

STREAM INVENTORY REPORT

Camp 16 Gulch

INTRODUCTION

A stream inventory was conducted on July 11, 2012 on Camp 16 Gulch. The survey began at the confluence with Flynn Creek and extended upstream 1.3 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Camp 16 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

Camp 16 Gulch is a tributary to Flynn Creek, a tributary to the North Fork Navarro River, a tributary to the Navarro River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Camp 16 Gulch's legal description at the confluence with Flynn Creek is T15N R16W S02. Its location is 39.1914 degrees north latitude and 123.6036 degrees west longitude, LLID number 1236024391914. Camp 16 Gulch is an intermittent stream according to the USGS Navarro 7.5 minute quadrangle. Camp 16 Gulch drains a watershed of approximately 1.6 square miles. Elevations range from about 170 feet at the mouth of the creek to 600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Flynn Creek Road, approximately six miles south of Comptche, CA.

METHODS

The habitat inventory conducted in Camp 16 Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). 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 Camp 16 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". Camp 16 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 Camp 16 Gulch, embeddedness was

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ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Camp 16 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 Camp 16 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 Camp 16 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 Wildlife. 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 Camp 16 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

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- 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 July 11, 2012 was conducted by B. James and C. Tiffany (WSP). The total length of the stream surveyed was 7,090 feet.

Stream flow was not measured on Camp 16 Gulch.

Camp 16 Gulch is a B4 channel type for the entire length of the survey, 7,090 feet. 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 52 to 55 degrees Fahrenheit. Air temperatures ranged from 59 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 47% flatwater units, 23% pool units, 16% dry units, and 14% riffle units (Graph 1). Based on total length of Level II habitat types there were 45% dry units, 42% flatwater units, 7% pool units, and 6% riffle units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were run units, 29%; mid-channel pool units, 23%; and step run units, 18% (Graph 3). Based on percent total length, dry units made up 45%, step run units 25%, and run units 18%.

A total of 17 pools were identified (Table 3). All of the pools encountered were main channel pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Five of the 17 pools (29%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 17 pool tail-outs measured, 13 had a value of 1 (76.5%); four had a value of 2 (23.5%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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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 0, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 4 (Table 1).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Camp 16 Gulch. Graph 7 describes the pool cover in Camp 16 Gulch. Small 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 65% of the pool tail-outs. Silt/clay, sand, and small cobble were each the dominant substrate type in 12% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Camp 16 Gulch was 94%. Six percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 25% and 75%, respectively. Graph 9 describes the mean percent canopy in Camp 16 Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 99%. Sand/silt/clay was the dominant element composing 100% of the structure of the stream banks (Graph 10). Coniferous trees were the dominant vegetation type observed in 70% of the units surveyed. Additionally, 16% of the units surveyed had brush as the dominant vegetation type, and 14% had deciduous trees as the dominant vegetation type (Graph 11).

DISCUSSION

Camp 16 Gulch is a B4 channel type for the entire length of the survey. The suitability of B4 channel types for fish habitat improvement structures is as follows: 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 day July 11, 2012 ranged from 52 to 55 degrees Fahrenheit. Air temperatures ranged from 59 to 77 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 42% of the total length of this survey, riffles 6%, and pools 7%. Five of the 17 (29%) 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

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will increase or deepen pool habitat is recommended.

All 17 of the 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.

Thirteen of the 17 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 4. The shelter rating in the flatwater habitats is 0. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by small woody debris in Camp 16 Gulch. Small 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 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 94%. In general, revegetation projects are considered when canopy density is less than 80%. The percentage of right and left bank covered with vegetation was 99% and 99%, 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) Camp 16 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 small 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 reach.

Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with Flynn Creek. The channel is a B4 for the entire length of the survey.
1007	0014.00	Log debris accumulation (LDA) #01 contains six pieces of large woody debris (LWD) and measures 5' high x 15' wide x 5' 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 7' long x 1' deep.
2068	0028.00	Tributary #01 enters on the right bank. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 70%. It is not accessible to salmonids.
6155	0061.00	Tributary #02 enters on the right bank. The water temperature of the tributary was 54 degrees Fahrenheit; the water temperature downstream and upstream of the tributary was 54 degrees Fahrenheit. The slope of the tributary is approximately 5%.
7090	0073.00	End of survey due to diminished habitat. Stream has long dry sections and the gradient is increasing.

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: Camp Sixteen Gulch

LLID: 1236024391914 Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02 Latitude: 39:11:29.0N Longitude: 123:36:09.0

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
12	0	DRY	16.4	266	3192	45.0									
34	4	FLATWATER	46.6	88	2990	42.2	7.5	0.7	1.2	801	27235	511	17388		0
17	17	POOL	23.3	28	481	6.8	7.1	0.8	1.8	192	3257	196	3325	150	4
10	1	RIFFLE	13.7	43	427	6.0	7.0	0.2	0.5	798	7980	160	1596		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
73	22				7090					38473			22310		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

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 (%)
10	1	LGR	13.7	43	427	6.0	7	0.2	0.5	798	7980	160	1596		0	91
21	2	RUN	28.8	60	1255	17.7	7	0.7	1.3	526	11036	377	7915		0	91
13	2	SRN	17.8	133	1735	24.5	8	0.6	1.1	1077	13996	646	8397		0	96
17	17	MCP	23.3	28	481	6.8	7	0.8	2.4	192	3257	196	3325	150	4	95
12	0	DRY	16.4	266	3192	45.0										95

Total Units
73

Total Units Fully Measured
22

Total Length (ft.)
7090

Total Area (sq.ft.)
36268

Total Volume (cu.ft.)
21233

Table 3 - Summary of Pool Types

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

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
17	17	MAIN	100	28	481	100	7.1	0.8	192	3257	150	2554	4

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
17	17	481	3257	2554

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

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
17	MCP	100	0	0	12	71	5	29	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
17	0	0	12	71	5	29	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.8

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Dry Units: 12

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

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
10	1	LGR	0	0	0	0	0	0	0	0	0
10	1	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
21	2	RUN	0	0	0	0	0	0	0	0	0
13	2	SRN	0	0	0	0	0	0	0	0	0
34	4	TOTAL FLAT	0	0	0	0	0	0	0	0	0
17	17	MCP	30	62	0	5	0	0	0	3	0
17	17	TOTAL POOL	30	62	0	5	0	0	0	3	0
73	22	TOTAL	30	62	0	5	0	0	0	3	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Dry Units: 12

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

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
10	1	LGR	0	0	100	0	0	0	0
21	2	RUN	0	0	100	0	0	0	0
13	2	SRN	0	50	0	50	0	0	0
17	17	MCP	6	18	76	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Camp Sixteen Gulch

LLID: 1236024391914

Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02

Latitude: 39:11:29.0N

Longitude: 123:36:09.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
94	75	25	0	99	99

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: Camp Sixteen Gulch

LLID: 1236024391914 Drainage: Navarro River

Survey Dates: 7/11/2012 to 7/11/2012

Confluence Location: Quad: ELK

Legal Description: T15NR16WS02 Latitude: 39:11:29.0N Longitude: 123:36:09.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	0	0	0.0
Boulder	0	0	0.0
Cobble / Gravel	0	0	0.0
Sand / Silt / Clay	25	25	100.0

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	0	0	0.0
Brush	5	3	16.0
Hardwood Trees	6	1	14.0
Coniferous Trees	14	21	70.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 1

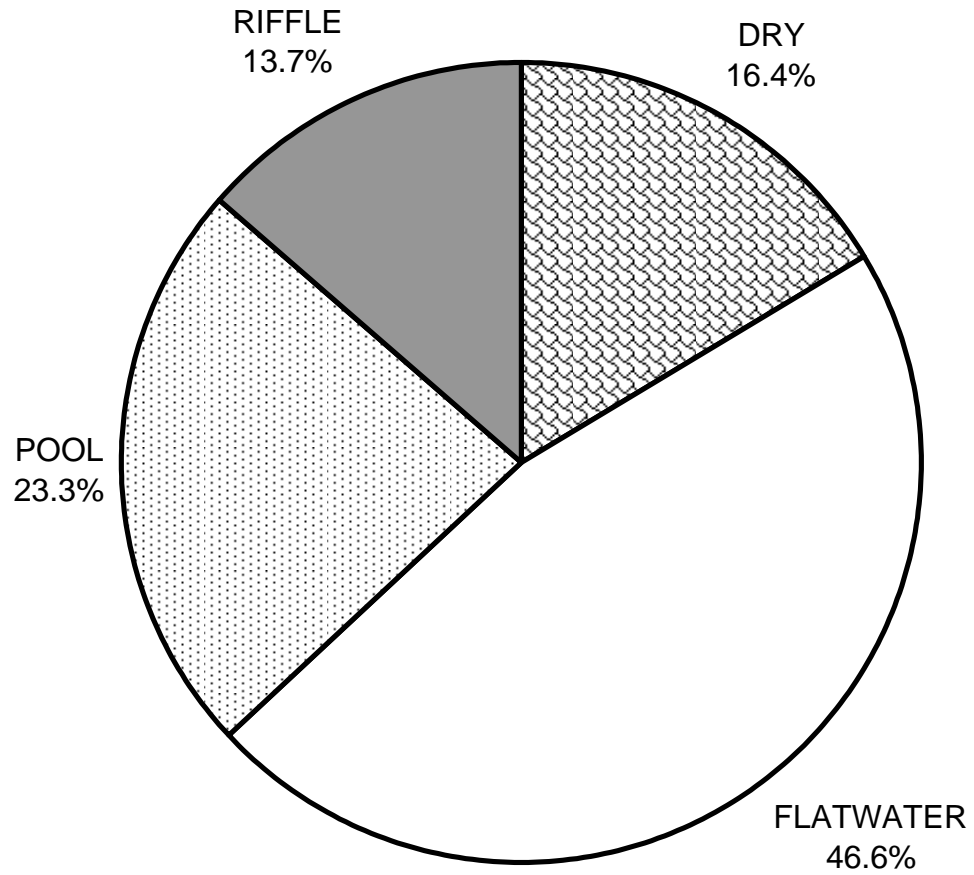
Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Camp Sixteen Gulch
Survey Dates: 7/11/2012 to 7/11/2012
Confluence Location: Quad: ELK

LLID: 1236024391914 Drainage: Navarro River
Legal Description: T15NR16WS02 Latitude: 39:11:29.0N Longitude: 123:36:09.0W

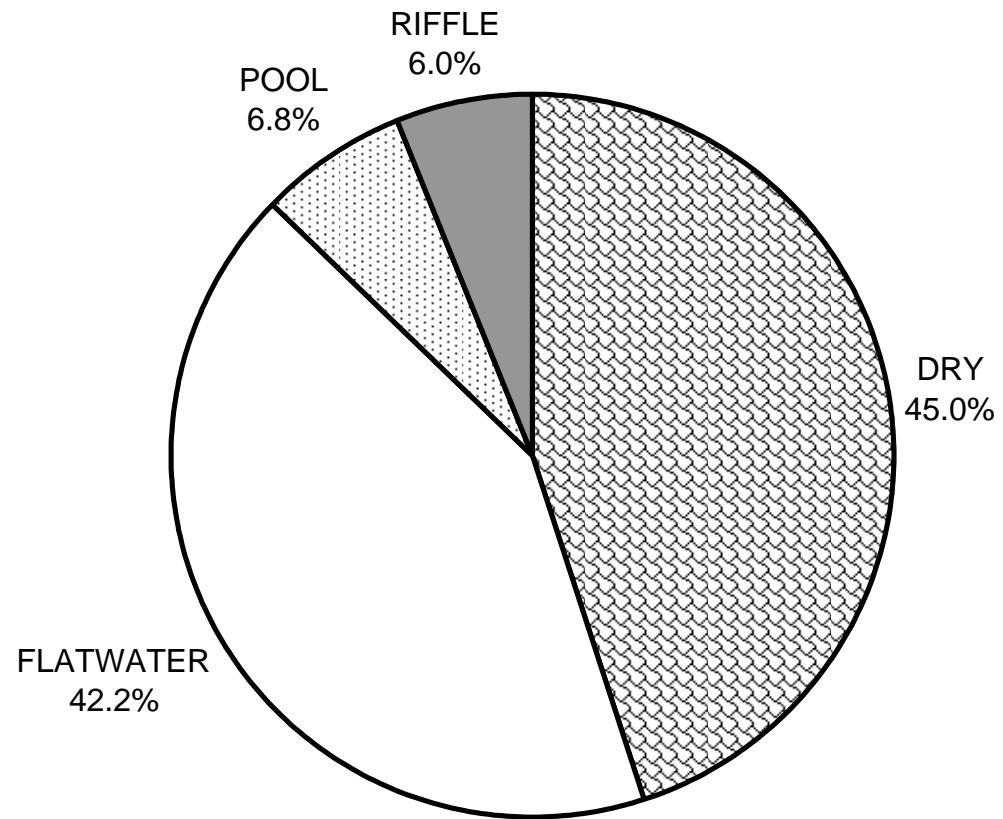
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	30
SMALL WOODY DEBRIS (%)	0	0	62
LARGE WOODY DEBRIS (%)	0	0	0
ROOT MASS (%)	0	0	5
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	0	3
BEDROCK LEDGES (%)	0	0	0

CAMP SIXTEEN GULCH 2012 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

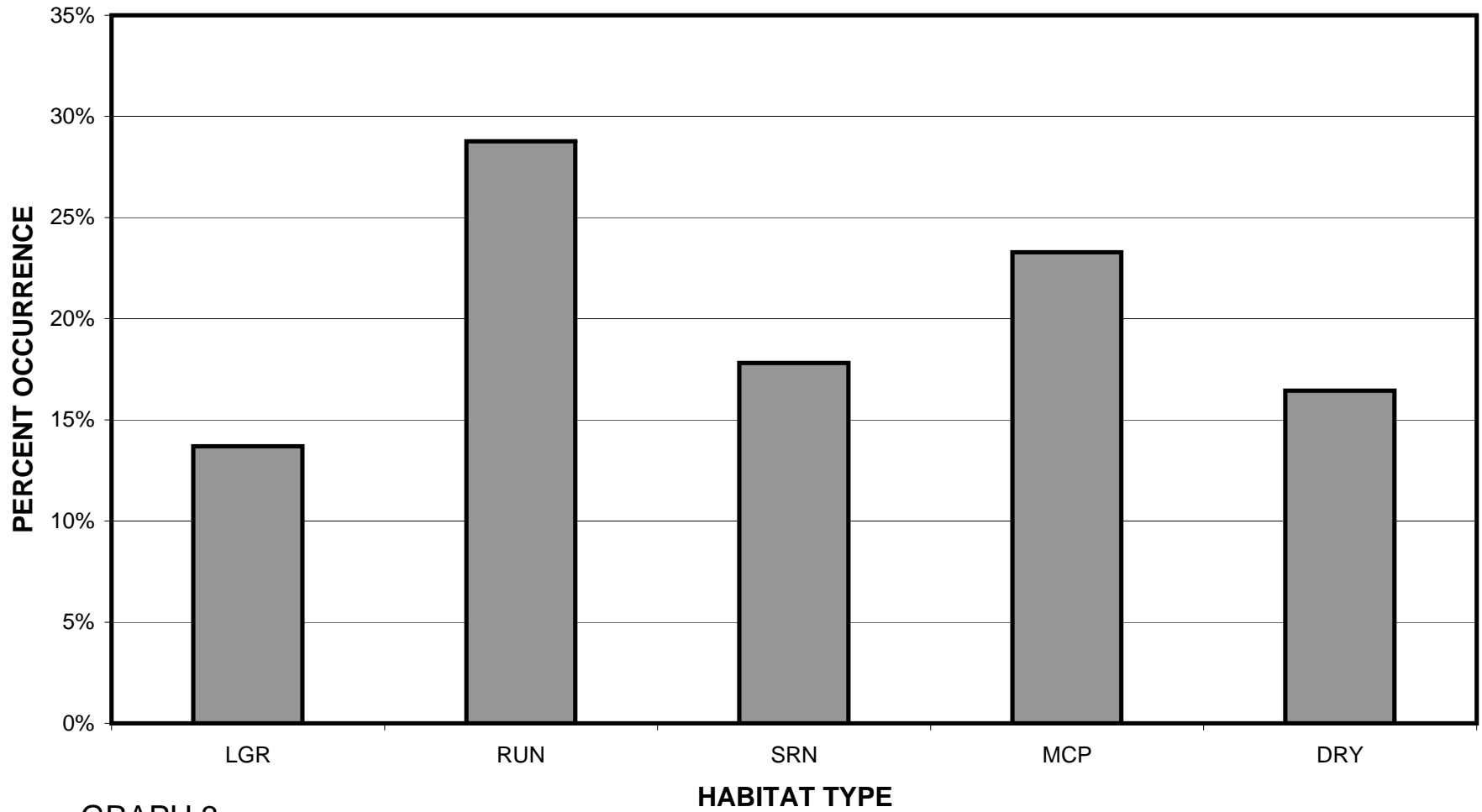
CAMP SIXTEEN GULCH 2012 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

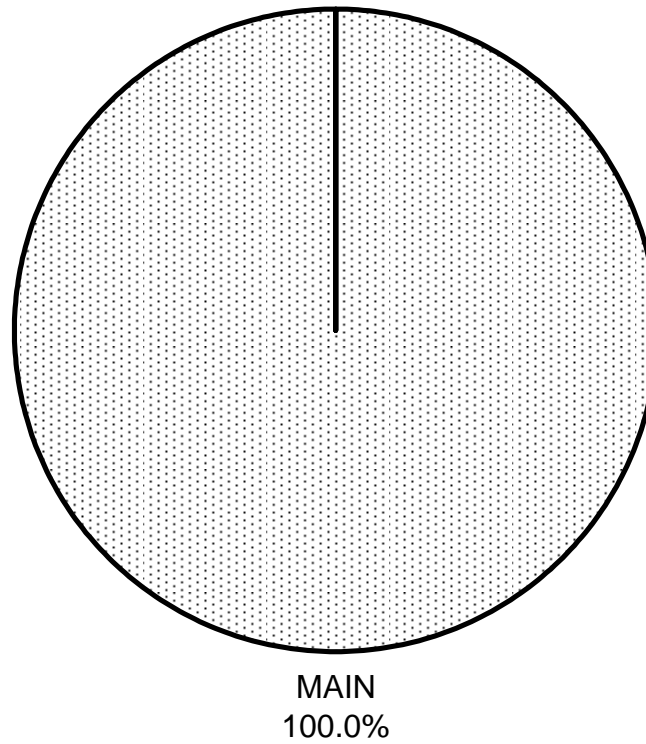
CAMP SIXTEEN GULCH 2012

HABITAT TYPES BY PERCENT OCCURRENCE



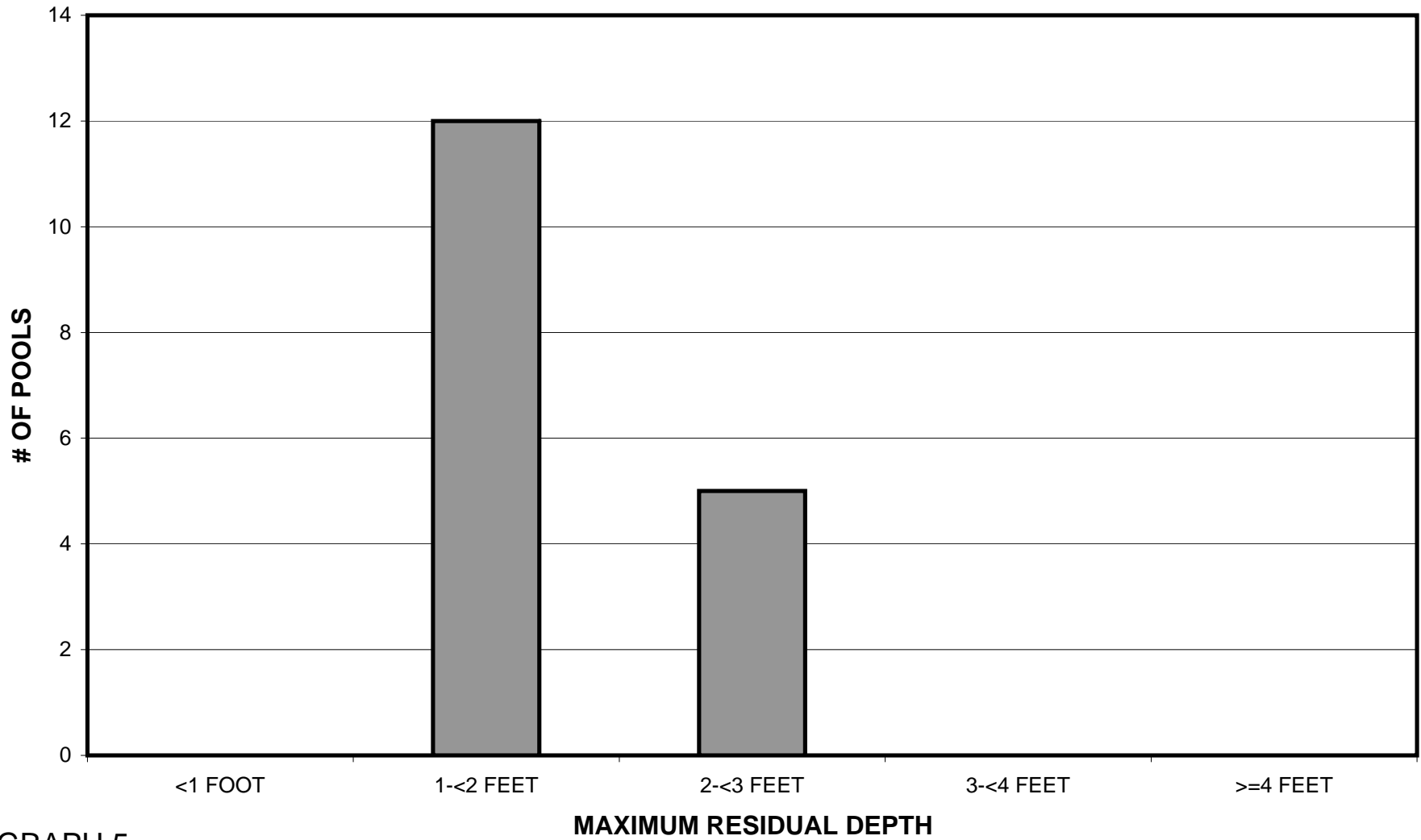
GRAPH 3

**CAMP SIXTEEN GULCH 2012
POOL TYPES BY PERCENT OCCURRENCE**



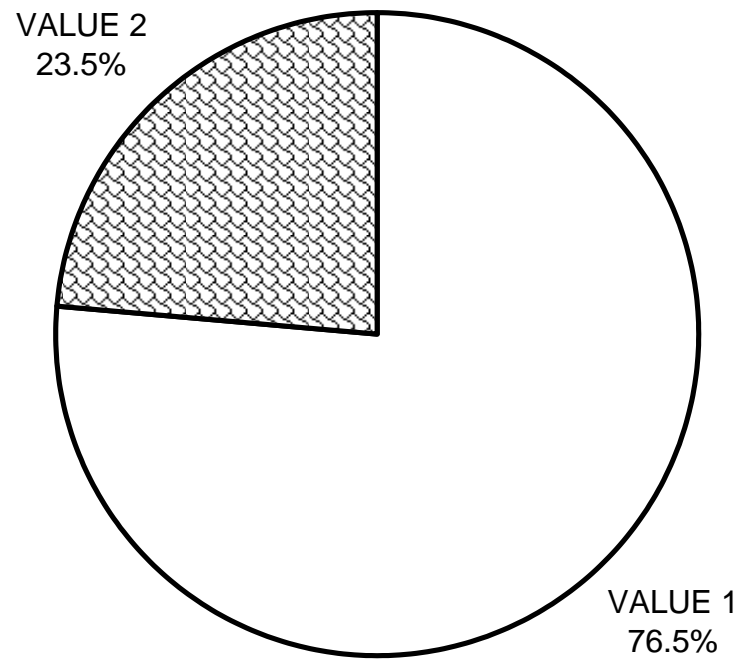
GRAPH 4

CAMP SIXTEEN GULCH 2012 MAXIMUM DEPTH IN POOLS



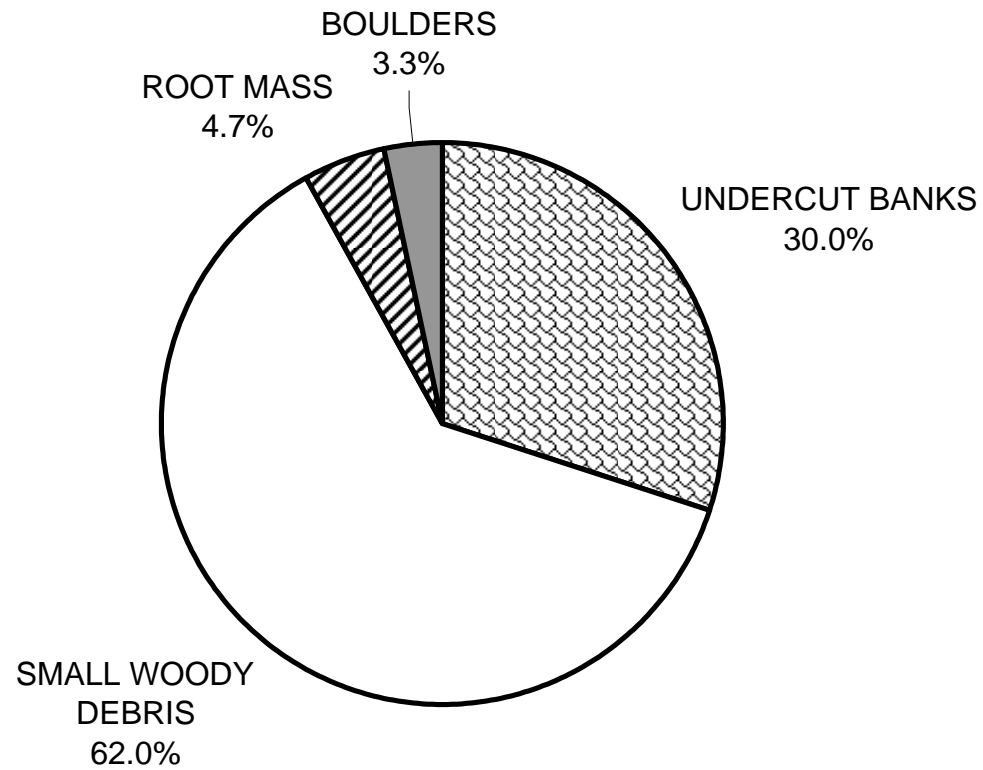
GRAPH 5

CAMP SIXTEEN GULCH 2012 PERCENT EMBEDDEDNESS



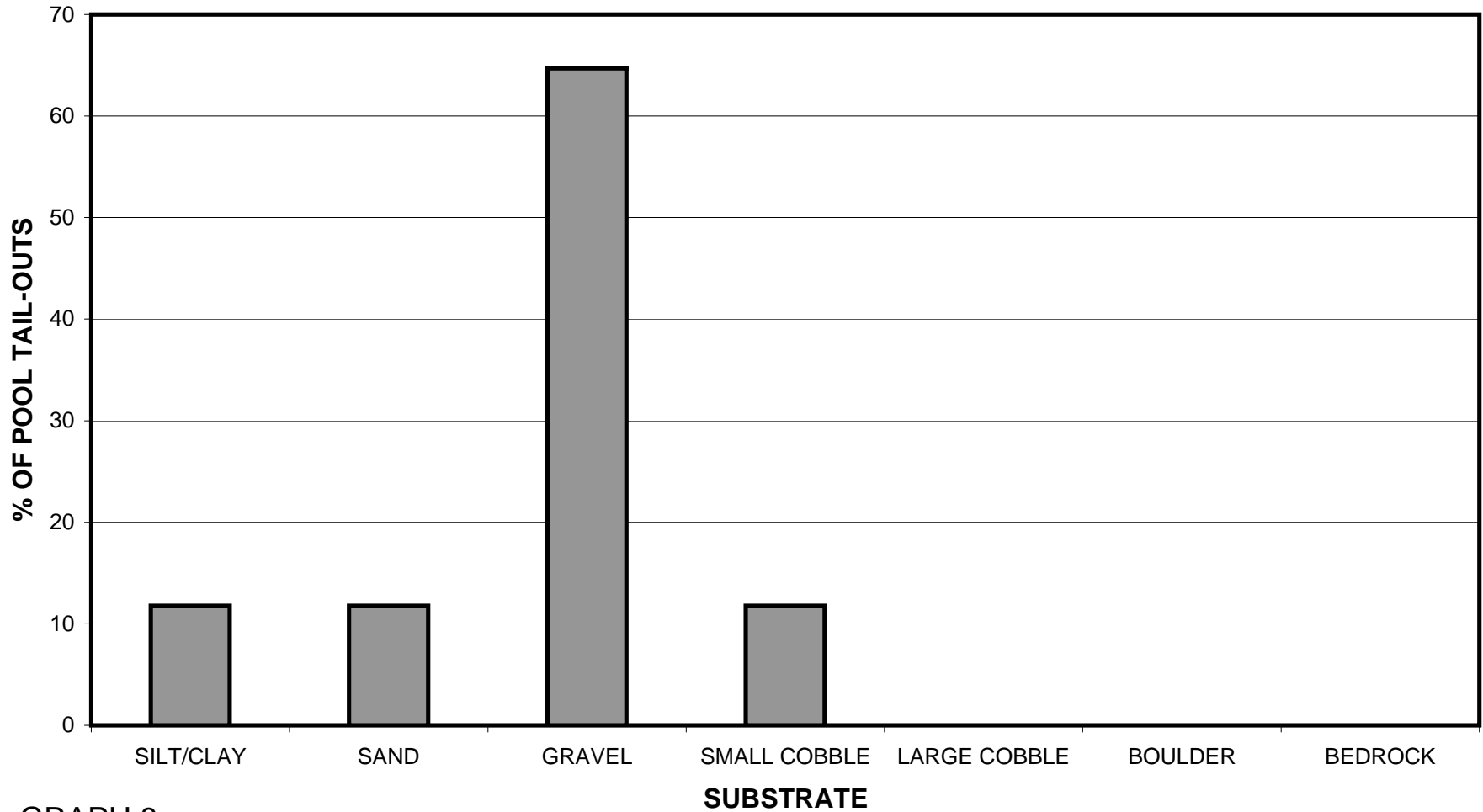
GRAPH 6

CAMP SIXTEEN GULCH 2012 MEAN PERCENT COVER TYPES IN POOLS



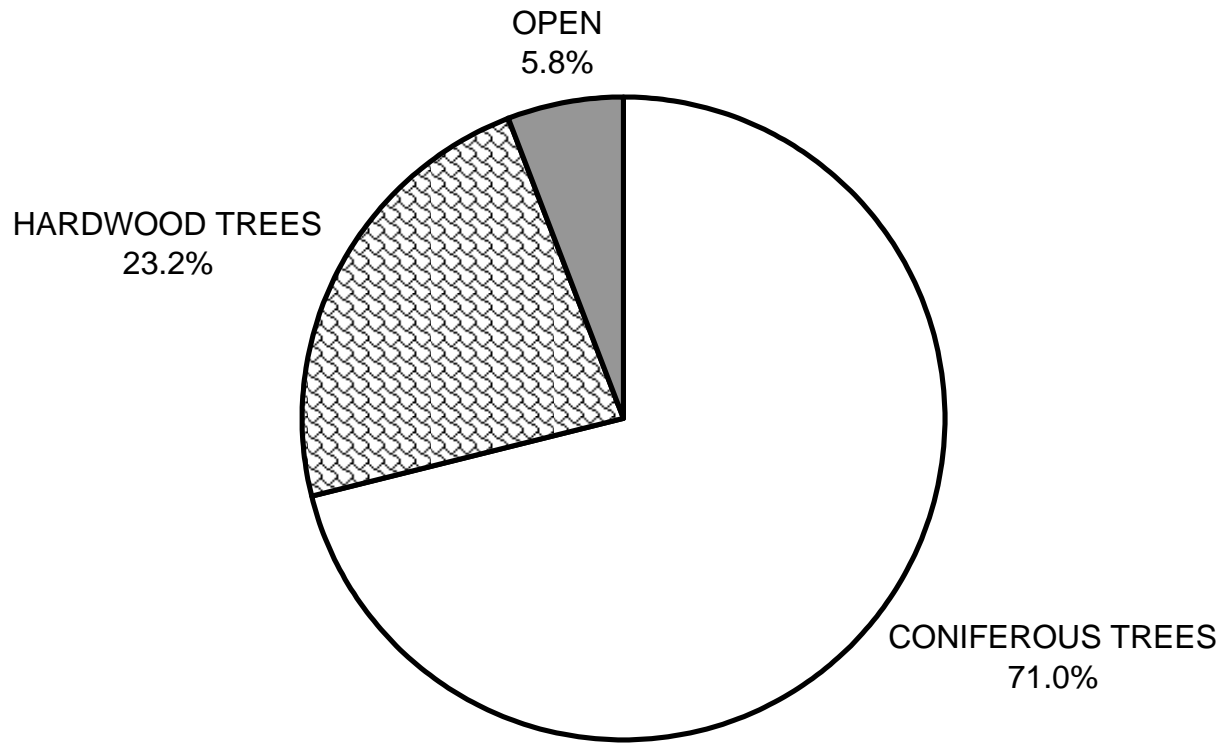
GRAPH 7

CAMP SIXTEEN GULCH 2012 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



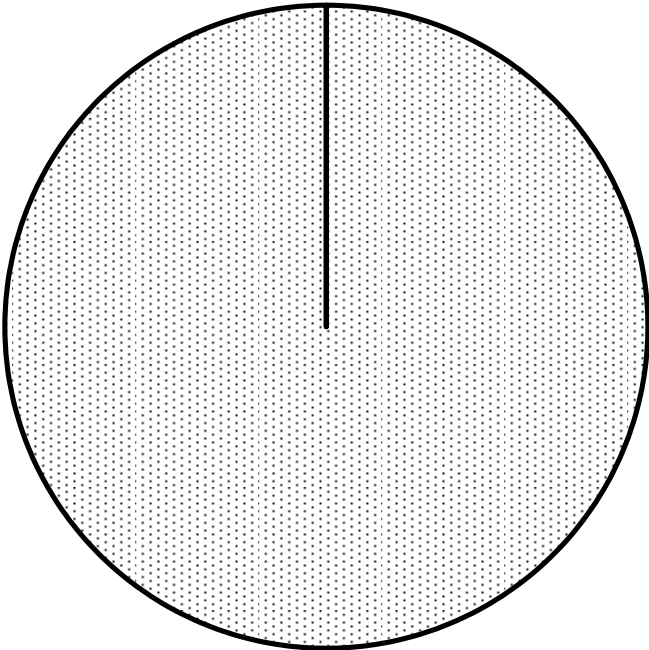
GRAPH 8

**CAMP SIXTEEN GULCH 2012
MEAN PERCENT CANOPY**



GRAPH 9

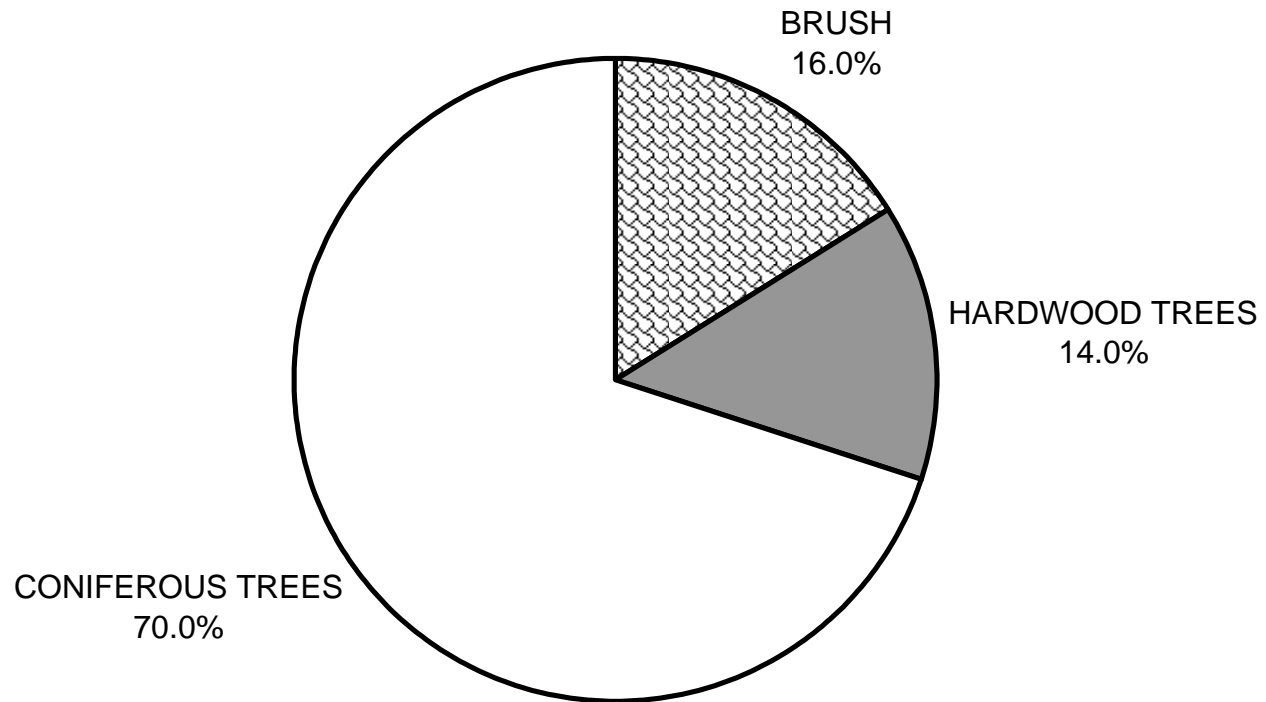
**CAMP SIXTEEN GULCH 2012
DOMINANT BANK COMPOSITION IN SURVEY REACH**



SAND/SILT/CLAY
100.0%

GRAPH 10

**CAMP SIXTEEN GULCH 2012
DOMINANT BANK VEGETATION IN SURVEY REACH**

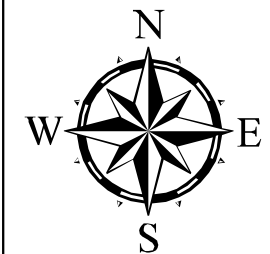


GRAPH 11

**Map 1
Camp 16 Gulch
Navarro River Watershed
Navarro Quad, Mendocino County**

End Survey

Start Survey



— Channel Type B6

