

# **STREAM INVENTORY REPORT**

## **Unnamed Tributary to Gulch Eleven**

### **INTRODUCTION**

A stream inventory was conducted on July 25, 2012 on an unnamed tributary to Gulch Eleven. The survey began at the confluence with Gulch Eleven and extended upstream 0.3 miles.

The unnamed tributary inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in the unnamed tributary. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

### **WATERSHED OVERVIEW**

The unnamed tributary is a tributary to Gulch Eleven, a tributary to South Fork Ten Mile River, a tributary to Ten Mile River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). The unnamed tributary's legal description at the confluence with Gulch Eleven is T19N R16W S25. Its location 39.4759 degrees north latitude and 123.5929 degrees west longitude, LLID number 1235917394759. The unnamed tributary is a first order stream and has approximately 0.3 miles of blue line stream according to the USGS Northspur 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 1.8 square miles. Elevations range from about 460 feet at the mouth of the creek to 1,000 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 Camp One Ten Mile Road north of Fort Bragg.

### **METHODS**

The habitat inventory conducted in the unnamed tributary to Gulch Eleven 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 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

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their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

### HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in the unnamed tributary 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". The unnamed tributary habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

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### 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In the unnamed tributary, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate like bedrock, log sills, boulders or other considerations.

### 6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is classified according to a list of nine cover types. In the unnamed tributary, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. The shelter rating is then calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

### 7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

### 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In the unnamed tributary, 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 the unnamed tributary, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) was estimated and recorded.

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### 10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

### 11. Average Bankfull Width:

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

## BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in the unnamed tributary to Gulch Eleven. In addition, underwater observations were made at two sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and 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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for the unnamed tributary include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

### HABITAT INVENTORY RESULTS

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

The habitat inventory of July 25, 2012 was conducted by A. Blessing and T. Anderson (WSP). The total length of the stream surveyed was 1,625 feet.

Stream flow was not measured on the unnamed tributary to Gulch Eleven.

The unnamed tributary is a G4 channel type for the entire length of the survey, 1,625 feet. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 50 to 51 degrees Fahrenheit. Air temperatures ranged from 60 to 61 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 45% pool units, 38% flatwater units, and 18% riffle units (Graph 1). Based on total length of Level II habitat types there were 75% flatwater units, 18% pool units, and 7% riffle units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 38%; step run units, 35%; and low gradient riffle units, 18% (Graph 3). Based on percent total length, step run units made up 74%, mid-channel pool units 14%, and low gradient riffle units 7%.

A total of 18 pools were identified (Table 3). Main channel pools were the most frequently encountered at 94% (Graph 4), and comprised 96% of the total length of all pools (Table 3).

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. One of the 18 pools (6%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, all of them had a value of 2 (100%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed not suitable for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle habitat types had a mean shelter rating of 5, flatwater habitat types had a mean shelter rating of 30, and pool habitats had a mean shelter rating of 40 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 45. Main channel pools had a mean shelter rating of 40 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in the unnamed tributary. Graph 7 describes the pool cover in the unnamed tributary. Large woody debris is the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 56% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 33% of the pool tail-outs.

The mean percent canopy density for the surveyed length of the unnamed tributary was 100%. Of the canopy present, the mean percentages of hardwood and coniferous trees were 38% and 62%, respectively. Graph 9 describes the mean percent canopy in the unnamed tributary.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 73% sand/silt/clay, 25% cobble/gravel, and 3% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 73% of the units surveyed. Additionally, 20% of the units surveyed had deciduous trees as the dominant vegetation type, and 8% had brush as the dominant vegetation type (Graph 11).

## **BIOLOGICAL INVENTORY RESULTS**

Survey teams conducted a snorkel survey at two sites for species composition and distribution in the unnamed tributary to Gulch Eleven on September 26, 2012. The sites were sampled by I. Mikus and M. Groff (CDFW).

The two sites were sampled within the first 1,625 feet of the unnamed tributary to Gulch Eleven. The sites yielded no fish.

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The following chart displays the information yielded from these sites:

2012 unnamed tributary to Gulch Eleven underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
G4 Channel Type									
09/26/12	1	002	Pool	41	0	0	0	0	0
	2	005	Pool	99	0	0	0	0	0

## DISCUSSION

The unnamed tributary to Gulch Eleven is a G4 channel type. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey day, July 25, 2012, ranged from 50 to 51 degrees Fahrenheit. Air temperatures ranged from 60 to 61 degrees Fahrenheit. This is a good water temperature range for salmonids. 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 75% of the total length of this survey, riffles 7%, and pools 18%. One of the 18 (6%) pools had a maximum residual depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum residual depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended.

All of the 18 pool tail-outs measured had embeddedness ratings of 1 or 2. None of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered not suitable 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.

Sixteen of the 18 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 40. 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 the unnamed tributary. Large woody debris is the

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dominant cover type in pools followed by small woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 100%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

### RECOMMENDATIONS

- 1) The unnamed tributary to Gulch Eleven 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.

### 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 Gulch Eleven. The channel is a G4 for the entire length of the survey.
496	0010.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 4.5' high x 14' wide x 11' long. Water flows through the LDA and there are visible gaps in it. Retained sediment ranges from silt to cobble and measures 15' wide x 40' long x 2' deep. Fish were not observed above the LDA.
1607	0040.00	End of survey. The creek forks into two equally flowing tributaries with increasing slope and little habitat. Both channels are clogged with woody debris, creating a series of plunges with a dry unit above. No fish were observed above HU#010.



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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: 1235917394759 LLID: 1235917394759 Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR Legal Description: T19NR16WS25 Latitude: 39:28:33.0N Longitude: 123:35:30.0

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
15	1	FLATWATER	37.5	81	1222	75.2	6.5	0.3	0.5	205	3071	61	921		30
18	18	POOL	45.0	16	292	18.0	7.3	0.5	1.2	114	2053	82	1476	57	40
7	1	RIFFLE	17.5	16	111	6.8	5.5	0.2	0.3	47	327	9	65		5
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
40	20				1625					5451			2463		

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

Stream Name: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Volume (cu.ft.)	Estimated Total Volume (cu.ft.)	Mean Residual Pool Vol (cu.ft.)	Mean Shelter Rating	Mean Canopy (%)
7	1	LGR	17.5	16	111	6.8	6	0.2	0.3	47	327	9	65		5	100
1	0	RUN	2.5	20	20	1.2										
14	1	SRN	35.0	86	1202	74.0	6	0.3	0.5	205	2867	61	860		30	100
15	15	MCP	37.5	15	223	13.7	7	0.5	1.9	97	1459	70	1045	49	42	100
2	2	STP	5.0	28	57	3.5	9	0.4	1.2	243	486	146	292	84	20	100
1	1	PLP	2.5	12	12	0.7	9	1.1	2.8	108	108	140	140	119	45	100

Total Units	Total Units Fully Measured
40	20

Total Length (ft.)
1625

Total Area (sq.ft.)
5247

Total Volume (cu.ft.)
2402

Stream Name:	1235917394759	LLID:	1235917394759	Drainage:	Rockport
Survey Dates:	7/25/2012 to 7/25/2012				
Confluence Location:	Quad: NORTHSPUR	Legal Description:	T19NR16WS25	Latitude:	39:28:33.0N
				Longitude:	123:35:30.0W

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
18	18	292	2053	1026

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

Stream Name: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
15	MCP	83	8	53	7	47	0	0	0	0	0	0
2	STP	11	1	50	1	50	0	0	0	0	0	0
1	PLP	6	0	0	0	0	1	100	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
18	9	50	8	44	1	6	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.2

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

Stream Name: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Dry Units: 0

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
7	1	LGR	0	10	0	0	0	0	0	90	0
7	1	TOTAL RIFFLE	0	10	0	0	0	0	0	90	0
1	0	RUN									
14	1	SRN	10	30	60	0	0	0	0	0	0
15	1	TOTAL FLAT	10	30	60	0	0	0	0	0	0
15	15	MCP	11	33	28	5	0	0	2	18	3
2	2	STP	0	20	50	0	0	0	0	30	0
1	1	PLP	0	10	40	0	0	0	30	20	0
18	18	TOTAL POOL	9	30	31	4	0	0	3	19	3
40	20	TOTAL	9	29	31	4	0	0	3	22	2

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

Stream Name: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Dry Units: 0

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
7	1	LGR	0	0	100	0	0	0	0
1	0	RUN	0	0	0	0	0	0	0
14	1	SRN	0	0	100	0	0	0	0
15	15	MCP	0	0	100	0	0	0	0
2	2	STP	0	0	100	0	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: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
100	62	38	0	100	100

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.

Stream Name:	1235917394759	LLID:	1235917394759	Drainage:	Rockport		
Survey Dates:	7/25/2012 to 7/25/2012	Survey Length (ft.):	1625	Main Channel (ft.):	1625	Side Channel (ft.):	0
Confluence Location:	Quad: NORTHSPUR	Legal Description:	T19NR16WS25	Latitude:	39:28:33.0N	Longitude:	123:35:30.0W

<b>STREAM REACH: 1</b>									
Channel Type: G4			Canopy Density (%): 99.6				Pools by Stream Length (%): 18.0		
Reach Length (ft.): 1625			Coniferous Component (%): 62.0				Pool Frequency (%): 45.0		
Riffle/Flatwater Mean Width (ft.): 6.0			Hardwood Component (%): 38.0				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Coniferous Trees				< 2 Feet Deep: 94		
Range (ft.): 7 to 10			Vegetative Cover (%): 100.0				2 to 2.9 Feet Deep: 6		
Mean (ft.): 9			Dominant Shelter: Large Woody Debris				3 to 3.9 Feet Deep: 0		
Std. Dev.: 1			Dominant Bank Substrate Type: Sand/Silt/Clay				>= 4 Feet Deep: 0		
Base Flow (cfs.): 0.0			Occurrence of LWD (%): 31				Mean Max Residual Pool Depth (ft.): 1.2		
Water (F): 50 - 51			Air (F): 60 - 61				LWD per 100 ft.:		
Dry Channel (ft): 0			Riffles: 4				Mean Pool Shelter Rating: 40		
			Pools: 12						
			Flat: 4						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 6 Gravel: 56 Sm Cobble: 33 Lg Cobble: 6 Boulder: 0 Bedrock: 0									
Embeddedness Values (%): 1. 0.0 2. 100.0 3. 0.0 4. 0.0 5. 0.0									

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

Stream Name: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	1	0	2.5
Boulder	0	0	0.0
Cobble / Gravel	4	6	25.0
Sand / Silt / Clay	15	14	72.5

**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	0	0	0.0
Brush	2	1	7.5
Hardwood Trees	3	5	20.0
Coniferous Trees	15	14	72.5
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: 1235917394759

LLID: 1235917394759

Drainage: Rockport

Survey Dates: 7/25/2012 to 7/25/2012

Confluence Location: Quad: NORTHSPUR

Legal Description: T19NR16WS25

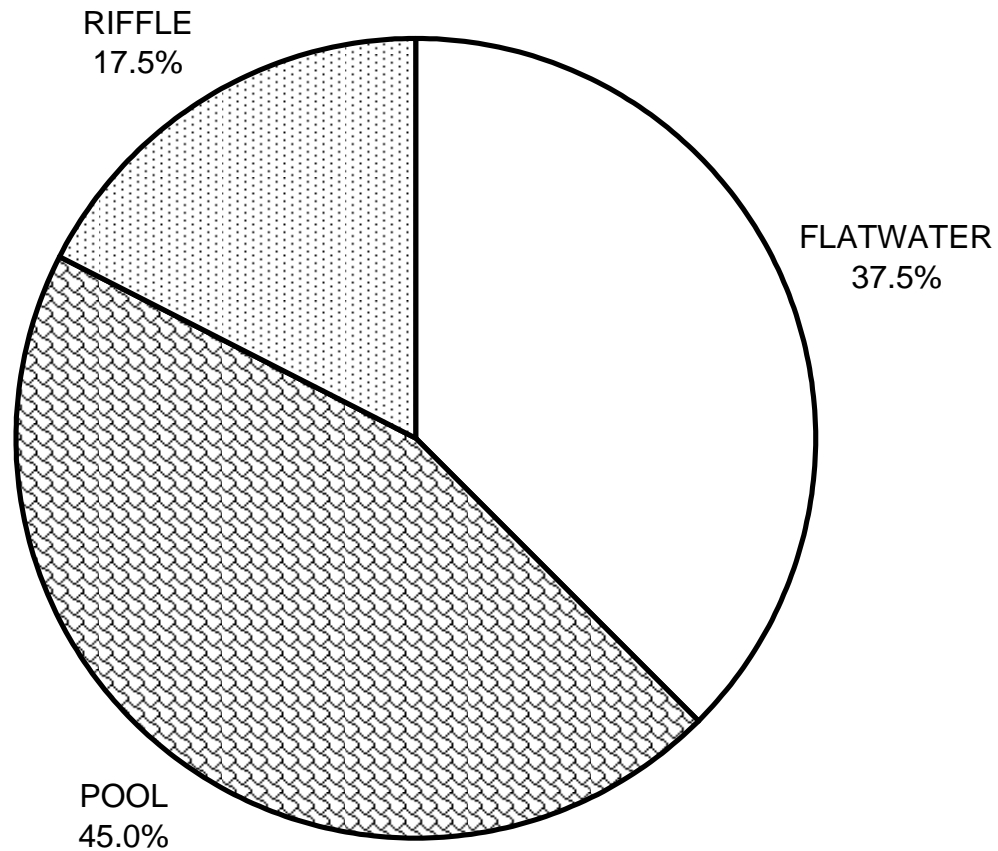
Latitude: 39:28:33.0N

Longitude: 123:35:30.0W

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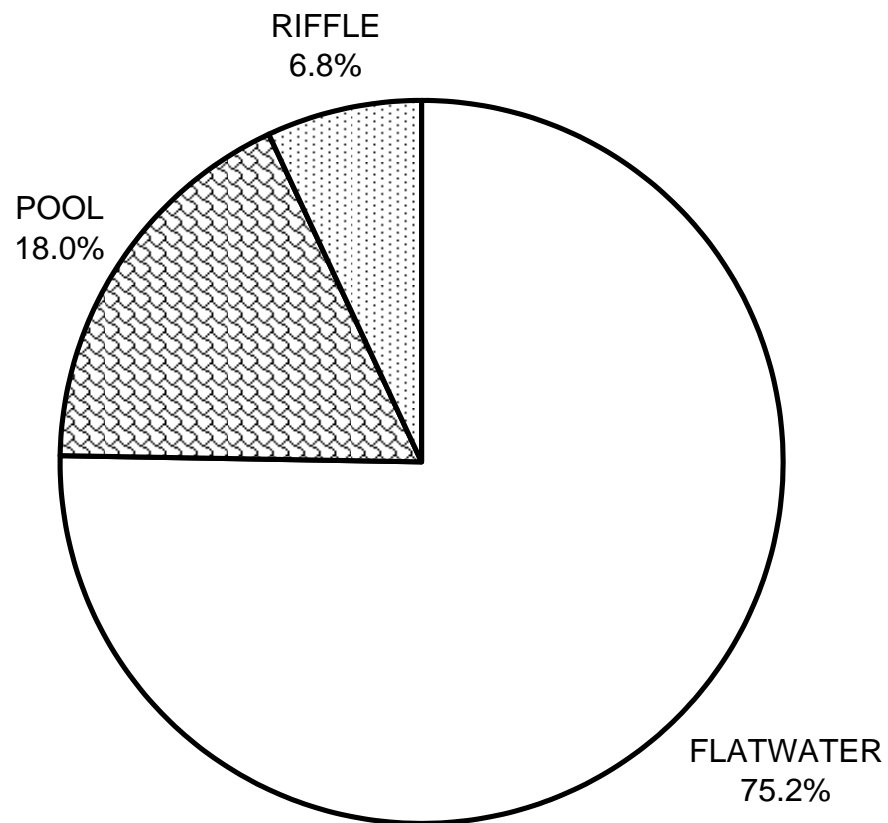
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	10	9
SMALL WOODY DEBRIS (%)	10	30	30
LARGE WOODY DEBRIS (%)	0	60	31
ROOT MASS (%)	0	0	4
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	3
BOULDERS (%)	90	0	19
BEDROCK LEDGES (%)	0	0	3

**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 1

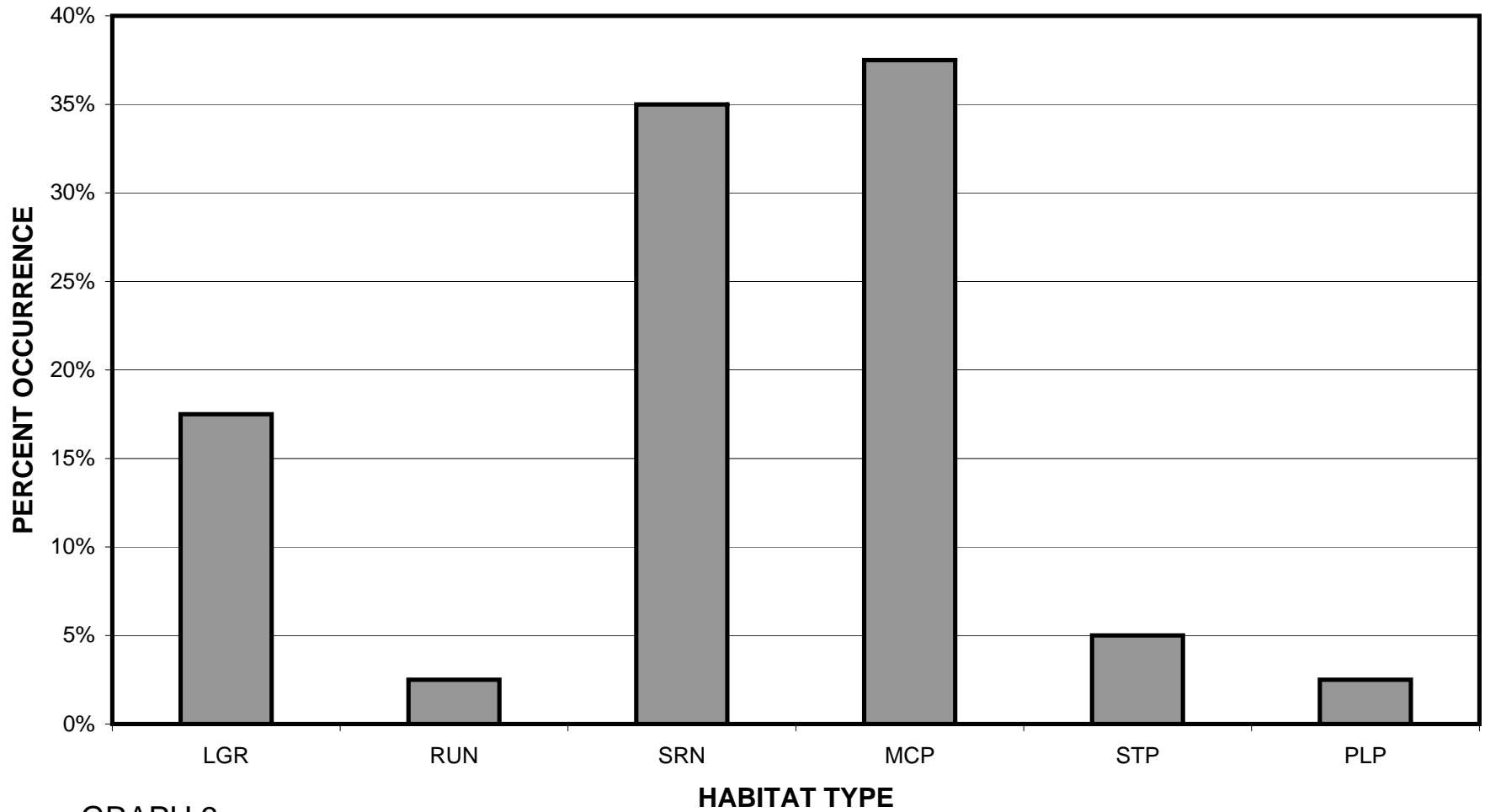
**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
HABITAT TYPES BY PERCENT TOTAL LENGTH**



GRAPH 2

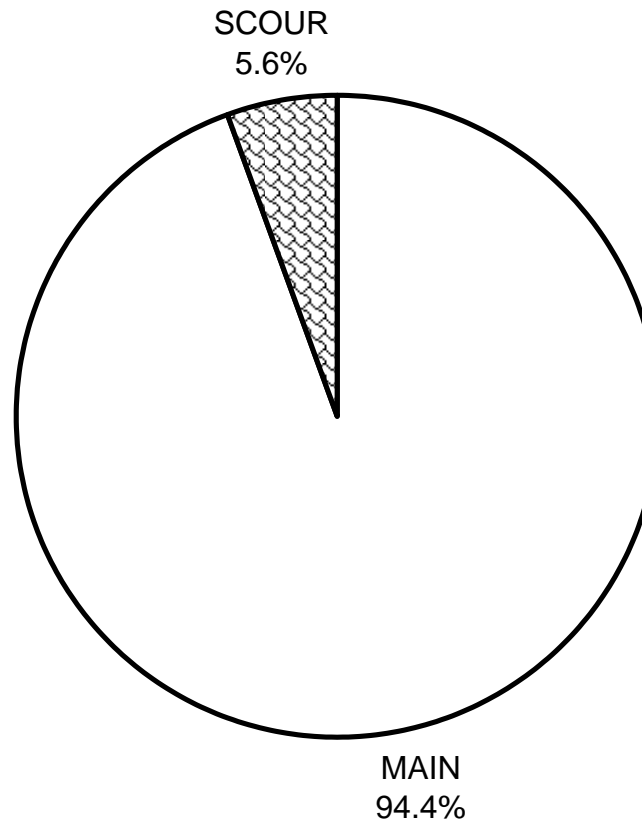
# UNNAMED TRIBUTARY TO GULCH ELEVEN 2012

## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

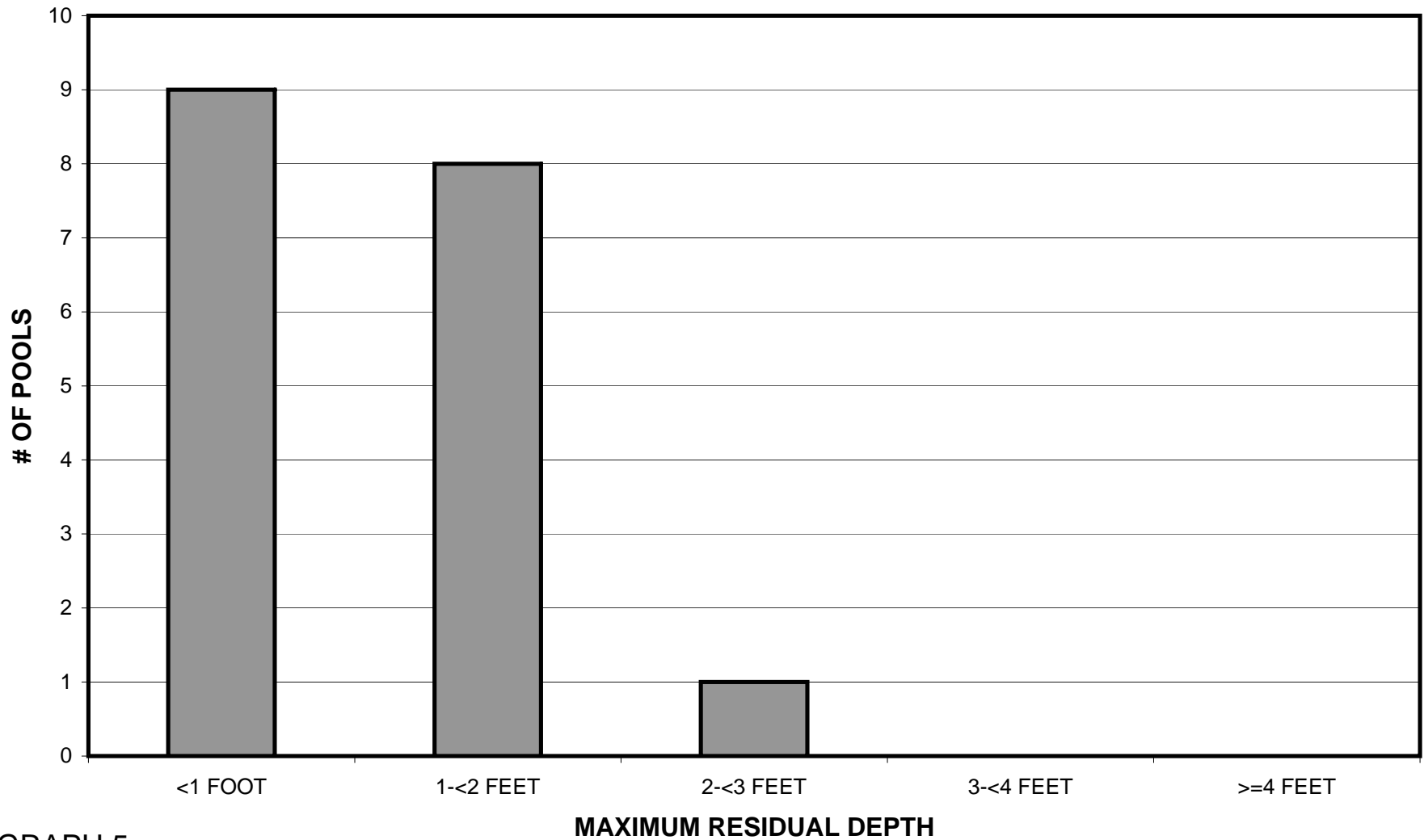
**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

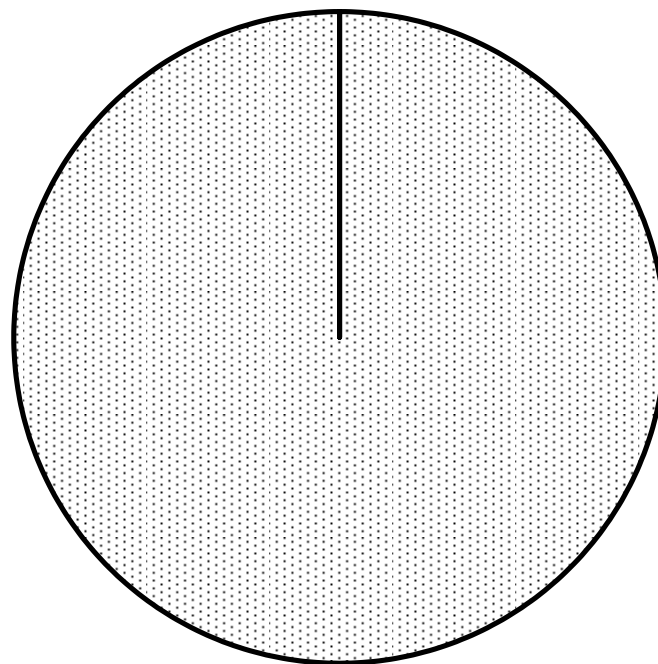


**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012**  
**MAXIMUM DEPTH IN POOLS**



GRAPH 5

**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
PERCENT EMBEDDEDNESS**

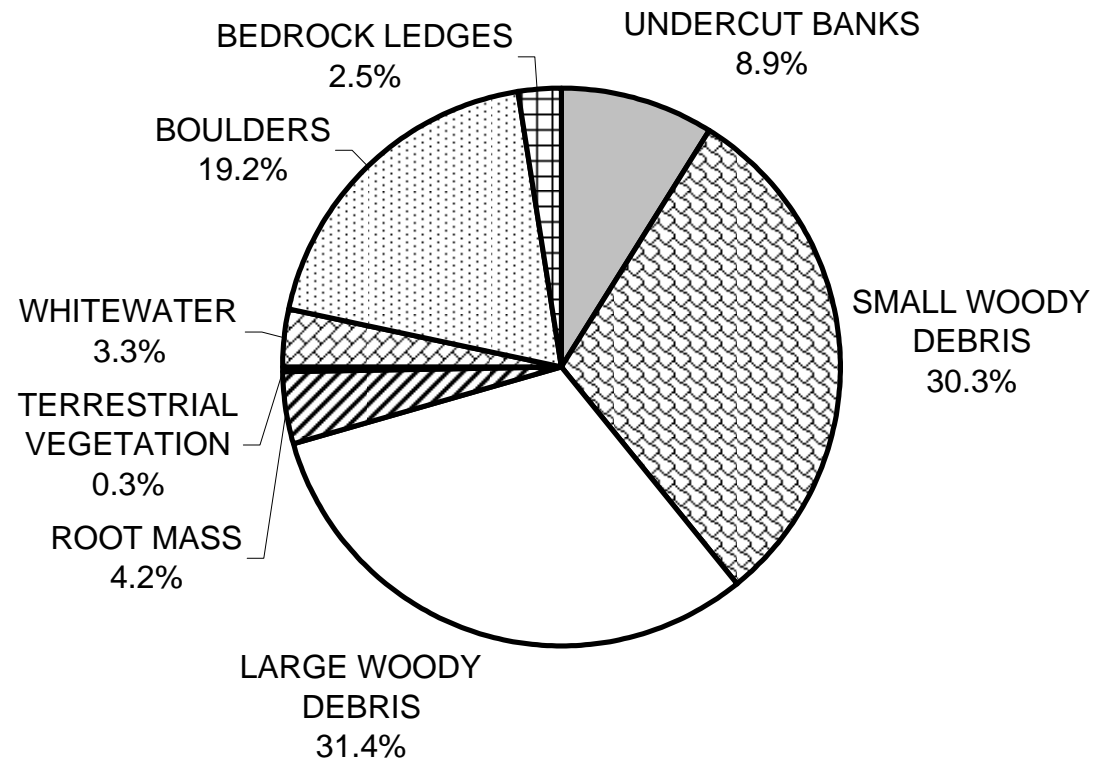


VALUE 2  
100.0%

GRAPH 6

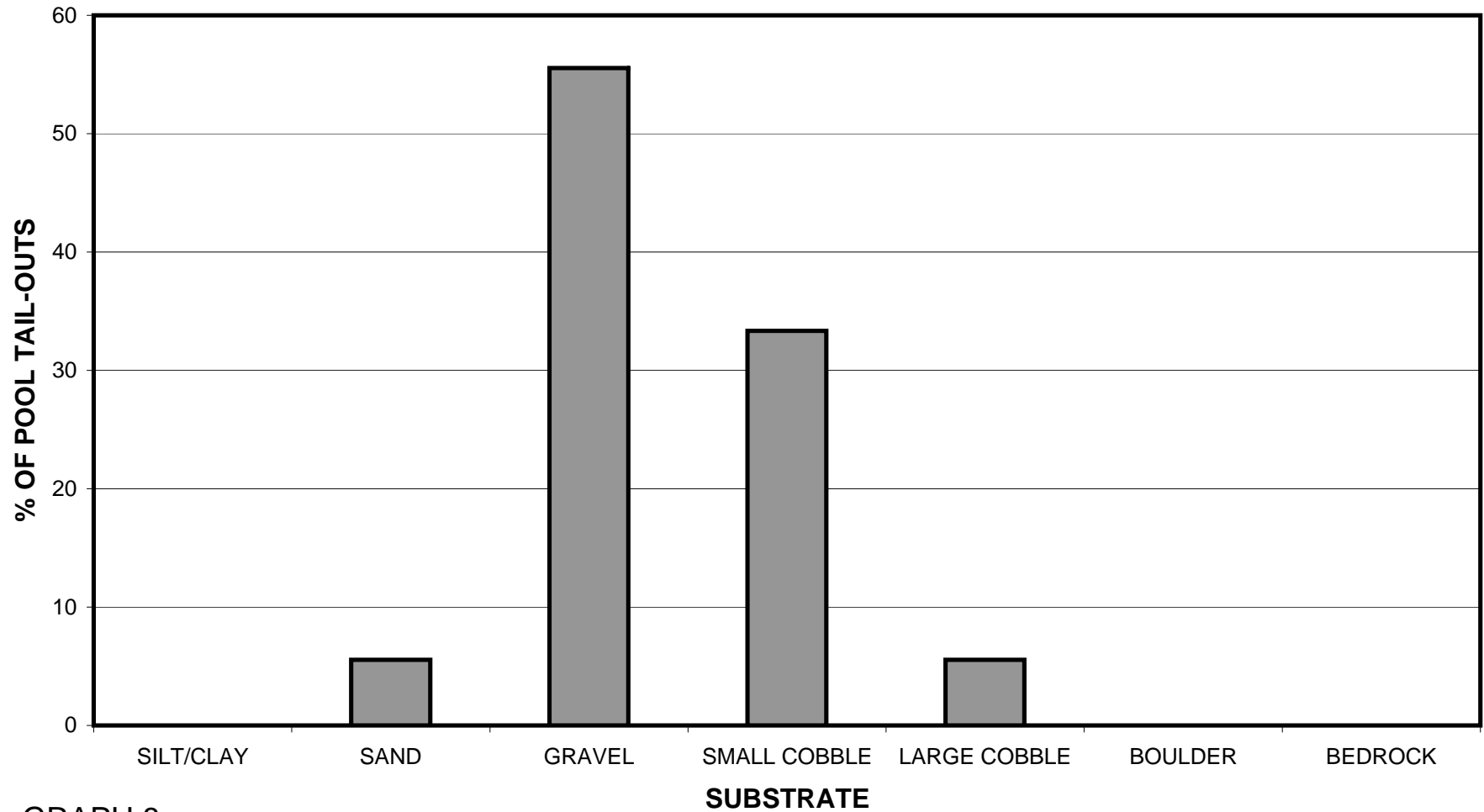
# UNNAMED TRIBUTARY TO GULCH ELEVEN 2012

## MEAN PERCENT COVER TYPES IN POOLS



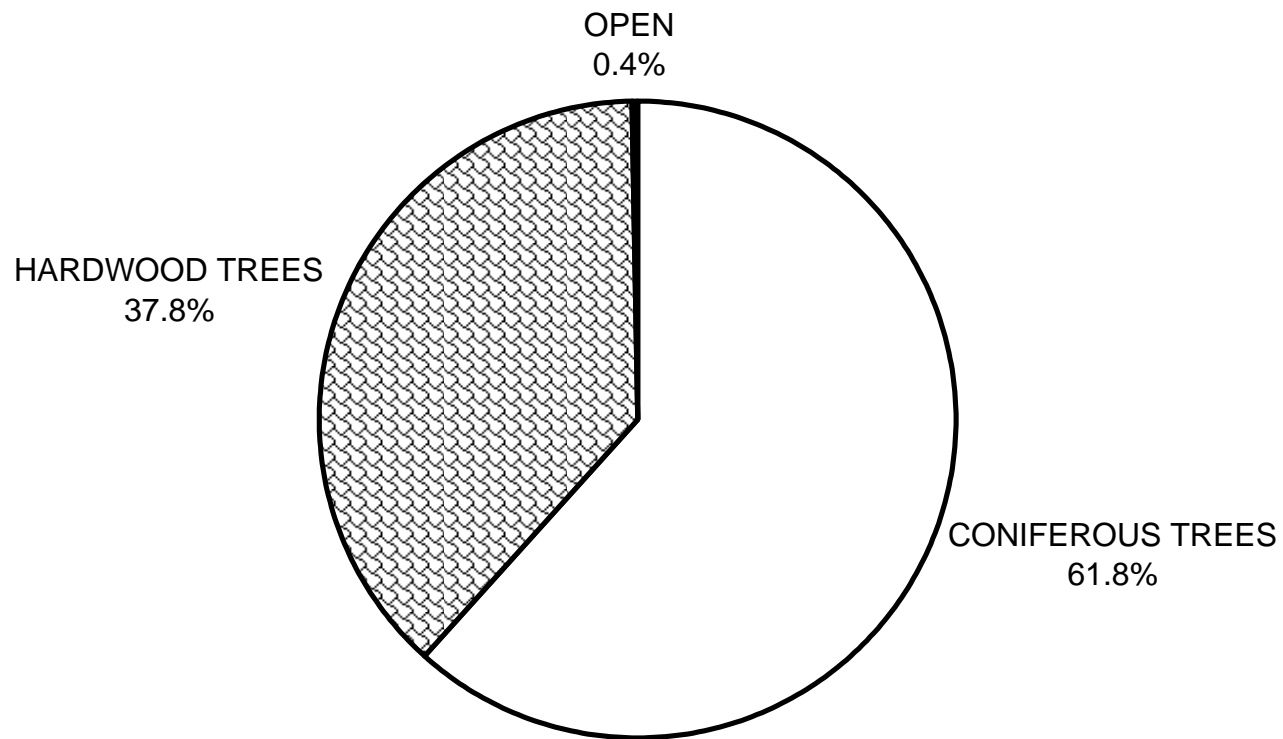
GRAPH 7

**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



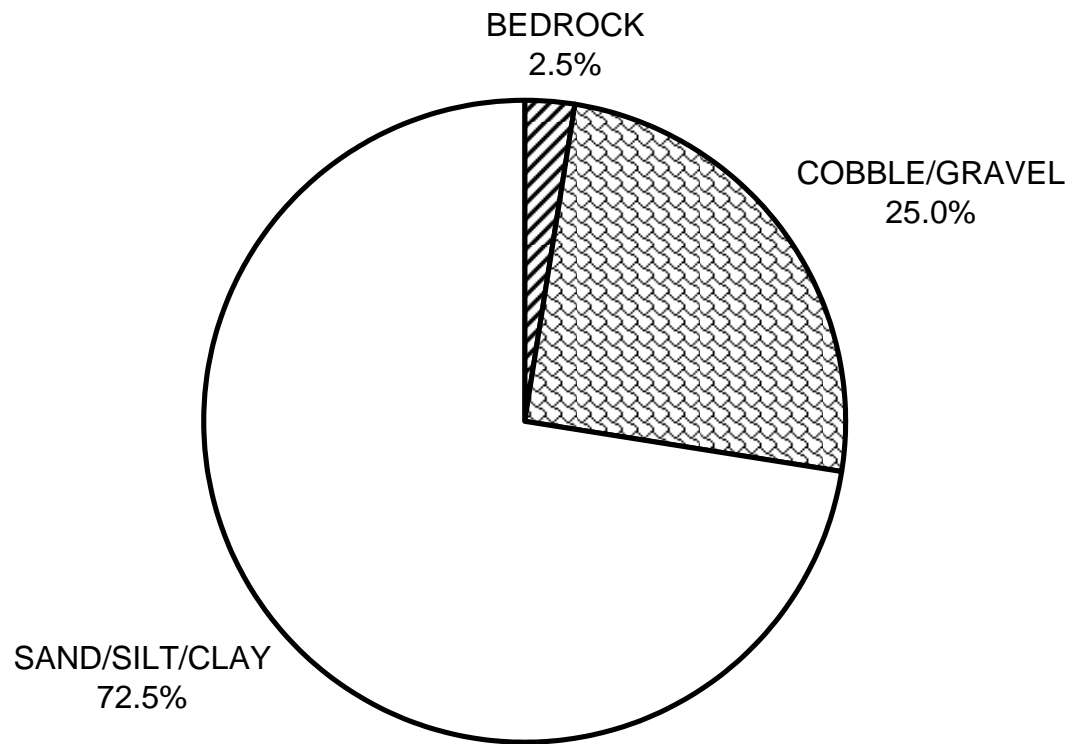
GRAPH 8

**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012**  
**MEAN PERCENT CANOPY**



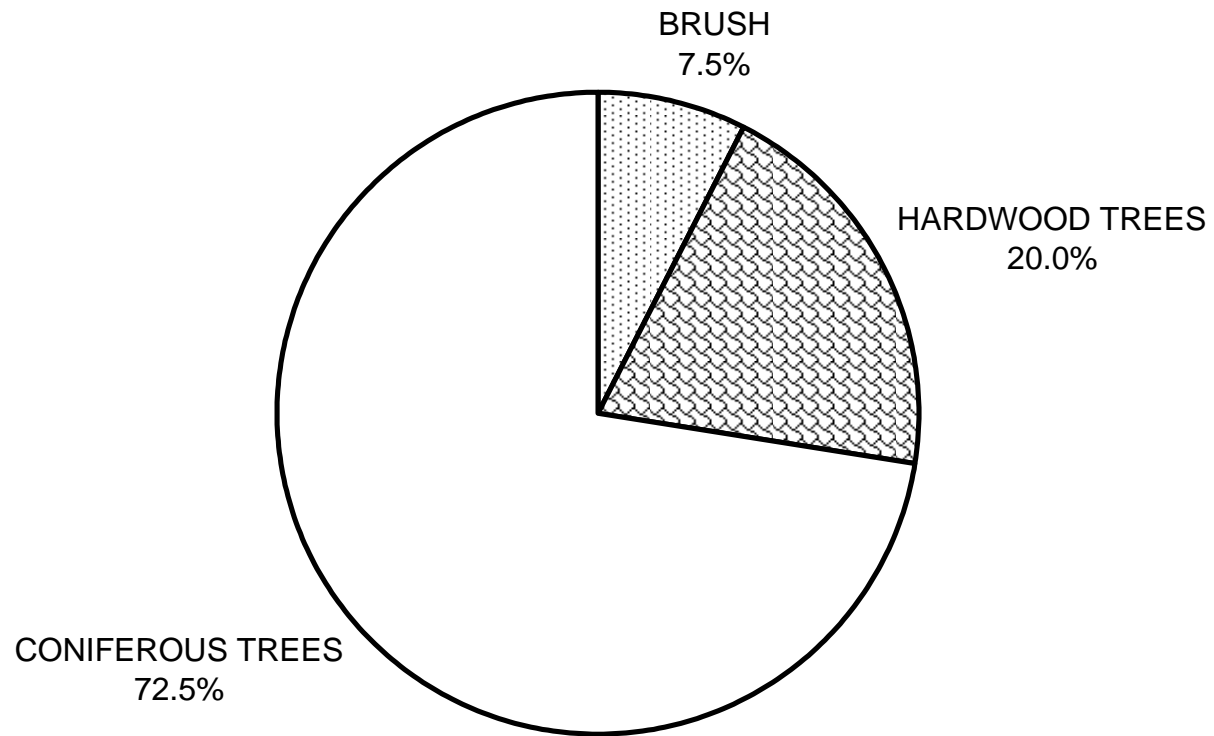
GRAPH 9

**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
DOMINANT BANK COMPOSITION IN SURVEY REACH**



GRAPH 10

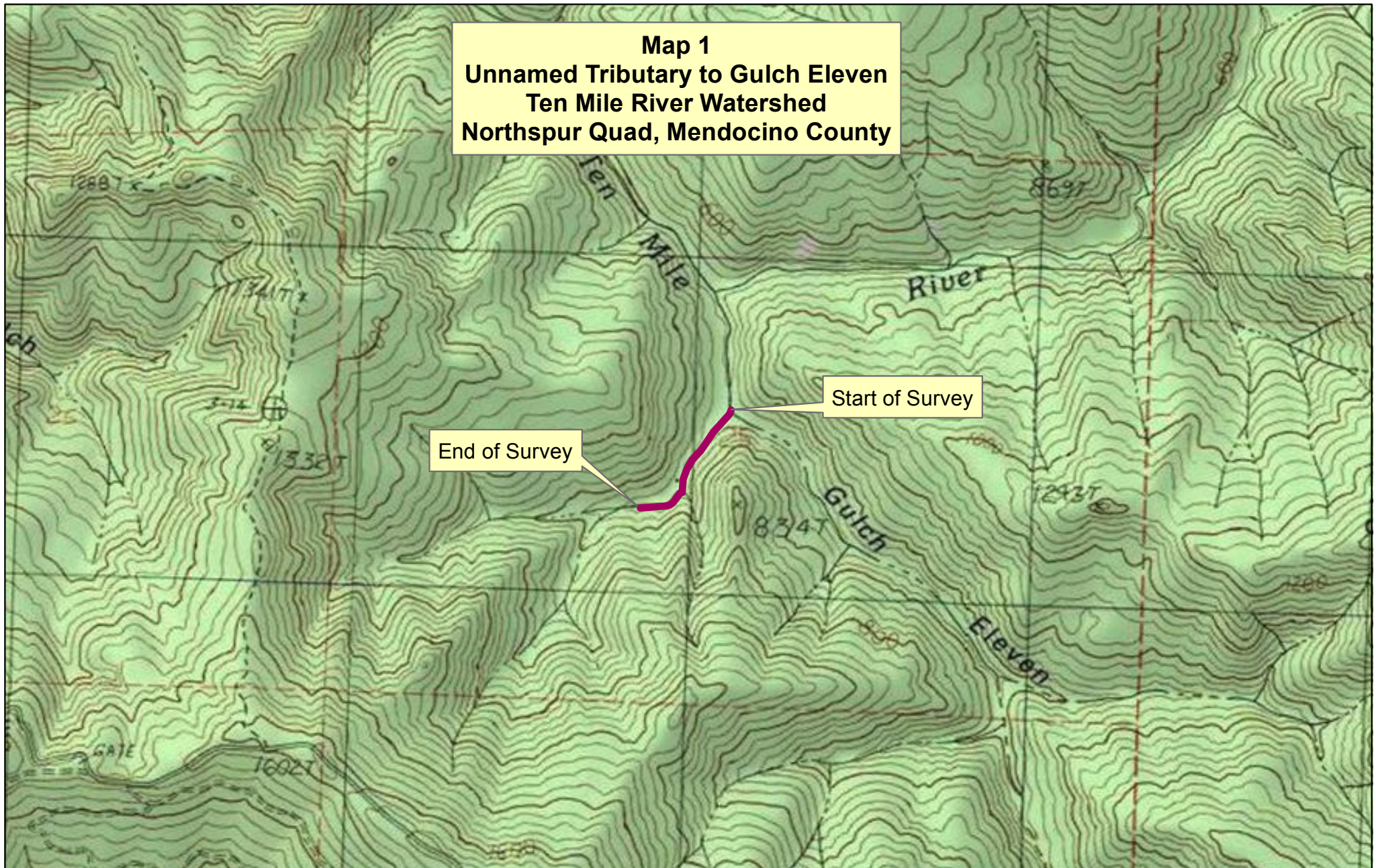
**UNNAMED TRIBUTARY TO GULCH ELEVEN 2012  
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11




**Map 1**  
**Unnamed Tributary to Gulch Eleven**  
**Ten Mile River Watershed**  
**Northspur Quad, Mendocino County**



 G4 Channel Type

0 1,500 3,000 Feet

A horizontal scale bar with three segments. The first segment is labeled '0', the second '1,500', and the third '3,000 Feet'.