

STREAM INVENTORY REPORT

Russian Gulch

INTRODUCTION

A stream inventory was conducted from July 7 to July 14, 2008 on Russian Gulch. The survey began at the confluence with Pacific Ocean and extended upstream 1.9 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Russian Gulch.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Russian Gulch drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Russian Gulch's legal description at the confluence with Pacific Ocean is T17N R17W S18. Its location is 39.3291 north latitude and 123.8036 west longitude, LLID number 1238037393291. Russian Gulch is a second order stream and has approximately 6.4 miles of blue line stream according to the USGS Mendocino 7.5 minute quadrangle. Russian Gulch drains a watershed of approximately 4.0 square miles. Elevations range from sea level at the mouth of the creek to 600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is located within Russian Gulch State Park and Jackson Demonstration State Forest and is managed for timber production and recreation. Vehicle access exists via Highway 1 to Russian Gulch State Park.

METHODS

The habitat inventory conducted in Russian Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians 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

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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 Russian 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". Russian 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 Russian Gulch, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26

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- 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Russian 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 Russian 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 Russian 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 root wads) 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

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twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

DATA ANALYSIS

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

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

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Russian 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

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HABITAT INVENTORY RESULTS

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

The habitat inventory of July 7 to July 14, 2008, was conducted by J. Johnson and R. Swan (PSMFC). The total length of the stream surveyed was 10,327 feet. The first 413 feet of Russian Gulch was not surveyed due to tidal influence. Three units totaling 153 feet were not surveyed due to log debris accumulations. The data included in this report is for the 9,913 feet actually surveyed.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.92 cfs on July 14, 2008

The channel type for the first 414 feet of Russian Gulch was undetermined (Reach 1). Russian Gulch is a B5 channel type for the next 3,505 feet of the stream surveyed (Reach 2), and a B4 channel type for 6,408 feet of the stream surveyed (Reach 3). B5 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and sand-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 49 to 66 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 54% pool units, 35% flatwater units, and 11% riffle units (Graph 1). Based on total length of Level II habitat types there were 48% flatwater units, 46% pool units, and 5% riffle units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were lateral scour pool - log enhanced units, 27%; step run units, 18%; and run units, 17% (Graph 3). Based on percent total length, step run units made up 27%, lateral scour pool - log enhanced units 22%, and run units 21%.

A total of 91 pools were identified (Table 3). Scour pools were the most frequently encountered at 75% (Graph 4), and comprised 76% 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. Fifty-two of the 91 pools (57%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 91 pool tail-outs measured, 34 had a value of 1 (37.4%); 23 had a value of 2 (25.3%); 10 had a value of 3 (11%); 1 had a value of 4 (1.1%); 23 had a value of 5 (25.3%) (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 unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

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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 60, flatwater habitat types had a mean shelter rating of 111, and pool habitats had a mean shelter rating of 135 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 145. Main channel pools had a mean shelter rating of 104 (Table 3).

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

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 59% of the pool tail-outs. Sand was the next most frequently observed dominant substrate type and occurred in 18% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Russian Gulch was 92%. Eight percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 73% and 27%, respectively. Graph 9 describes the mean percent canopy in Russian Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 90%. The mean percent left bank vegetated was 93%. The dominant elements composing the structure of the stream banks consisted of 83% sand/silt/clay, 14% cobble/gravel, 1% bedrock, and 1% boulder (Graph 10). Brush was the dominant vegetation type observed in 65% of the units surveyed. Additionally, 24% of the units surveyed had deciduous trees as the dominant vegetation type, and 8% had coniferous trees as the dominant vegetation type (Graph 11).

DISCUSSION

Russian Gulch channel type was undetermined for the first 413 feet of stream, a B5 channel type for the next 3,505 feet surveyed (Reach 1), and a B4 channel type for the remaining 6,408 feet of the stream surveyed (Reach 3). The suitability of B5 and B4 channel types for fish habitat improvement structures is as follows: B5 channel types are excellent for bank-placed boulders and good for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days July 7 to July 14, 2008, ranged from 57 to 62 degrees Fahrenheit. Air temperatures ranged from 49 to 66 degrees Fahrenheit. To make any conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 48% of the total length of this survey, riffles 5%, and pools 46%. Fifty-two of the 91 (57%) pools had a maximum residual depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40%

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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.

Fifty-seven of the 91 pool tail-outs measured had embeddedness ratings of 1 or 2. Eleven of the pool tail-outs had embeddedness ratings of 3 or 4. Twenty-three 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.

Sixty-six of the 90 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 was 135. The shelter rating in the flatwater habitats was 111. 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 Russian Gulch. Large woody debris is the dominant cover type in pools followed by terrestrial vegetation. 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 92%. Reach 2 had a canopy density of 90%, Reach 3 had a canopy density of 93%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 90% and 93%, 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) Russian 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.

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COMMENTS AND LANDMARKS

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

Position (ft)	Habitat Unit #	Comments:
414	0002.00	Started survey 414 feet from the Pacific Ocean.
983	0006.00	Bridge #01 is a park road bridge made of concrete covering wetted width. Its dimensions are 6.7 feet high and 15 feet long.
1186	0012.00	Bridge #02 is a park road bridge made of wood measuring 4.3 feet high, 24 feet long and 15 feet wide.
1225	0014.00	There is a wire fence holding the bank back. A one year old+ salmonid (1+) was observed. There is a road and a metal culvert on the right bank.
1258	0015.00	There is a trail across the stream and sediment accumulation.
1447	0022.00	There is a road on the right bank.
1491	0023.00	There is left bank sediment accumulation, a right bank failure and a road on the right bank.
1586	0025.00	Bridge #03 is made of wood and measures 4 feet high, 21 feet long and 18' wide.
1608	0026.00	There are bank failure and trails to the stream on both banks.
2258	0039.00	There is a right bank failure/erosion measuring approximately 6.5 feet high, and 8' wide.
2351	0042.00	There is a large sediment accumulation mid-channel.
2371	0043.00	There is a road on the right bank.
2535	0047.00	There is a large sediment accumulation mid-channel
2565	0048.00	There is a log jam between this unit and the last, there is also a left bank failure.
2899	0054.00	The right bank is held back by wire fencing, and there is a road on the right bank.

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Position (ft)	Habitat Unit #	Comments:
3371	0064.00	There are logs holding back the right bank.
3617	0067.00	There is a right bank tributary (Trib #01) contributing approximately 1% to Russian Gulch's flow. It is not accessible to fish and no fish were observed in it.
3801	0070.00	There are logs placed to hold back the right bank.
3856	0071.00	There is a left bank failure and right bank sediment accumulation.
4027	0074.00	There is a right bank failure and left bank sediment deposits.
4266	0078.00	There is a left bank failure, and right bank sediment accumulation.
4695	0083.00	Tributary #02 enters from the left bank and is contributing to approx. 1% of Russian Gulch's flow. No fish were observed and the tributary is currently not accessible to fish, although it may be at higher flows. The temperature of the tributary is 56 Fahrenheit.
4809	0084.00	The right bank is failing and being held back by logs.
5339	0094.00	There is a large debris accumulation (LDA) measuring 4.5 feet high x 35 feet wide x 63 feet long and contains 17 pieces of large woody debris (LWD). It is a possible fish barrier in low flows. It is retaining sediment in the dimensions of 1.6 feet high x 10 feet wide x 15 feet long.
5402	0095.00	There is a left bank failure, and a large sediment accumulation combined with small woody debris.
5611	0099.00	Young of the year and 1+ salmonids were observed in this unit.
6209	0105.00	There is a right bank tributary flowing from a culvert (Tributary #03).
6338	0107.00	There is a small log jam with sediment accumulation and a left bank failure.
6847	0115.00	There are logs built up on the right bank to keep bank back. There is a right bank culvert that is flowing water.
7342	0124.00	Tributary #04 enters from the right bank tributary contributing to approximately 2% of Russian Gulch's flow. The tributary is not currently

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Position (ft)	Habitat Unit #	Comments:
		accessible to fish, but may be in higher flows. No fish were observed in it.
7496	0127.00	A stickleback and a sculpin were observed in this unit.
7932	0132.00	There is an LDA that measures 5 feet high x 23 feet wide x 13' long. The log jam has gaps and is accessible to fish. It is made up of approximately 20 pieces of LWD. There is a sediment deposit measuring approximately 25 feet long x 14 feet wide x 1.5 feet high. The sediment is composed of sand and gravel. Salmonids were observed above the LDA.
7962	0133.00	There is a trail on the right bank. There is an erosion site above the trail.
8746	0146.00	A 1+ salmonid was observed in this unit.
9178	0150.00	There is an LDA that is retaining sediment and large boulders. A trail on the right bank is washed out and the right bank is failing. Logs have been placed to protect the right bank. This LDA is causing a possible barrier due to built up sediment and a boulder cascade with no jump pool below. The sediment measures approximately 11 feet high x 23 feet wide sediment x 22 feet long.
9178	0150.00	There is an LDA that measures 26 feet wide x 19 feet long x 10 feet high and contains 23 pieces of LWD. There are gaps in it and maybe accessible to fish in higher flows. Sediment is being retained in the approximate dimensions of 3.7 feet high x 15 feet long x 16.5 feet wide, with a tree growing in the middle of it.
9263	0152.00	There is a log and boulder jam which may be inaccessible to fish in low flows.
9522	0157.00	There are logs holding the right bank back.
9664	0161.00	There was a two year old+ trout observed in this unit.
10027	0167.00	There is a log jam with sediment accumulation on the right bank.
10327	0171.00	End of survey, only one salmonid has been observed since the LDA at habitat unit #149.

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REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }

BACKWATER POOLS

Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Russian Gulch

LLID: 1238037393291 Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO Legal Description: T17NR17WS18 Latitude: 39:19:45.0N Longitude: 123:48:13.0

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
58	20	FLATWATER	34.7	81	4695	48.1	12.1	0.5	1.2	993	57597	492	28550		111
4	0	NOSURVEY		142	567										
91	91	POOL	54.5	50	4530	46.4	13.9	0.6	2.1	708	64385	660	60029	422	135
18	2	RIFFLE	10.8	30	535	5.5	14.0	0.5	1.0	263	4725	118	2117		60
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
171	113				10327					126707			90696		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

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 (%)
17	2	LGR	10.2	28	477	4.9	14	0.5	1.2	263	4463	118	1999		60	96
1	0	HGR	0.6	58	58	0.6										94
28	7	RUN	16.8	72	2018	20.7	12	0.5	1.9	1021	28588	464	12980		89	86
30	13	SRN	18.0	89	2677	27.4	12	0.6	2	978	29340	508	15230		123	95
23	23	MCP	13.8	47	1083	11.1	14	0.5	3	666	15327	606	13934	391	104	92
10	10	CRP	6.0	74	743	7.6	16	0.6	3.2	1288	12880	1152	11520	788	145	96
45	45	LSL	26.9	48	2159	22.1	14	0.6	4.6	651	29295	637	28643	395	148	91
6	6	LSR	3.6	42	249	2.6	13	0.5	3.1	535	3211	445	2673	309	100	95
1	1	LSBk	0.6	70	70	0.7	14	0.3	2.1	980	980	588	588	294	225	100
5	5	LSBo	3.0	33	165	1.7	13	0.6	3.2	441	2205	417	2086	260	173	84
1	1	PLP	0.6	61	61	0.6	8	0.4	1.3	488	488	586	586	195	45	92
4	0	NS		142	567											

Total Units
171

Total Units Fully Measured
113

Total Length (ft.)
10327

Total Area (sq.ft.)
126775

Total Volume (cu.ft.)
90238

Table 3 - Summary of Pool Types

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

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
23	23	MAIN	25	47	1083	24	13.8	0.5	666	15327	391	8992	104
68	68	SCOUR	75	51	3447	76	14.0	0.6	721	49059	433	28994	145

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
91	91	4530	64385	37986

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

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

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
23	MCP	25	1	4	6	26	15	65	1	4	0	0
10	CRP	11	0	0	1	10	8	80	1	10	0	0
45	LSL	49	3	7	21	47	15	33	3	7	3	7
6	LSR	7	1	17	1	17	2	33	2	33	0	0
1	LSBk	1	0	0	0	0	1	100	0	0	0	0
5	LSBo	5	1	20	3	60	0	0	1	20	0	0
1	PLP	1	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
91	6	7	33	36	41	45	8	9	3	3

Mean Maximum Residual Pool Depth (ft.): 2.1

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Dry Units: 0

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

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
17	2	LGR	25	35	10	0	30	0	0	0	0
1	0	HGR									
18	2	TOTAL RIFFLE	25	35	10	0	30	0	0	0	0
28	7	RUN	16	28	11	0	41	1	0	3	0
30	13	SRN	5	23	19	3	34	0	3	12	0
58	20	TOTAL FLAT	9	25	17	2	37	1	2	9	0
23	23	MCP	10	23	22	7	29	0	1	9	0
10	10	CRP	12	20	22	12	30	0	0	6	0
45	45	LSL	5	22	44	6	17	0	1	5	0
6	6	LSR	14	14	3	52	13	0	1	3	0
1	1	LSBk	15	10	10	10	10	0	5	20	20
5	5	LSBo	12	11	15	4	20	0	6	28	4
1	1	PLP	0	30	30	0	40	0	0	0	0
91	91	TOTAL POOL	8	21	31	10	21	0	1	7	0
4	0	NS									
171	113	TOTAL	8	22	28	8	24	0	1	7	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Dry Units: 0

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

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
17	2	LGR	0	0	100	0	0	0	0
1	0	HGR	0	0	0	0	0	0	0
28	7	RUN	0	57	43	0	0	0	0
30	13	SRN	0	0	62	38	0	0	0
23	23	MCP	9	39	48	4	0	0	0
10	10	CRP	0	60	40	0	0	0	0
45	45	LSL	13	42	38	7	0	0	0
6	6	LSR	17	50	33	0	0	0	0
1	1	LSBk	0	100	0	0	0	0	0
5	5	LSBo	0	20	60	20	0	0	0
1	1	PLP	0	0	100	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
92	27	73	0	90	93

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: Russian Gulch LLID: 1238037393291 Drainage: Big River
 Survey Dates: 7/7/2008 to 7/14/2008 Survey Length (ft.): 10327 Main Channel (ft.): 10327 Side Channel (ft.): 0
 Confluence Location: Quad: MENDOCINO Legal Description: T17NR17WS18 Latitude: 39:19:45.0N Longitude: 123:48:13.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: NA	Canopy Density (%):	Pools by Stream Length (%): 0.0
Reach Length (ft.): 414	Coniferous Component (%):	Pool Frequency (%): 0.0
Riffle/Flatwater Mean Width (ft.):	Hardwood Component (%):	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation:	< 2 Feet Deep:
Range (ft.): 23 to 23	Vegetative Cover (%): 0.0	2 to 2.9 Feet Deep:
Mean (ft.): 23	Dominant Shelter:	3 to 3.9 Feet Deep:
Std. Dev.: 0	Dominant Bank Substrate Type:	>= 4 Feet Deep:
Base Flow (cfs.): 1.9	Occurrence of LWD (%):	Mean Max Residual Pool Depth (ft.):
Water (F): 58 - 58 Air (F): 49 - 49	LWD per 100 ft.:	Mean Pool Shelter Rating:
Dry Channel (ft): 0	Riffles:	
	Pools:	
	Flat:	
Pool Tail Substrate (%): Silt/Clay: Sand: Gravel: Sm Cobble: Lg Cobble: Boulder: Bedrock:		
Embeddedness Values (%): 1. 2. 3. 4. 5. 0.0		

STREAM REACH: 2

Channel Type: B5	Canopy Density (%): 90.3	Pools by Stream Length (%): 51.4
Reach Length (ft.): 3505	Coniferous Component (%): 13.3	Pool Frequency (%): 52.9
Riffle/Flatwater Mean Width (ft.): 12.2	Hardwood Component (%): 86.7	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 27
Range (ft.): 20 to 23	Vegetative Cover (%): 90.4	2 to 2.9 Feet Deep: 59
Mean (ft.): 21	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 8
Std. Dev.: 1	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 5
Base Flow (cfs.): 1.9	Occurrence of LWD (%): 32	Mean Max Residual Pool Depth (ft.): 2.4
Water (F): 57 - 62 Air (F): 49 - 66	LWD per 100 ft.:	Mean Pool Shelter Rating: 126
Dry Channel (ft): 0	Riffles: 7	
	Pools: 9	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 16 Sand: 38 Gravel: 46 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 45.9 2. 0.0 3. 0.0 4. 0.0 5. 54.1		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B4	Canopy Density (%): 92.8	Pools by Stream Length (%): 42.6
Reach Length (ft.): 6408	Coniferous Component (%): 37.4	Pool Frequency (%): 54.0
Riffle/Flatwater Mean Width (ft.): 12.3	Hardwood Component (%): 62.6	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 54
Range (ft.): 15 to 19	Vegetative Cover (%): 92.4	2 to 2.9 Feet Deep: 35
Mean (ft.): 17	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 9
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 2
Base Flow (cfs.): 1.9	Occurrence of LWD (%): 25	Mean Max Residual Pool Depth (ft.): 2.0
Water (F): 58 - 62 Air (F): 52 - 66	LWD per 100 ft.:	Mean Pool Shelter Rating: 141
Dry Channel (ft): 0	Riffles: 3	
	Pools: 7	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 2 Sand: 4 Gravel: 68 Sm Cobble: 25 Lg Cobble: 2 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 31.5 2. 42.6 3. 18.5 4. 1.9 5. 5.6		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

Legal Description: T17NR17WS18

Latitude: 39:19:45.0N

Longitude: 123:48:13.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	1	2	1.3
Boulder	2	0	0.9
Cobble / Gravel	17	15	14.3
Sand / Silt / Clay	92	95	83.5

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	1	2.7
Brush	69	76	64.7
Hardwood Trees	31	23	24.1
Coniferous Trees	7	12	8.5
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

StreamName: Russian Gulch

LLID: 1238037393291

Drainage: Big River

Survey Dates: 7/7/2008 to 7/14/2008

Confluence Location: Quad: MENDOCINO

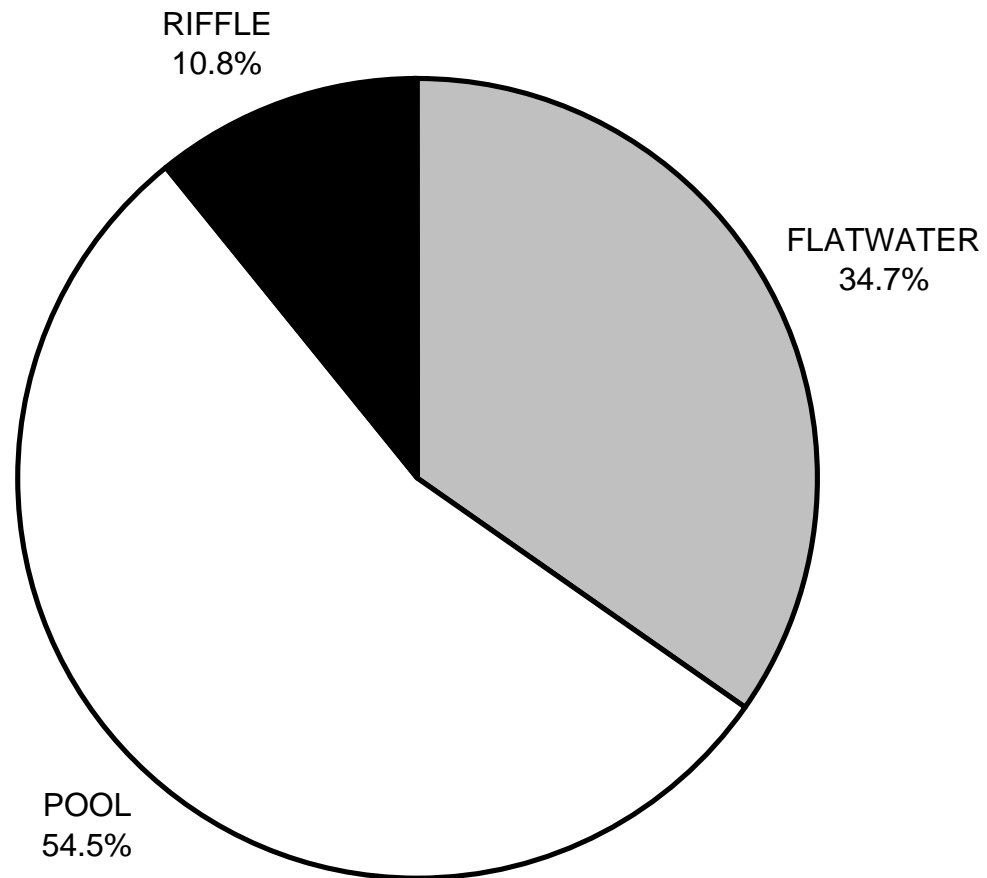
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Longitude: 123:48:13.0W

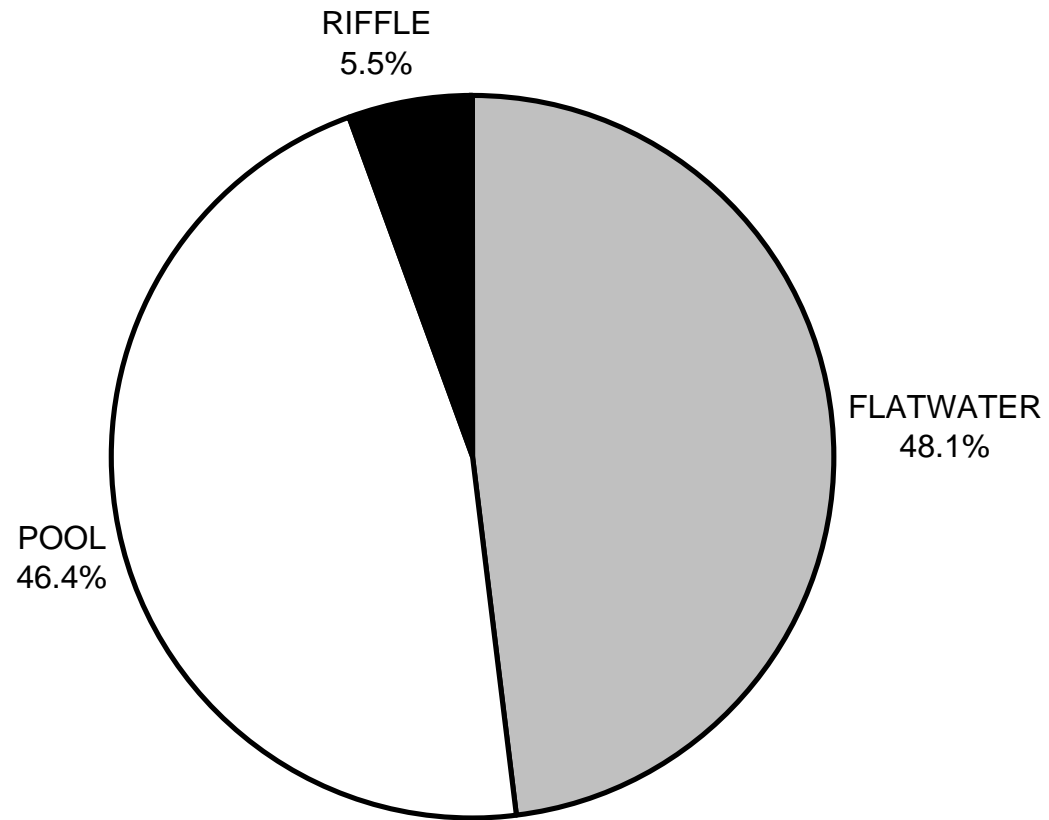
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	25	9	8
SMALL WOODY DEBRIS (%)	35	25	21
LARGE WOODY DEBRIS (%)	10	17	31
ROOT MASS (%)	0	2	10
TERRESTRIAL VEGETATION (%)	30	37	21
AQUATIC VEGETATION (%)	0	1	0
WHITEWATER (%)	0	2	1
BOULDERS (%)	0	9	7
BEDROCK LEDGES (%)	0	0	0

RUSSIAN GULCH 2008 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

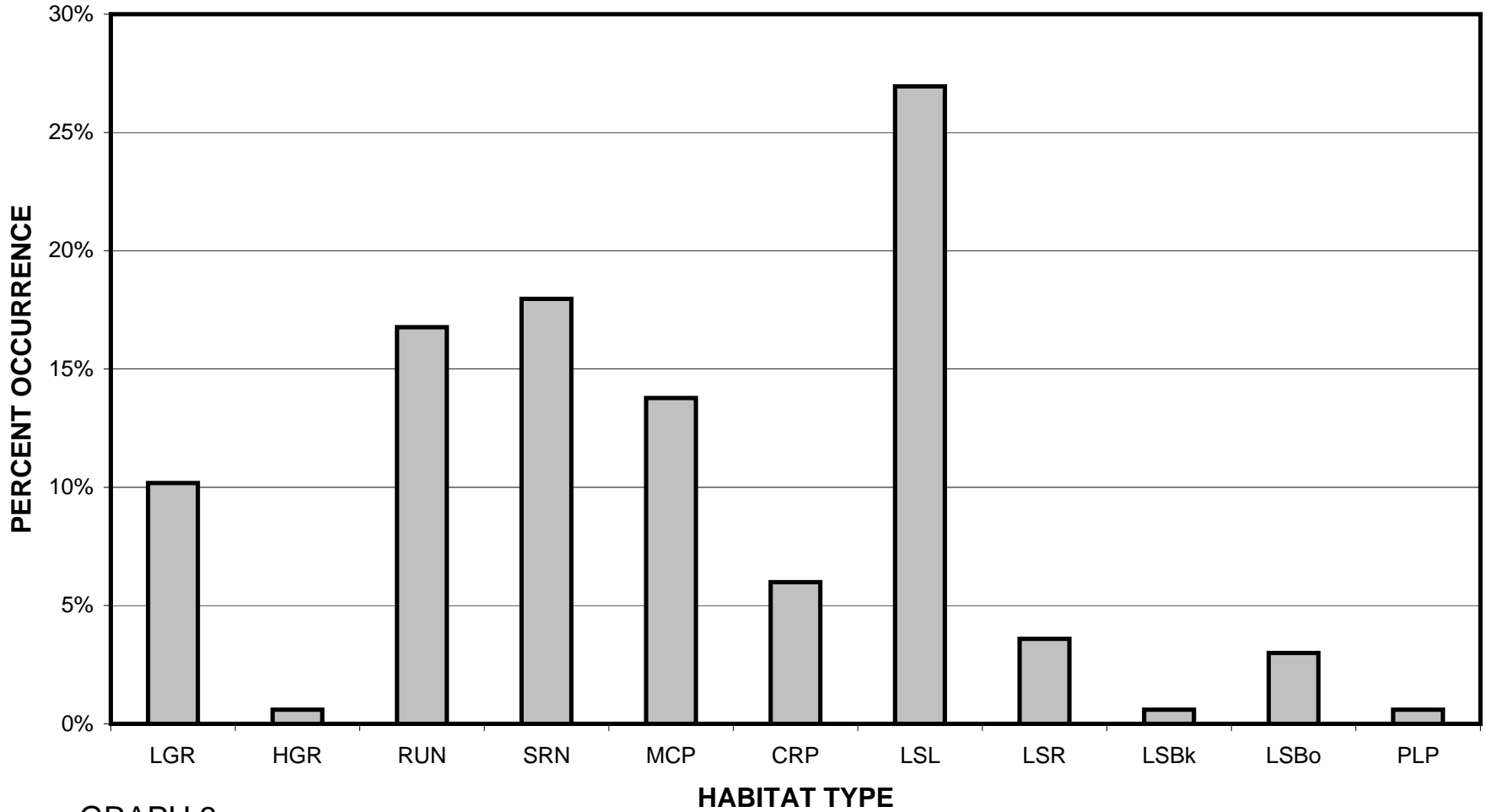
**RUSSIAN GULCH 2008
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

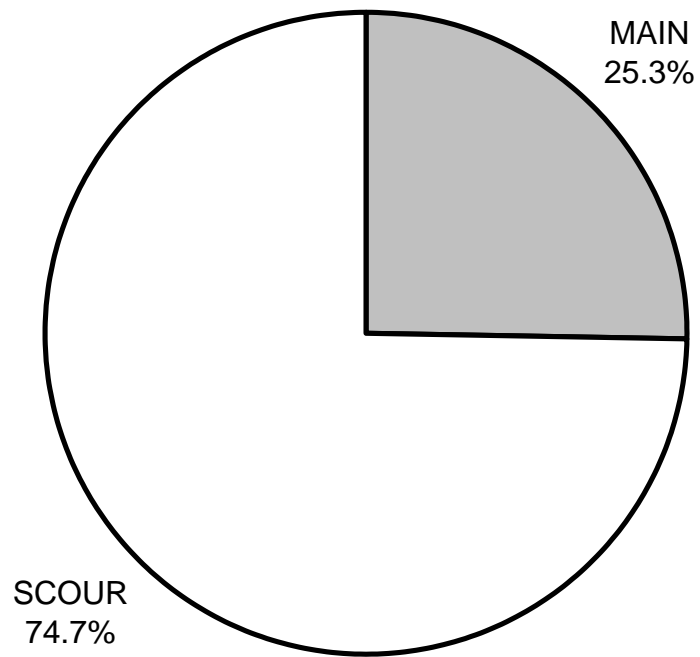
RUSSIAN GULCH 2008

HABITAT TYPES BY PERCENT OCCURRENCE



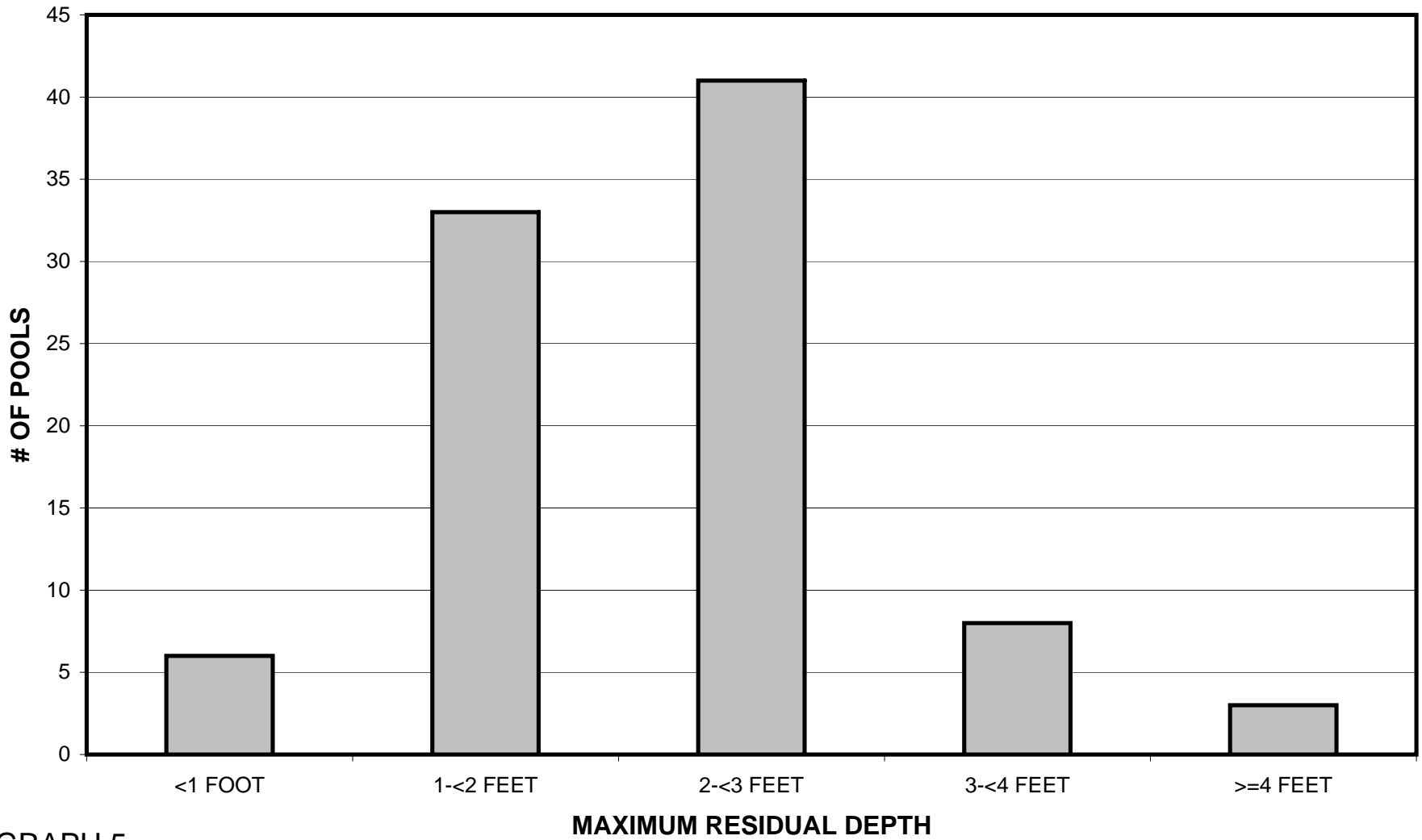
GRAPH 3

**RUSSIAN GULCH 2008
POOL TYPES BY PERCENT OCCURRENCE**



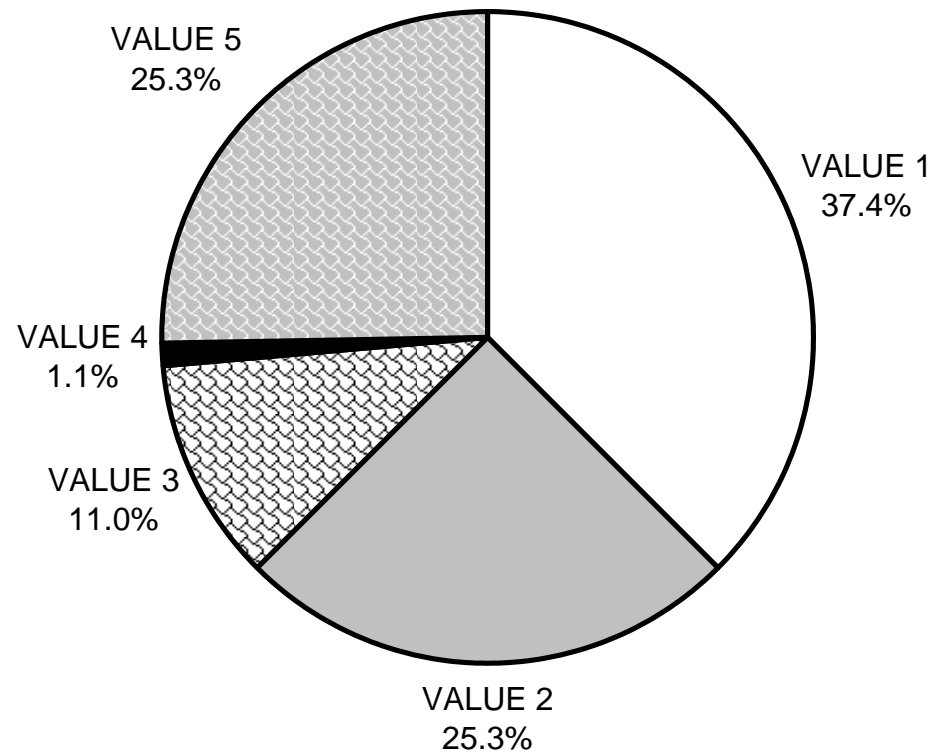
GRAPH 4

RUSSIAN GULCH 2008 MAXIMUM DEPTH IN POOLS



GRAPH 5

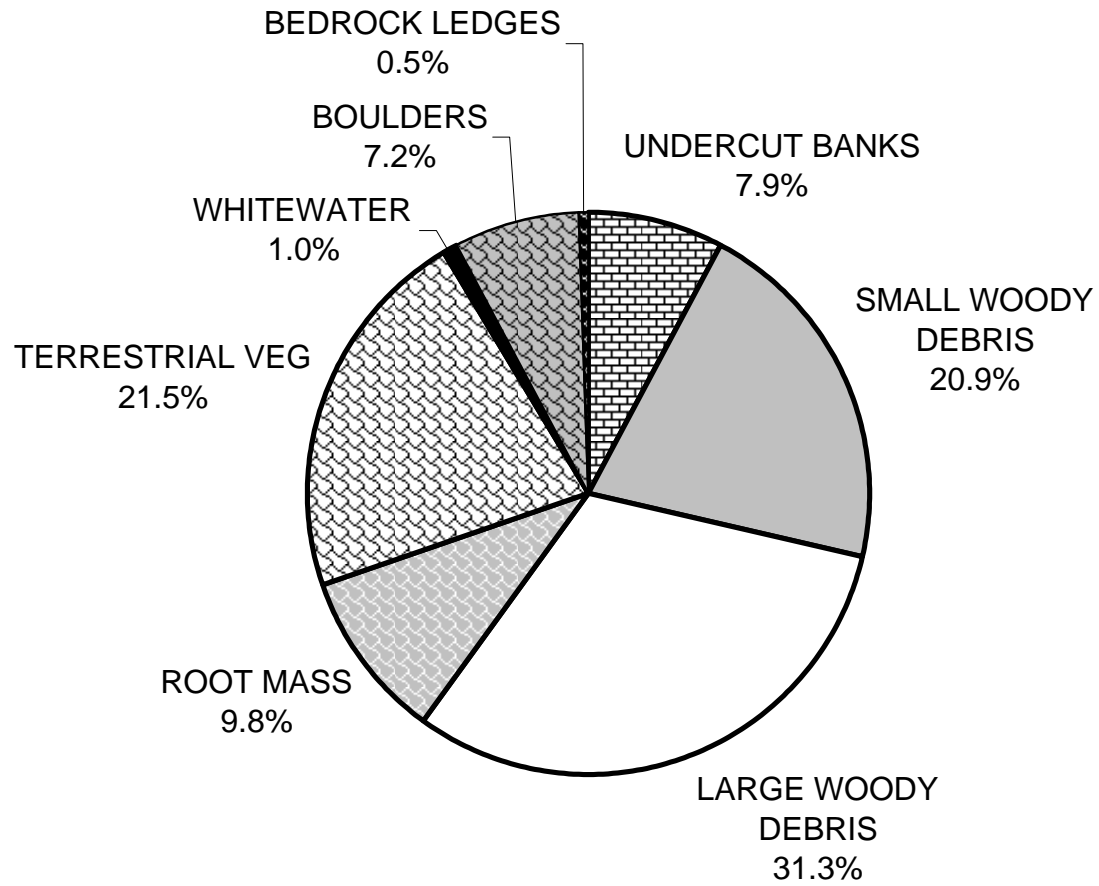
RUSSIAN GULCH 2008 PERCENT EMBEDDEDNESS



GRAPH 6

RUSSIAN GULCH 2008

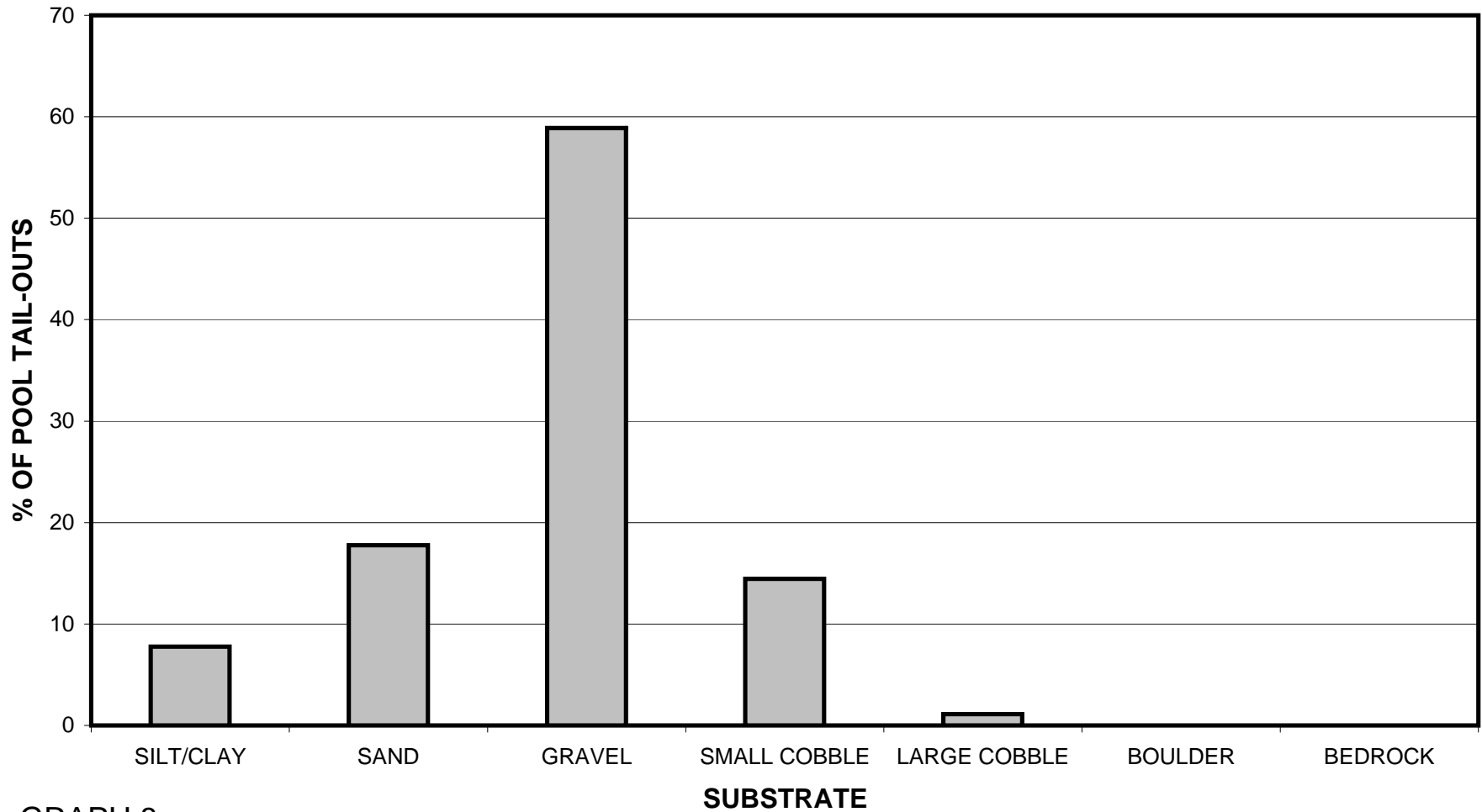
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

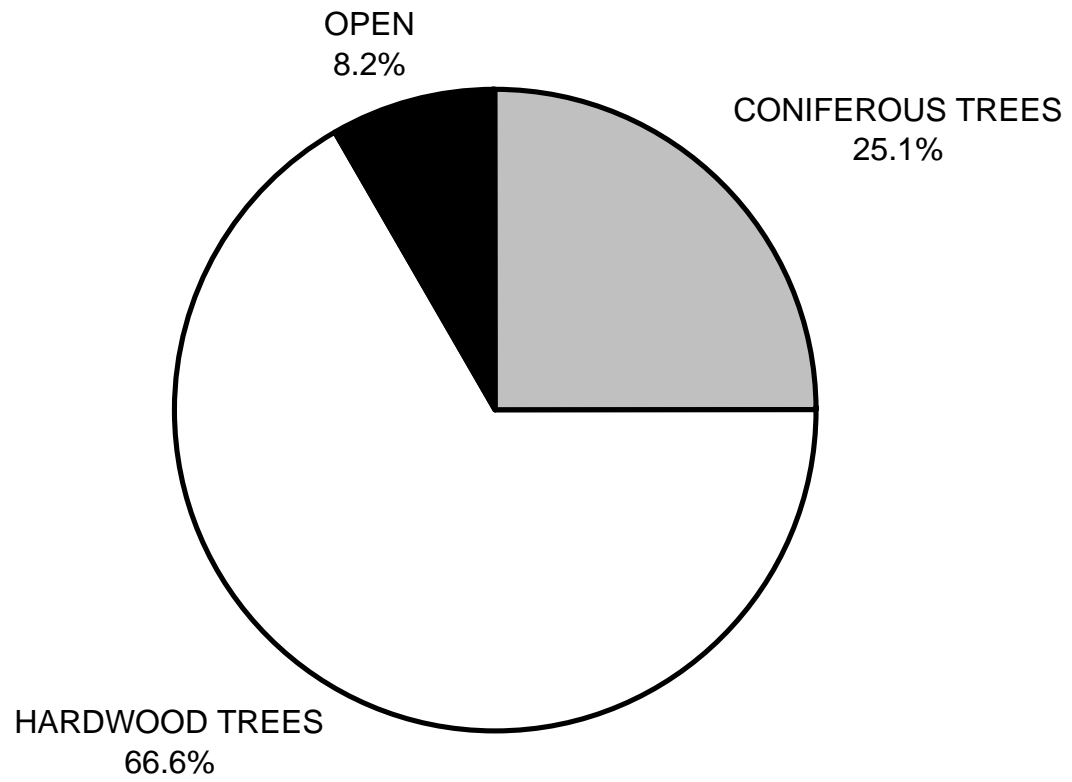
RUSSIAN GULCH 2008

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



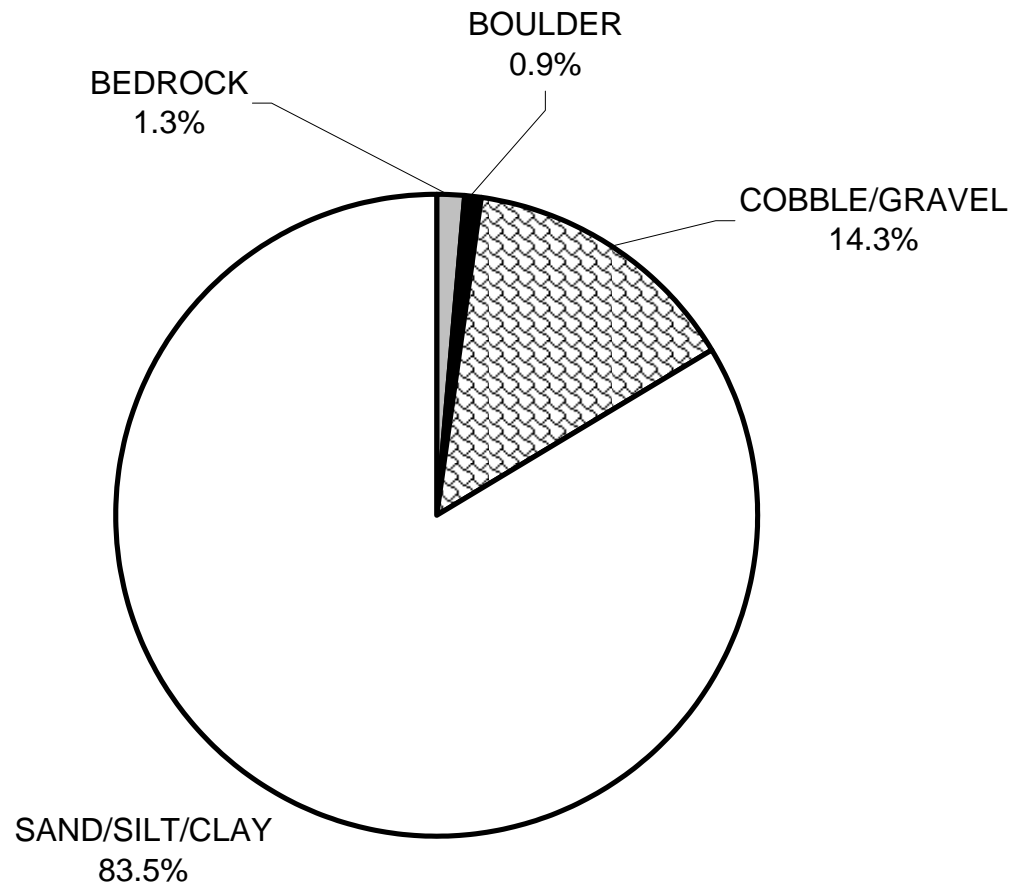
GRAPH 8

RUSSIAN GULCH 2008 MEAN PERCENT CANOPY



GRAPH 9

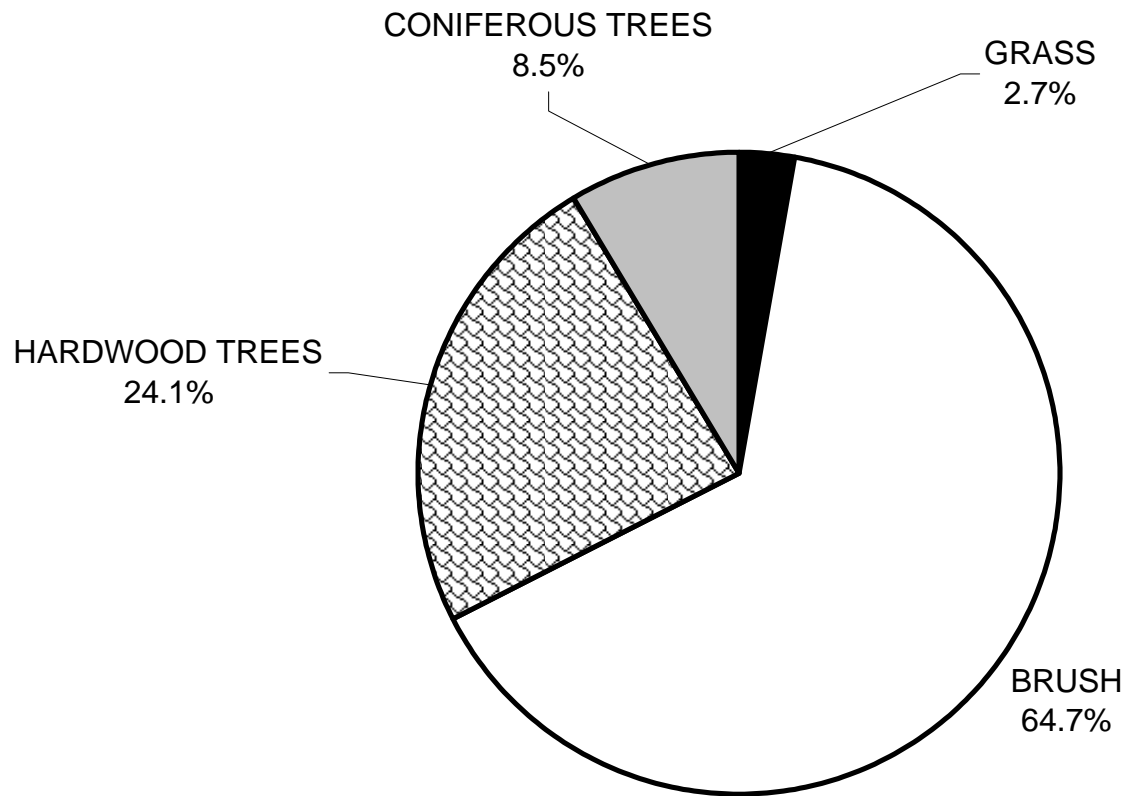
**RUSSIAN GULCH 2008
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

RUSSIAN GULCH 2008

DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

