



CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

McKay Gulch

INTRODUCTION

A stream inventory was conducted on June 22, 2016 on McKay Gulch. The survey began at the confluence with Albion River and extended upstream 0.1 miles.

The McKay 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 McKay 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

McKay Gulch is a tributary to Albion River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). McKay Gulch's legal description at the confluence with Albion River is T16N R17W S13. Its location is 39.254° north latitude and 123.705° west longitude, LLID number 1237054392535. McKay Gulch is a first order stream and has approximately 0.5 miles of blue line stream according to the USGS Mathison Peak 7.5 minute quadrangle. McKay Gulch drains a watershed of approximately 0.3 square miles. Elevations range from about 19 feet at the mouth of the creek to 100 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 McKay Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998). The Watershed Stewards Project/AmeriCorps (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and 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 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 McKay 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". McKay 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 McKay 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 McKay 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 McKay 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 McKay 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 McKay Gulch. In addition, underwater mask and snorkel 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 2.0.18, 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 McKay 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 of June 22, 2016 was conducted by Nicole Bejar and Alejandra Camacho (WSP). The total length of the stream surveyed was 631 feet.

Stream flow was not measured for this survey.

McKay Gulch is an E4 channel type for the entire 631 feet of the stream surveyed. E4 channels are low gradient, meandering riffle/pool streams with low width/depth ratios and little deposition. They are very efficient and stable with a high meander width ratio and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 52° to 52° Fahrenheit. Air temperatures ranged from 52° to 61° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 35% pool units, 24% riffle units, 18% dry units, 18% flatwater units, and 6% non-surveyable marsh units (Graph 1). Based on total length of Level II habitat types there were 34% non-surveyable marsh units, 33% dry units, 23% pool units, 6% flatwater units, and 5% riffle units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 35%; dry units, 18%; run units, 18%; and low gradient riffle units, 18% (Graph 3). Based on percent total length, non-surveyable marsh units made up 34%, dry units 33%, and mid-channel pools 23%.

A total of 6 pools were identified (Table 3). Main channel pools were the most frequently encountered at 100% (Graph 4), and comprised 100% 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. One of the 6 pools (17%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 6 pool tail-outs measured, 5 had a value of 1 (83.3%); 1 had a value of 5 (16.7%) (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 0, flatwater habitat types had a mean shelter rating of 0, and pool habitats had a mean shelter rating of 9 (Table 1). Of the pool types, the main-channel pools had a mean shelter rating of 9 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in McKay Gulch. Graph 7 describes the pool cover in McKay Gulch. Small woody debris is the dominant pool cover type followed by large 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 83% of the pool tail-outs. Silt/clay was the next most frequently observed dominant substrate type and occurred in 17% of the pool tail-outs.

The mean percent canopy density for the surveyed length of McKay Gulch was 99%. One percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 11% and 89%, respectively. Graph 9 describes the mean percent canopy in McKay Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 100%. The dominant elements composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a mask and snorkel survey at two sites for species composition and distribution in McKay Gulch on June 22, 2016. Water temperatures taken during the snorkel period of 1133 to 1145 ranged from 51° to 51° Fahrenheit. The sites were sampled by Brian Starks and Chad Moura (CDFW).

The survey sites yielded no fish.

Table A. Summary of results for a fish composition and distribution survey within McKay Gulch, 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+	
09/14/16	1	10	Pool	518	0	0	0	0	0	0
	2	14	Pool	555	0	0	0	0	0	0

DISCUSSION

McKay Gulch is an E4 channel type for the entire 631 feet of stream surveyed. The suitability of E4 channel types for fish habitat improvement structures is as follows: E4 channel types are good for bank-placed boulders and fair for opposing wing-deflectors.

The water temperatures recorded on the survey day June 22, 2016 ranged from 52° to 52° Fahrenheit. Air temperatures ranged from 52° to 61° 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 6% of the total length of this survey, riffles 5%, and pools 23%. One of the 6 (17%) 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.

Five of the 6 pool tail-outs measured had embeddedness ratings of 1 or 2. None of the pool tail-outs had embeddedness ratings of 3 or 4. One 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.

Five of the 6 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 9. 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 McKay Gulch. Small woody debris is the dominant cover type in pools followed by large 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 99%. The percentage of right and left bank covered with vegetation was 99% and 100%, respectively.

RECOMMENDATIONS

McKay 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 McKay Gulch. Keep in

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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) 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. It is unclear where the mouth of McKay and Albion intersect. Albion River has a large floodplain and a dry channel appears to run parallel to Albion for over 100'. The survey starts where dry channel is still present. The surrounding area is swampy and dominated with ferns and grasses.
215	0002.00	The creek bed is apparent because the bottom is lined with gravel but there is almost no bank.
401	0003.00	This unit is a puddle.
518	0010.00	The pool ends under two redwoods that are slightly above bankfull.
588	0014.00	This is a cavernous-looking pool with pockets of deeper areas.
608	0017.00	End of survey. The creek is dry for approximately 300' past this unit.

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

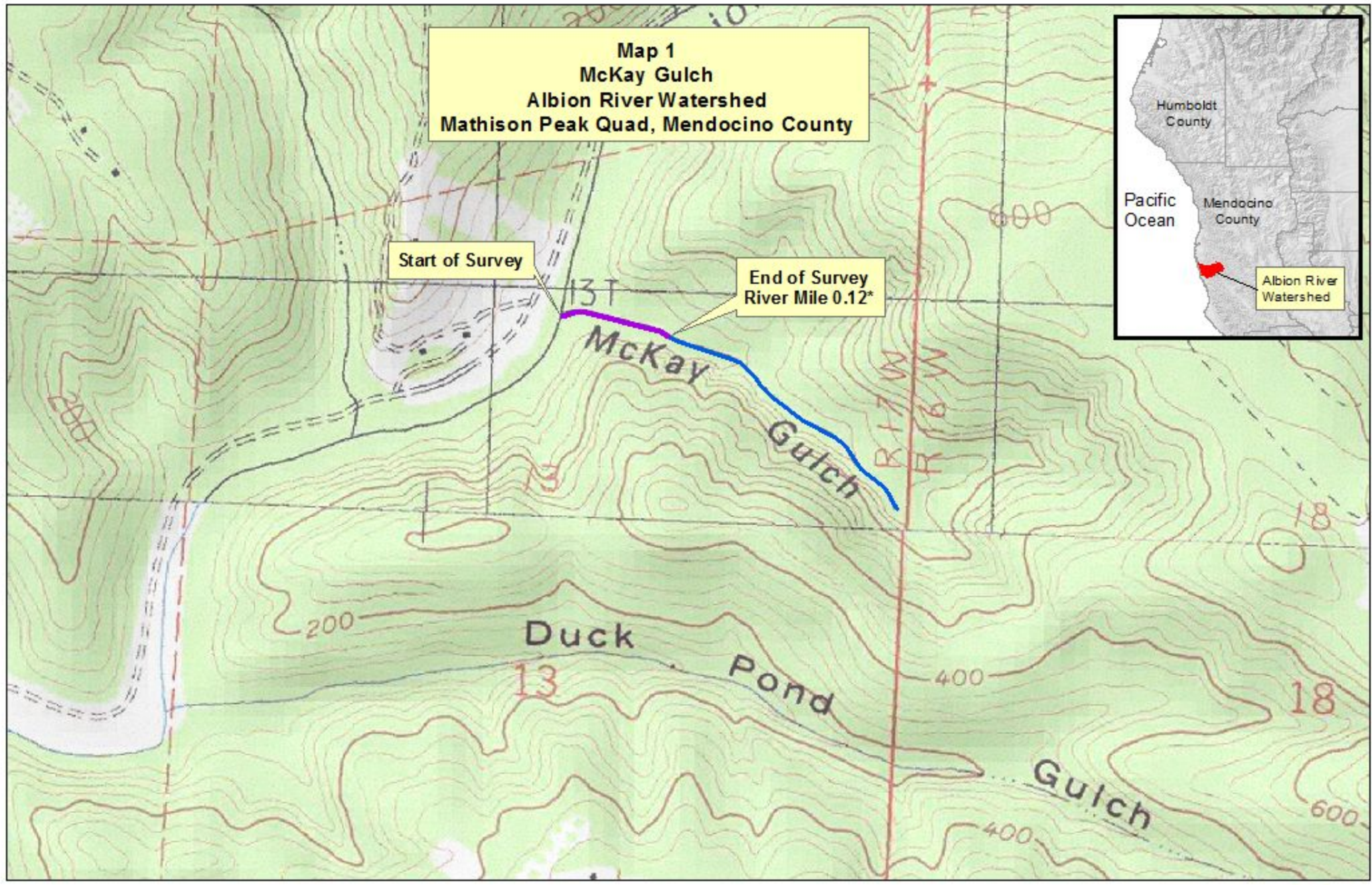
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }



BACKWATER POOLS

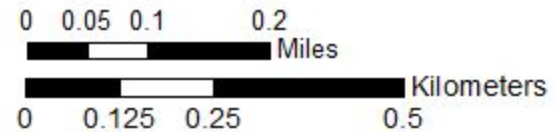
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}

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]	



-  Reach 1: E4 Channel Type
-  McKay Gulch



APPENDIX I

TABLES AND GRAPHS

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

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0

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
3	1	DRY	17.6	69	207	32.8	6.0			72	216				
3	1	FLATWATER	17.6	13	38	6.0	4.0	0.4	1.0	112	336	45	134		0
1	0	NOSURVEY_	5.9	215	215	34.1									
6	6	POOL	35.3	24	142	22.5	4.8	0.9	1.7	117	703	98	590	95	9
4	2	RIFFLE	23.5	7	29	4.6	2.5	0.1	0.2	9	36	2	7		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
17	10				631					1290			731		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

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 (%)
3	1	LGR	17.6	8	24	3.8	3	0.2	0.3	16	47	3	9		0	89
1	1	HGR	5.9	5	5	0.8	2	0.1	0.1	2	2	0	0		0	100
3	1	RUN	17.6	13	38	6.0	4	0.4	1	112	336	45	134		0	100
6	6	MCP	35.3	24	142	22.5	5	0.9	2.5	117	703	98	590	95	9	100
3	1	DRY	17.6	69	207	32.8	6			72	216					
1	0	MAR	5.9	215	215	34.1										

Total Units
17

Total Units Fully Measured
10

Total Length (ft.)
631

Total Area (sq.ft.)
1304

Total Volume (cu.ft.)
734

Table 3 - Summary of Pool Types

Stream Name: McKay Gulch								LLID: 1237054392535		Drainage: Albion River			
Survey Dates: 6/22/2016 to 6/22/2016													
Confluence Location:		Quad: MATHISON PEAK		Legal Description: T16NR17WS13		Latitude: 39:15:13.0N		Longitude: 123:42:19.0W					
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
6	6	MAIN	100	24	142	100	4.8	0.9	117	703	95	568	9

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

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

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
6	MCP	100	0	0	5	83	1	17	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
6	0	0	5	83	1	17	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Dry Units: 3

Confluence Location:

Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

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
3	1	LGR	0	0	0	0	0	0	0	0	0
1	1	HGR	0	0	0	0	0	0	0	0	0
4	2	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
3	1	RUN	0	0	0	0	0	0	0	0	0
3	1	TOTAL FLAT	0	0	0	0	0	0	0	0	0
6	6	MCP	25	32	30	2	11	0	0	0	0
6	6	TOTAL POOL	25	32	30	2	11	0	0	0	0
1	0	MAR	0	0	0	0	0	0	0	0	0
17	9	TOTAL	25	32	30	2	11	0	0	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Dry Units: 3

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

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
3	1	LGR	0	0	100	0	0	0	0
1	1	HGR	100	0	0	0	0	0	0
3	1	RUN	0	0	100	0	0	0	0
6	6	MCP	33	0	67	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
99	89	11	0	99	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: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Survey Length (ft.): 631

Main Channel (ft.): 631

Side Channel (ft.): 0

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13 Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

Summary of Fish Habitat Elements By Stream Reach**STREAM REACH: 1**

Channel Type: E4

Canopy Density (%): 98.6

Pools by Stream Length (%): 22.5

Reach Length (ft.): 631

Coniferous Component (%): 89.4

Pool Frequency (%): 35.3

Riffle/Flatwater Mean Width (ft.): 3.0

Hardwood Component (%): 10.6

Residual Pool Depth (%):

BFW:

Dominant Bank Vegetation: Coniferous Trees

< 2 Feet Deep: 83

Range (ft.): 5 to 6

Vegetative Cover (%): 99.4

2 to 2.9 Feet Deep: 17

Mean (ft.): 6

Dominant Shelter: Small Woody Debris

3 to 3.9 Feet Deep: 0

Std. Dev.: 0

Dominant Bank Substrate Type: Sand/Silt/Clay

>= 4 Feet Deep: 0

Base Flow (cfs.): 1.1

Occurrence of LWD (%): 17

Mean Max Residual Pool Depth (ft.): 1.7

Water (F): 52 - 52 Air (F): 52 - 61

LWD per 100 ft.:

Mean Pool Shelter Rating: 9

Dry Channel (ft): 207

Riffles: 0

Pools: 2

Flat: 0

Pool Tail Substrate (%): Silt/Clay: 17 Sand: 0 Gravel: 83 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 83.3 2. 0.0 3. 0.0 4. 0.0 5. 16.7

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR17WS13

Latitude: 39:15:13.0N

Longitude: 123:42:19.0W

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	9	9	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	3	3	33.3
Hardwood Trees	1	2	16.7
Coniferous Trees	5	4	50.0
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

Stream Name: McKay Gulch

LLID: 1237054392535

Drainage: Albion River

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

Confluence Location:

Quad: MATHISON PEAK

Legal Description: T16NR17WS13

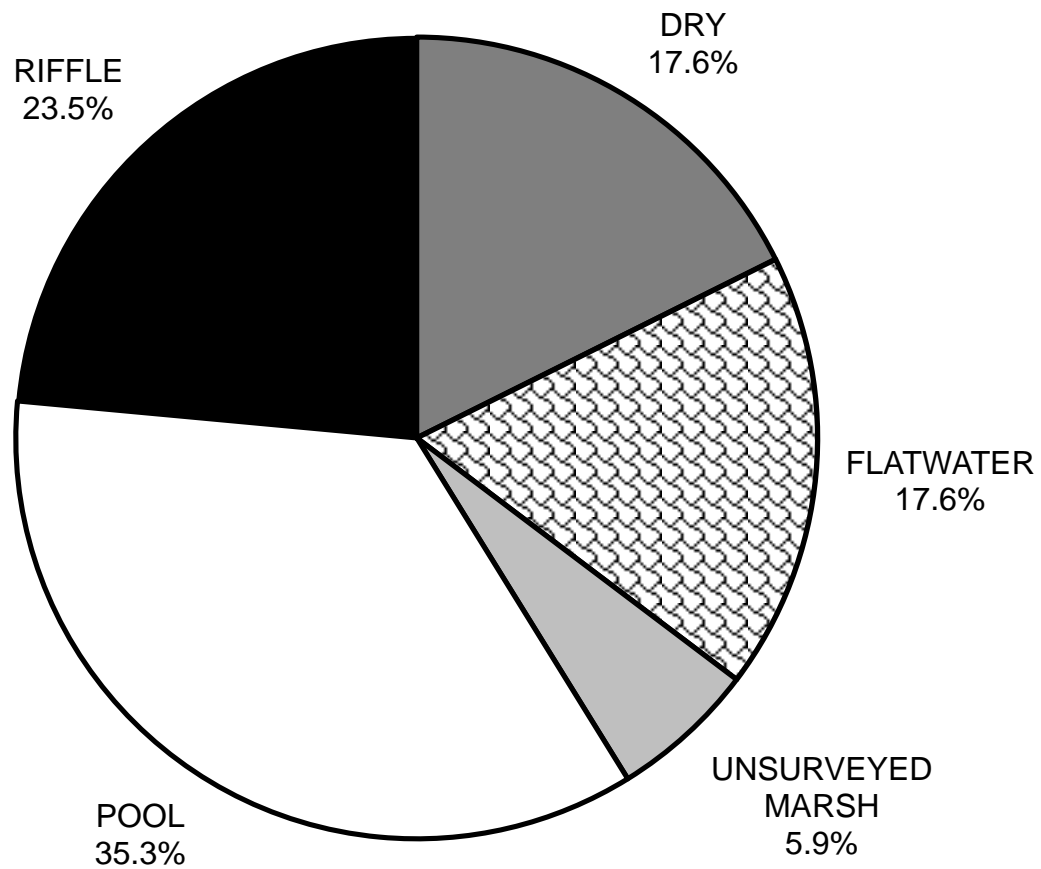
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Longitude: 123:42:19.0W

	Riffles	Flatwater	Pools
UNDER BANKS (%)	0	0	25
SMALL WOODY DEBRIS (%)	0	0	32
LARGE WOODY DEBRIS (%)	0	0	30
ROOT MASS (%)	0	0	2
TERRESTRIAL VEGETATION (%)	0	0	11
AQUATIC VEGETATION (%)	0	0	0
WHITewater (%)	0	0	0
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

MCKAY GULCH 2016

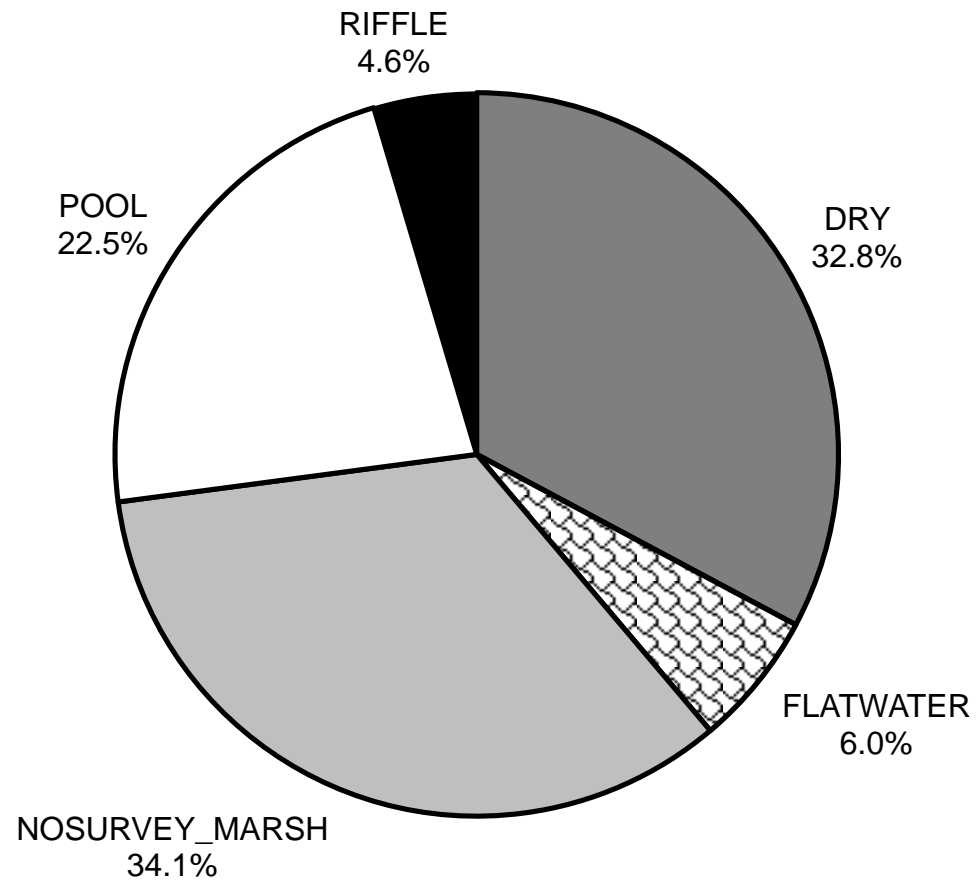
HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

MCKAY GULCH 2016

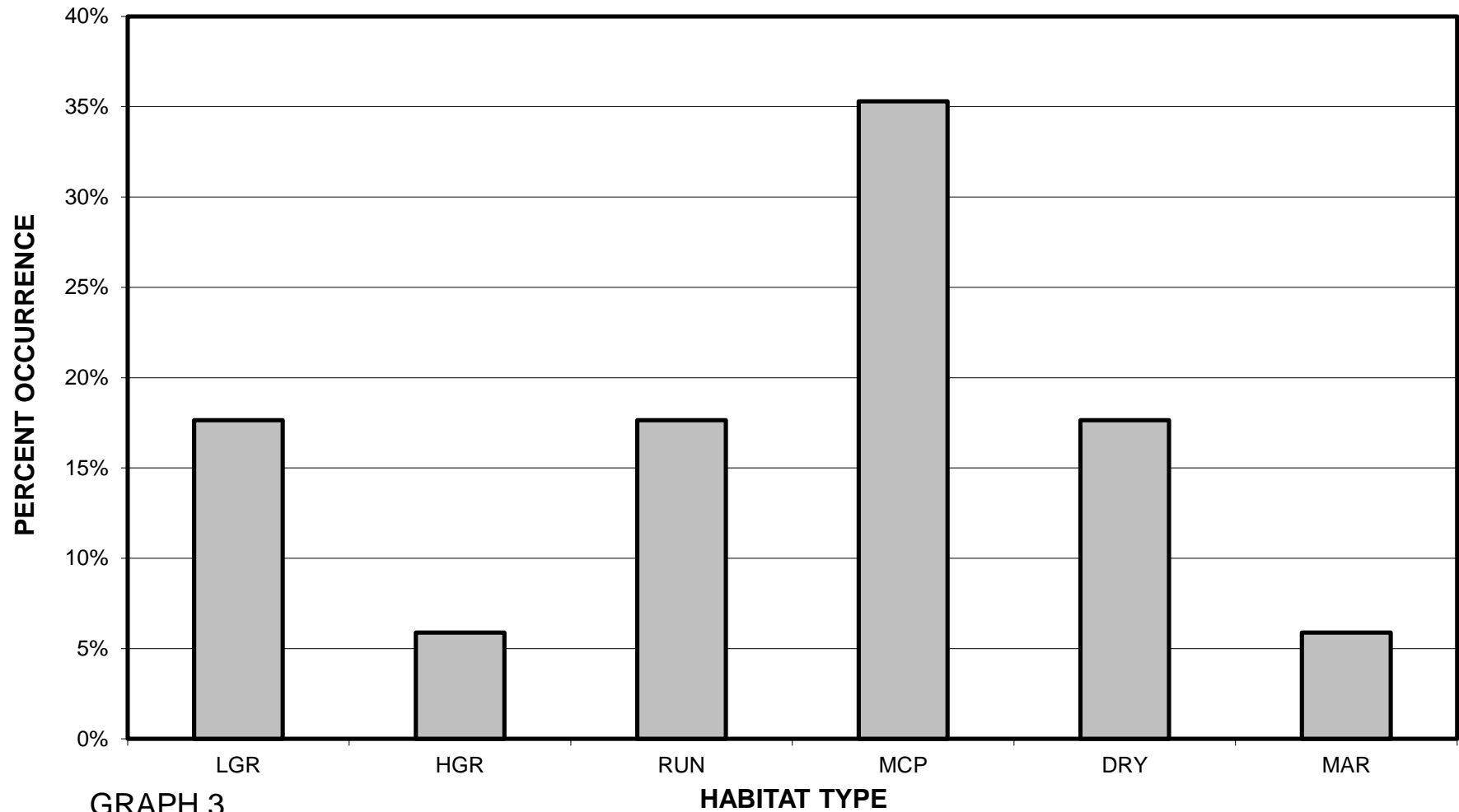
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

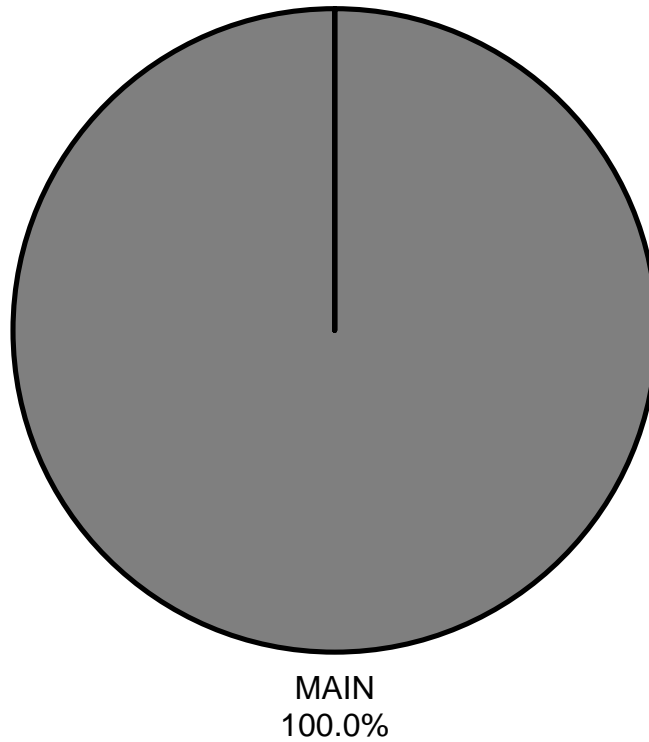
MCKAY GULCH 2016

HABITAT TYPES BY PERCENT OCCURRENCE



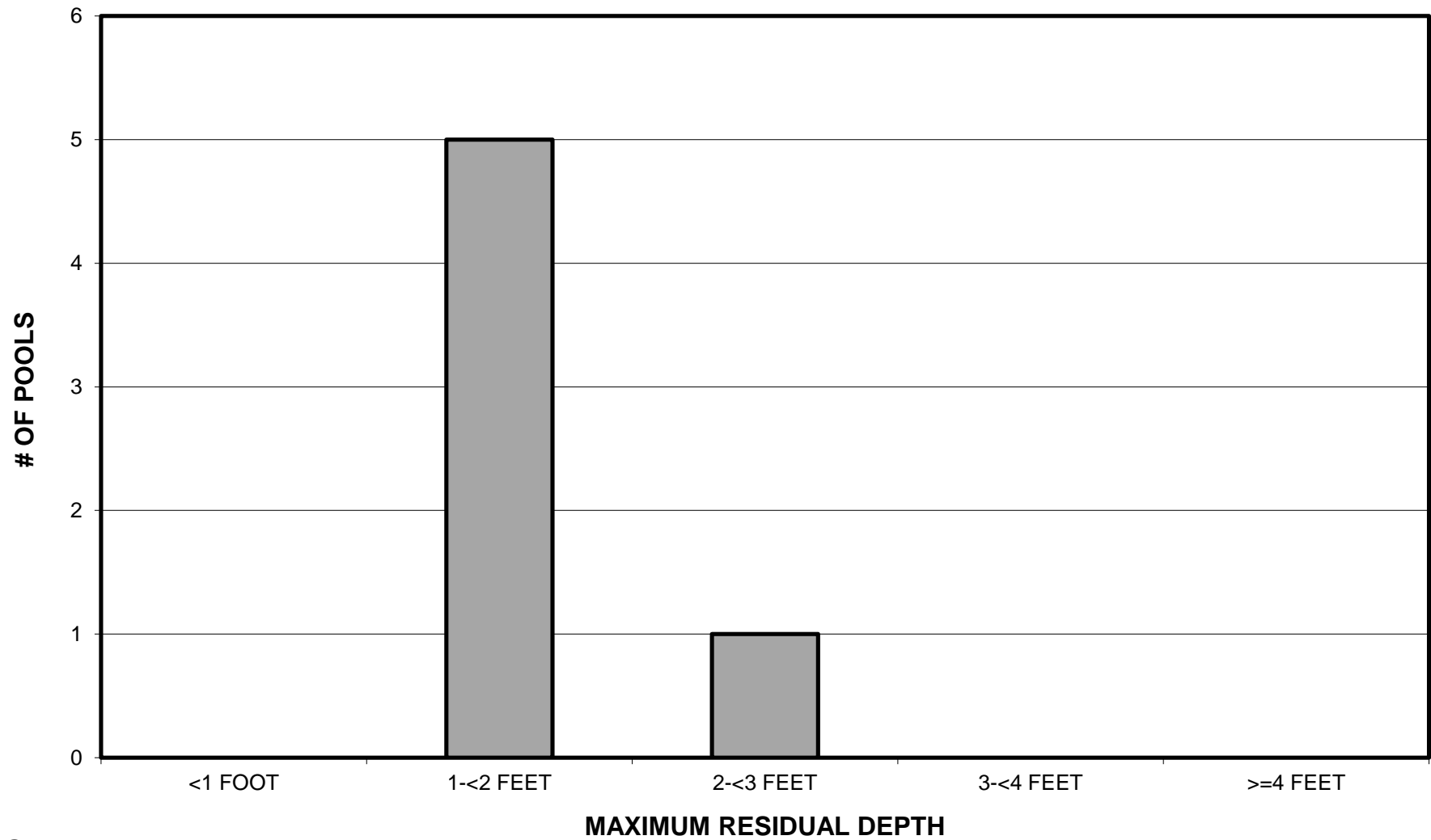
GRAPH 3

MCKAY GULCH 2016
POOL TYPES BY PERCENT OCCURRENCE



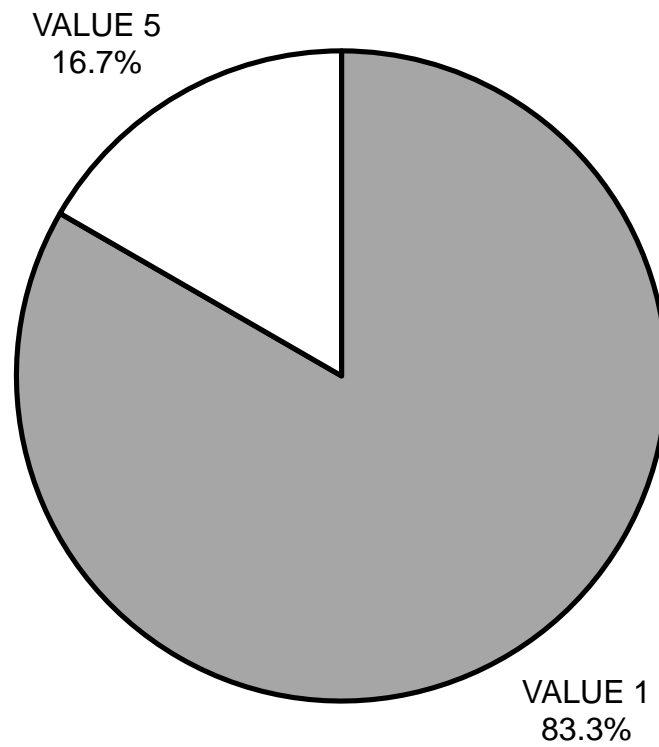
GRAPH 4

**MCKAY GULCH 2016
MAXIMUM DEPTH IN POOLS**



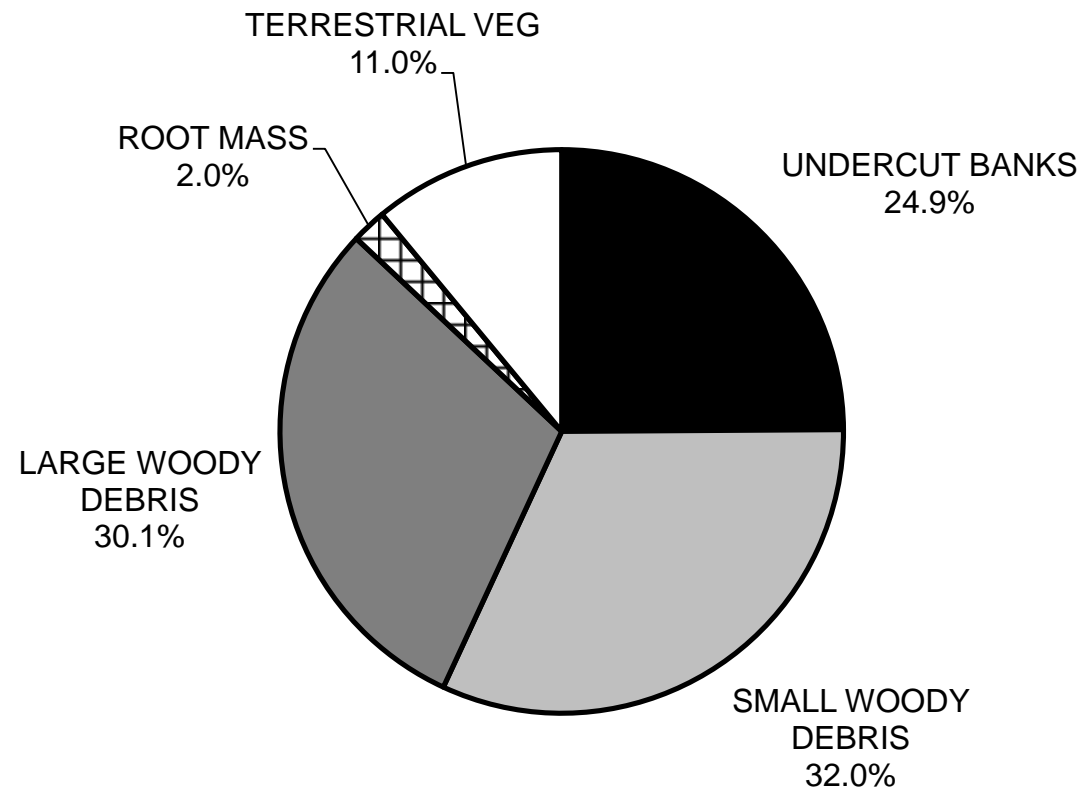
GRAPH 5

**MCKAY GULCH 2016
PERCENT EMBEDDEDNESS**



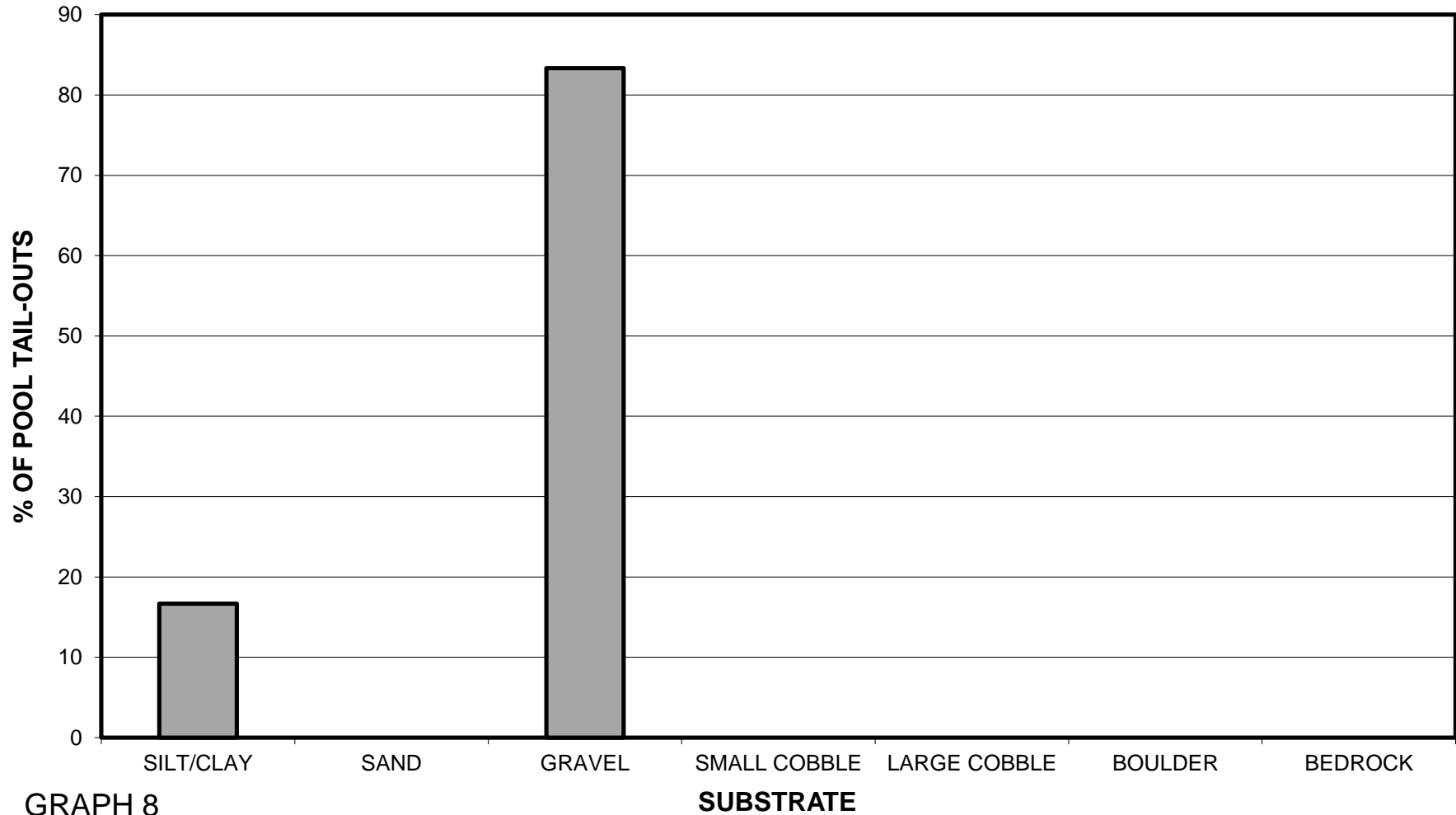
GRAPH 6

MCKAY GULCH 2016
MEAN PERCENT COVER TYPES IN POOLS

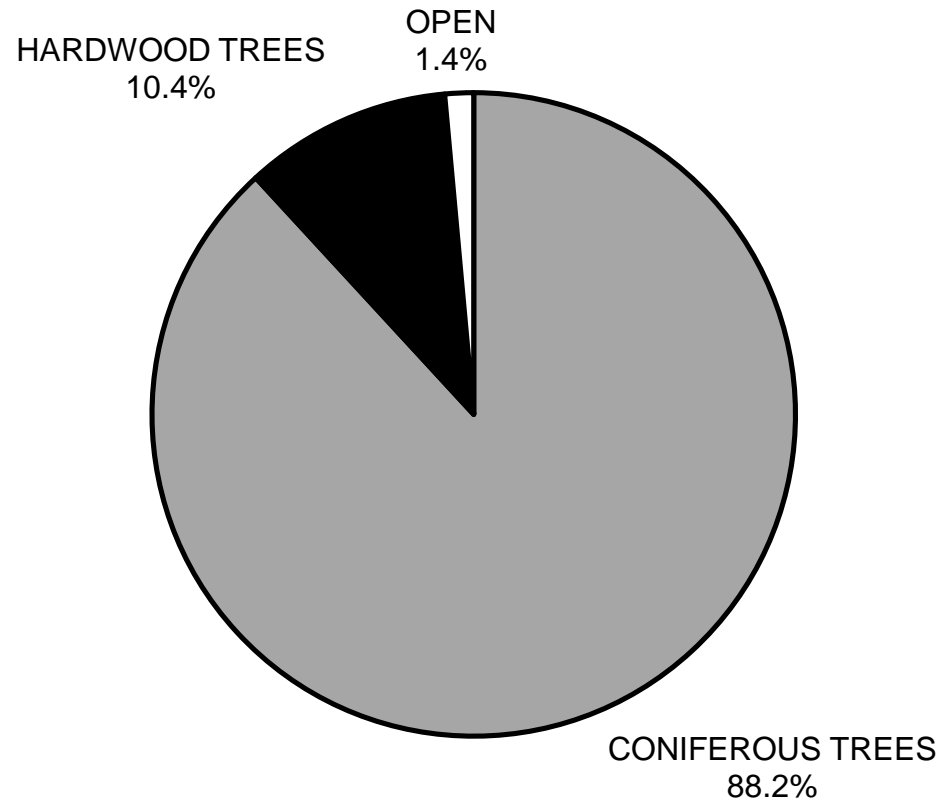


GRAPH 7

MCKAY GULCH 2016
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

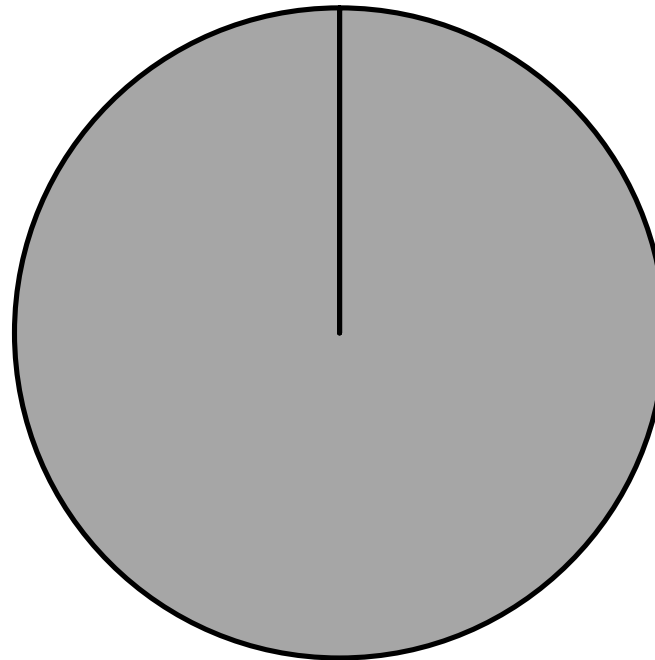


MCKAY GULCH 2016 MEAN PERCENT CANOPY



GRAPH 9

MCKAY GULCH 2016
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

SAND/SILT/CLAY
100.0%

MCKAY GULCH 2016
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11