

# **STREAM INVENTORY REPORT**

## **Pleasant Valley Gulch**

### INTRODUCTION

A stream inventory was conducted from June 3 to June 12, 2003 on Pleasant Valley Gulch. The survey began at the confluence with Railroad Gulch and extended upstream 1.5 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Pleasant Valley 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

Pleasant Valley Gulch is a tributary to Railroad Gulch, a tributary to Albion River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Pleasant Valley Gulch's legal description at the confluence with Railroad Gulch is T16N R17W S23. Its location is 39.2405 degrees north latitude and 123.7181 degrees west longitude, LLID number 1237179392404. Pleasant Valley Gulch is a first order stream and has approximately 1.4 miles of blue line stream according to the USGS Elk 7.5 minute quadrangle. Pleasant Valley Gulch drains a watershed of approximately 1.1 square miles. Elevations range from about 20 feet at the mouth of the creek to 700 feet in the headwater area. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via U.S. Highway 1, to Albion Ridge Road.

### METHODS

The habitat inventory conducted in Pleasant Valley 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

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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 Pleasant Valley 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". Pleasant Valley 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 Pleasant Valley Gulch,

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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 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 Pleasant Valley 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 Pleasant Valley 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 Pleasant Valley 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.

## **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 Pleasant Valley 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

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- 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 3 to June 12, 2003 was conducted by G. Trousdale and S. Sellars (WSP), and J. Richardson (DFG). The total length of the stream surveyed was 8,064 feet with an additional 156 feet of side channel.

Stream flow was not measured on Pleasant Valley Gulch.

Pleasant Valley Gulch is an E4 channel type for 3,353 feet of the stream surveyed (Reach 1), a B4 channel type for 3,930 feet of the stream surveyed (Reach 2), and an A4 channel type for 781 feet of the stream surveyed (Reach 3). E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-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. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 53 to 57 degrees Fahrenheit. Air temperatures ranged from 54 to 67 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 49% pool units, 32% flatwater units, 18% riffle units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 54% flatwater units, 24% riffle units, and 22% pool units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 30%; run units, 29%; and low gradient riffle units, 17% (Graph 3). Based on percent total length, run units made up 38%, low gradient riffle units 23%, and step-run units 16%.

A total of 90 pools were identified (Table 3). Main channel pools were the most frequently encountered at 61% (Graph 4), and comprised 69% 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. Twenty-five of the 90 pools (28%) had a residual depth of two feet or greater (Graph 5).

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The depth of cobble embeddedness was estimated at pool tail-outs. Of the 90 pool tail-outs measured, 1 had a value of 2 (1.1%); 23 had a value of 3 (25.6%); 61 had a value of 4 (67.8%); 5 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 unsuited 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 14, flatwater habitat types had a mean shelter rating of 30, and pool habitats had a mean shelter rating of 46 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 65. Main channel pools had a mean shelter rating of 44 and scour pools had a mean shelter rating of 45 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Pleasant Valley Gulch. Graph 7 describes the pool cover in Pleasant Valley Gulch. Large woody debris is the dominant pool cover type followed by undercut banks.

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 94% of the pool tail-outs. Boulders were the next most frequently observed dominant substrate type and occurred in 3% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Pleasant Valley Gulch was 86%. Fourteen percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 19% and 81%, respectively. Graph 9 describes the mean percent canopy in Pleasant Valley Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 81%. The mean percent left bank vegetated was 81%. The dominant elements composing the structure of the stream banks consisted of 93% sand/silt/clay, 4% cobble/gravel, and 3% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 53% of the units surveyed. Additionally, 38% of the units surveyed had brush as the dominant vegetation type, and 6% had deciduous trees as the dominant vegetation type (Graph 11).

## **DISCUSSION**

Pleasant Valley Gulch is an E4 channel type for the first 3,353 feet of stream surveyed, a B4 channel type for the next 3,930 feet and an A4 channel type for the remaining 781 feet. The suitability of E4, B4, and A4 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. A4 channel types are generally not suitable for fish habitat improvement structures.

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The water temperatures recorded on the survey days June 3 to June 12, 2003 ranged from 53 to 57 degrees Fahrenheit. Air temperatures ranged from 54 to 67 degrees Fahrenheit. To make any conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 54% of the total length of this survey, riffles 24%, and pools 22%. 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.

One of the 90 pool tail-outs measured had embeddedness ratings of 1 or 2. Eighty-four of the pool tail-outs had embeddedness ratings of 3 or 4. Five 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 Pleasant Valley Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-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 is 46. The shelter rating in the flatwater habitats is 30. 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 Pleasant Valley Gulch. Large woody debris is the dominant cover type in pools followed by undercut banks. 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 86%. Reach 1 had a canopy density of 86.3%, Reach 2 had a canopy density of 88.1%, and Reach 3 had a canopy density of 79.4%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 81% and 81%, 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) Pleasant Valley 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

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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.
- 4) 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 Railroad Gulch. The channel is an E4.
3353	0119.00	Channel changes from an E4 to a B4.
4048	0134.00	A tributary enters from the left bank.
4831	0141.00	1+ and 2+ steelhead observed.
5083	0148.00	A tributary enters from the left bank.
6857	0164.00	There is a three foot jump over large woody debris (LWD). The LWD is retaining sediment.
6875	0165.00	There is tributary that is not flowing.
7283	0166.00	Channel changes from a B4 to an A4.
7366	0168.00	LWD is retaining sediment.
7378	0170.00	There is a 2' high jump over a log.
7464	0172.00	There is a 2.5' high jump over LWD.
7574	0174.00	There is a 2' high jump over LWD.



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7586	0175.00	A tributary enters on the right bank. A wooden bridge spans the channel.
8064	0175.00	End of survey.

## **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: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0

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
1	0	DRY	0.5	6	6	0.1									
60	44	FLATWATER	32.4	73	4409.5	53.6	5.4	0.5	0.9	251	15066	140	8371		30
1	0	NOSURVEY	0.5	15	15	0.2									
90	90	POOL	48.6	20	1842	22.4	7.7	0.9	1.8	151	13580	170	15287	140	46
33	24	RIFFLE	17.8	59	1947	23.7	4.9	0.3	0.5	114	3760	29	972		14
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
185	158				8219.5					32406			24631		

**Table 2 - Summary of Habitat Types and Measured Parameters**

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

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 (%)
32	23	LGR	17.3	60	1915	23.3	5	0.3	1	112	3591	29	920		17	86
1	1	BRS	0.5	32	32	0.4	6	0.3	0.6	154	154	46	46		0	92
54	42	RUN	29.2	57	3092	37.6	5	0.5	1.7	232	12508	128	6913		32	83
6	2	SRN	3.2	220	1318	16.0	6	0.6	1.3	660	3960	381	2286		20	88
55	55	MCP	29.7	23	1269	15.4	8	0.9	9.8	173	9512	193	10635	159	44	87
3	3	CRP	1.6	15	45	0.5	5	0.7	1.7	89	267	85	256	76	20	90
8	8	LSL	4.3	20	162	2.0	7	0.7	2.5	134	1069	134	1071	113	54	90
3	3	LSR	1.6	19	56	0.7	8	0.9	2.1	150	451	149	446	128	45	100
1	1	LSBo	0.5	11	11	0.1	7	0.7	1.1	77	77	77	77	54	80	85
15	15	PLP	8.1	16	240	2.9	9	1.1	3.1	127	1910	169	2535	139	42	82
1	1	SCP	0.5	20	20	0.2	3	0.5	1.6	36	36	18	18	18	140	95
2	2	BPL	1.1	11	22	0.3	6	1.0	1.3	63	127	65	131	57	60	98
2	2	DPL	1.1	8	17	0.2	8	0.7	2.1	66	132	59	119	43	33	73
1	0	DRY	0.5	6	6	0.1										100
1	0	NS	0.5	15	15	0.2										

Total Units  
185

Total Units Fully Measured  
158

Total Length (ft.)  
8219.5

Total Area (sq.ft.)  
33793

Total Volume (cu.ft.)  
25452

Table 3 - Summary of Pool Types

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

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
55	55	MAIN	61	23	1269	69	7.8	0.9	173	9512	159	8762	44
30	30	SCOUR	33	17	514	28	7.7	0.9	126	3774	122	3662	45
5	5	BACKWATER	6	12	59	3	6.0	0.7	59	295	44	219	65
Total Units 90	Total Units Fully Measured 90				Total Length (ft.) 1842					Total Area (sq.ft.) 13580		Total Volume (cu.ft.) 12643	

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

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

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
55	MCP	61	3	5	39	71	10	18	1	2	2	4
3	CRP	3	1	33	2	67	0	0	0	0	0	0
8	LSL	9	1	13	6	75	1	13	0	0	0	0
3	LSR	3	0	0	2	67	1	33	0	0	0	0
1	LSBo	1	0	0	1	100	0	0	0	0	0	0
15	PLP	17	0	0	6	40	8	53	1	7	0	0
1	SCP	1	0	0	1	100	0	0	0	0	0	0
2	BPL	2	0	0	2	100	0	0	0	0	0	0
2	DPL	2	0	0	1	50	1	50	0	0	0	0
Total Units			Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
90			5	6	60	67	21	23	2	2	2	2

Mean Maximum Residual Pool Depth (ft.): 1.8

**Table 5 - Summary of Mean Percent Cover By Habitat Type**

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Dry Units: 1

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

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
32	6	LGR	0	20	28	0	35	7	0	2	7
1	1	BRS	0	0	0	0	0	0	0	0	0
33	7	TOTAL RIFFLE	0	20	28	0	35	7	0	3	7
54	12	RUN	12	17	52	4	9	6	0	0	0
6	2	SRN	8	5	63	0	3	0	5	18	0
60	14	TOTAL FLAT	12	15	53	3	8	5	1	3	0
55	55	MCP	21	18	47	4	6	2	1	2	0
3	3	CRP	90	2	0	8	0	0	0	0	0
8	8	LSL	4	28	57	5	1	0	6	0	0
3	3	LSR	37	33	0	23	7	0	0	0	0
1	1	LSBo	0	10	90	0	0	0	0	0	0
15	15	PLP	13	11	54	3	1	0	16	3	0
1	1	SCP	0	5	90	0	5	0	0	0	0
2	2	BPL	65	5	30	0	0	0	0	0	0
2	2	DPL	20	13	63	5	0	0	0	0	0
90	90	TOTAL POOL	20	17	47	4	4	1	4	2	0
1	0	NS									
185	111	TOTAL	18	17	47	4	6	2	3	2	0

**Table 6 - Summary of Dominant Substrates By Habitat Type**

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Dry Units: 1

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

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
32	6	LGR	0	17	83	0	0	0	0
1	1	BRS	0	0	0	0	0	0	100
54	11	RUN	9	9	82	0	0	0	0
6	2	SRN	0	0	50	50	0	0	0
55	11	MCP	0	18	82	0	0	0	0
3	3	CRP	0	33	67	0	0	0	0
8	2	LSL	0	0	100	0	0	0	0
3	1	LSR	0	0	100	0	0	0	0
1	1	LSBo	0	100	0	0	0	0	0
15	7	PLP	0	29	57	14	0	0	0
1	1	SCP	0	100	0	0	0	0	0
2	2	BPL	0	0	100	0	0	0	0
2	1	DPL	0	100	0	0	0	0	0



**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
86	81	19	0	81	81

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: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Survey Length (ft.): 8219.5

Main Channel (ft.): 8063.5

Side Channel (ft.): 156

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: E4

Reach Length (ft.): 3352.5

Riffle/Flatwater Mean Width (ft.): 5.2

BFW:

Range (ft.): 8 to 11

Mean (ft.): 9

Std. Dev.: 1

Base Flow (cfs.): 0.0

Water (F): 54 - 57

Air (F): 56 - 67

Dry Channel (ft): 6

Canopy Density (%): 86.3

Coniferous Component (%): 74.8

Hardwood Component (%): 25.2

Dominant Bank Vegetation: Brush

Vegetative Cover (%): 87.0

Dominant Shelter: Large Woody Debris

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 38

LWD per 100 ft.:

Riffles: 1

Pools: 7

Flat: 2

Pools by Stream Length (%): 39.4

Pool Frequency (%): 50.8

Residual Pool Depth (%):

< 2 Feet Deep: 80

2 to 2.9 Feet Deep: 18

3 to 3.9 Feet Deep: 0

>= 4 Feet Deep: 2

Mean Max Residual Pool Depth (ft.): 1.6

Mean Pool Shelter Rating: 49

Pool Tail Substrate (%): Silt/Clay: 0

Sand: 0

Gravel: 97

Sm Cobble: 2

Lg Cobble: 0

Boulder: 2

Bedrock: 0

Embeddedness Values (%): 1. 0.0

2. 1.5

3. 29.2

4. 67.7

5. 1.5

STREAM REACH: 2

Channel Type: B4

Reach Length (ft.): 3930

Riffle/Flatwater Mean Width (ft.): 5.8

BFW:

Range (ft.): 7 to 11

Mean (ft.): 8

Std. Dev.: 1

Base Flow (cfs.): 0.0

Water (F): 53 - 55

Air (F): 54 - 65

Dry Channel (ft): 0

Canopy Density (%): 88.1

Coniferous Component (%): 92.6

Hardwood Component (%): 7.4

Dominant Bank Vegetation: Coniferous Trees

Vegetative Cover (%): 67.5

Dominant Shelter: Large Woody Debris

Dominant Bank Substrate Type: Sand/Silt/Clay

Occurrence of LWD (%): 61

LWD per 100 ft.:

Riffles: 1

Pools: 12

Flat: 3

Pools by Stream Length (%): 10.3

Pool Frequency (%): 42.6

Residual Pool Depth (%):

< 2 Feet Deep: 50

2 to 2.9 Feet Deep: 35

3 to 3.9 Feet Deep: 10

>= 4 Feet Deep: 5

Mean Max Residual Pool Depth (ft.): 2.2

Mean Pool Shelter Rating: 42

Pool Tail Substrate (%): Silt/Clay: 0

Sand: 0

Gravel: 85

Sm Cobble: 0

Lg Cobble: 0

Boulder: 10

Bedrock: 5

Embeddedness Values (%): 1. 0.0

2. 0.0

3. 10.0

4. 75.0

5. 15.0

## Summary of Fish Habitat Elements By Stream Reach

### STREAM REACH: 3

Channel Type: A4	Canopy Density (%): 79.4	Pools by Stream Length (%): 6.8
Reach Length (ft.): 781	Coniferous Component (%): 100.0	Pool Frequency (%): 50.0
Riffle/Flatwater Mean Width (ft.): 4.6	Hardwood Component (%): 0.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 60
Range (ft.): 7 to 7	Vegetative Cover (%): 68.3	2 to 2.9 Feet Deep: 40
Mean (ft.): 7	Dominant Shelter: Large Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 0	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 63	Mean Max Residual Pool Depth (ft.): 1.7
Water (F): 53 - 53 Air (F): 56 - 56	LWD per 100 ft.:	Mean Pool Shelter Rating: 19
Dry Channel (ft): 0	Riffles: 0	
	Pools: 21	
	Flat: 3	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 100 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 0.0 2. 0.0 3. 40.0 4. 40.0 5. 20.0		

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

Latitude: 39:14:25.0N

Longitude: 123:43:04.0W

**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	2	1	3.1
Boulder	0	0	0.0
Cobble / Gravel	3	1	4.1
Sand / Silt / Clay	44	47	92.9

**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	2	3.1
Brush	19	18	37.8
Hardwood Trees	2	4	6.1
Coniferous Trees	27	25	53.1
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 4

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

StreamName: 1237179392404

LLID: 1237179392404

Drainage: Albion River

Survey Dates: 6/3/2003 to 6/12/2003

Confluence Location: Quad: ELK

Legal Description: T16NR17WS23

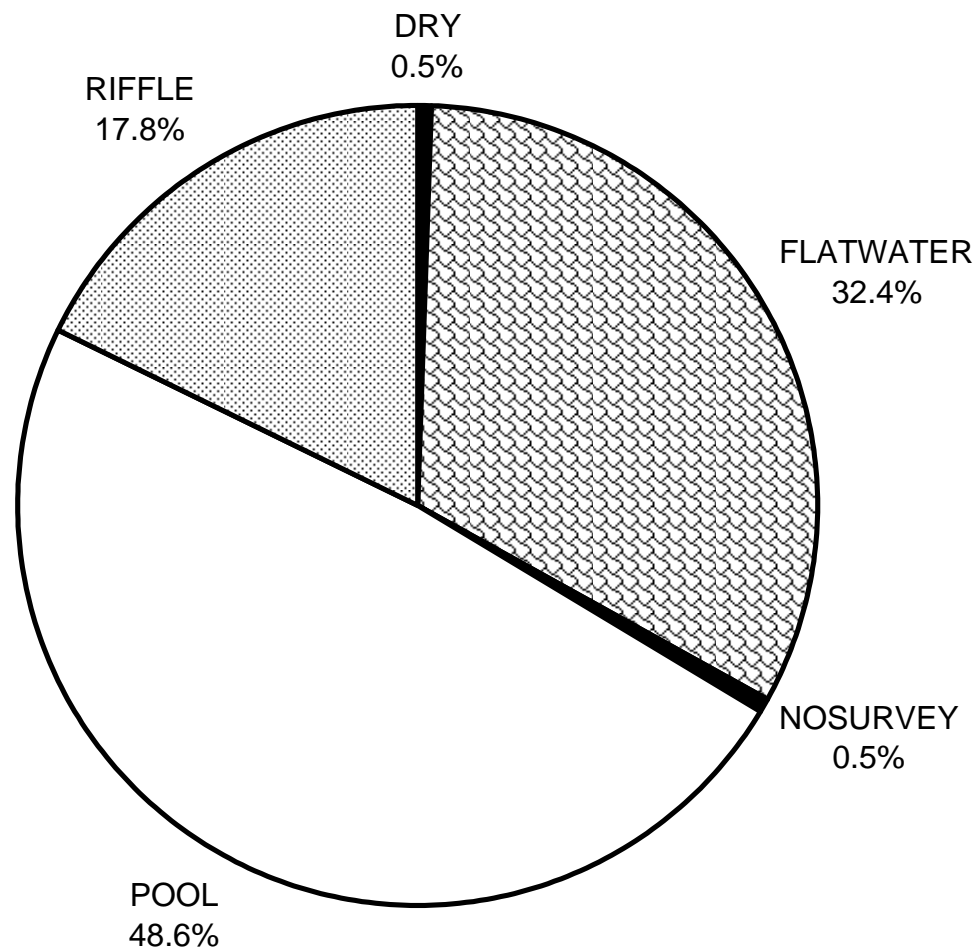
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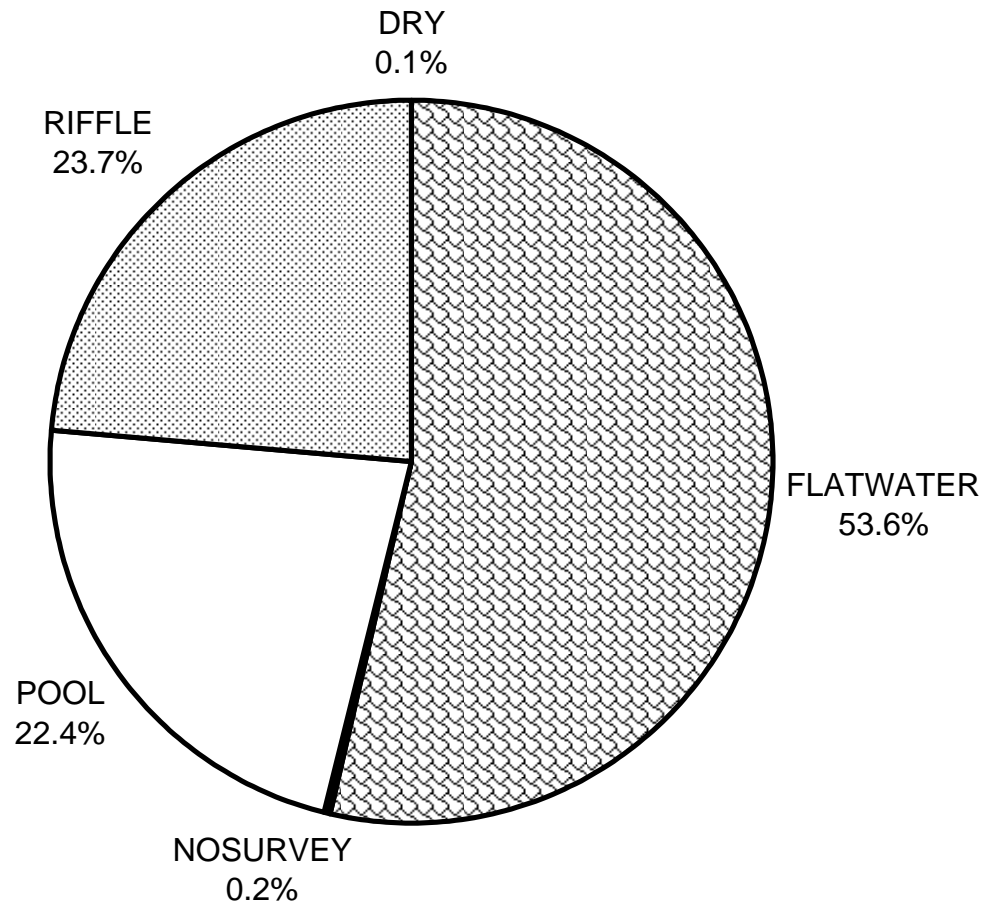
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
<hr/>			
UNDERCUT BANKS (%)	0	12	20
SMALL WOODY DEBRIS (%)	20	15	17
LARGE WOODY DEBRIS (%)	28	53	47
ROOT MASS (%)	0	3	4
TERRESTRIAL VEGETATION (%)	35	8	4
AQUATIC VEGETATION (%)	7	5	1
WHITEWATER (%)	0	1	4
BOULDERS (%)	3	3	2
BEDROCK LEDGES (%)	7	0	0

**"PLEASANT VALLEY GULCH" 2003  
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

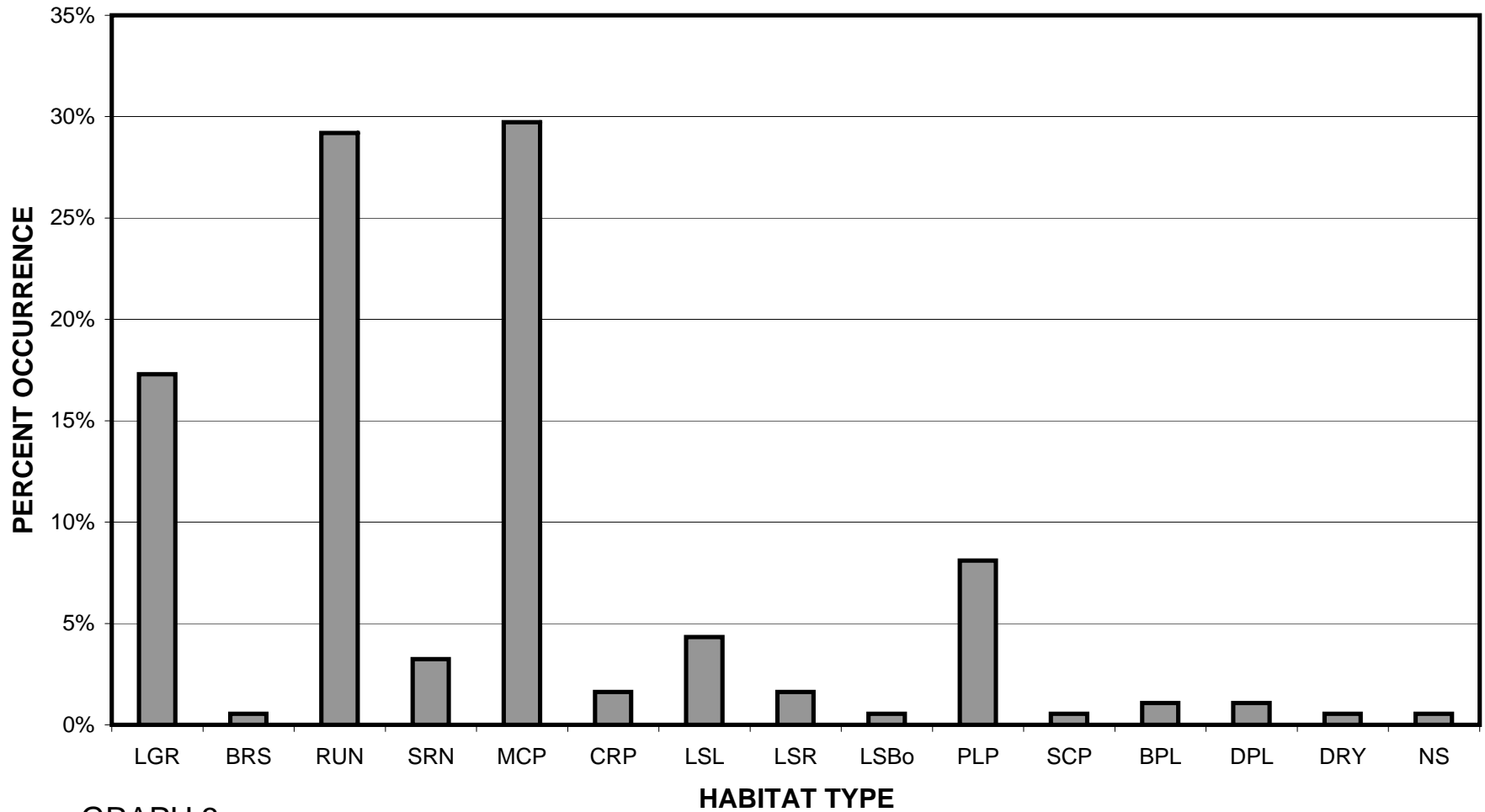
**"PLEASANT VALLEY GULCH" 2003  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

# "PLEASANT VALLEY GULCH" 2003

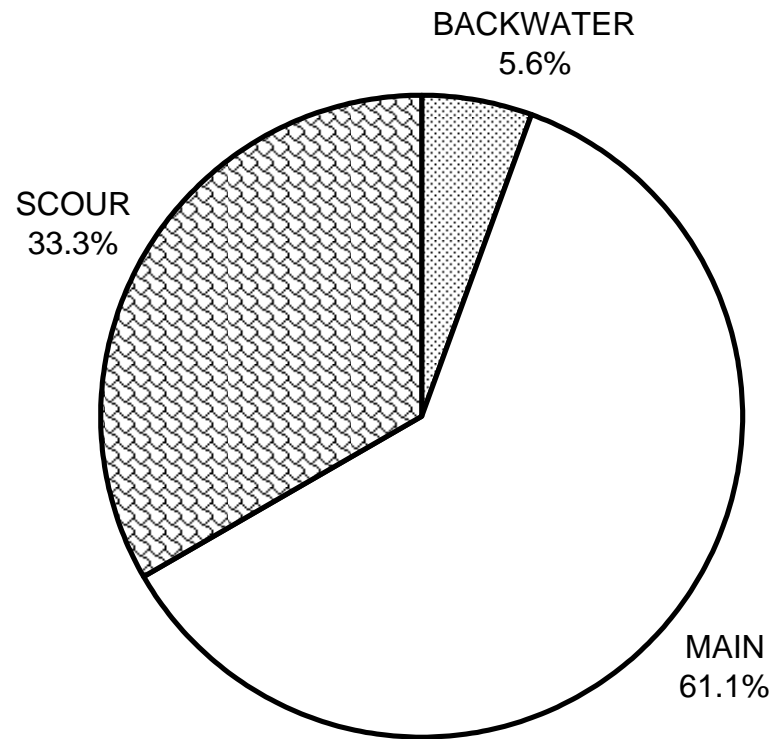
## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

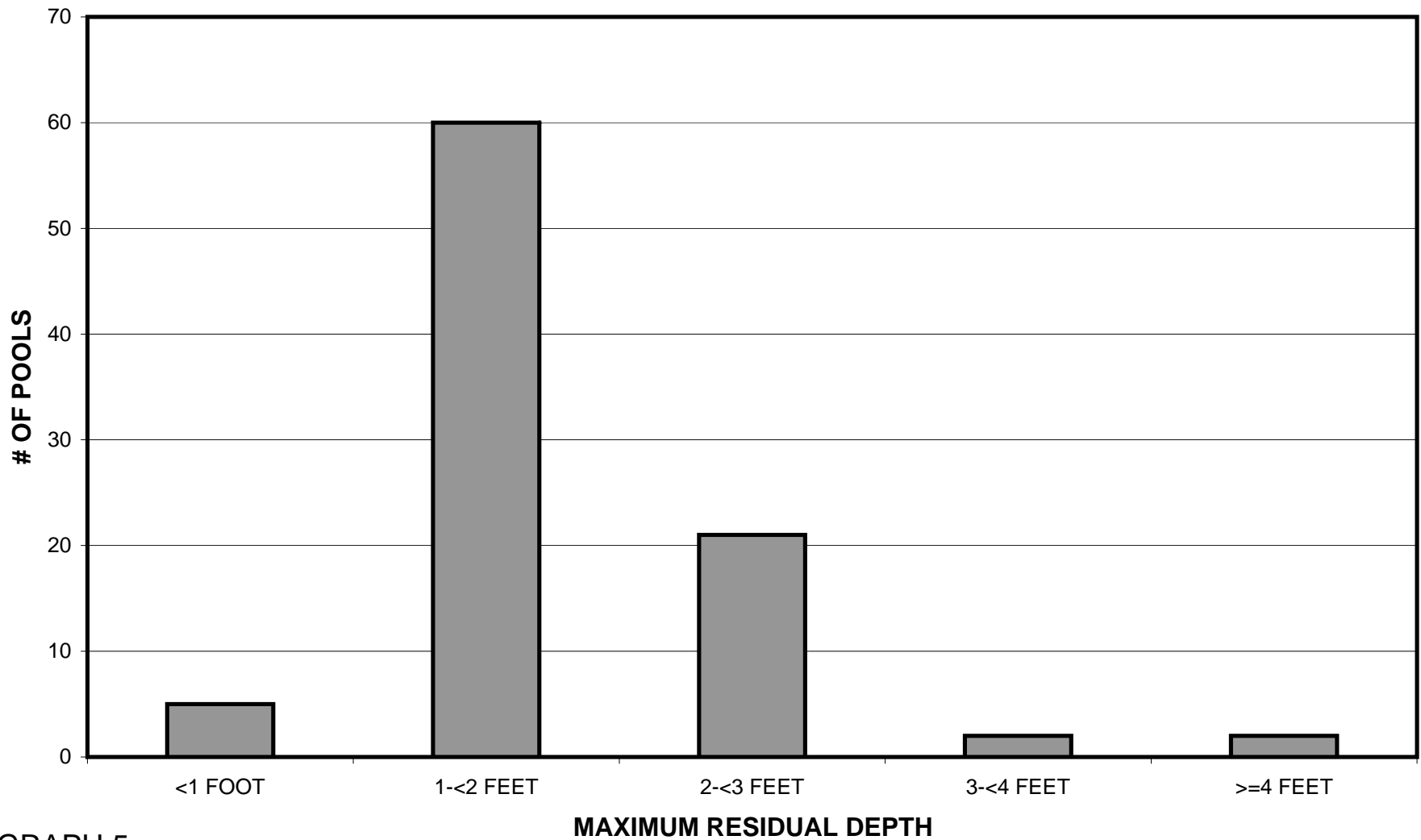


**"PLEASANT VALLEY GULCH" 2003  
POOL TYPES BY PERCENT OCCURRENCE**



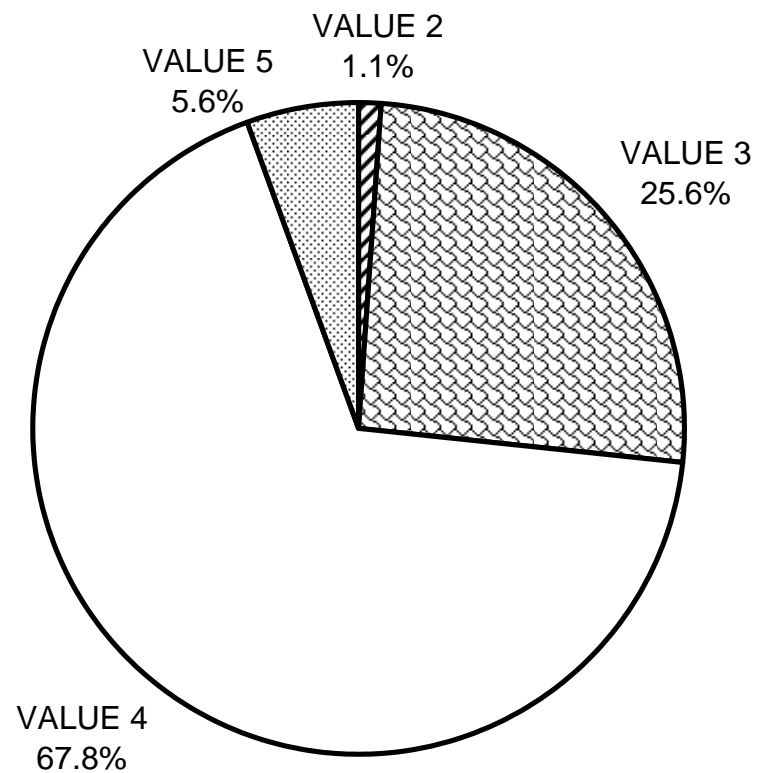
GRAPH 4

**"PLEASANT VALLEY GULCH" 2003**  
**MAXIMUM DEPTH IN POOLS**



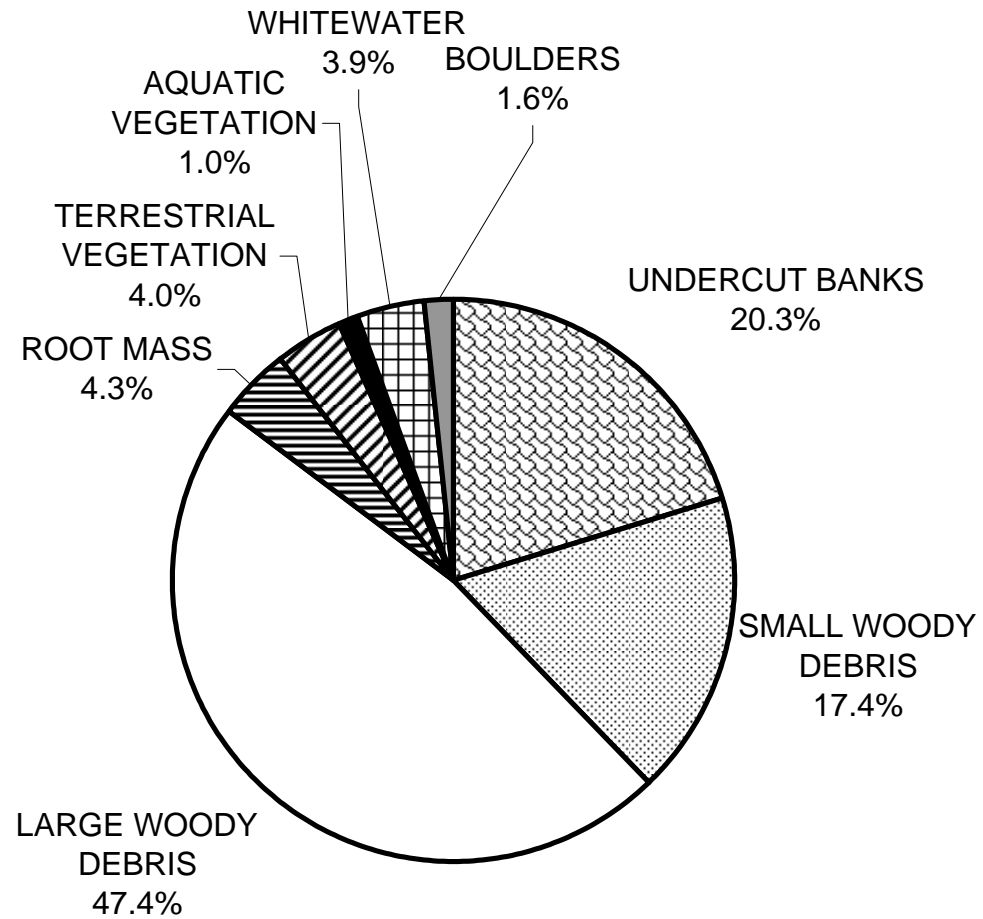
GRAPH 5

# "PLEASANT VALLEY GULCH" 2003 PERCENT EMBEDDEDNESS



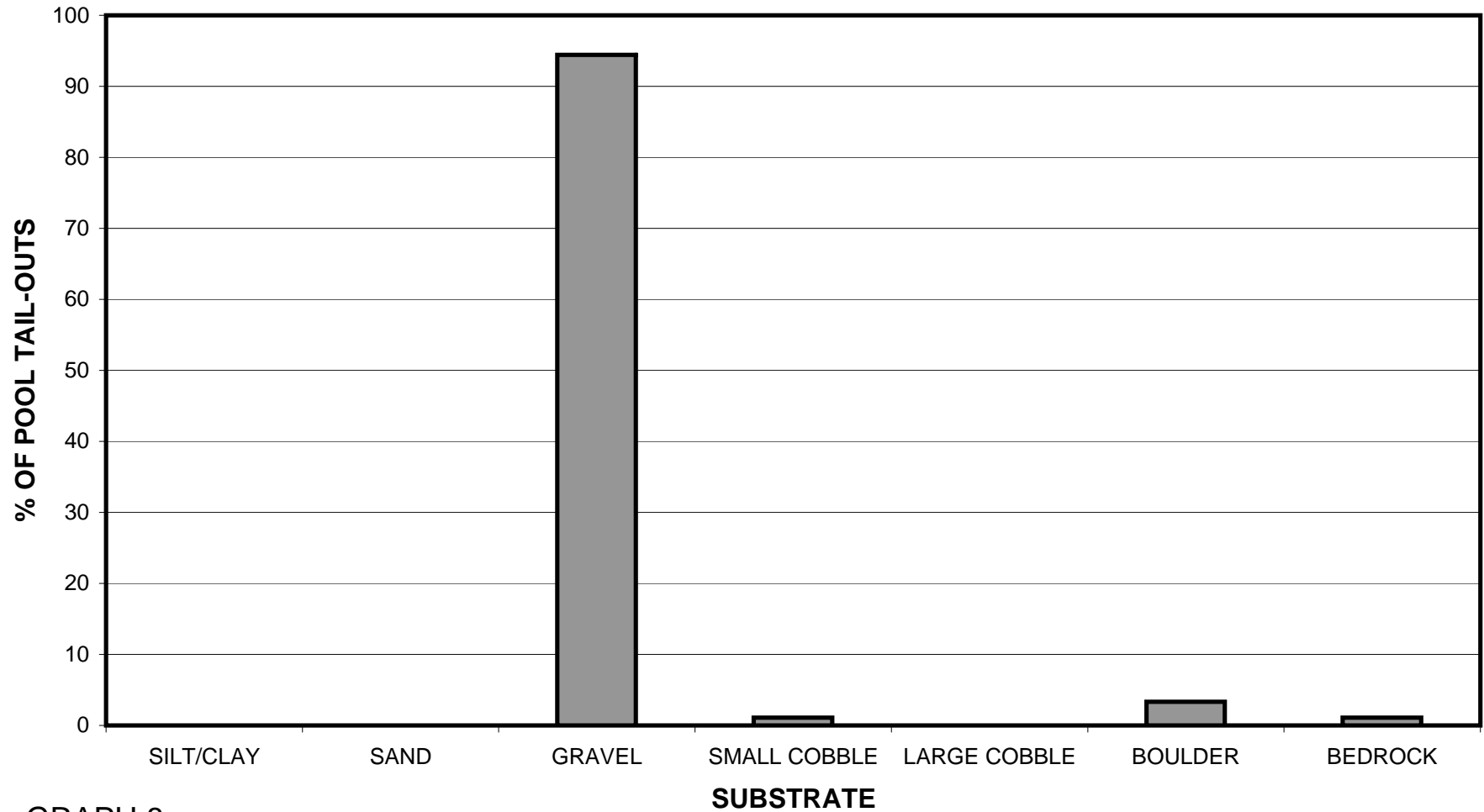
GRAPH 6

# **"PLEASANT VALLEY GULCH" 2003 MEAN PERCENT COVER TYPES IN POOLS**



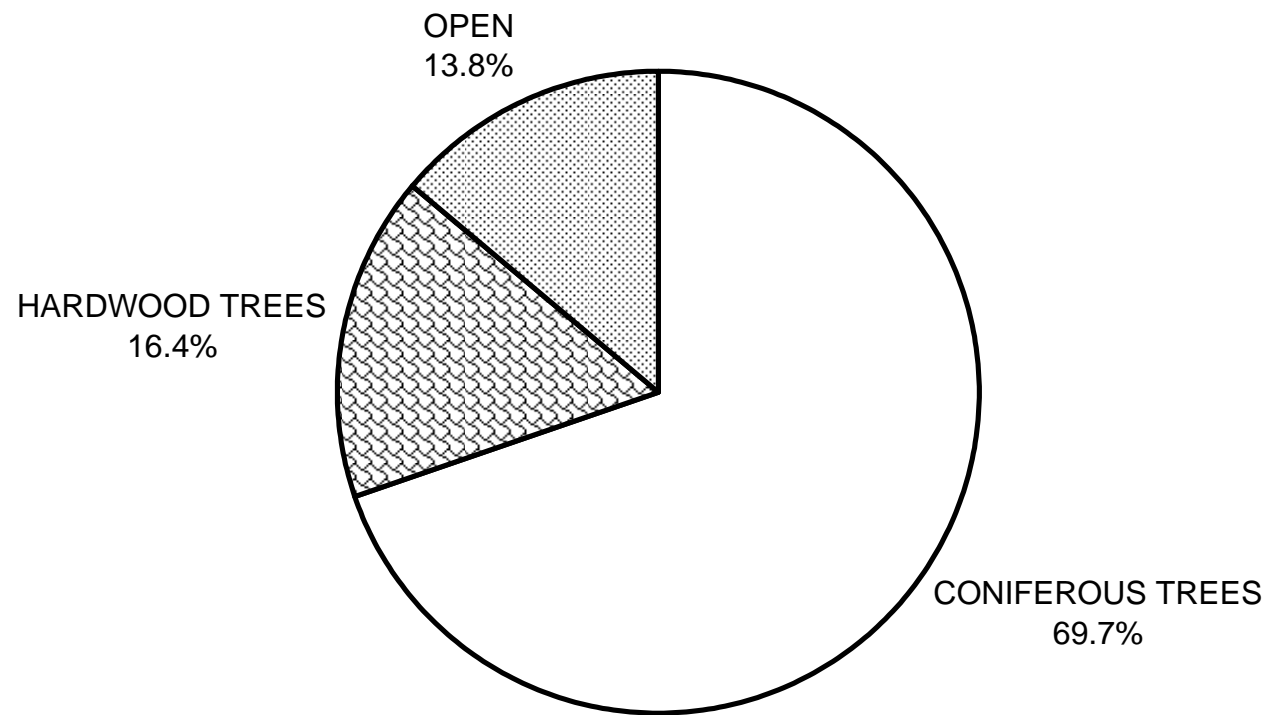
GRAPH 7

**"PLEASANT VALLEY GULCH" 2003  
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



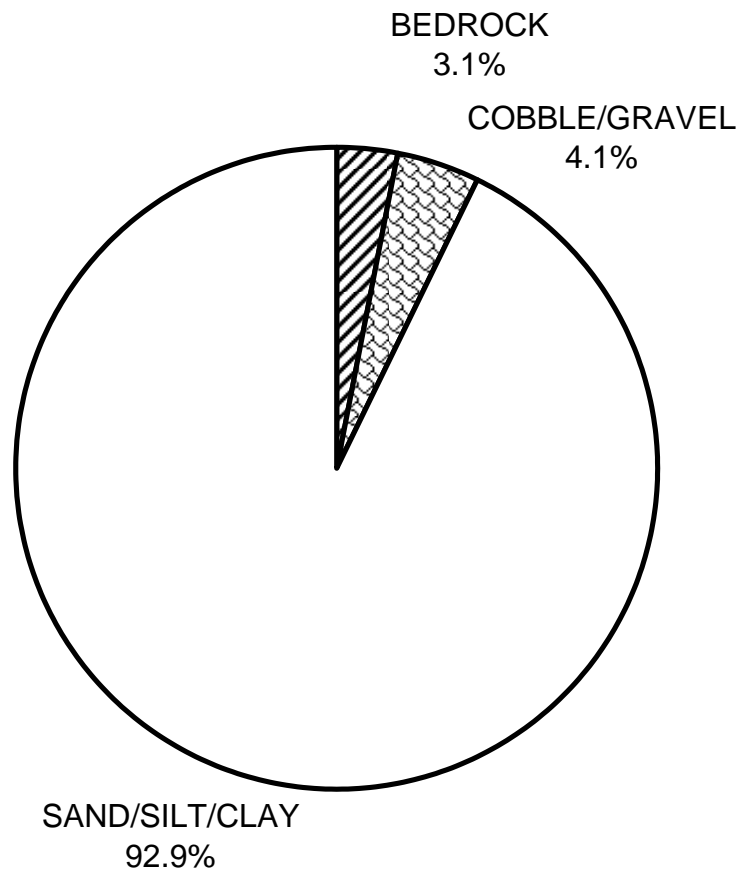
GRAPH 8

**"PLEASANT VALLEY GULCH" 2003  
MEAN PERCENT CANOPY**



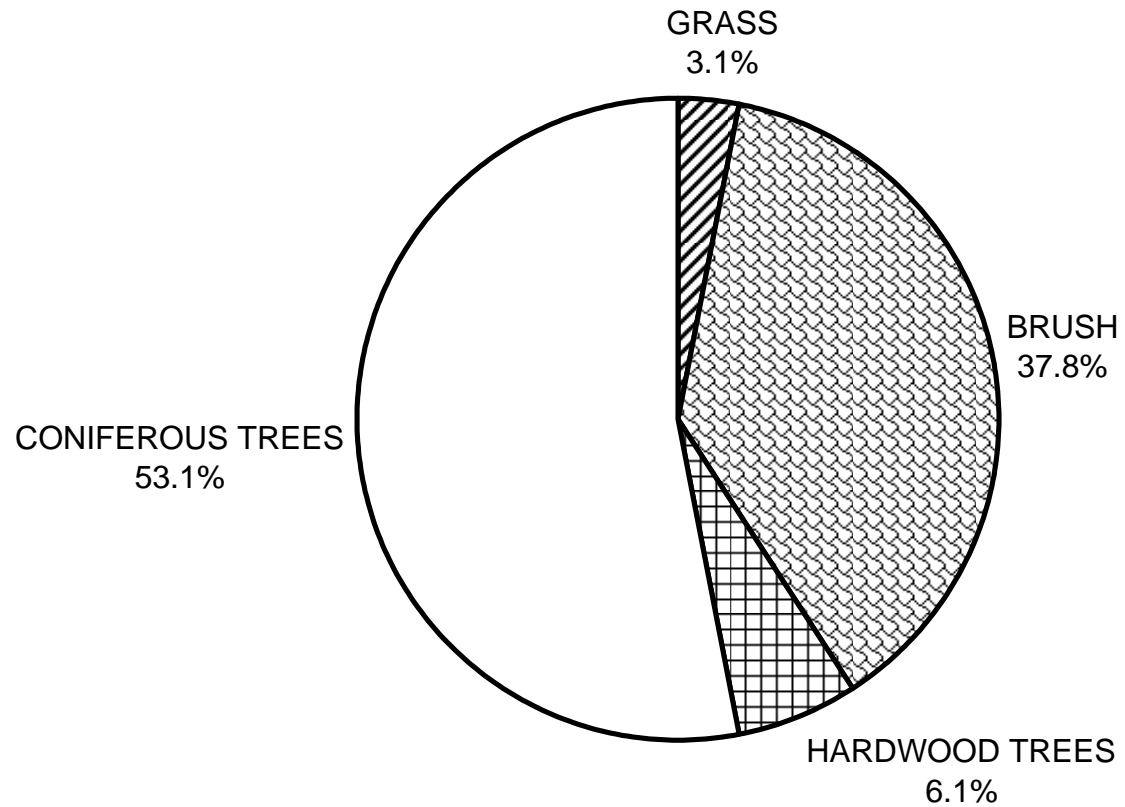
GRAPH 9

**"PLEASANT VALLEY GULCH" 2003  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

**"PLEASANT VALLEY GULCH" 2003  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11



**Map 1**  
**Pleasant Valley Gulch**  
**Albion River Watershed**  
**Elk Quad, Mendocino County**

Start of Survey

End of Survey



## Legend

— Pleasant Valley

0 1,500 3,000 Feet

End of survey point is approximate.

