STREAM INVENTORY REPORT

"Moe Gulch"

INTRODUCTION

A stream inventory was conducted June 30, 2010 on an unnamed tributary to Parlin Creek commonly know as and hereinafter referred to as Moe Gulch. The survey began at the confluence with Parlin Creek and extended upstream 0.5 miles.

The Moe 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 Moe 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

Moe Gulch is a tributary to Parlin Creek, 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). Moe Gulch's legal description at the confluence with Parlin Creek is T18N R16W S28. Its location is 39.38504 degrees north latitude and 123.64297 degrees west longitude, LLID number 1236418393850. Moe Gulch is an intermittent stream according to the USGS Noyo Hill 7.5 minute quadrangle. Moe Gulch drains a watershed of approximately 0.56 square miles. Elevations range from about 260 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is located within Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via California Division of Forestry and Fire Protection Road 340.

METHODS

The habitat inventory conducted in Moe 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 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 Moe 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". Moe 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.

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 Moe 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 Moe 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 Moe 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 Moe 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.

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 Sample Creek. In addition, underwater observations were made at 10 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

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

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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Moe 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 30, 2010, was conducted by B. Williams and B. Leonard (WSP). The total length of the stream surveyed was 2,543 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.23 cfs on June 30, 2010.

Moe Gulch is a G4 channel type for 2,543 feet of the stream surveyed. G4 channels are entrenched "gully" step-pool channels on moderate gradients with low width /depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 54 degrees Fahrenheit. Air temperatures ranged from 58 to 67 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 30% riffle units, 30% flatwater units, and 1% no survey units (Graph 1). Based on total length of Level II habitat types there were 42% flatwater units, 33% riffle units, 24% pool units, and 1% no survey units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 37%; low gradient riffle units, 27%; and run units, 16% (Graph 3). Based on percent total length, step run units made up 31%, low gradient riffle units 30%, and mid-channel pool units 23%.

A total of 36 pools were identified (Table 3). Main channel pools were the most frequently encountered at 94% (Graph 4), and comprised 95% 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. Four of the 36 pools (11%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 36 pool tail-outs measured, 3 had a value of 1 (8.3%); 25 had a value of 2 (69.4%); 6 had a value of 3 (16.7%); 2 had a value of 5 (5.6%) (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 1, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 28 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 28. Scour pools had a mean shelter rating of 15 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Moe Gulch. Graph 7 describes the pool cover in Moe 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 61% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 31% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Moe Gulch was 96%. Four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 13% and 87%, respectively. Graph 9 describes the mean percent canopy in Moe Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 98%. The mean percent left bank vegetated was 97%. The dominant elements composing the structure of the stream banks consisted of 91% sand/silt/clay, 4% cobble/gravel, 3% bedrock, and 1% boulder (Graph 10). Brush was the dominant vegetation type observed in 44% of the units surveyed. Additionally, 41% of the units surveyed had coniferous trees as the dominant vegetation type, and 8% had grass as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 10 sites for species composition and distribution in Moe Gulch on June 30, 2010. The water temperature taken during the survey period of 1305 hours to 1420 hours was 54 degrees Fahrenheit. Air temperatures ranged from 66 to 68 degrees Fahrenheit. The sites were sampled by S. McSmith and I. Mikus (DFG).

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Ten sites were sampled from the confluence with Parlin Creek upstream past the end of the stream survey, approximately 2,600 feet. The reach sites yielded 3 young-of-the-year steelhead/rainbow trout (SH/RT), 1 age 1+ SH/RT, 0 coho salmon and 3 sculpin.

The following chart displays the information yielded from these sites:

2010 Moe 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									
06/30/10	1	005	Pool	166	2	0	0	0	0
06/30/10	2	028	Pool	791	0	0	0	0	0
06/30/10	3	042	Pool	1114	0	0	0	0	0
06/30/10	4	045	Pool	1382	0	0	0	0	0
06/30/10	5	073	Pool	2010	0	0	0	0	0
06/30/10	6	075	Pool	2050	0	0	0	0	0
06/30/10	7	077	Pool	2089	0	0	0	0	0
06/30/10	8	079	Pool	2125	1	0	0	0	0
06/30/10	9	Above survey	Pool		0	1	0	0	0
06/30/10	10	Above survey	Pool		0	0	0	0	0

DISCUSSION

Moe Gulch is a G4 channel type for the entire 2,543 feet of stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey day June 30, 2010, ranged from 53 to 54 degrees Fahrenheit. Air temperatures ranged from 58 to 67 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 42% of the total length of this survey, riffles 33%, and pools 24%. Four of the 36 (11%) 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 for locations where their installation will not be threatened by high stream energy.

Twenty-eight of the 36 pool tail-outs measured had embeddedness ratings of 1 or 2. Six 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 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 Moe Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Thirty-three of the 36 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 28. 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 large woody debris in Moe 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 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 98% and 97%, 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) Moe 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) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

4) 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.

5) 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 the confluence with Parlin Creek. The channel is a G4 for the entire length of the survey, 2,543 feet.
2543	0093.00	End of survey due to a log debris accumulation and a cascade with no jump pools creating a fish passage barrier.

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: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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
28	4	FLATWATER	30.1	38	1064	41.8	6.3	0.4	0.8	90	2507	36	1020		0
1	0	NOSURVEY	1.1	14	14	0.6									
36	36	POOL	38.7	17	617	24.3	7.1	0.6	1.4	116	4168	98	3513	75	28
28	5	RIFFLE	30.1	30	848	33.3	5.4	0.2	0.5	152	4263	39	1096		1

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
93	45	2543	10938	5630

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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 (%)
25	3	LGR	26.9	31	770	30.3	5	0.2	0.6	160	3991	34	844		2	92
1	0	HGR	1.1	16	16	0.6										
1	1	CAS	1.1	49	49	1.9	6	0.4	0.7	221	221	88	88		0	
1	1	BRS	1.1	13	13	0.5	5	0.1	0.5	62	62	6	6		0	100
15	4	RUN	16.1	18	277	10.9	6	0.4	1	90	1343	36	547		0	95
13	0	SRN	14.0	61	787	30.9										
34	34	MCP	36.6	17	589	23.2	7	0.6	3.3	118	4016	99	3367	76	28	97
1	1	LSR	1.1	18	18	0.7	4	0.4	1	72	72	50	50	29	10	96
1	1	LSBo	1.1	10	10	0.4	10	1.0	2.2	80	80	96	96	80	20	80
1	0	NS	1.1	14	14	0.6										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
93	45	2543	9784	4999

Table 3 - Summary of Pool Types

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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
34	34	MAIN	94	17	589	95	7.1	0.6	118	4016	76	2599	28
2	2	SCOUR	6	14	28	5	7.0	0.7	76	152	54	109	15

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
36	36	617	4168	2708

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

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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
34	MCP	94	6	18	25	74	2	6	1	3	0	0
1	LSR	3	0	0	1	100	0	0	0	0	0	0
1	LSBo	3	0	0	0	0	1	100	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
36	6	17	26	72	3	8	1	3	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010 Dry Units: 0

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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
25	3	LGR	0	50	50	0	0	0	0	0	0
1	0	HGR									
1	1	CAS	0	0	0	0	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	0	0	0
28	5	TOTAL RIFFLE	0	50	50	0	0	0	0	0	0
15	4	RUN	0	0	0	0	0	0	0	0	0
13	0	SRN									
28	4	TOTAL FLAT	0	0	0	0	0	0	0	0	0
34	34	MCP	15	30	38	9	0	0	5	3	0
1	1	LSR	10	0	0	90	0	0	0	0	0
1	1	LSBo	50	20	0	20	0	0	0	10	0
36	36	TOTAL POOL	16	29	36	12	0	0	4	3	0
1	0	NS									
93	45	TOTAL	15	30	36	11	0	0	4	3	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010 Dry Units: 0

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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
25	3	LGR	0	0	100	0	0	0	0
1	0	HGR	0	0	0	0	0	0	0
1	1	CAS	0	0	0	0	0	100	0
1	1	BRS	0	0	0	0	0	0	100
15	4	RUN	0	0	100	0	0	0	0
13	0	SRN	0	0	0	0	0	0	0
34	34	MCP	32	3	59	3	0	3	0
1	1	LSR	0	0	100	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
96	87	13	0	98	97

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: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010 Survey Length (ft.): 2543 Main Channel (ft.): 2543 Side Channel (ft.): 0

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G4
Reach Length (ft.): 2543
Riffle/Flatwater Mean Width (ft.): 5.8
BFW:
Range (ft.): 5 to 8
Mean (ft.): 8
Std. Dev.: 1
Base Flow (cfs.): 0.2
Water (F): 53 - 54 Air (F): 58 - 67
Dry Channel (ft): 0

Canopy Density (%): 95.8
Coniferous Component (%): 86.7
Hardwood Component (%): 13.3
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 97.3
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 27
LWD per 100 ft.:
Riffles: 3
Pools: 11
Flat: 3

Pools by Stream Length (%): 24.3
Pool Frequency (%): 38.7
Residual Pool Depth (%):
< 2 Feet Deep: 89
2 to 2.9 Feet Deep: 8
3 to 3.9 Feet Deep: 3
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.4
Mean Pool Shelter Rating: 28

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 3 Gravel: 61 Sm Cobble: 31 Lg Cobble: 0 Boulder: 6 Bedrock: 0

Embeddedness Values (%): 1. 8.3 2. 69.4 3. 16.7 4. 0.0 5. 5.6

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

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	3	3.3
Boulder	1	0	1.1
Cobble / Gravel	4	0	4.4
Sand / Silt / Clay	40	42	91.1

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	5	2	7.8
Brush	19	21	44.4
Hardwood Trees	2	4	6.7
Coniferous Trees	19	18	41.1
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

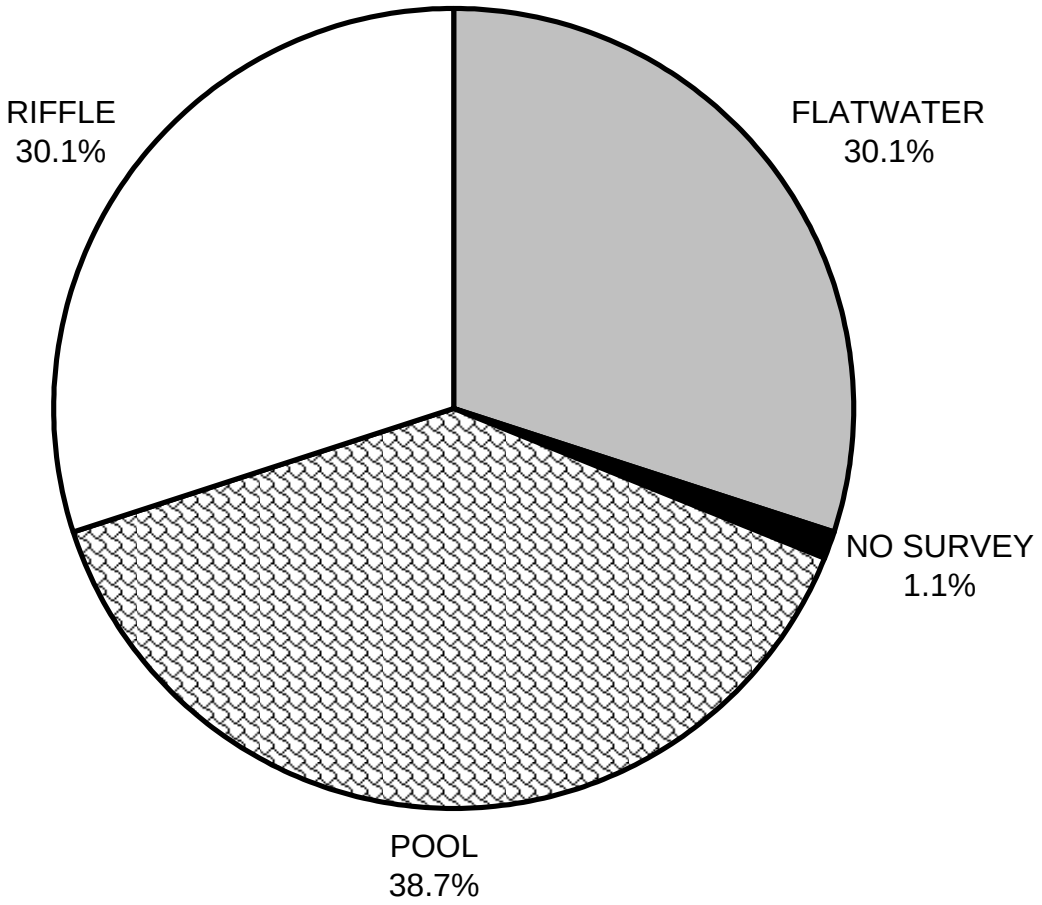
StreamName: 1236418393850 LLID: 1236418393850 Drainage: Noyo River

Survey Dates: 6/30/2010 to 6/30/2010

Confluence Location: Quad: NOYO HILL Legal Description: T18NR16WS28 Latitude: 39:23:06.0N Longitude: 123:38:30.0W

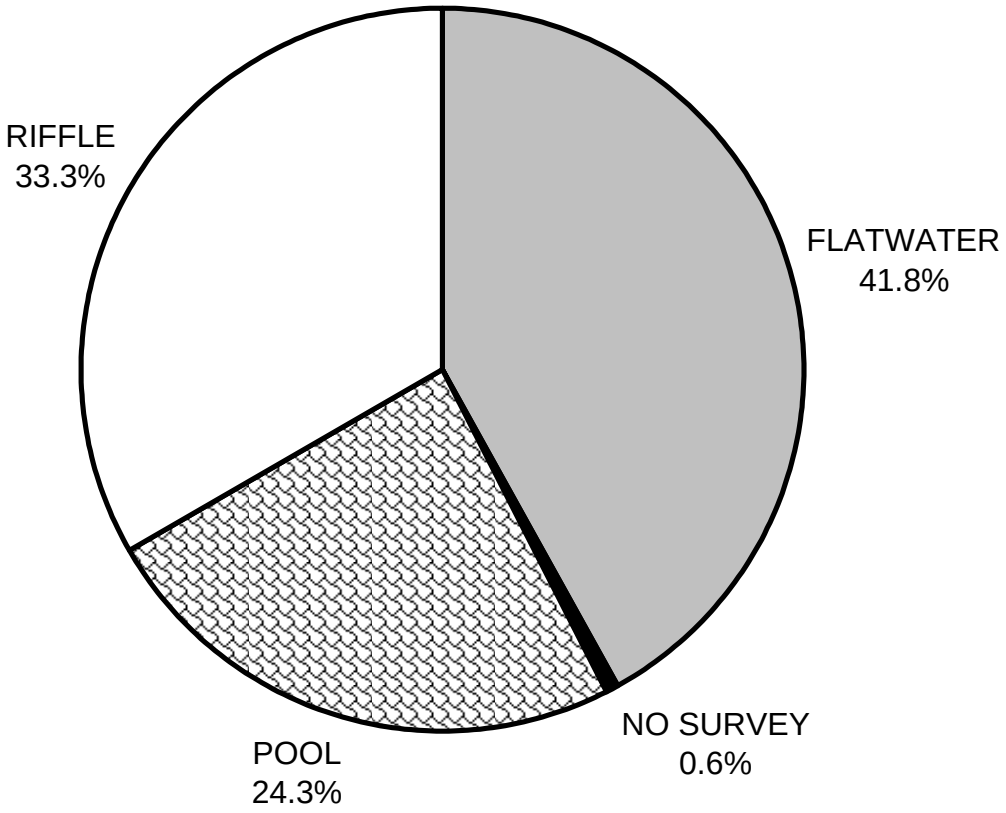
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	16
SMALL WOODY DEBRIS (%)	50	0	29
LARGE WOODY DEBRIS (%)	50	0	36
ROOT MASS (%)	0	0	12
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	4
BOULDERS (%)	0	0	3
BEDROCK LEDGES (%)	0	0	0

"Moe Gulch" 2010
HABITAT TYPES BY PERCENT OCCURRENCE



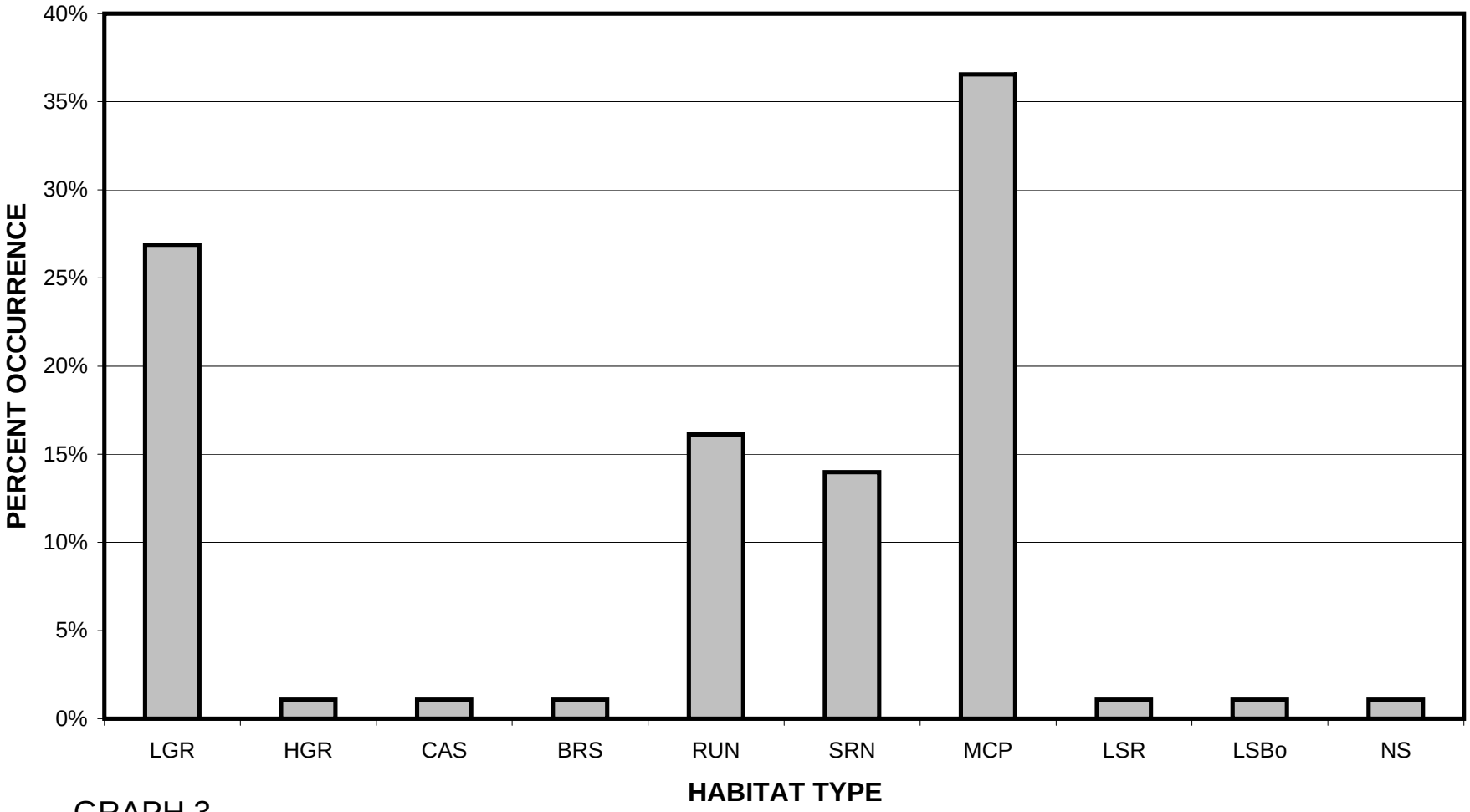
GRAPH 1

"Moe Gulch" 2010
HABITAT TYPES BY PERCENT TOTAL LENGTH



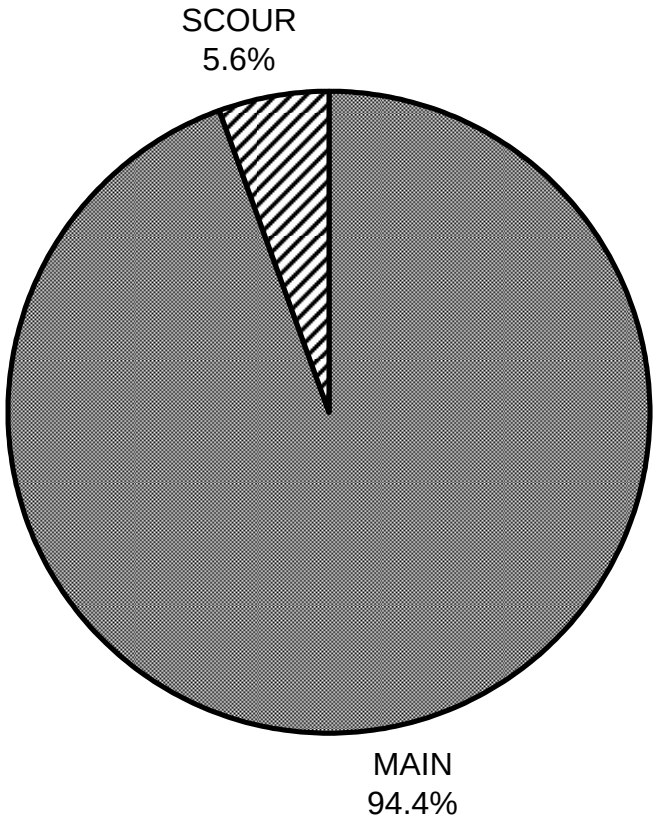
GRAPH 2

"Moe Gulch" 2010
HABITAT TYPES BY PERCENT OCCURRENCE



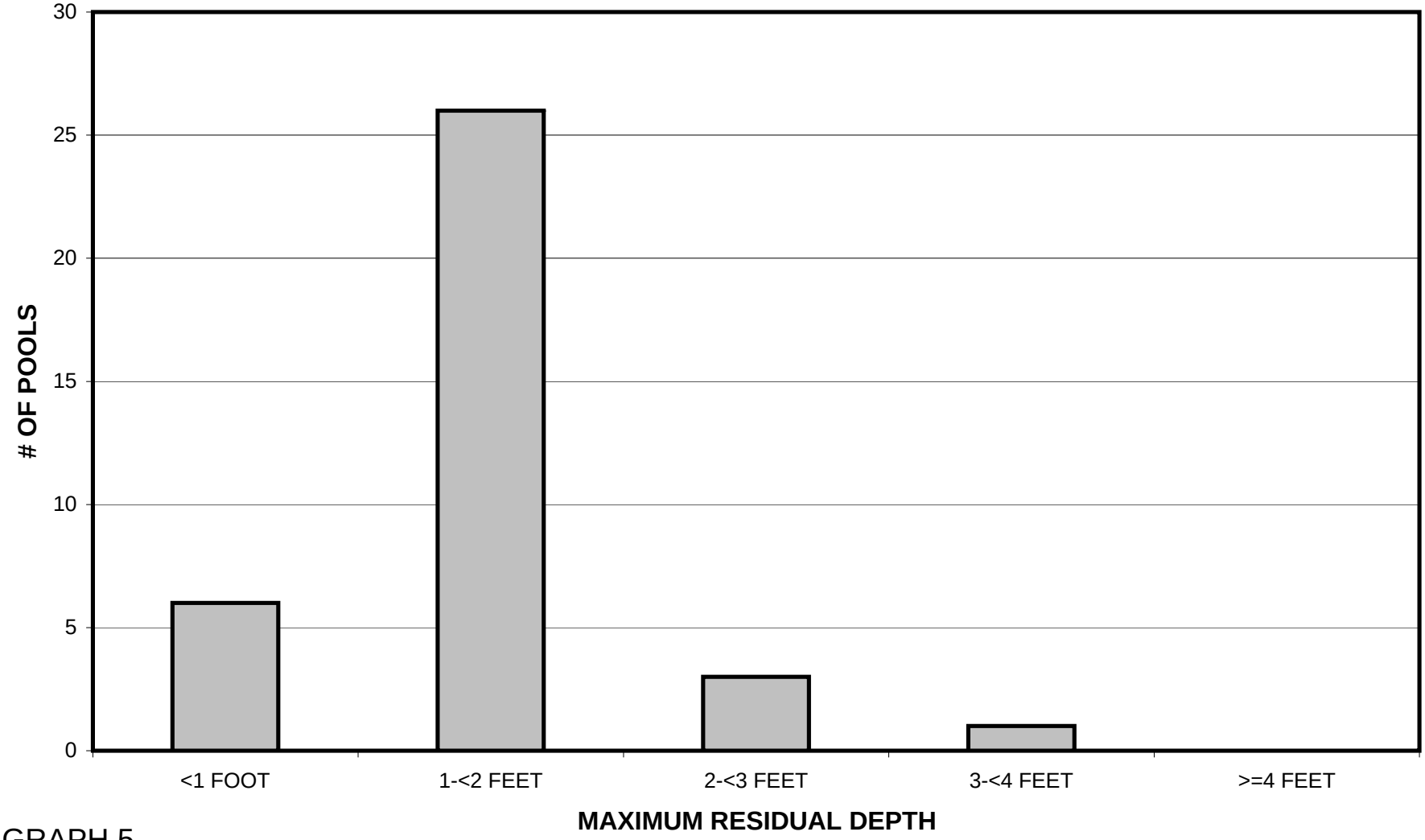
GRAPH 3

"Moe Gulch" 2010
POOL TYPES BY PERCENT OCCURRENCE



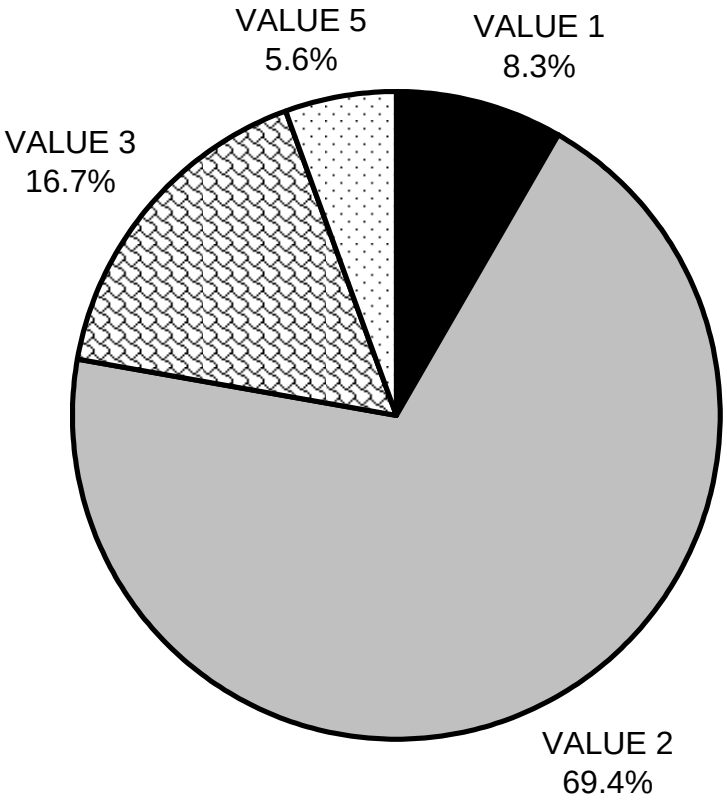
GRAPH 4

"Moe Gulch" 2010
MAXIMUM DEPTH IN POOLS



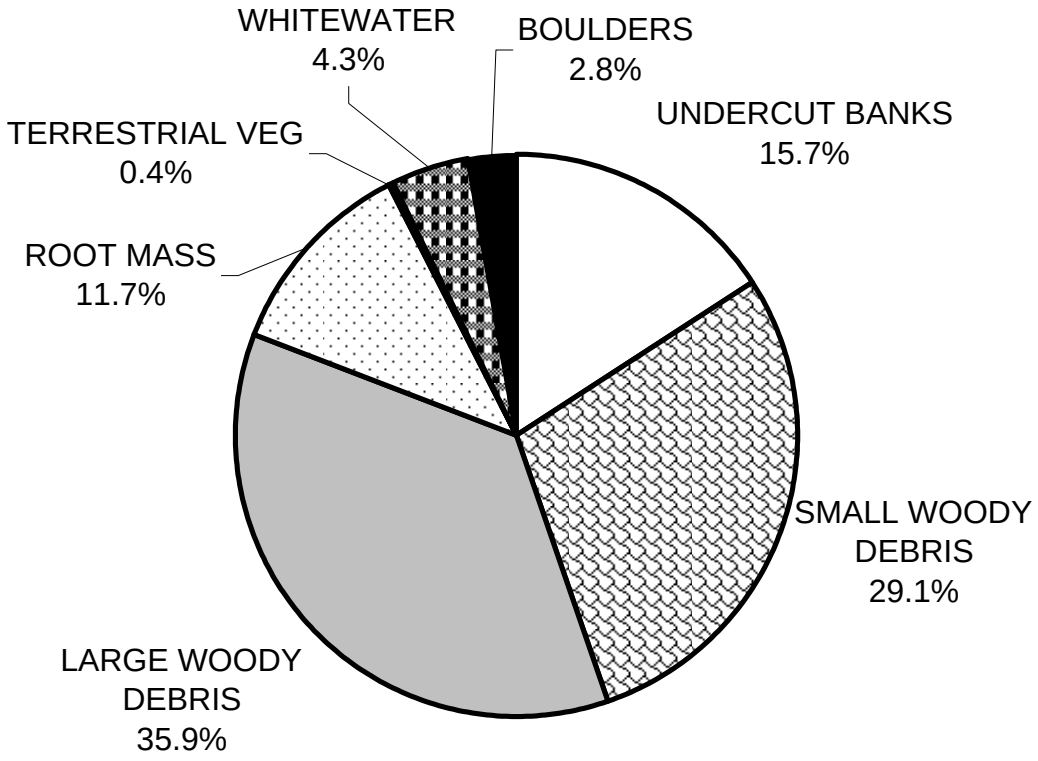
GRAPH 5

"Moe Gulch" 2010
PERCENT EMBEDDEDNESS



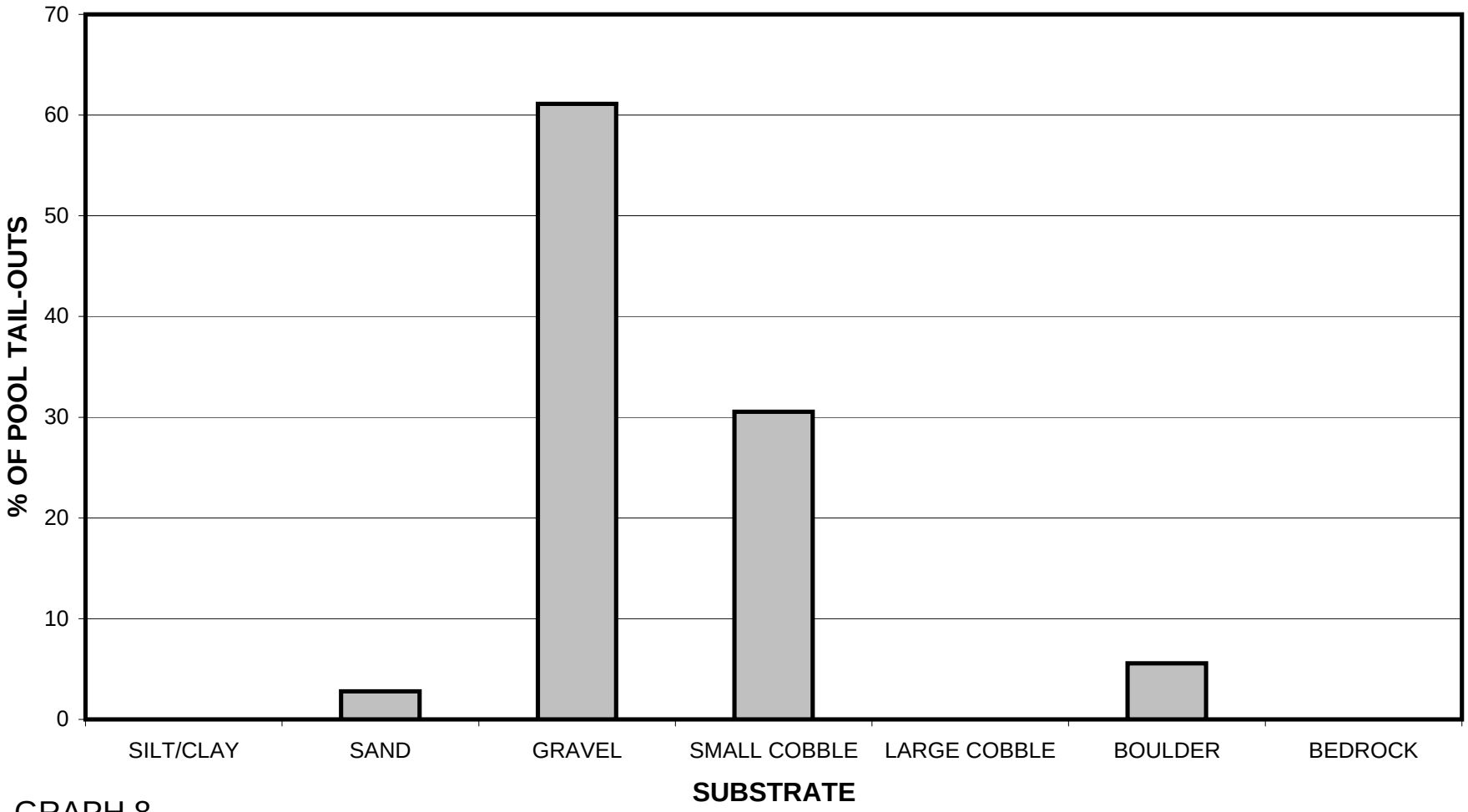
GRAPH 6

"Moe Gulch" 2010
MEAN PERCENT COVER TYPES IN POOLS



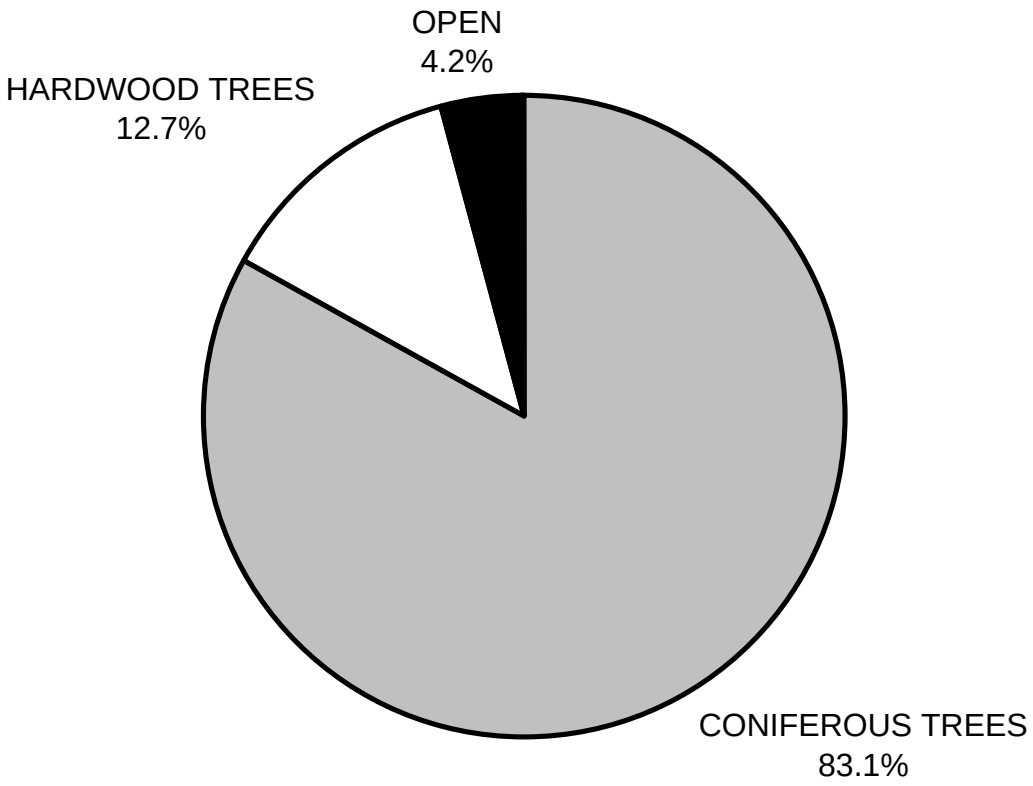
GRAPH 7

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



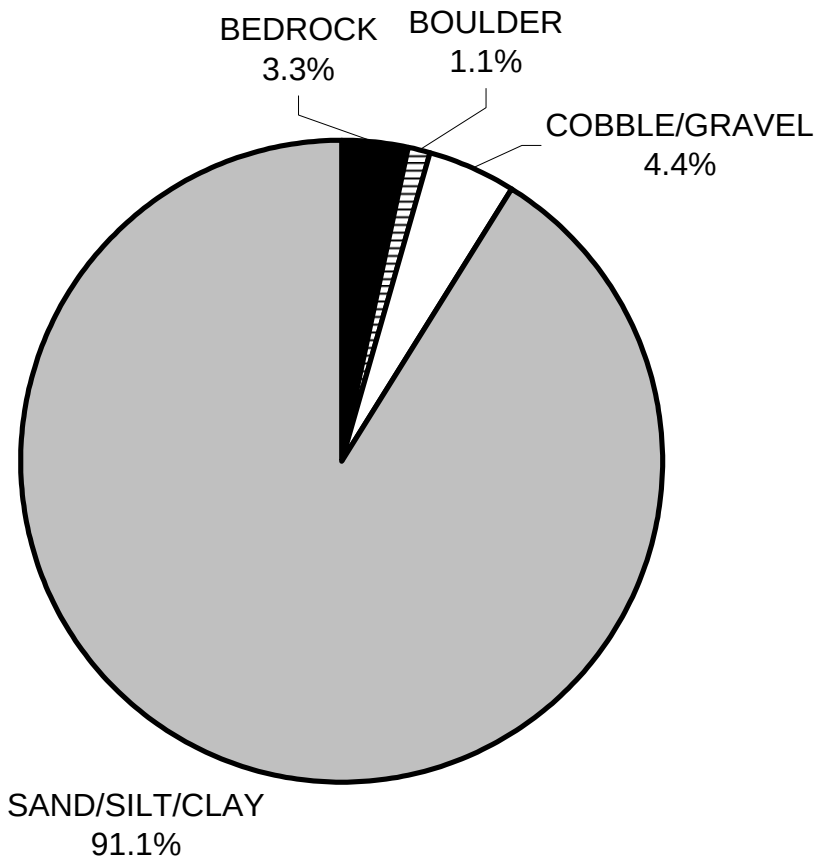
GRAPH 8

"Moe Gulch" 2010
MEAN PERCENT CANOPY



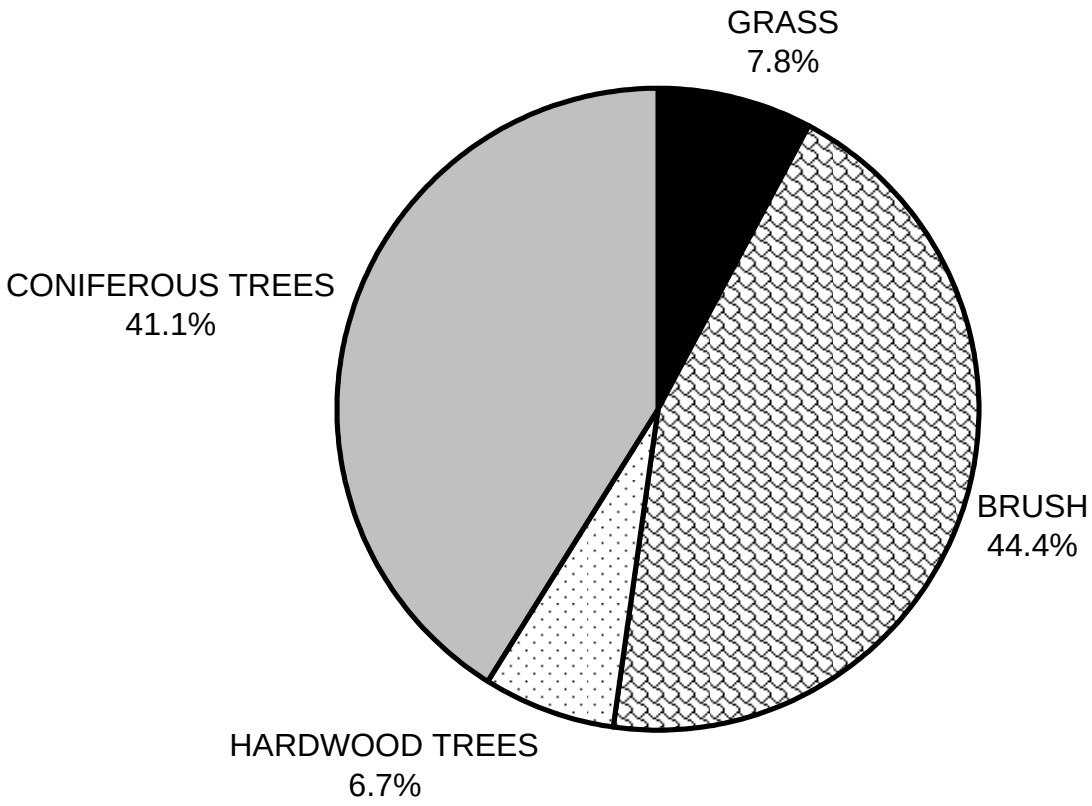
GRAPH 9

"Moe Gulch" 2010
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

"Moe Gulch" 2010
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11