CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Unnamed Tributary to Railroad Gulch

INTRODUCTION

A stream inventory was conducted from June 22 to June 29, 2016 on Unnamed Tributary to Railroad Gulch. The survey began at the confluence with Railroad Gulch and extended upstream 1.2 miles.

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

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

WATERSHED OVERVIEW

Unnamed Tributary to Railroad Gulch flows to Railroad Gulch, tributary to Albion River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Unnamed Tributary to Railroad Gulch's legal description at the confluence with Railroad Gulch is T16N R17W S25. Its location is 39.2259° north latitude and -123.7102° west longitude, LLID number 1237089392260. Unnamed Tributary to Railroad Gulch is a first order stream and has approximately 1.15 miles of blue line stream according to the USGS Elk 7.5 minute quadrangle. Unnamed Tributary to Railroad Gulch drains a watershed of approximately 0.4 square miles. Elevations range from about 88 feet at the mouth of the creek to 320 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 Highway 1 to Little River Airport Road, south of Mendocino.

METHODS

The habitat inventory conducted in Unnamed Tributary to Railroad Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998). The California Department of Fish and Wildlife (CDFW) personnel, California Conservation Corps (CCC) personnel, and Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the 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 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 Unnamed Tributary to Railroad 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:

Water and air temperatures are measured and recorded at every tenth habitat unit using a hand-held thermometer. Both temperatures are taken in degrees Fahrenheit and the time of the measurement is also recorded. Air temperatures are recorded within one foot of the water surface, while water temperatures are recorded (where possible) in flowing water within the habitat unit.

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". Unnamed Tributary to Railroad 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 Unnamed Tributary to Railroad

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

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition for prey. 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 Unnamed Tributary to Railroad 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Unnamed Tributary to Railroad 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 Unnamed Tributary to Railroad 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.

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 Unnamed Tributary to Railroad Gulch. In addition, underwater mask and snorkel observations were made at 11 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 2.0.18, 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 Unnamed Tributary to Railroad Gulch include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence

- Maximum Residual Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED IN APPENDIX I *

The habitat inventory from June 22 to June 29, 2016, was conducted by Ryan Bernstein (WSP), Brian Starks, (CDFW) and Chantel Moore (CCC). The total length of the stream surveyed was 6,333 feet with an additional 516 feet of side channel.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.152 cfs on June 27, 2016.

Unnamed Tributary to Railroad Gulch is a G4 channel type for the entire 6,849 feet of the stream surveyed. G4 channel types are 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 52° to 57° Fahrenheit. Air temperatures ranged from 54° to 62° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 38% flatwater units, 33% pool units, 26% riffle units, 2% dry units, and 1% unsurveyed marsh units (Graph 1). Based on total length of Level II habitat types there were 56% flatwater units, 17% pool units, 15% unsurveyed marsh units, 12% riffle units, and 1% dry units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 32%; run units, 22%; low gradient riffle units, 20% (Graph 3). Based on percent total length, step-run units made up 36%, run units 20%, and mid-channel pool units 16%.

A total of 88 pools were identified (Table 3). Main-channel pools were the most frequently encountered at 98% (Graph 4), and comprised 98% 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. Seven of the 88 pools (8%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 88 pool tail-outs

measured, 24 had a value of 1 (27.3%); 14 had a value of 2 (15.9%); 20 had a value of 3 (22.7%); 14 had a value of 4 (15.9%); 16 had a value of 5 (18.2%) (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. The pool habitats had the highest mean shelter rating of 35. Flatwater habitat types had a mean shelter rating of 6.

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Unnamed Tributary to Railroad Gulch. Graph 7 describes the pool cover in Unnamed Tributary to Railroad 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 most dominant substrate observed in 84% of pool tail-outs. Silt/clay was the next most dominant substrate type observed in 14% of pool tail-outs.

The mean percent canopy density for the surveyed length of Unnamed Tributary to Railroad Gulch was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 39% and 61%, respectively. Graph 9 describes the mean percent canopy in Unnamed Tributary to Railroad Gulch.

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 82% sand/silt/clay and 17% cobble/gravel (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at 11 sites for species composition and distribution in Unnamed Tributary to Railroad Gulch on September 9, 2016. The water temperature taken during the survey period was 52° Fahrenheit. The sites were sampled by Brian Starks, Matt Rice, and Maddelyn Harden (CDFW).

The survey sites yielded 0 young-of-the-year (YOY) steelhead/rainbow trout (SH/RT), one age 1+ SH/RT, 7 YOY coho, and 1 coastal giant salamander.

During the survey, the upstream-most observation of juvenile coho salmon occurred at 39.2255° degrees north latitude, -123.7107° degrees west longitude, approximately 206 feet upstream from the confluence with Railroad Gulch. The upstream-most observation of juvenile steelhead occurred at 39.2246° degrees north latitude, -123.7118° degrees west longitude, approximately 928 feet upstream from the confluence with Railroad Gulch.

Table A. Summary of results for a fish composition and distribution survey within Unnamed Tributary to Railroad Gulch, September, 2016.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	Steelhead Trout			Coho Salmon		Additional Aquatic Species Observed
					YOY	1+	2+	YOY	1+	
G4 Channel Type										
09/22/16	1	003	Pool	105	0	0	0	3	0	
	2	006	Pool	154	0	0	0	0	0	1 CGS
	3	007	Pool	164	0	0	0	1	0	
	4	010	Pool	211	0	0	0	3	0	
	5	021	Pool	404	0	0	0	0	0	
	6	027	Pool	498	0	0	0	0	0	
	7	037	Pool	646	0	0	0	0	0	
	8	039	Pool	679	0	0	0	0	0	
	9	040	Pool	687	0	0	0	0	0	
	10	050	Pool	857	0	0	0	0	0	
	11	052	Pool	869	0	1	0	0	0	

Species Abbreviations: CGS=Coastal/California Giant Salamander

DISCUSSION

Unnamed Tributary to Railroad Gulch is a G4 channel type for the entire 6,849 feet of the stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days June 22 to June 29, 2016, ranged from 52° to 57° Fahrenheit. Air temperatures ranged from 54° to 62° Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 56% of the total length of this survey, riffles 12%, and pools 17%. Seven of the 88 (8%) 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.

Thirty-eight of the 88 pool tail-outs measured had embeddedness ratings of 1 or 2. Thirty-four of the pool tail-outs had embeddedness ratings of 3 or 4. Sixteen 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 Unnamed Tributary to Railroad Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Seventy-six of the 88 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 35. The shelter rating in the flatwater habitats is 6. 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 Unnamed Tributary to Railroad 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 97%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

Unnamed Tributary to Railroad Gulch should be managed as an anadromous, natural production stream. Recommendations for potential habitat improvement activities are based on target habitat values suitable for salmonids in California's north coast streams. Considering the results from this stream habitat inventory, factors that affect salmonid productivity and CDFW's professional judgment, the following list prioritizes habitat improvement activities in Unnamed Tributary to Railroad Gulch. Keep in mind, watershed and stream ecosystem processes, land use alterations, changes in land ownership, and other factors could potentially change the order of these recommendations or create the need to remove/add recommendations in the future.

1) 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.

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 confluence with the Albion River. Channel type is a

G4. Channel type cross-section location is at Habitat Unit (HU) #79.

105	0003.00	Multiple salmonids observed in pool.
404	0021.00	Log debris accumulation (LDA) #1 contains 9 pieces of large woody debris (LWD) and measures 5' high x 17' wide x 9' long. Water flows through the LDA and there are visible gaps in it. Sediment is predominantly gravel and not retained behind LDA. LDA is not a possible barrier to salmonids.
687	0040.00	LDA # 2 is 6' high x 12' wide x 8' long and contains 7 pieces of LWD. Water does flow through the LDA and there are visible gaps in it. Sediment is being retained in the approximate dimensions of 15' wide x 26' long x 3' deep. The sediment is predominantly large cobble. LDA is a possible barrier to salmonids as there is 3' plunge into a 4' plunge on left bank into channel as well as a 4' plunge on the right bank of the channel. A rootwad and boulders are integrated into the LDA as well, creating lots of obstacles to fish.
842	0050.00	This unit contains a 2' plunge over wood/LWD.
898	0055.00	Tributary #1 enters on the left bank. The water temperature of the tributary was 54 degrees Fahrenheit, the water temperature downstream of the confluence was 53 degrees Fahrenheit, and the water temperature upstream of the confluence was 54 degrees Fahrenheit. The slope of the tributary is estimated 9%. The tributary is not accessible to salmonids as 50' upstream is 10' drop over where stream is dry for 15'. Stream is very steep and choked with vegetation and debris. Fish were not observed in the tributary.
1106	0070.00	Tributary #2 enters on the left bank. The water temperature of the tributary was 53 degrees Fahrenheit, the water temperature downstream of the confluence was 54 degrees Fahrenheit, and the water temperature upstream of the confluence was 54 degrees Fahrenheit. The slope of the tributary is estimated 30%. The tributary is not accessible to salmonids due to extreme slope. Fish were not observed in the tributary.
1237	0074.00	This habitat unit contains 4' x 5' of undercut created by LWD.
1306	0077.00	There is a 1.5' plunge into a pool.
1481	0084.00	There is a 1.6' plunge over a boulder into a 1.3' pool.
1778	0103.00	Tributary #3 enters on the left bank. The water temperature of the tributary was 54 degrees Fahrenheit, the water temperature downstream

of the confluence was 53 degrees Fahrenheit, and the water temperature upstream of the confluence was 53 degrees Fahrenheit. The slope of the tributary is estimated 10%. The tributary is not accessible to salmonids possibly due to slope. Fish were not observed in the tributary.

2306   0123.00   Tributary #4 enters on the bank. The water temperature of the tributary was 53 degrees Fahrenheit, the water temperature downstream of the confluence was 53 degrees Fahrenheit, and the water temperature upstream of the confluence was 53 degrees Fahrenheit. The slope of the tributary is estimated 10%. The tributary is not accessible to salmonids due to a 3' plunge off wood into the mains tem of the Unnamed Tributary. Fish were not observed in the tributary.

2781   0137.00   The pool is 100% under small pieces of wood.

3205   0156.00   Entire run occurs under a root wad.

3252   0158.00   There is a 2.8' plunge over bedrock into a 0.6' deep pool.

3400   0163.00   Stream is very entrenched. There is low water flow.

3449   0164.00   Stream is getting flatter, not as steep as previously noted.

3784   0177.00   Water is flowing under a lot of small wood pieces.

5791   0263.00   There is a 7' plunge over wood into a 0.5' deep area of water.

5809   0264.00   There is a 4.7' plunge over wood into a 0.4' deep area of water.

5833   0265.00   There is a marsh above the plunge. Tributary #5 enters into the marshy area. The water temperature of the tributary was 54 degrees Fahrenheit, the water temperature downstream of the confluence was 55 degrees Fahrenheit, and the water temperature upstream of the confluence was 55 degrees Fahrenheit. The slope of the tributary is estimated 20%. The tributary is not accessible to salmonids due to low flow into the marsh, fish could possibly get into the tributary during high flows. Currently there is very low flow into the marsh. Fish were not observed in the tributary.

6333   0265.01   End of survey due to stream going subsurface.

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.

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]

**Map 1
Unnamed Tributary to Railroad Gulch
Albion River Watershed
Elk Quad, Mendocino County**

Humboldt County

Mendocino County

Pacific Ocean

Albion River Watershed

Start of Survey

End of Survey
River Mile 0.54*

N
W E
S
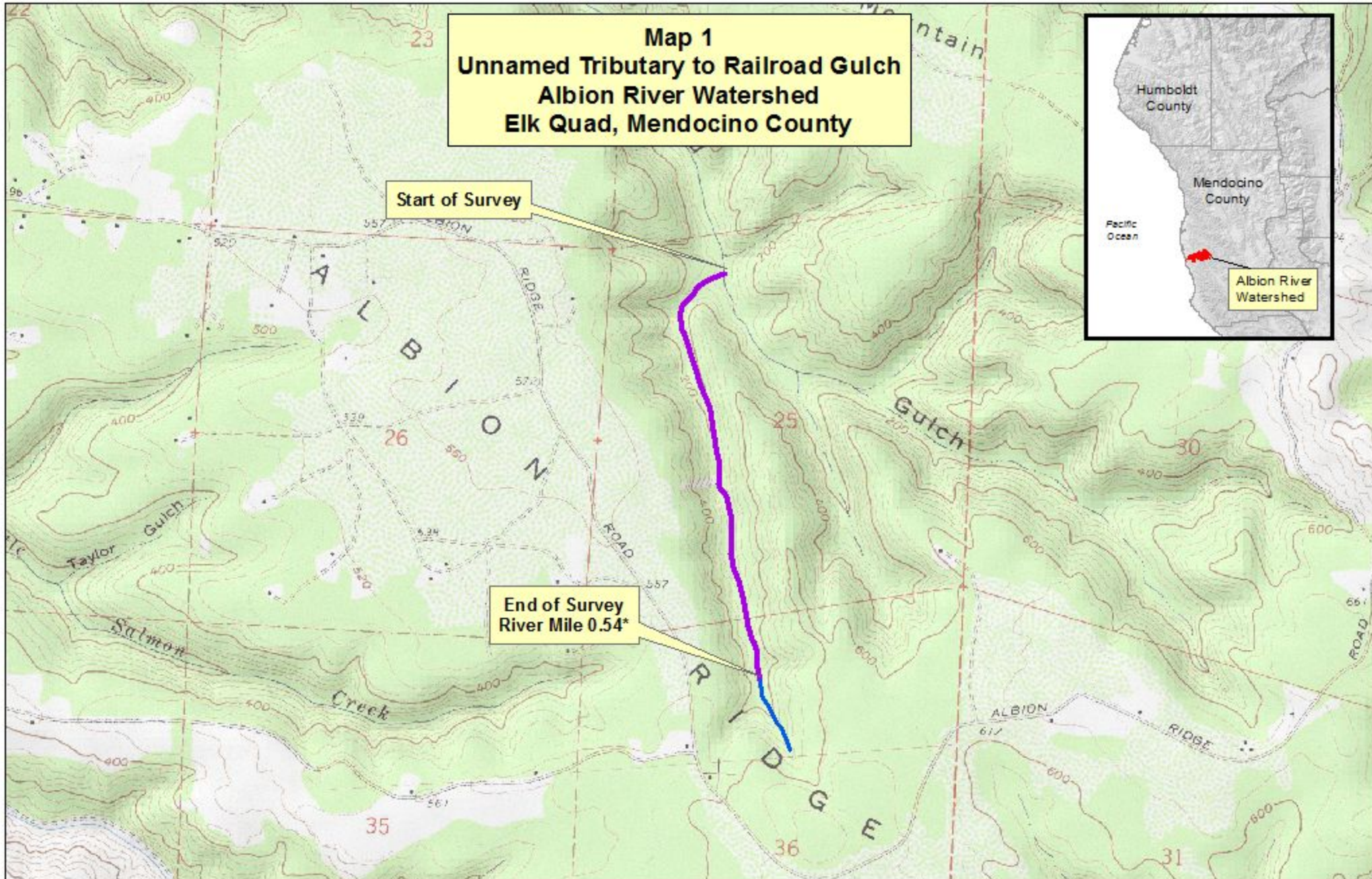
▬▬ Reach 1: G4 Channel Type   ▬▬ Unnamed Trib to Railroad Gulch

0   0.125 0.25   0.5
Miles

0   0.25   0.5   1
Kilometers

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*River Mile indicates distance from confluence with Railroad Gulch

Coordinate System: NAD 1983 California Teale Albers
Data Sources: CDFW, USGS, CalWater 2.21, CDF 24k

APPENDIX I

TABLES AND GRAPHS

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

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0

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
6	0	DRY	2.2	15	91	1.3									
102	10	FLATWATER	38.2	37	3811	55.6	4.1	0.4	0.8	113	11575	47	4765		6
2	0	NOSURVEY_	0.7	500	1000	14.6									
88	88	POOL	33.0	13	1140	16.6	6.3	0.7	1.4	82	7186	75	6622	57	35
69	15	RIFFLE	25.8	12	807	11.8	3.9	0.2	0.4	40	2751	10	662		3

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
267	113	6849	21512	12049

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

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 (%)
54	11	LGR	20.2	11	592	8.6	3	0.2	0.5	29	1565	6	328		0	98
15	4	HGR	5.6	14	215	3.1	6	0.3	0.7	70	1047	19	290		13	96
60	6	RUN	22.5	23	1361	19.9	4	0.4	1	63	3750	27	1627		3	97
42	4	SRN	15.7	58	2450	35.8	4	0.4	1	190	7978	76	3196		9	100
86	86	MCP	32.2	13	1115	16.3	6	0.6	2.3	82	7051	75	6472	56	36	97
1	1	PLP	0.4	15	15	0.2	5	1.1	2.2	75	75	90	90	83	20	91
1	1	BPL	0.4	10	10	0.1	6	0.9	1.5	60	60	60	60	54		95
6	0	DRY	2.2	15	91	1.3										
2	0	MAR	0.7	500	1000	14.6										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
267	113	6849	21526	12063

Table 3 - Summary of Pool Types

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

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
86	86	MAIN	86	13	1115		6.3	0.6	82	7051	56	4855	36
1	1	SCOUR	1	15	15		5.0	1.1	75	75	83	83	20
1	1	BACKWATER	1	10	10		6.0	0.9	60	60	54	54	

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
88	88	1140	7186	4991

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

Stream Name: 1237089392260 LLID: 1237089392260 Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK Legal Description: T16NR17WS25 Latitude: 39:13:34.0N Longitude: 123:42:32.0W

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
86	MCP	98	6	7	74	86	6	7	0	0	0	0
1	PLP	1	0	0	0	0	1	100	0	0	0	0
1	BPL	1	0	0	1	100	0	0	0	0	0	0

Total Units			Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
88			6	7	75	85	7	8	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.4

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Railroad Gulch   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016   Dry Units: 6

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

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
54	10	LGR	0	0	0	0	0	0	0	0	0
15	3	HGR	0	45	5	0	0	0	0	50	0
69	13	**TOTAL RIFFLE**	0	44	6	0	0	0	0	50	0
60	6	RUN	0	100	0	0	0	0	0	0	0
42	4	SRN	6	53	35	0	0	0	6	0	0
102	10	**TOTAL FLAT**	3	77	17	0	0	0	2	0	0
86	83	MCP	22	47	20	1	0	0	10	0	0
1	1	PLP	0	0	70	0	0	0	30	0	0
1	0	BPL									
88	84	**TOTAL POOL**	21	47	21	1	0	0	10	0	0
2	0	MAR									
267	107	**TOTAL**	19	49	21	0	0	0	9	2	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016   Dry Units: 6

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

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
54	11	LGR	0	0	100	0	0	0	0
15	4	HGR	0	0	100	0	0	0	0
60	6	RUN	67	0	33	0	0	0	0
42	4	SRN	50	0	50	0	0	0	0
86	86	MCP	83	0	16	0	1	0	0
1	1	PLP	0	0	100	0	0	0	0
1	1	BPL	100	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1237089392260 LLID: 1237089392260 Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK Legal Description: T16NR17WS25 Latitude: 39:13:34.0N Longitude: 123:42:32.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	61	39	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.

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016   Survey Length (ft.): 6849   Main Channel (ft.): 6333   Side Channel (ft.): 516

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: G4	Canopy Density (%): 97.3	Pools by Stream Length (%): 16.6
Reach Length (ft.): 6333	Coniferous Component (%): 60.6	Pool Frequency (%): 33.0
Riffle/Flatwater Mean Width (ft.): 4.0	Hardwood Component (%): 39.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 92
Range (ft.): 4 to 18	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 8
Mean (ft.): 10	Dominant Shelter: Small Woody Debris	3 to 3.9 Feet Deep: 0
Std. Dev.: 4	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.2	Occurrence of LWD (%): 15	Mean Max Residual Pool Depth (ft.): 1.4
Water (F): 52 - 57 Air (F): 54 - 62	LWD per 100 ft.:	Mean Pool Shelter Rating: 35
Dry Channel (ft): 91	Riffles: 4	
	Pools: 16	
	Flat: 4	

Pool Tail Substrate (%):   Silt/Clay: 14   Sand: 0   Gravel: 84   Sm Cobble: 2   Lg Cobble: 0   Boulder: 0   Bedrock: 0

Embeddedness Values (%):   1. 27.3   2. 15.9   3. 22.7   4. 15.9   5. 18.2

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1237089392260   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

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	0.4
Boulder	0	0	0.0
Cobble / Gravel	22	17	17.3
Sand / Silt / Clay	90	96	82.3

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	23	19	18.6
Hardwood Trees	45	50	42.0
Coniferous Trees	45	44	39.4
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 3

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

Stream Name: Railroad Gulch   LLID: 1237089392260   Drainage: Albion River

Survey Dates: 6/22/2016 to 6/29/2016

Confluence Location: Quad: ELK   Legal Description: T16NR17WS25   Latitude: 39:13:34.0N   Longitude: 123:42:32.0W

	Riffles	Flatwater	Pools
Undercut Banks (%)	0	3	21
Small Woody Debris (%)	44	77	47
Large Woody Debris (%)	6	18	21
Root Mass (%)	0	0	1
Terrestrial Vegetation (%)	0	0	0
Aquatic Vegetation (%)	0	0	0
Whitewater (%)	0	2	10
Boulders (%)	50	0	0
Bedrock Ledges (%)	0	0	0

Unnamed Tributary to Railroad Gulch 2016
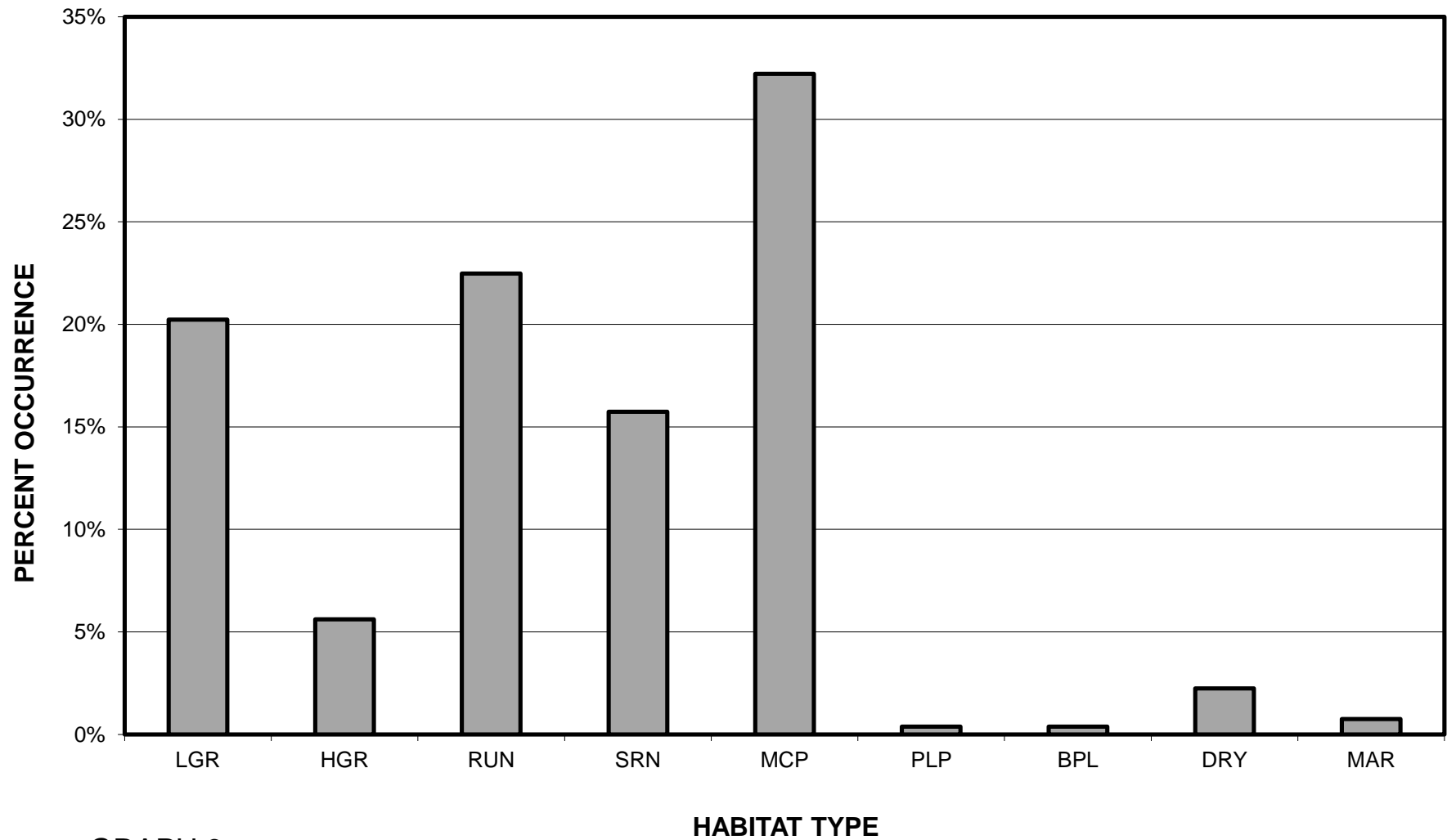## HABITAT TYPES BY PERCENT OCCURRENCE

DRY
2.2%

RIFFLE
25.8%

FLATWATER
38.2%

POOL
33.0%

UNSURVEYABLE
MARSH
0.7%
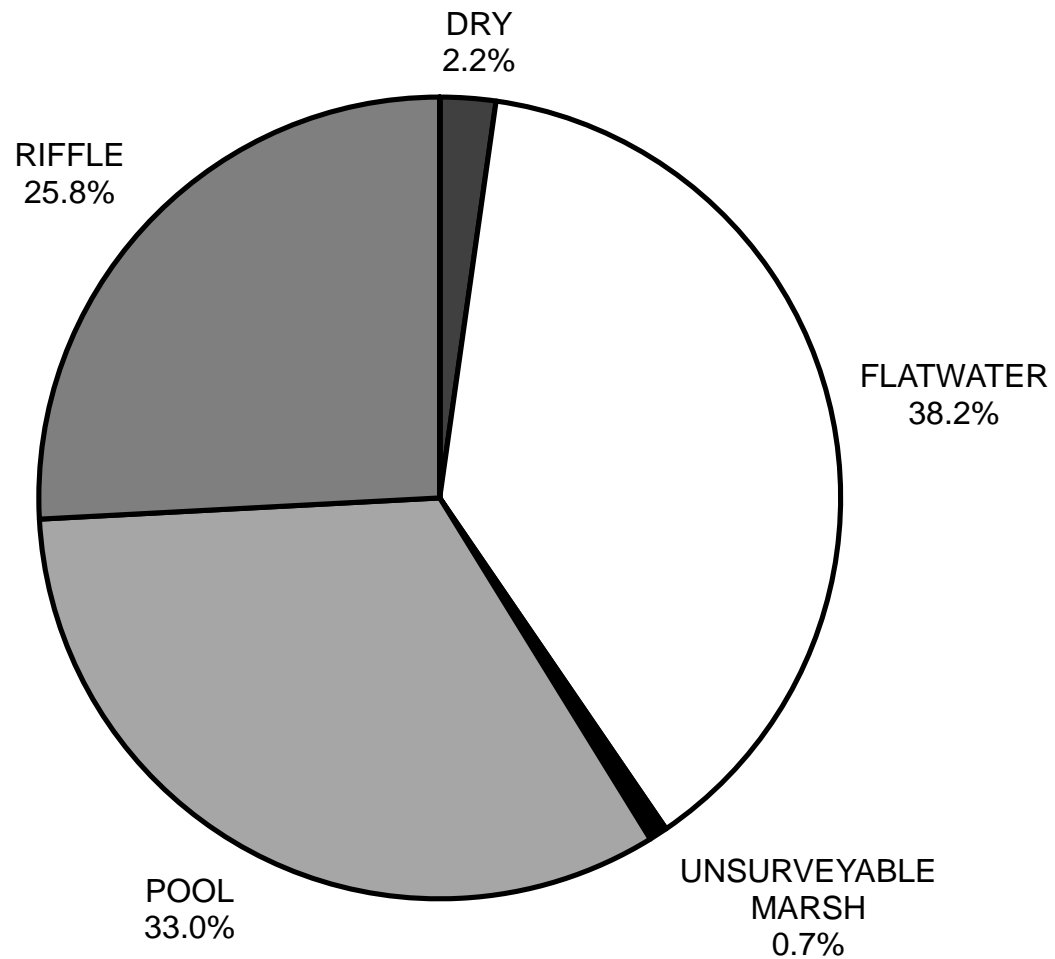
GRAPH 1

Unnamed Tributary to Railroad Gulch   2016
HABITAT TYPES BY PERCENT TOTAL LENGTH

RIFFLE
11.8%

DRY
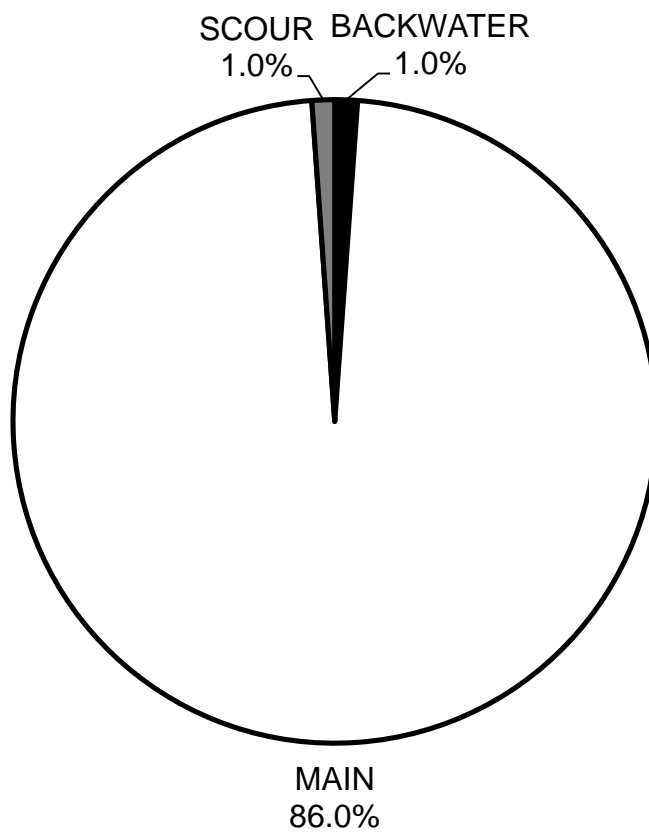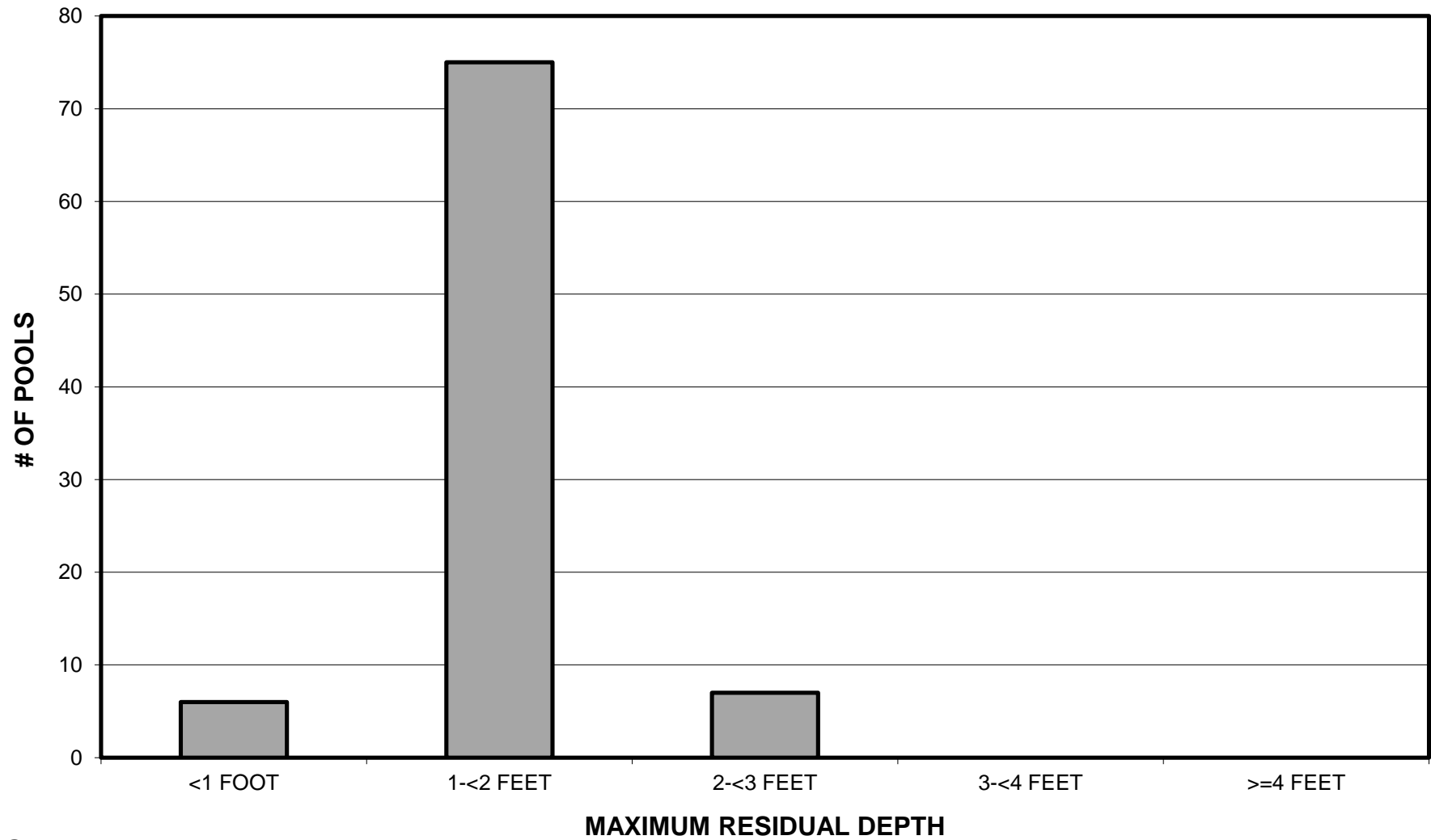1.3%

POOL
16.6%

FLATWATER
55.6%

UNSURVEYABLE
MARSH
14.6%
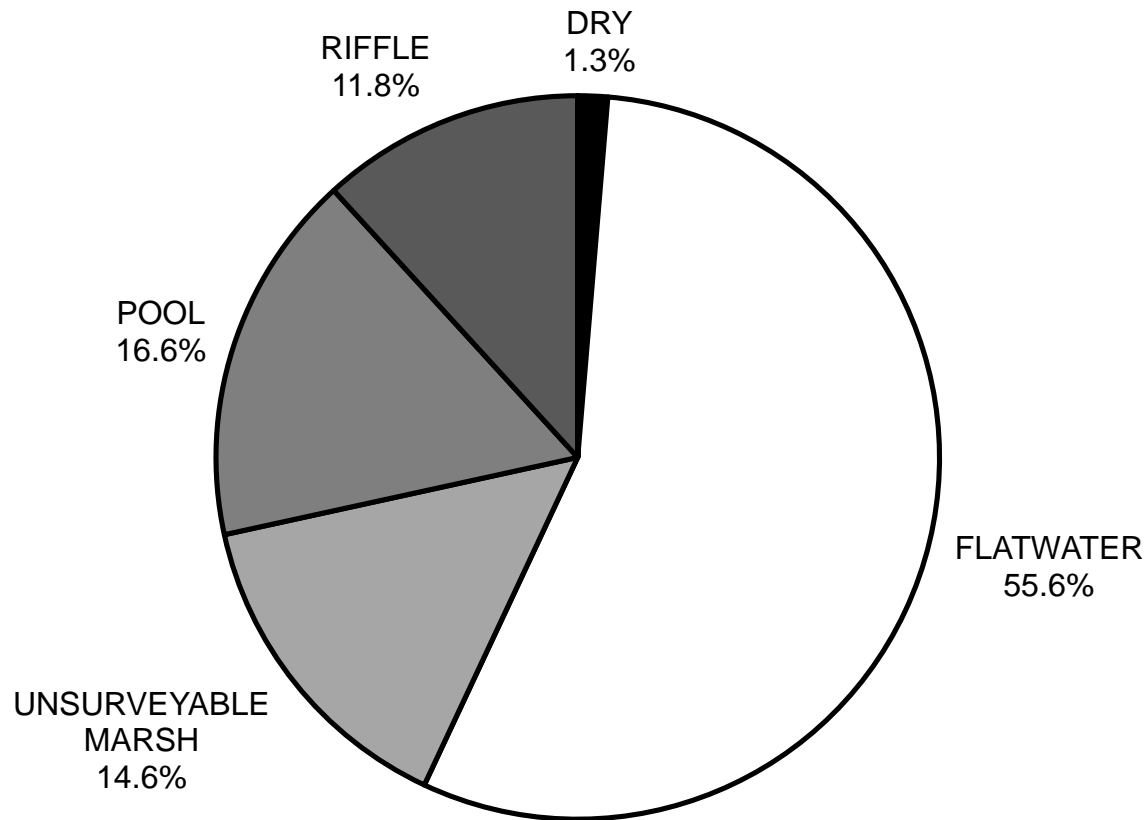
GRAPH 2

Unnamed Tributary to Railroad Gulch 2016
HABITAT TYPES BY PERCENT OCCURRENCE

GRAPH 3

Unnamed Tributary to Railroad Gulch   2016
POOL TYPES BY PERCENT OCCURRENCE

SCOUR
1.0%

BACKWATER
1.0%

MAIN
86.0%

GRAPH 4

Unnamed Tributary to Railroad Gulch   2016
MAXIMUM DEPTH IN POOLS

GRAPH 5

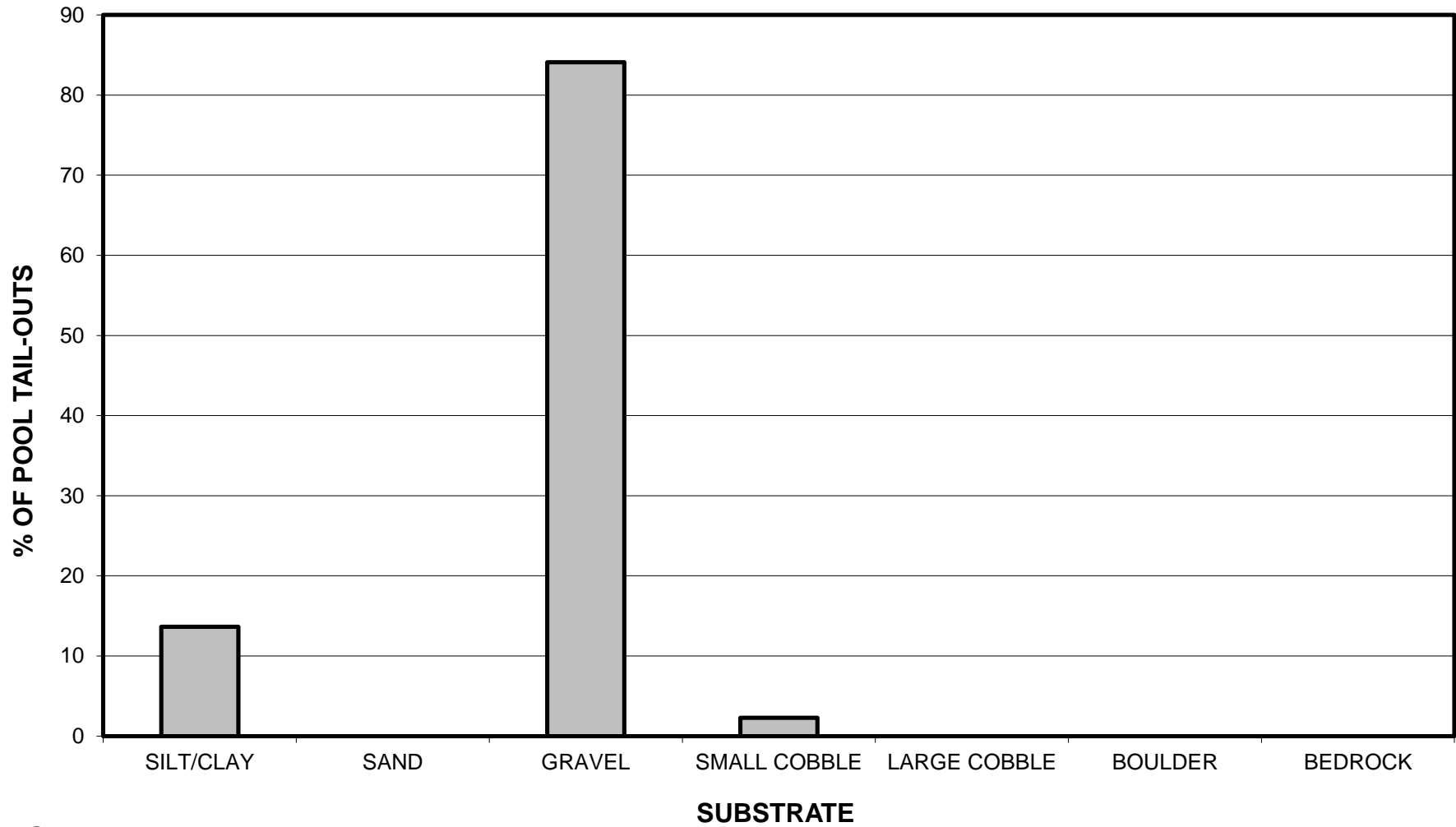# Unnamed Tributary to Railroad Gulch   2016
PERCENT EMBEDDEDNESS

VALUE 5
18.2%

VALUE 1
27.3%

VALUE 4
15.9%

VALUE 2
15.9%

VALUE 3
22.7%
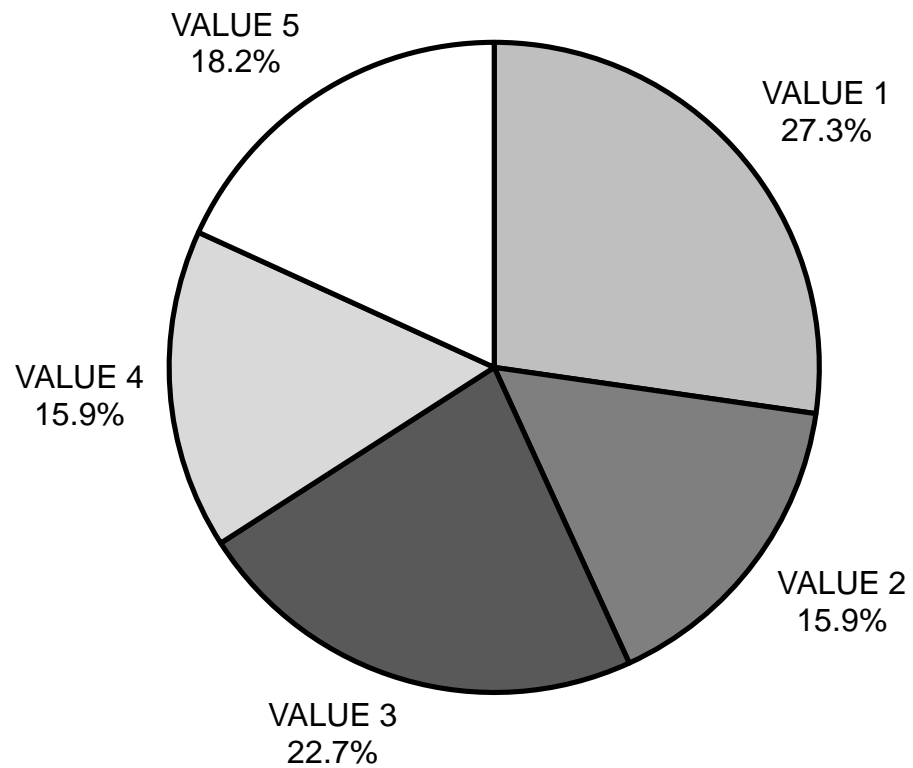
GRAPH 6

Unnamed Tributary to Railroad Gulch   2016
MEAN PERCENT COVER TYPES IN POOLS

BOULDERS
0.3%

WHITEWATER
10.4%

ROOT MASS
0.8%

UNDERCUT BANKS
20.9%

LARGE WOODY
DEBRIS
20.8%

SMALL WOODY
DEBRIS
46.8%
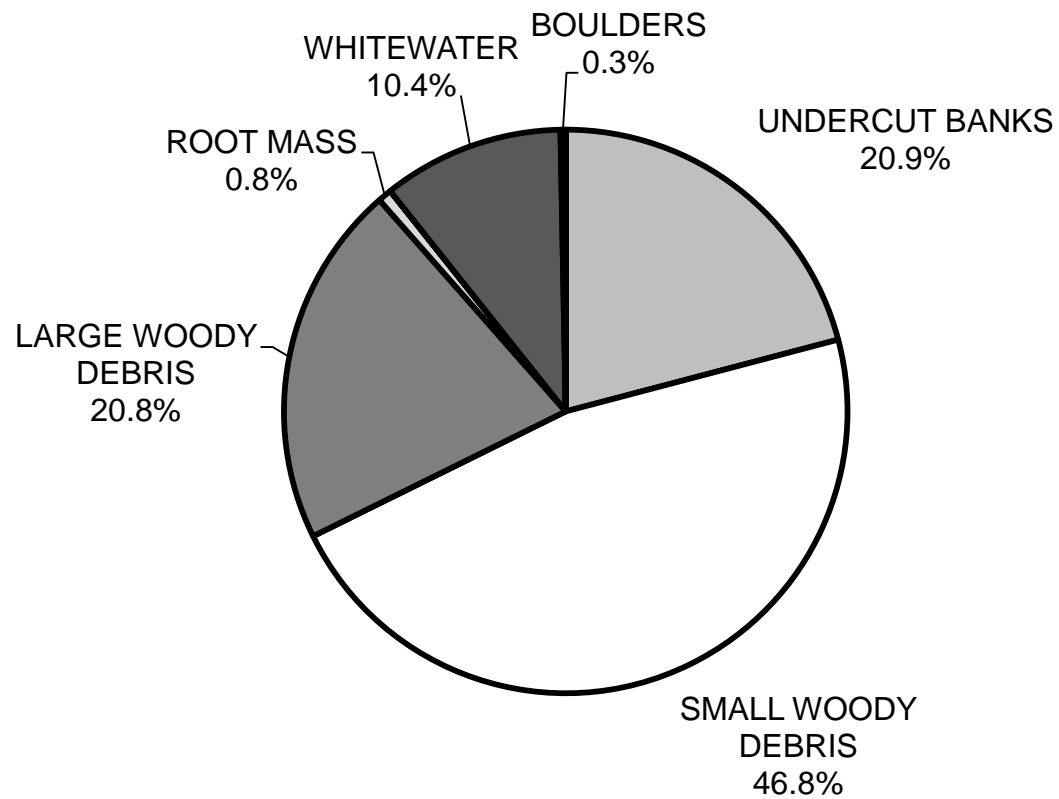
GRAPH 7

Unnamed Tributary to Railroad Gulch 2016
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

GRAPH 8

Unnamed Tributary to Railroad Gulch   2016
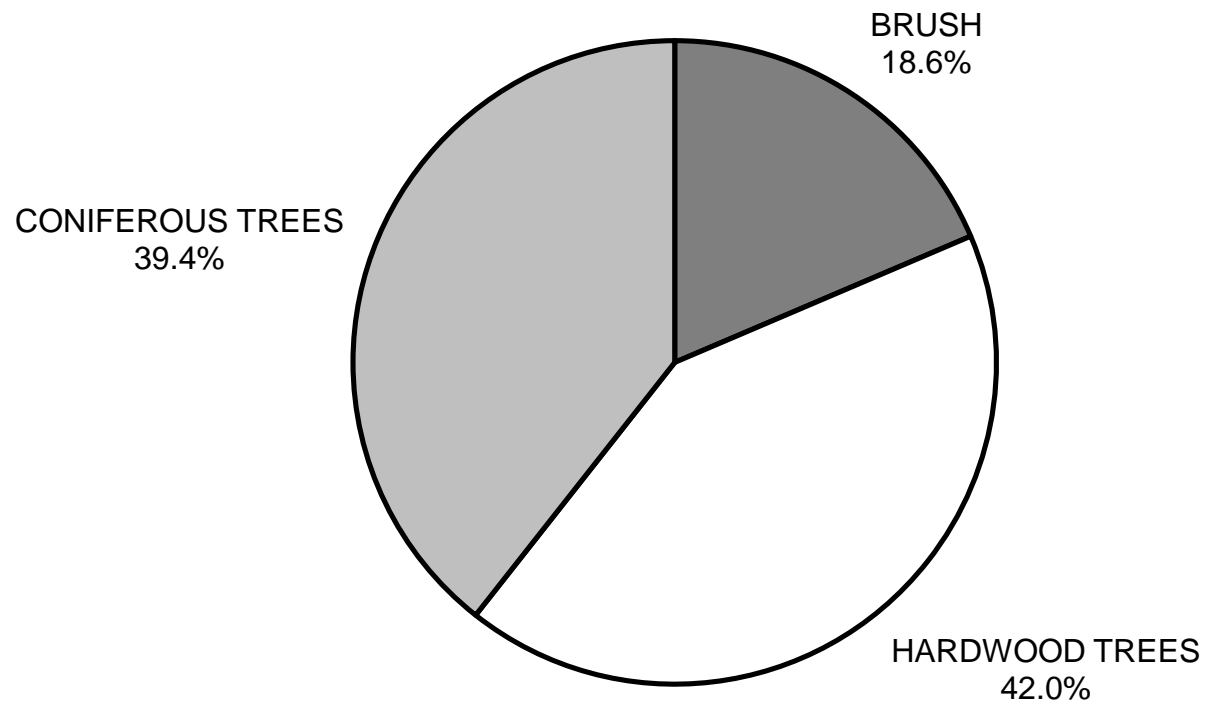## MEAN PERCENT CANOPY

OPEN
2.7%

HARDWOOD TREES
38.4%

CONIFEROUS TREES
59.0%
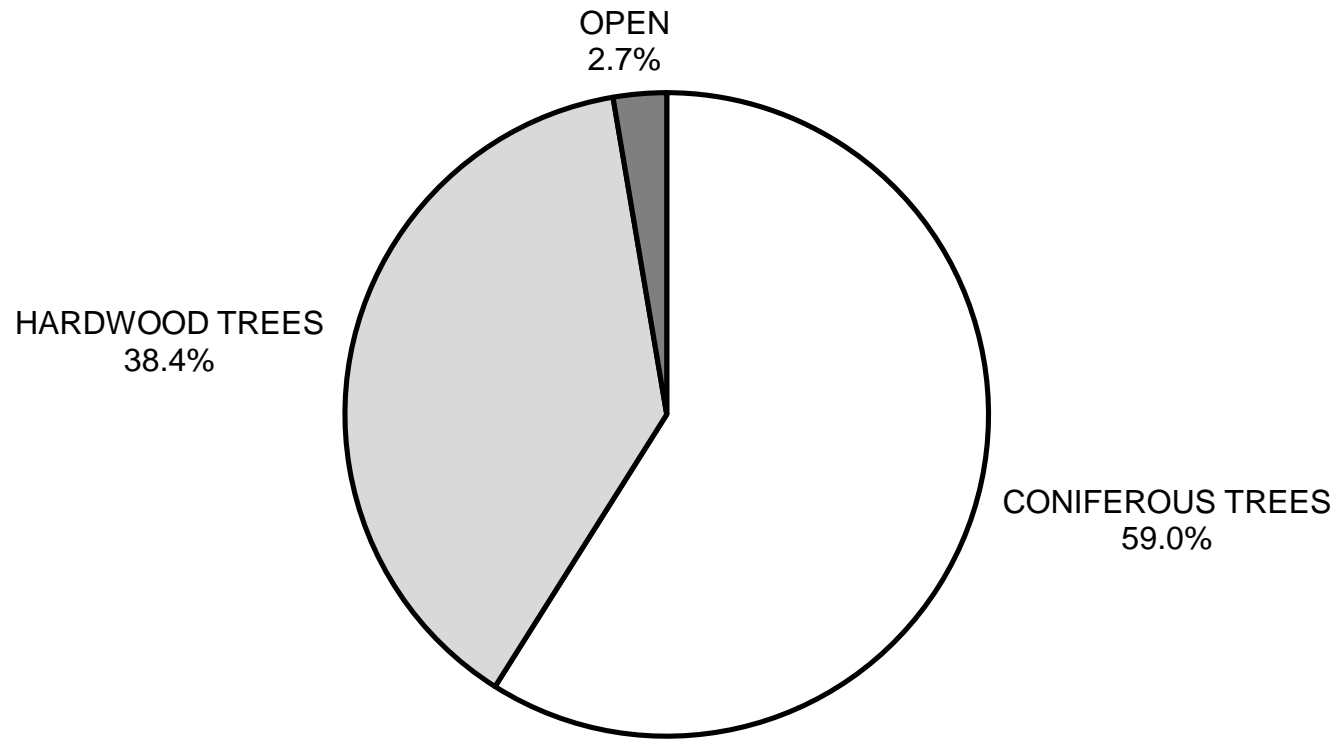
GRAPH 9

Unnamed Tributary to Railroad Gulch   2016
DOMINANT BANK COMPOSITION IN SURVEY REACH

BEDROCK
0.4%

COBBLE/GRAVEL
17.3%

SAND/SILT/CLAY
82.3%
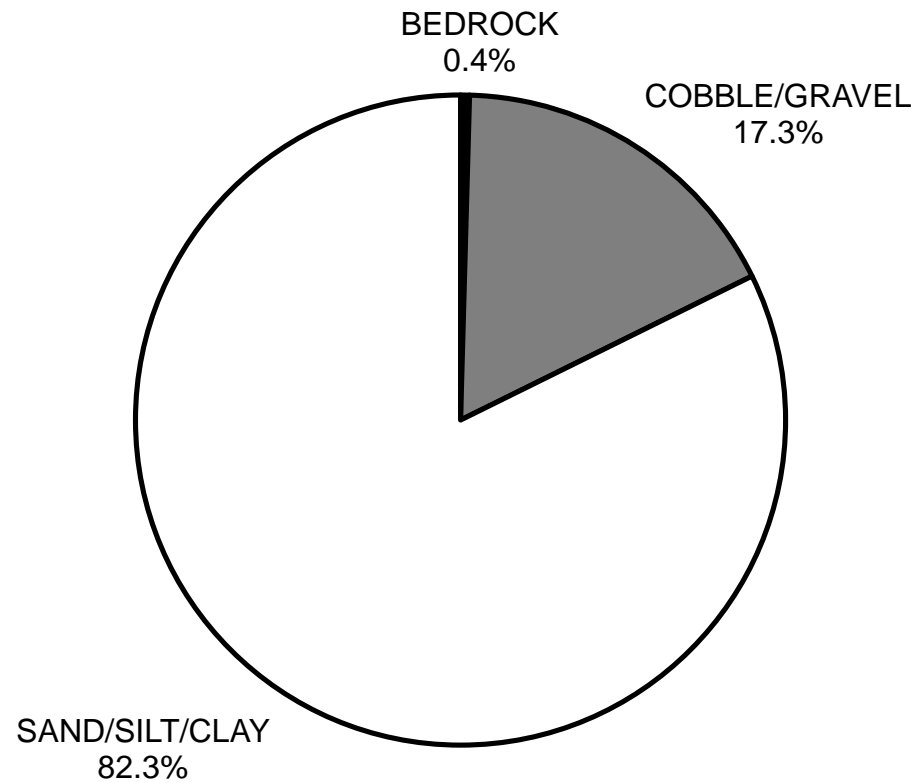
GRAPH 10

Unnamed Tributary to Railroad Gulch   2016
DOMINANT BANK VEGETATION IN SURVEY REACH

BRUSH
18.6%

CONIFEROUS TREES
39.4%

HARDWOOD TREES
42.0%

GRAPH 11