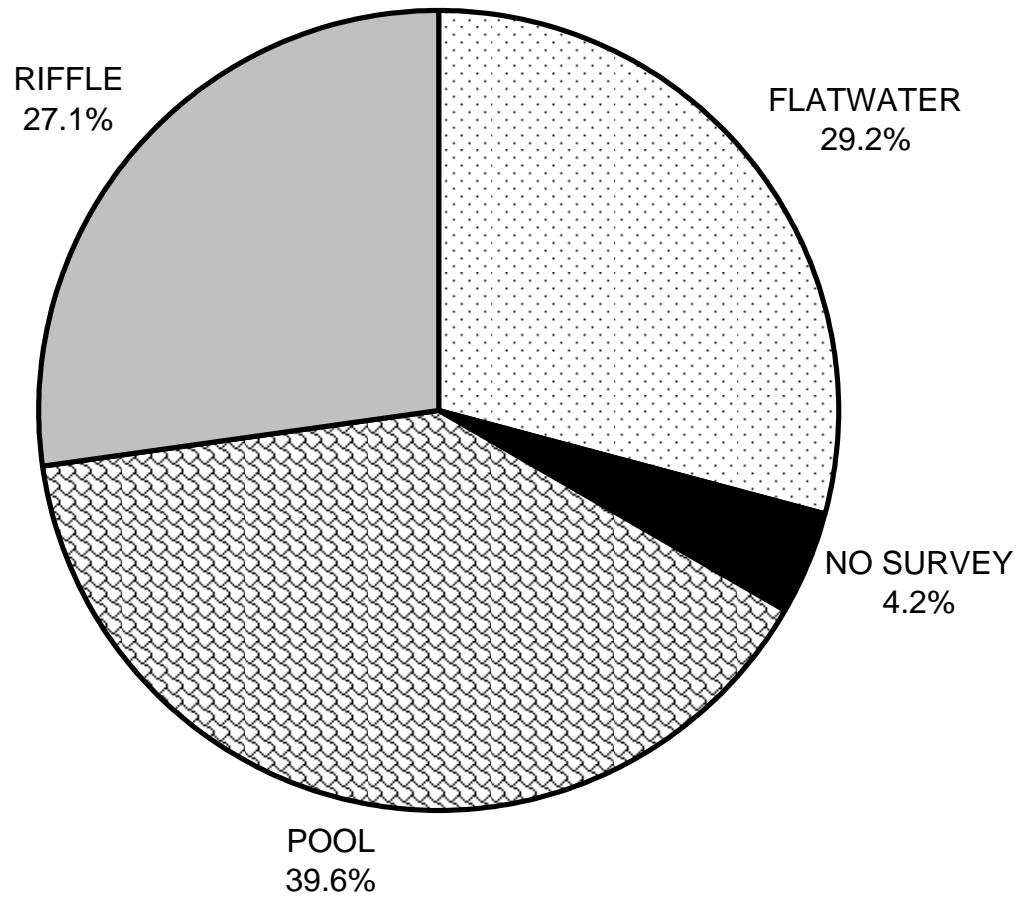
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Longitude: 123:39:28.0W

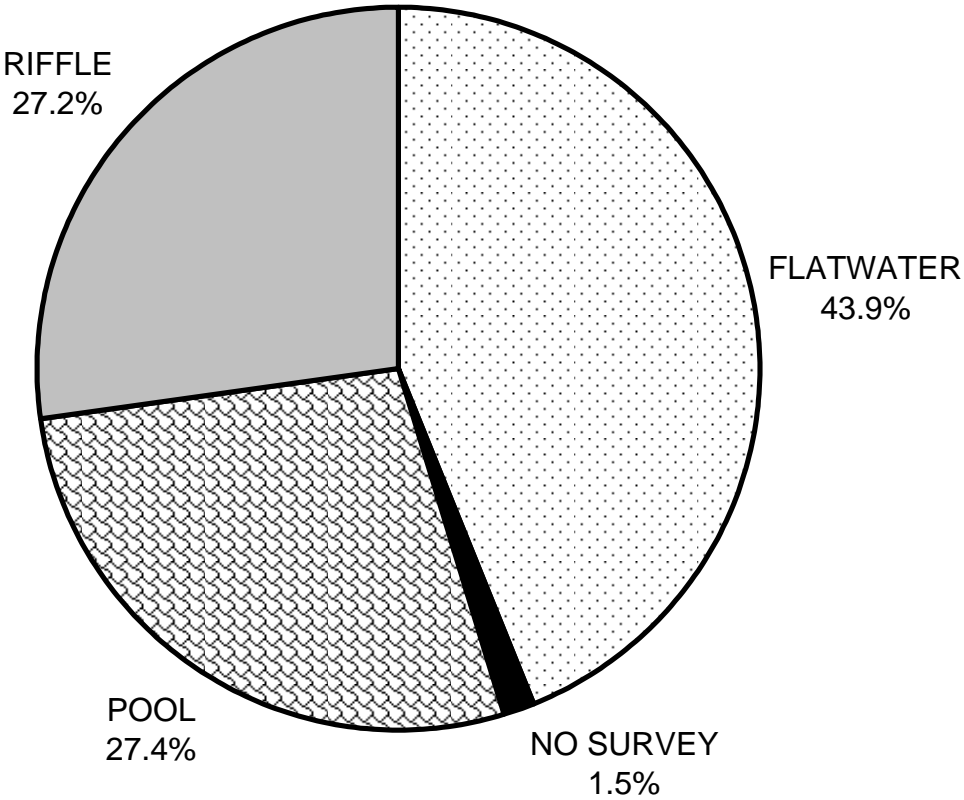
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	20	8
SMALL WOODY DEBRIS (%)	0	10	33
LARGE WOODY DEBRIS (%)	90	70	49
ROOT MASS (%)	0	0	5
TERRESTRIAL VEGETATION (%)	10	0	4
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	2
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

"23 Gulch" 2010
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

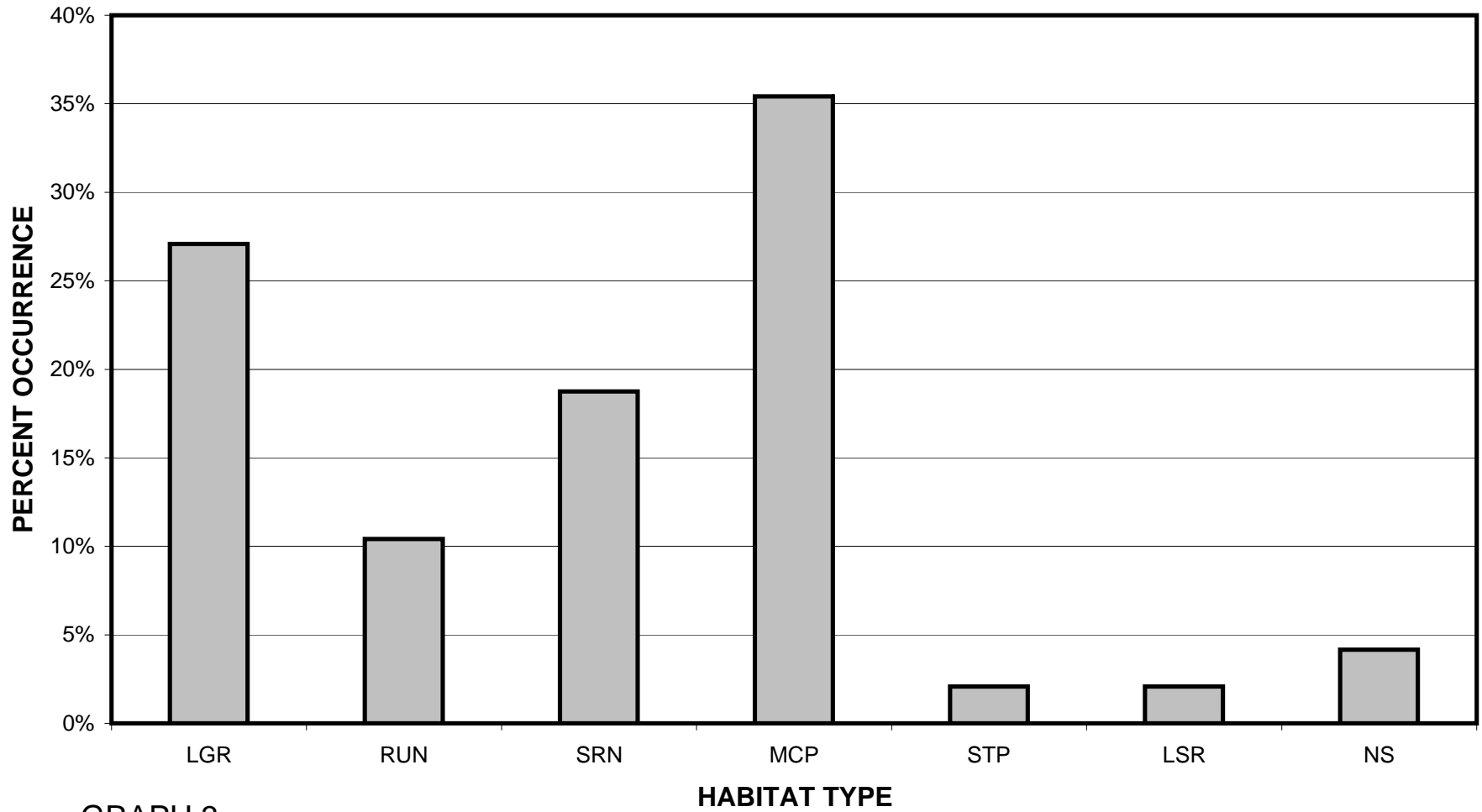
"23 Gulch" 2010
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

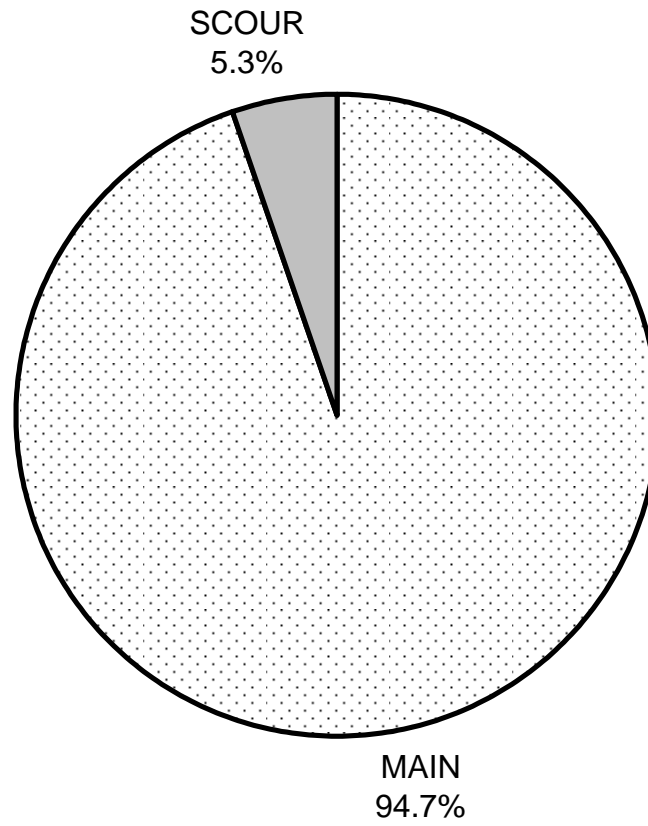
"23 Gulch" 2010

HABITAT TYPES BY PERCENT OCCURRENCE



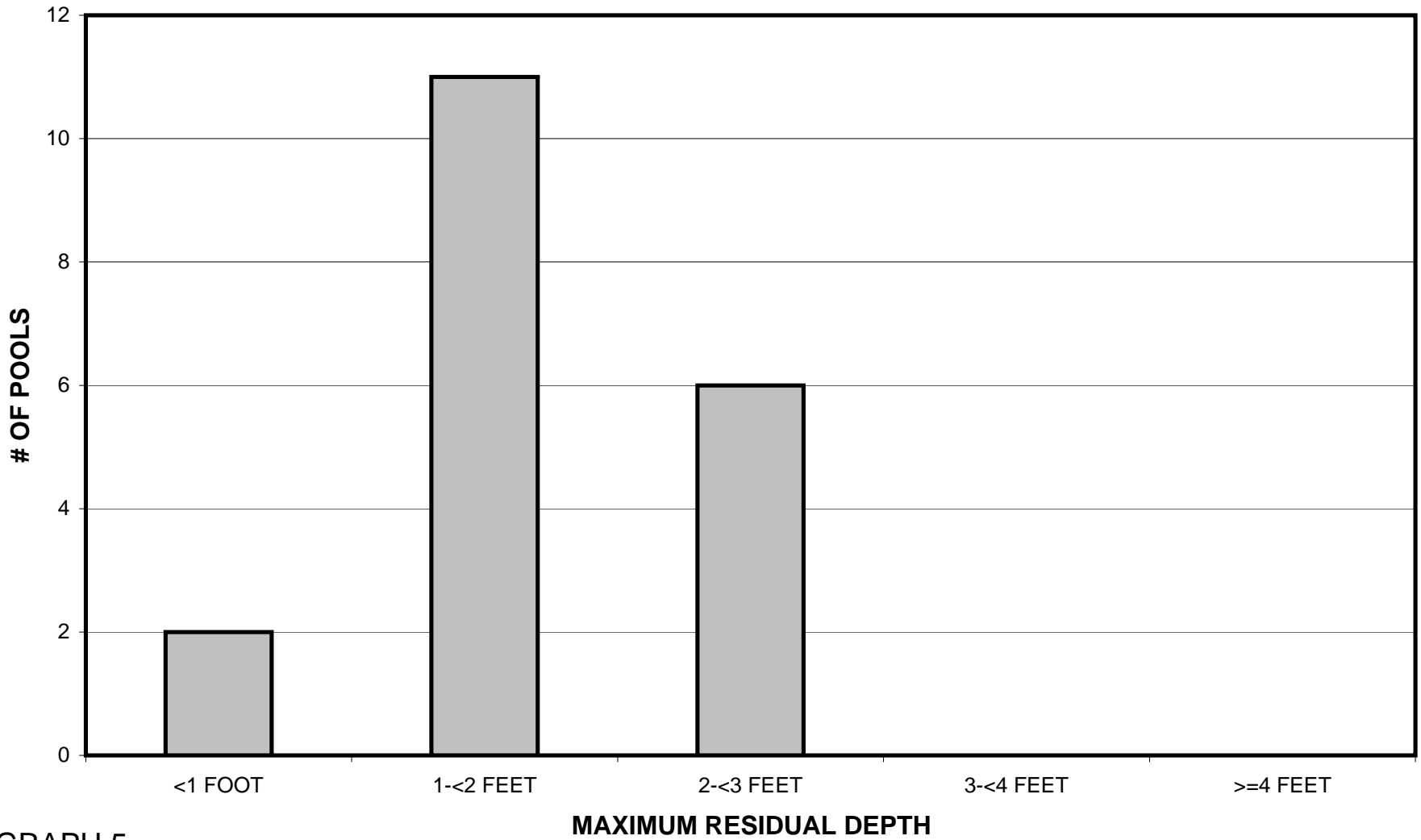
GRAPH 3

**"23 Gulch" 2010
POOL TYPES BY PERCENT OCCURRENCE**



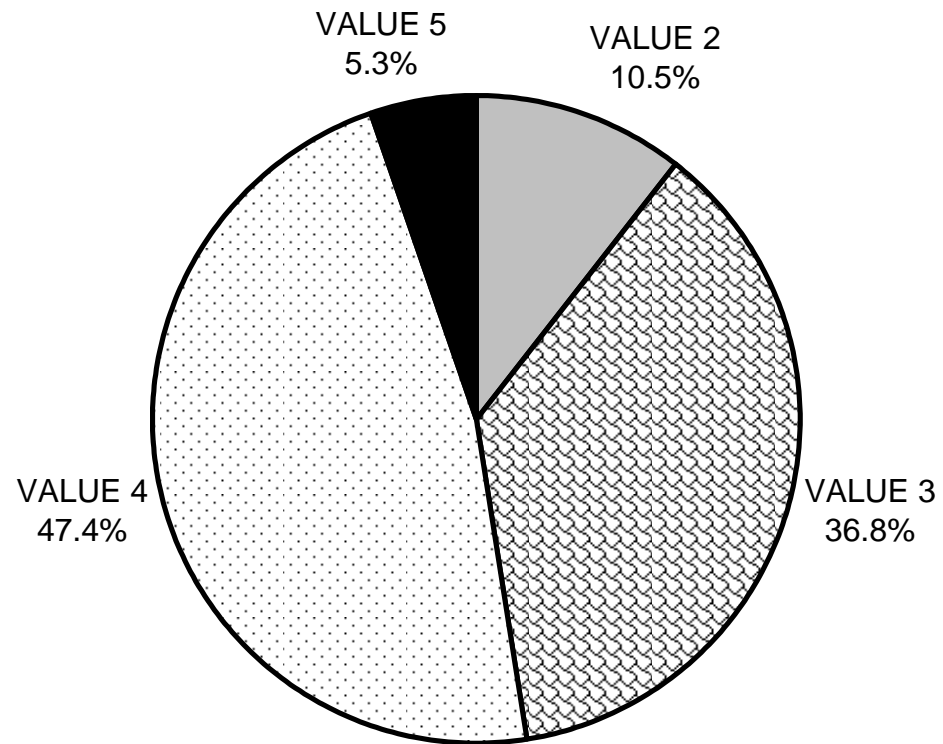
GRAPH 4

"23 Gulch" 2010 MAXIMUM DEPTH IN POOLS



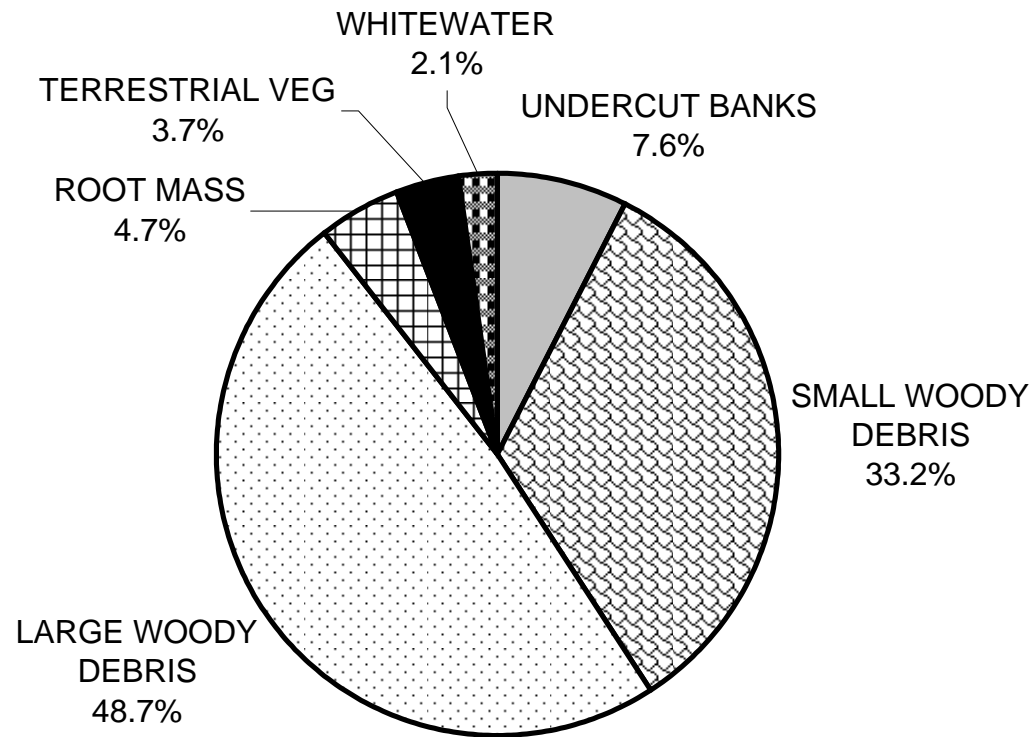
GRAPH 5

"23 Gulch" 2010 PERCENT EMBEDDEDNESS



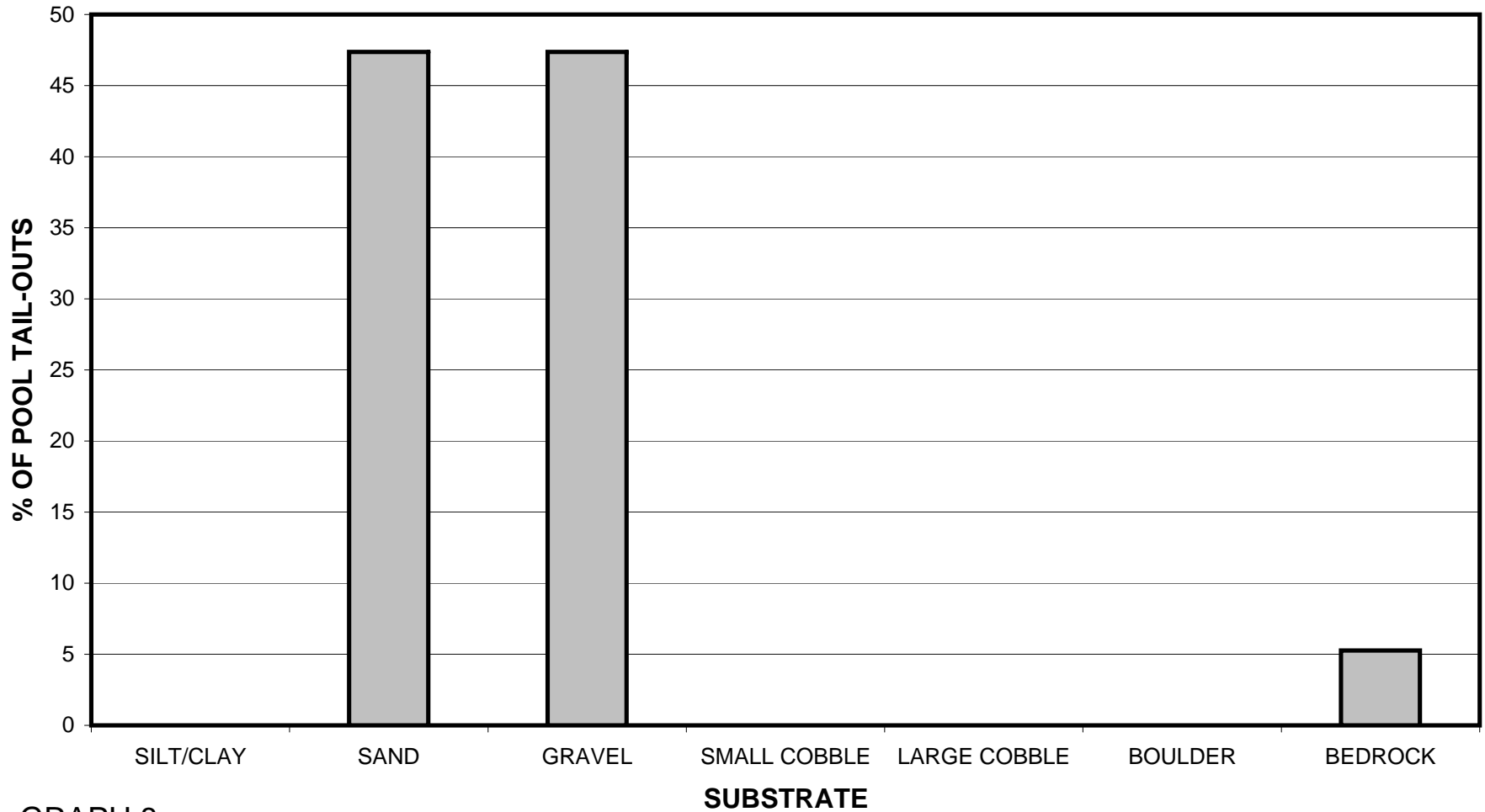
GRAPH 6

"23 Gulch" 2010 MEAN PERCENT COVER TYPES IN POOLS



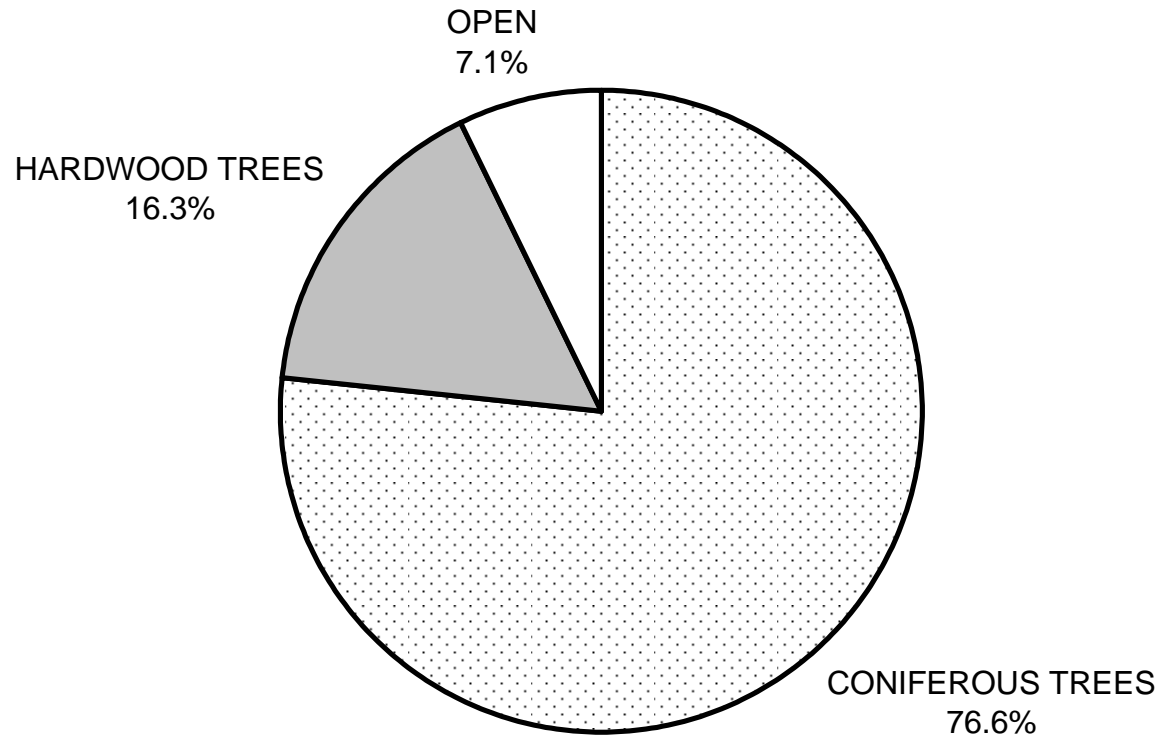
GRAPH 7

"23 Gulch" 2010
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



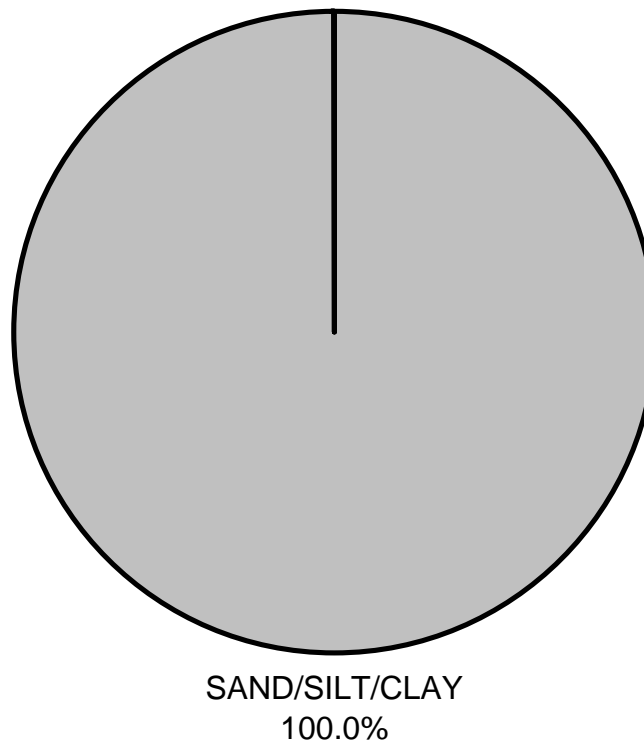
GRAPH 8

**"23 Gulch" 2010
MEAN PERCENT CANOPY**



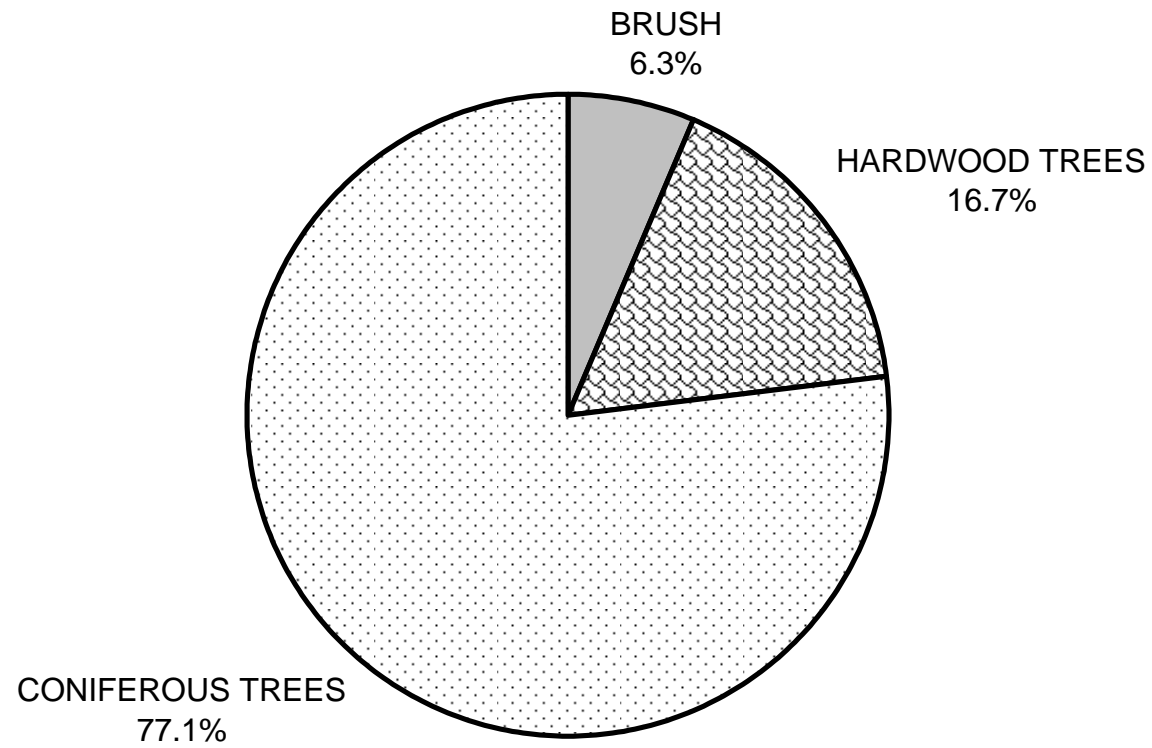
GRAPH 9

"23 Gulch" 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH



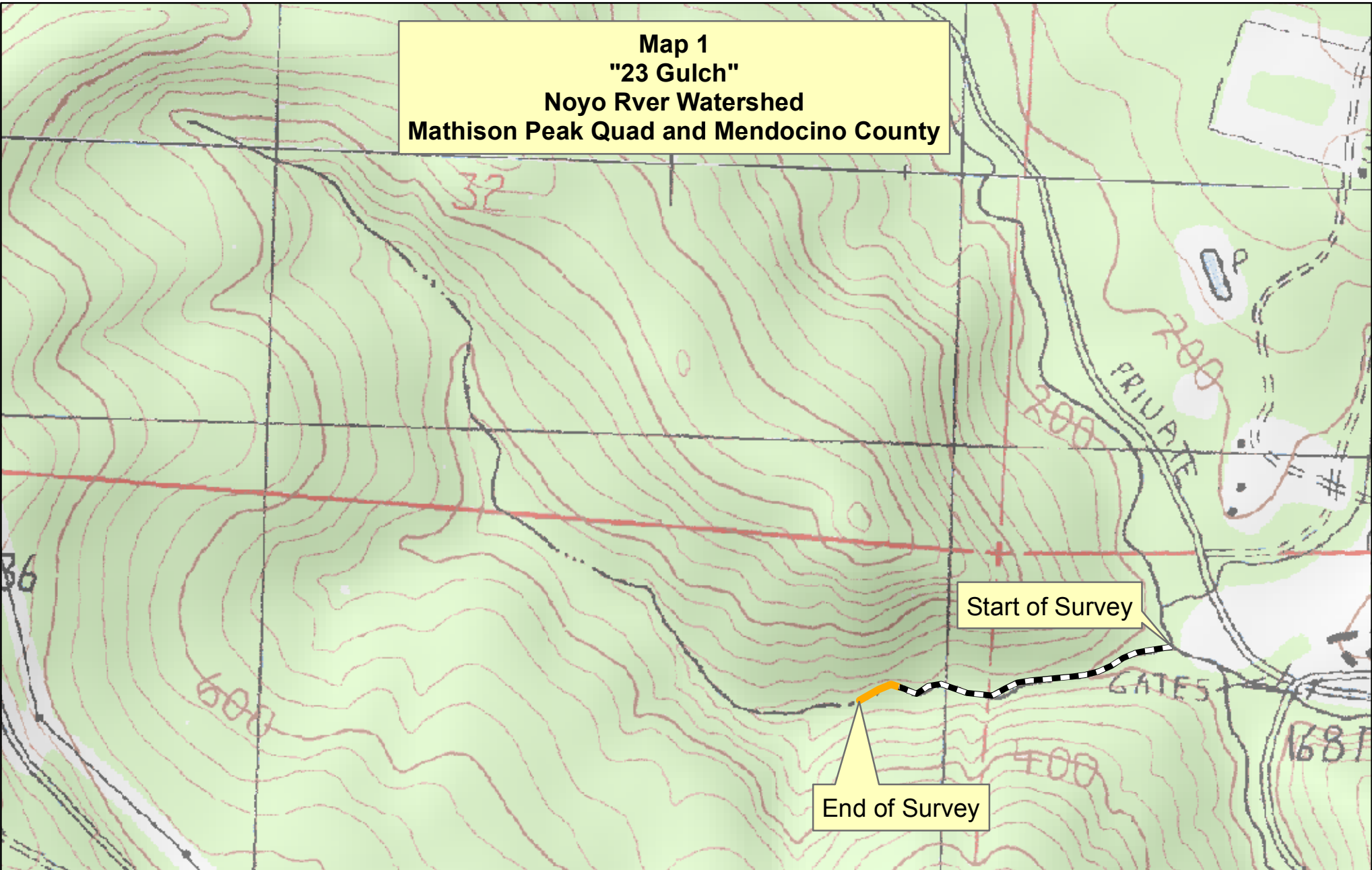
GRAPH 10

"23 Gulch" 2010
DOMINANT BANK VEGETATION IN SURVEY REACH





GRAPH 11

Map 1
"23 Gulch"
Noyo Rver Watershed
Mathison Peak Quad and Mendocino County



Legend

-  Reach 1, Channel Type F4
-  Reach 2, Channel Type A4

