

STREAM INVENTORY REPORT

Park Gulch

INTRODUCTION

A stream inventory was conducted from May 23 to May 24, 2011 on Park Gulch. The survey began at the confluence with Chamberlain Creek and extended upstream 0.4 miles.

The Park 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 Park 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

Park Gulch is a tributary to Chamberlain Creek, a tributary to North Fork Big River, a tributary to Big River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Park Gulch's legal description at the confluence with Chamberlain Creek is T17N R15W S05. Its location is 39.3597 degrees north latitude 123.555 degrees west longitude, LLID number 1235538393596. Park Gulch is a first order stream and has approximately 0.5 miles of blue line stream according to the USGS Comptche 7.5 minute quadrangle. Park Gulch drains a watershed of approximately 1.1 square miles. Elevations range from about 345 feet at the mouth of the creek to 1,000 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is in the Jackson Demonstration State Forest and is managed by the California Department of Forestry and Fire Protection. Vehicle access exists via State Route 20.

METHODS

The habitat inventory conducted in Park Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Department of Fish and Game (DFG) personnel or Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the DFG. This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and

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embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Park 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". Park 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 Park 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. In Water 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. Next, 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. The shelter rating is 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 Park 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 Park 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 Park 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 Park 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 May 23 to May 24, 2011 was conducted by A. Blessing and G. Goforth (WSP). The total length of the stream surveyed was 2,072 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.37 cfs on May 25, 2011.

Park Gulch is a G4 channel type for 2,072 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 45 to 50 degrees Fahrenheit. Air temperatures ranged from 47 to 63 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 50% pool units, 34% flatwater units, 15% riffle units, and 1% no survey units (Graph 1). Based on total length of Level II habitat types there were 56% flatwater units, 33% pool units, 10% riffle units, and 1% no survey units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 33%; low gradient riffle units, 15%; and plunge pool units, 15% (Graph 3). Based on percent total length, step run units made up 37%, mid-channel pool units 23%, and run units 11%.

A total of 46 pools were identified (Table 3). Main channel pools were the most frequently encountered at 65% (Graph 4), and comprised 69% 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 46 pools (9%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 46 pool tail-outs measured, 44 had a value of 1 (95.7%) and 2 had a value of 2 (4.3%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 10, flatwater habitat types had a mean shelter rating of 7, and pool habitats had a mean shelter rating of 32 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 59. Main channel pools had a mean shelter rating of 18 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Park Gulch. Graph 7 describes the pool cover in Park 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 100% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Park Gulch was 92%. Eight percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 52% and 48%, respectively. Graph 9 describes the mean percent canopy in Park Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 95%. The dominant elements composing the structure of the stream banks consisted of 90% sand/silt/clay, 5% bedrock, 3% boulder, and 2% cobble/gravel (Graph 10). Deciduous trees were the dominant vegetation type observed in 51% of the units surveyed. Additionally, 40% of the units surveyed had coniferous trees as the dominant vegetation type, and 8% 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 Park Gulch on June 6, 2011. The water temperature taken during the survey period of 1210 hours to 1340 hours was 54 degrees Fahrenheit. Air temperatures ranged from 57 to 58 degrees Fahrenheit. The sites were sampled by I. Mikus and M. Groff (DFG).

The 13 sites sampled, including 2 sites above the end of the survey distance, yielded one age 1+ steelhead/rainbow trout and five sculpin.

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The following chart displays the information yielded from these sites:

2011 Park 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									
06/06/11	1	004	Pool	151	0	0	0	0	0
	2	007	Pool	188	0	0	0	0	0
	3	009	Pool	214	0	1	0	0	0
	4	014	Pool	433	0	0	0	0	0
	5	016	Pool	468	0	0	0	0	0
	6	039	Pool	983	0	0	0	0	0
	7	057	Pool	1305	0	0	0	0	0
	8	063	Pool	1423	0	0	0	0	0
	9	069	Pool	1598	0	0	0	0	0
	10	089	Pool	2021	0	0	0	0	0
	11	092	Pool	2072	0	0	0	0	0
	12	--	Pool		0	0	0	0	0
	13	--	Pool		0	0	0	0	0

DISCUSSION

Park Gulch is a G4 channel type for 2,072 feet of the stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days May 23 to May 24, 2011, ranged from 45 to 50 degrees Fahrenheit. Air temperatures ranged from 47 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 56% of the total length of this survey, riffles 10%, and pools 33%. Four of the 46 (9%) 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 large wood structures that will increase or deepen pool habitat is recommended.

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All of the 46 pool tail-outs measured had embeddedness ratings of 1 or 2. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

All of the 46 pool tail-outs measured had gravel as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools is 32. The shelter rating in the flatwater habitats is 7. 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 Park 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 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 93% and 95%, 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) Park 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.

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COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey.

Position (ft):	Habitat Unit #:	Comments:
0	0001.00	Start of survey at the confluence with Chamberlain Creek. The channel is a G4 for the entire length of the survey.
95	0003.00	A logging road crosses the channel. The crossing is a 14' wide x 27' high x 32' long concrete and wood bridge.
952	0038.00	Log debris accumulation (LDA) #01 contains six pieces of large woody debris (LWD) and measures 3' high x 16' wide x 10' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 8' wide x 21' long x 1.5' deep. Fish were observed above the LDA.
1147	0050.00	LDA #02 contains five pieces of LWD and measures 2' high x 12' wide x 20' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 7' wide x 18' long x 1' deep. Fish were observed above the LDA.
1305	0058.00	LDA #03 contains seven pieces of LWD and measures 5.5' high x 20' wide x 14' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 7' wide x 12' long x 2' deep. It is a possible barrier to adult salmonids.
1780	0077.00	LDA #04 contains four pieces of LWD and measures 5' high x 20' wide x 8' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 10' wide x 20' long x 2' deep. It is a possible barrier to adult salmonids.
1884	0082.00	LDA #05 contains five pieces of LWD and measures 2' high x 12' wide x 16' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from sand to gravel and measures 6' wide x 8' long x 1' deep. It is not a barrier to juvenile and adult salmonids.
1980	0088.00	Tributary #01 enters on the right bank. It contributes to less than 1% of Park Gulch's flow. The water temperature of the tributary is 50 degrees Fahrenheit, the water temperature downstream of the tributary is 50 degrees Fahrenheit, and the water temperature upstream of the confluence is 49 degrees Fahrenheit. The tributary is not accessible to salmonids.

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2059 0092.00 End of survey at an 11' high bedrock plunge. It is a possible barrier to salmonids and a possible end of anadromy.

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: Park Gulch

LLID: 1235538393596 Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE Legal Description: T17NR15WS05 Latitude: 39:21:35.0N Longitude: 123:33:14.0

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
31	9	FLATWATER	33.7	38	1169	56.4	4.4	0.4	0.7	187	5808	81	2516		7
1	0	NOSURVEY	1.1	12	12	0.6									
46	46	POOL	50.0	15	690	33.3	7.1	0.7	1.4	108	4983	111	5104	81	32
14	1	RIFFLE	15.2	14	201	9.7	3.0	0.3	0.5	37	519	11	156		10
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
92	56				2072					11310			7776		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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 (%)
14	1	LGR	15.2	14	201	9.7	3	0.3	0.5	37	519	11	156		10	96
6	1	GLD	6.5	28	165	8.0	5	0.3	1	295	1767	88	530		5	90
12	4	RUN	13.0	19	233	11.2	4	0.4	0.7	79	950	31	375		5	92
13	4	SRN	14.1	59	771	37.2	4	0.5	1	269	3494	129	1681		9	95
30	30	MCP	32.6	16	477	23.0	6	0.5	2	102	3051	87	2607	62	18	92
1	1	CRP	1.1	17	17	0.8	6	0.8	1.9	111	111	111	111	88	20	88
1	1	LSR	1.1	8	8	0.4	11	0.2	0.7	84	84	42	42	17	45	97
14	14	PLP	15.2	13	188	9.1	9	1.0	3.4	124	1738	167	2345	126	63	90
1	0	NS	1.1	12	12	0.6										

Total Units
92

Total Units Fully Measured
56

Total Length (ft.)
2072

Total Area (sq.ft.)
11713

Total Volume (cu.ft.)
7845

Table 3 - Summary of Pool Types

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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
30	30	MAIN	65	16	477	69	6.1	0.5	102	3051	62	1856	18
16	16	SCOUR	35	13	213	31	9.0	0.9	121	1932	117	1869	59

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
46	46	690	4983	3725

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

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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
30	MCP	65	11	37	18	60	1	3	0	0	0	0
1	CRP	2	0	0	1	100	0	0	0	0	0	0
1	LSR	2	1	100	0	0	0	0	0	0	0	0
14	PLP	30	0	0	11	79	2	14	1	7	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
46	12	26	30	65	3	7	1	2	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Dry Units: 0

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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
14	1	LGR	90	10	0	0	0	0	0	0	0
14	1	TOTAL RIFFLE	90	10	0	0	0	0	0	0	0
6	1	GLD	20	60	0	0	0	0	0	20	0
12	3	RUN	48	50	0	0	0	0	0	0	3
13	4	SRN	15	23	1	10	0	0	0	51	0
31	8	TOTAL FLAT	25	36	1	6	0	0	0	32	1
30	30	MCP	21	29	27	5	0	0	0	17	1
1	1	CRP	90	0	0	10	0	0	0	0	0
1	1	LSR	40	30	30	0	0	0	0	0	0
14	14	PLP	16	22	49	6	0	0	5	1	0
46	46	TOTAL POOL	22	26	34	5	0	0	2	11	1
1	0	NS									
92	55	TOTAL	24	27	28	5	0	0	1	14	1

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Dry Units: 0

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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
14	1	LGR	0	0	100	0	0	0	0
6	1	GLD	0	0	100	0	0	0	0
12	3	RUN	0	33	67	0	0	0	0
13	4	SRN	0	25	25	0	0	0	50
30	30	MCP	0	20	70	0	0	0	10
1	1	CRP	0	100	0	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0
14	14	PLP	0	14	79	7	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
92	48	52	0	93	95

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 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

Legal Description: T17NR15WS05

Latitude: 39:21:35.0N

Longitude: 123:33:14.0W

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	3	3	5.5
Boulder	1	2	2.7
Cobble / Gravel	1	1	1.8
Sand / Silt / Clay	50	49	90.0

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	1	0	0.9
Brush	3	6	8.2
Hardwood Trees	29	27	50.9
Coniferous Trees	22	22	40.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 1

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

StreamName: Park Gulch

LLID: 1235538393596

Drainage: Big River

Survey Dates: 5/23/2011 to 5/24/2011

Confluence Location: Quad: COMPTCHE

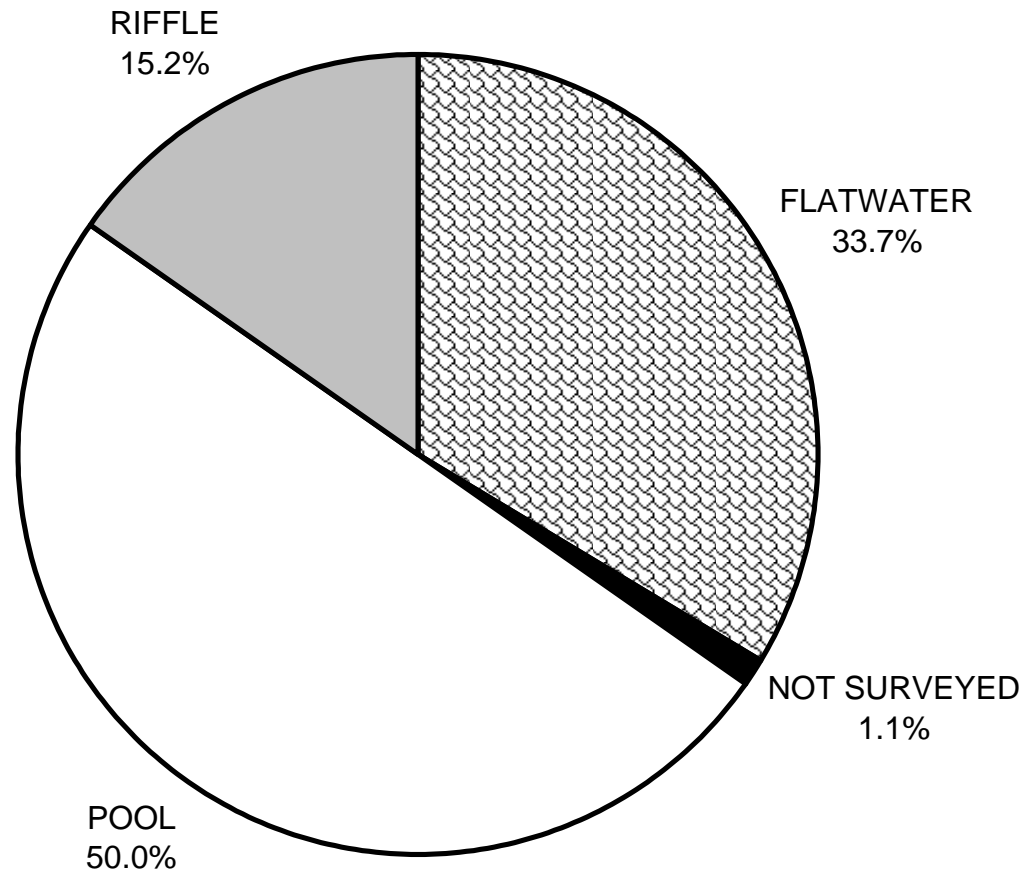
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Longitude: 123:33:14.0W

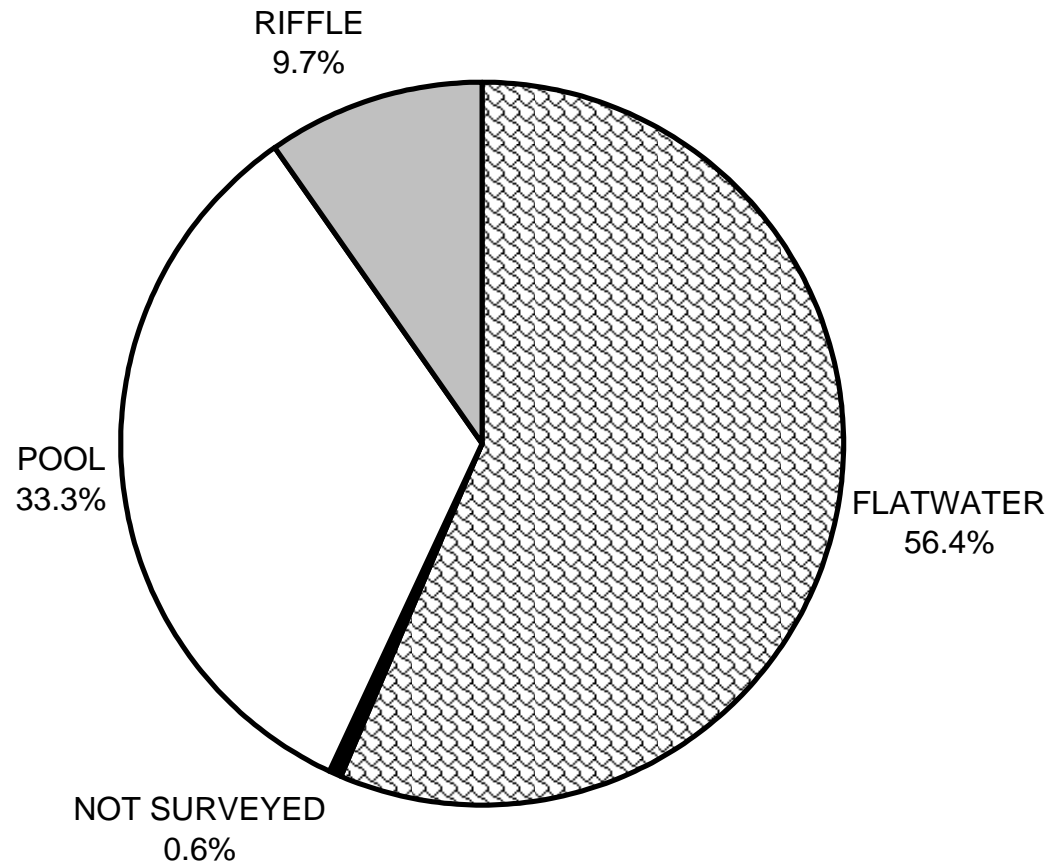
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	90	25	22
SMALL WOODY DEBRIS (%)	10	36	26
LARGE WOODY DEBRIS (%)	0	1	34
ROOT MASS (%)	0	6	5
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	2
BOULDERS (%)	0	32	11
BEDROCK LEDGES (%)	0	1	1

PARK GULCH 2011 HABITAT TYPES BY PERCENT OCCURRENCE



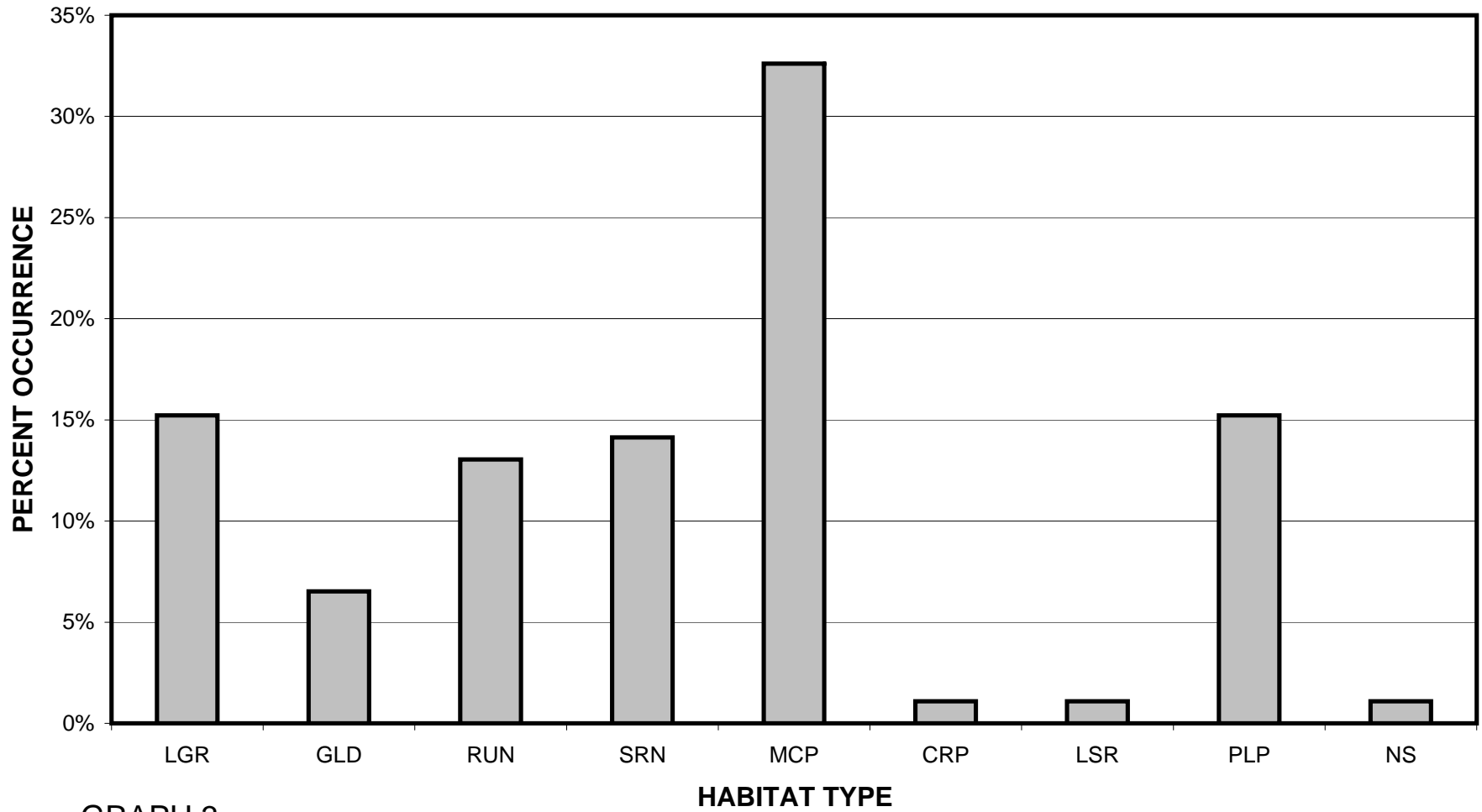
GRAPH 1

PARK GULCH 2011 HABITAT TYPES BY PERCENT TOTAL LENGTH



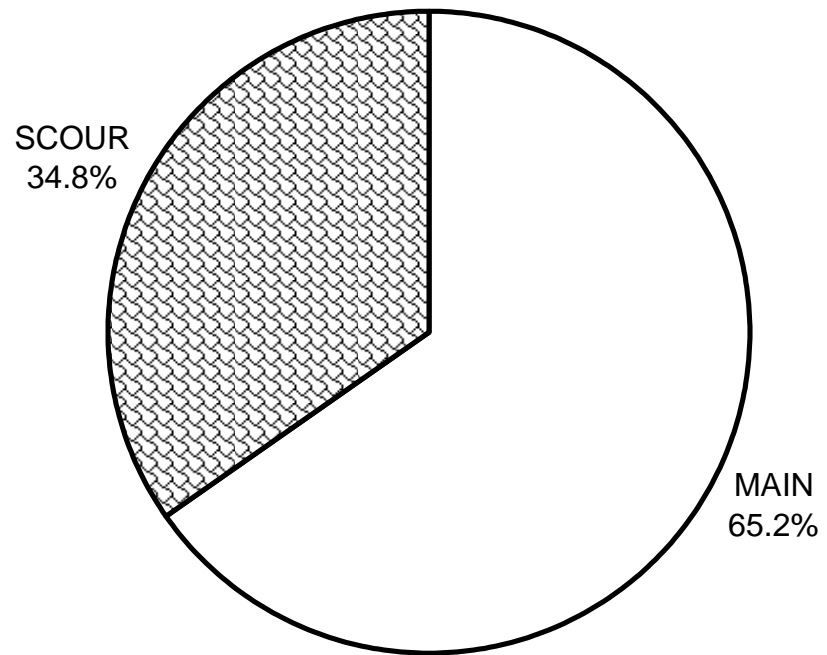
GRAPH 2

PARK GULCH 2011 HABITAT TYPES BY PERCENT OCCURRENCE



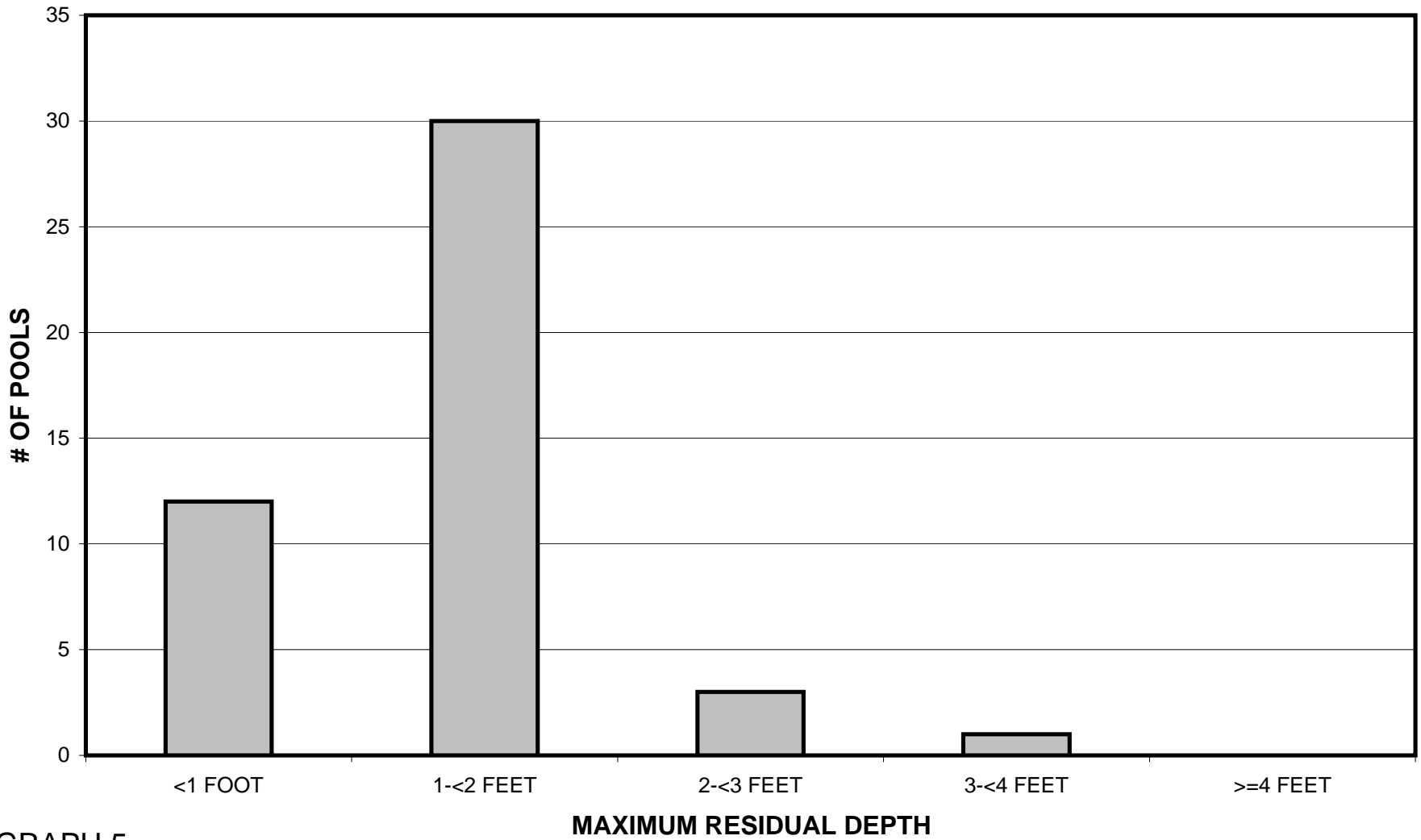
GRAPH 3

**PARK GULCH 2011
POOL TYPES BY PERCENT OCCURRENCE**



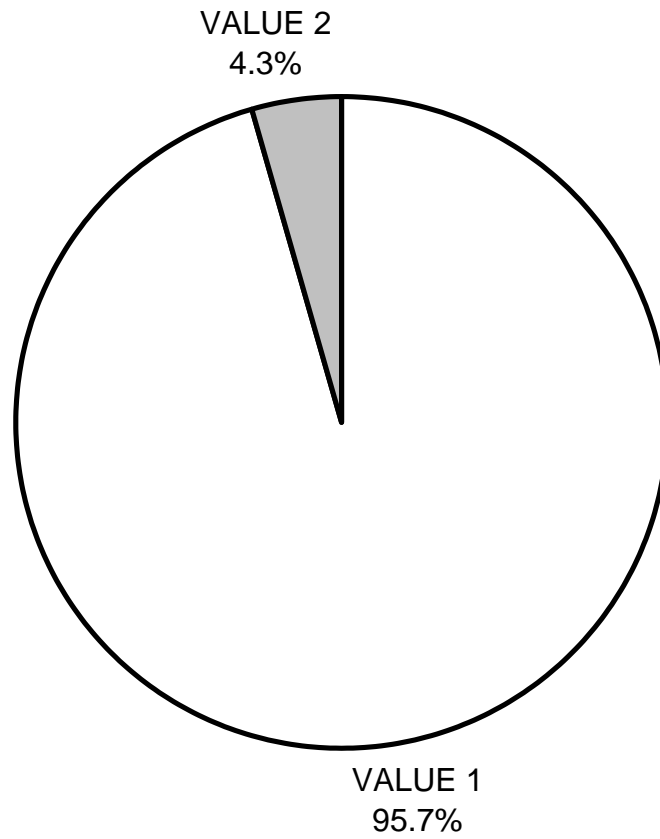
GRAPH 4

PARK GULCH 2011 MAXIMUM DEPTH IN POOLS



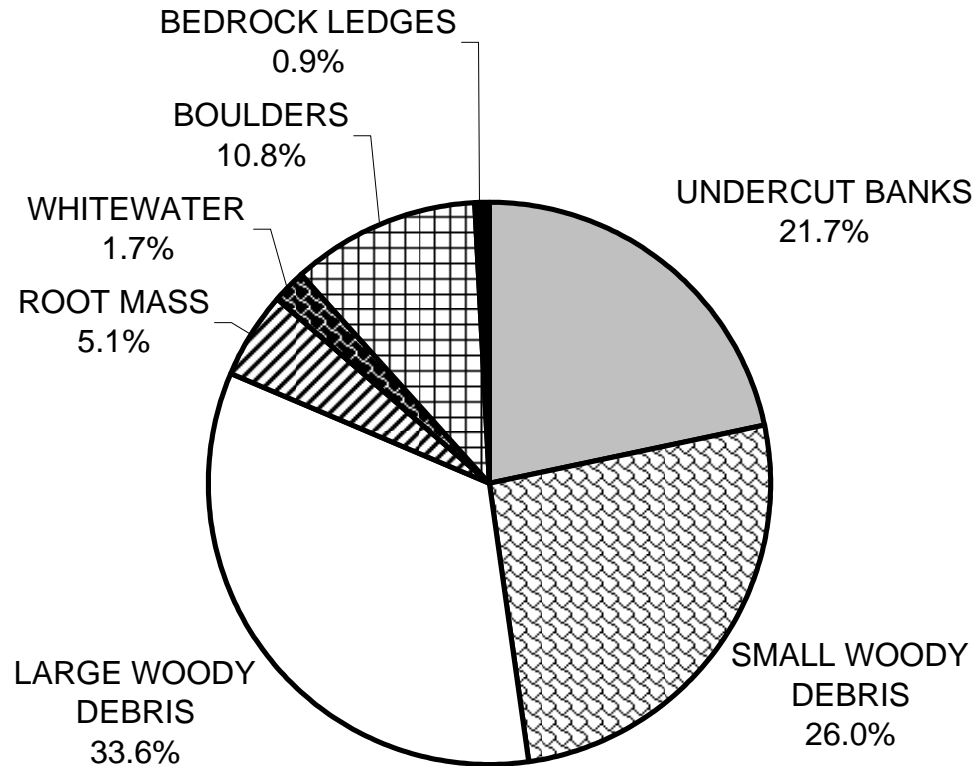
GRAPH 5

PARK GULCH 2011 PERCENT EMBEDDEDNESS



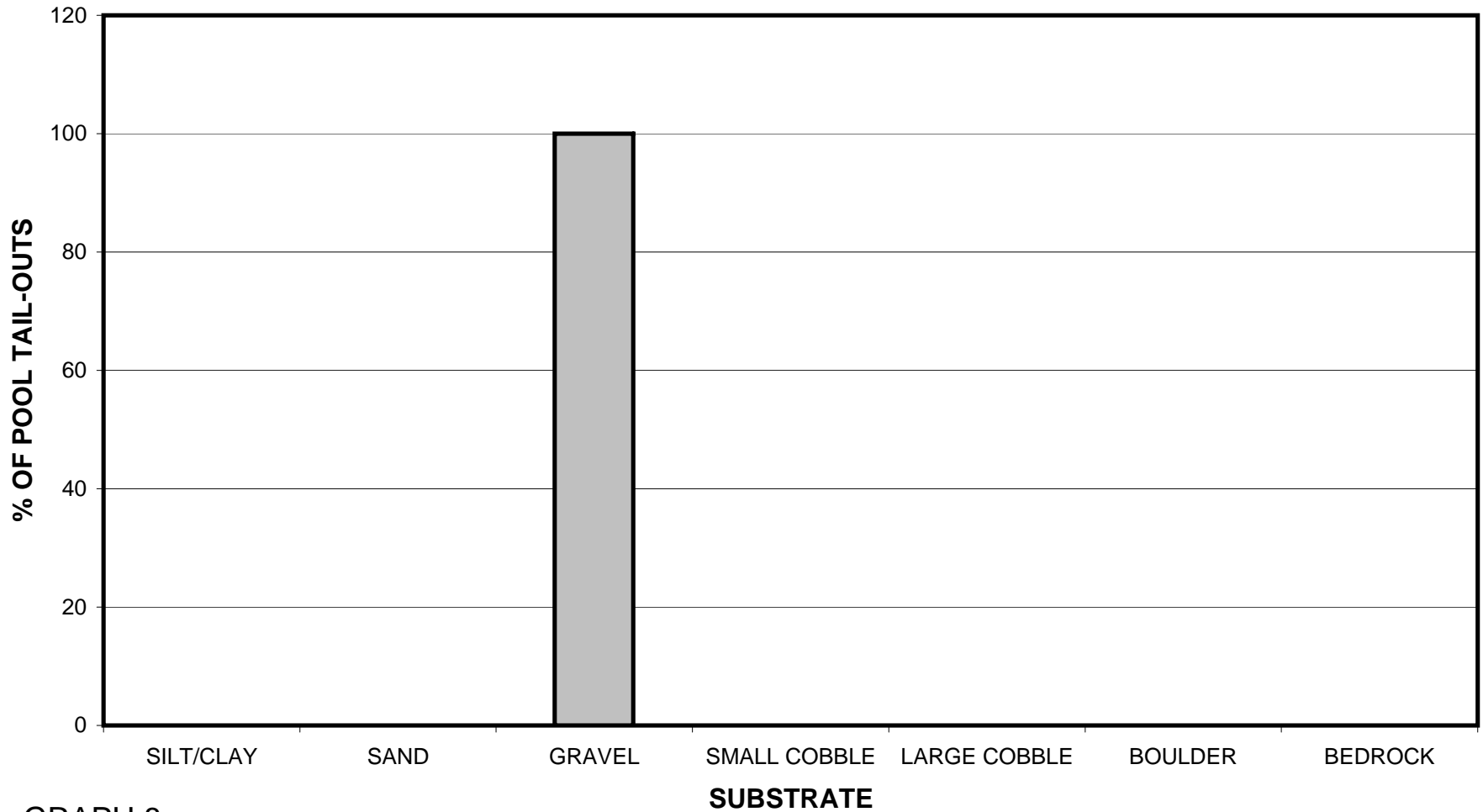
GRAPH 6

PARK GULCH 2011 MEAN PERCENT COVER TYPES IN POOLS



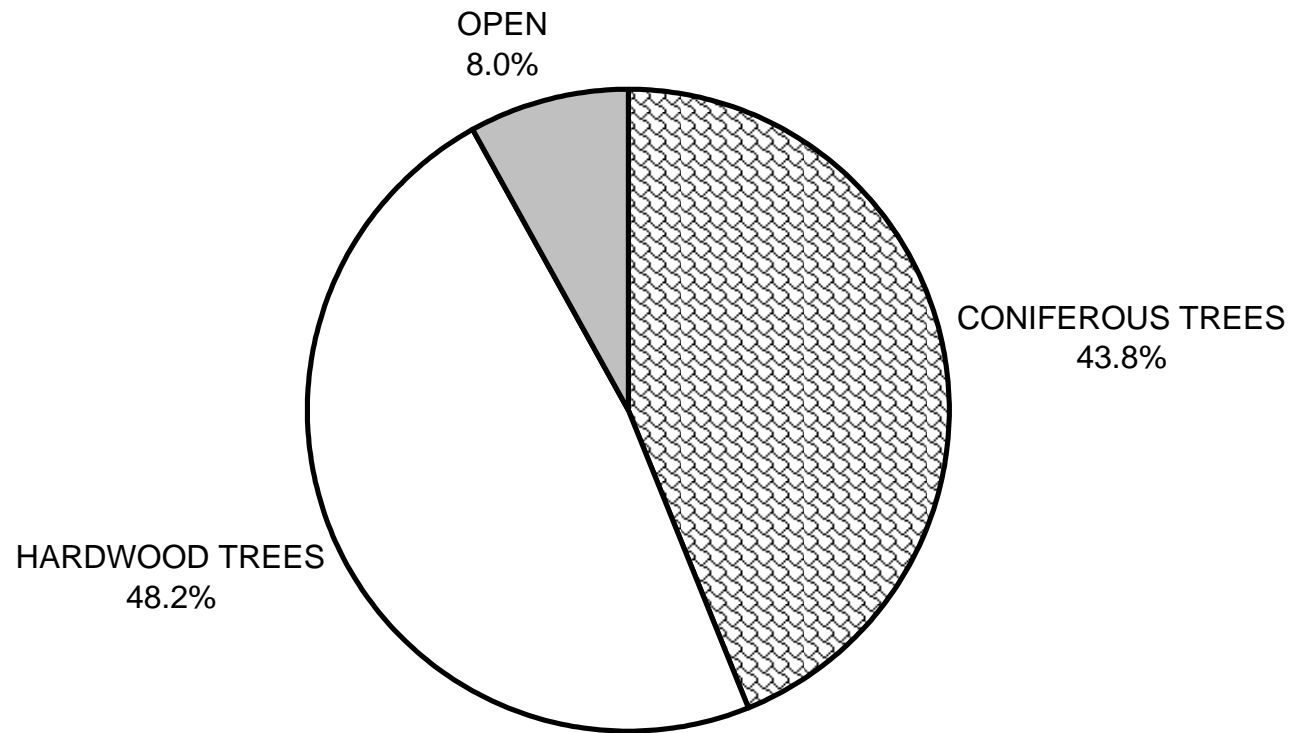
GRAPH 7

PARK GULCH 2011 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



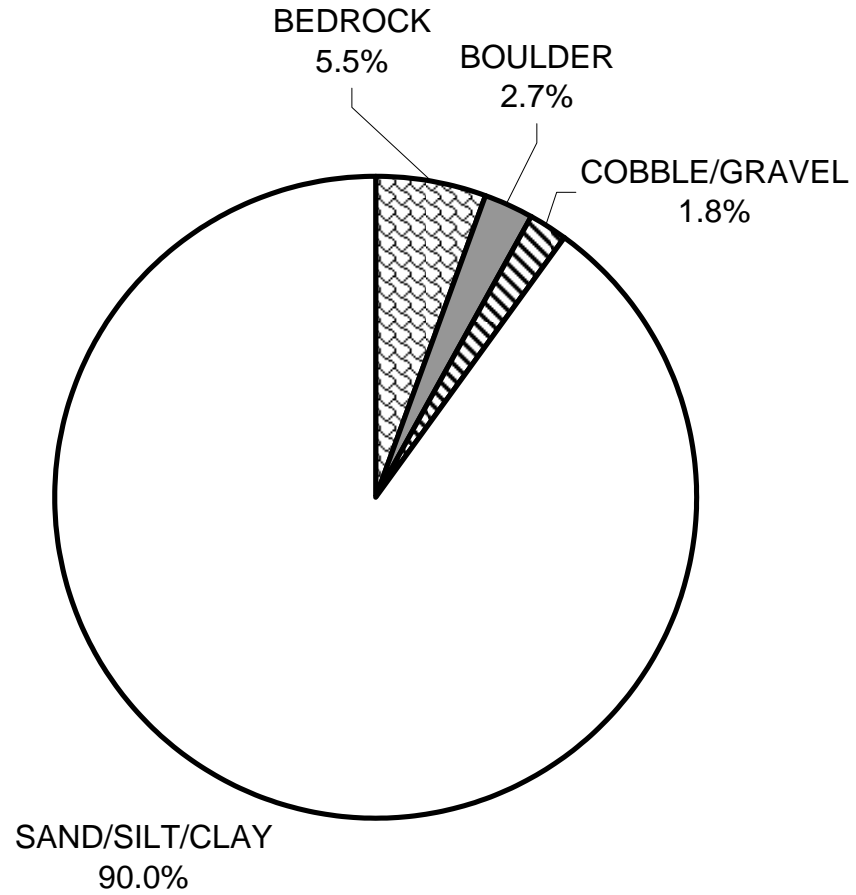
GRAPH 8

PARK GULCH 2011 MEAN PERCENT CANOPY



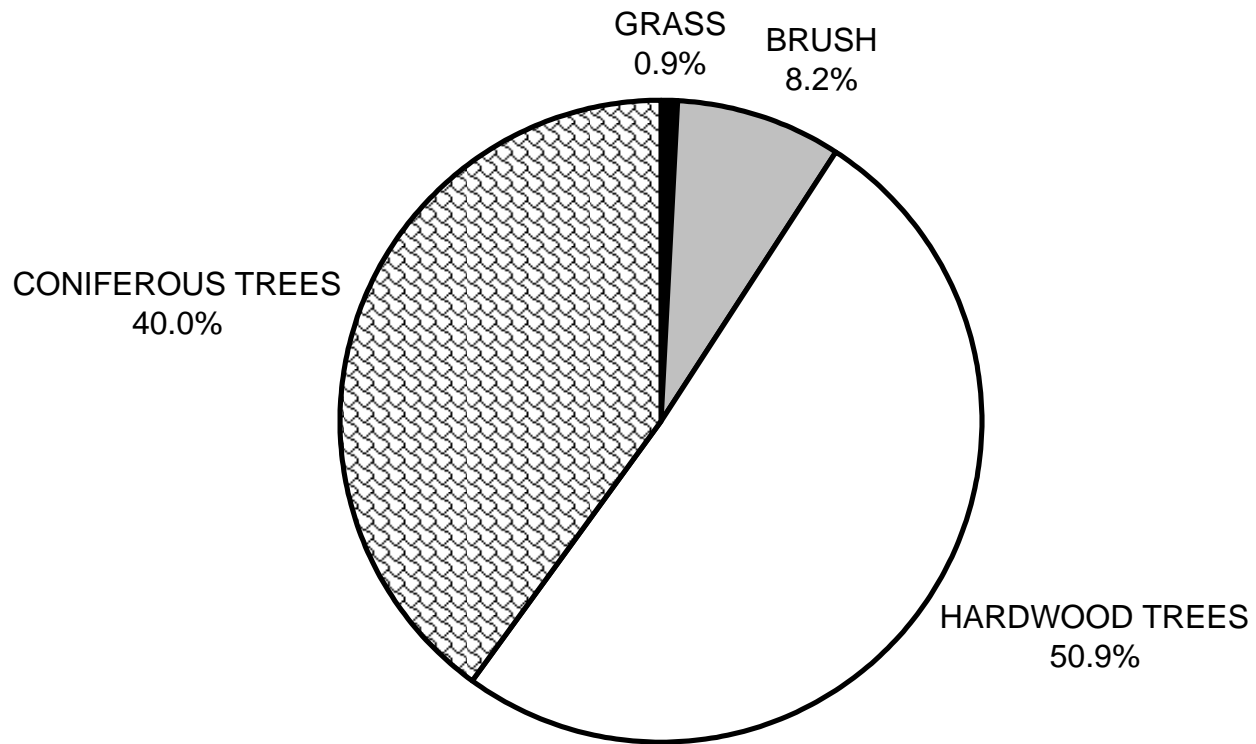
GRAPH 9

**PARK GULCH 2011
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

PARK GULCH 2011 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

