CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

STREAM INVENTORY REPORT

Deadman Gulch

INTRODUCTION

A stream inventory was conducted from July 29 to July 30, 2015 on Deadman Gulch. The survey began at the confluence with the Albion River and extended upstream 0.4 miles.

The Deadman 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 Deadman 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 Chinook salmon, 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

Deadman Gulch is a tributary to the Albion River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Deadman Gulch's legal description at the confluence with the Albion River is T16N R17W S14. Its location is 39.2447 degrees north latitude and 123.7255 degrees west longitude, LLID number 1237243392447. Deadman Gulch is an intermittent stream according to the USGS Elk 7.5 minute quadrangle. Deadman Gulch drains a watershed of approximately 0.6 square miles. Elevations range from about 5 feet at the mouth of the creek to 400 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 a private logging road off of Airport Road, south of Fort Bragg, CA.

METHODS

The habitat inventory conducted in Deadman Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project (WSP) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Wildlife (CDFW). The 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 Deadman 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 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". Deadman 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 Deadman 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 unsuitable 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 then classified according to a list of nine cover types. In Deadman 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. The shelter rating is then calculated by multiplying the qualitative shelter value by the percent of the unit covered. 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 Deadman 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 Deadman 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 Deadman Gulch. In addition, underwater observations were made at six 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 Deadman 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 AT THE END OF THE REPORT *

The habitat inventory of July 29 to July 30, 2015 was conducted by J. Guczek and J. Lee (WSP). The total length of the stream surveyed was 2,149 feet.

Stream flow was not measured on Deadman Gulch.

Deadman Gulch is a C6 channel type for all 2,149 feet of the stream surveyed. C6 channels are meandering point-bar, riffle/pool, alluvial channels with broad well defined floodplain on low gradients and silt/clay-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 70 degrees Fahrenheit. Air temperatures ranged from 69 to 81 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 48% flatwater units, 35% riffle units, 15% pool units, and 3% unsurveyed marsh units (Graph 1). Based on total length of Level II habitat types there were 71% flatwater units, 16% riffle units, 9% unsurveyed marsh units, and 4% pool units (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were step run units, 48%; low gradient riffle units, 33%; and mid-channel pool units, 13% (Graph 3). Based on percent total length, step run units made up 71%, low gradient riffle units 15%, and unsurveyed marsh units 9%.

A total of six pools were identified (Table 3). Main channel pools were the most frequently encountered at 83% (Graph 4), and comprised 84% 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. Two of the six pools (33%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the six pool tail-outs measured, two had a value of 4 (33.3%); four had a value of 5 (66.7%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. Additionally, a value of 5 was assigned to tail-outs deemed unsuitable 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 22, flatwater habitat types had a mean shelter rating of 10, and pool habitats had a mean shelter rating of 28 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 29. Scour pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Deadman Gulch. Graph 7 describes the pool cover in Deadman 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. Silt/clay was the dominant substrate observed in 67% of the pool tail-outs. Gravel 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 Deadman Gulch was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 19% and 81%, respectively. Graph 9 describes the mean percent canopy in Deadman Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 100%. The mean percent left bank vegetated was 100%. Sand/silt/clay was the dominant element composing the structure of 100% of the stream banks (Graph 10). Brush was the dominant vegetation type observed in 50% of the units surveyed. Additionally, 33% of the units surveyed had coniferous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at six sites for species composition and distribution in Deadman Gulch on August 25, 2015 (Table A). The sites were sampled by I. Mikus (CDFW), and K. Bocast (California Conservation Corps).

The reach sites yielded no fish during this survey. Coho salmon were observed in Deadman Gulch in previous surveys.

Table A. Summary of results for a fish composition and distribution survey within Deadman Gulch, 2015.

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+	
C6 Channel Type										
08/25/15	1	010	Run	989	0	0	0	0	0	
08/25/15	2	013	Pool	1,028	0	0	0	0	0	
08/25/15	3	019	Pool	1,237	0	0	0	0	0	
08/25/15	4	027	Pool	1,619	0	0	0	0	0	
08/25/15	5	033	Pool	1,862	0	0	0	0	0	
08/25/15	6	035	Pool	1,883	0	0	0	0	0	

DISCUSSION

Deadman Gulch is a C6 channel type for the entire length of the survey, 2,149 feet. The suitability of C6 channel types for fish habitat improvement structures is as follows: C6 channels are good for bank-placed boulders and log cover and fair for plunge weirs.

The water temperatures recorded on the survey days July 29 to July 30, 2015 ranged from 54 to 70 degrees Fahrenheit. Air temperatures ranged from 69 to 81 degrees Fahrenheit. This is a suitable water temperature 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 71% of the total length of this survey, riffles 16%, and pools 4%. Two of the six (33%) 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.

Two of the pool tail-outs had embeddedness ratings of 3 or 4. Four 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 Deadman Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Four of the six pool tail-outs had silt, sand, large cobble, boulders or bedrock as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter rating for pools is 28. The shelter rating in the flatwater habitats is 10. 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 Deadman 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 98%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

Deadman 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 Deadman 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) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

3) Suitable size spawning substrate on Deadman Gulch is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel.

4) The limited water temperature data available suggest that maximum temperatures are above 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 three to five 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.

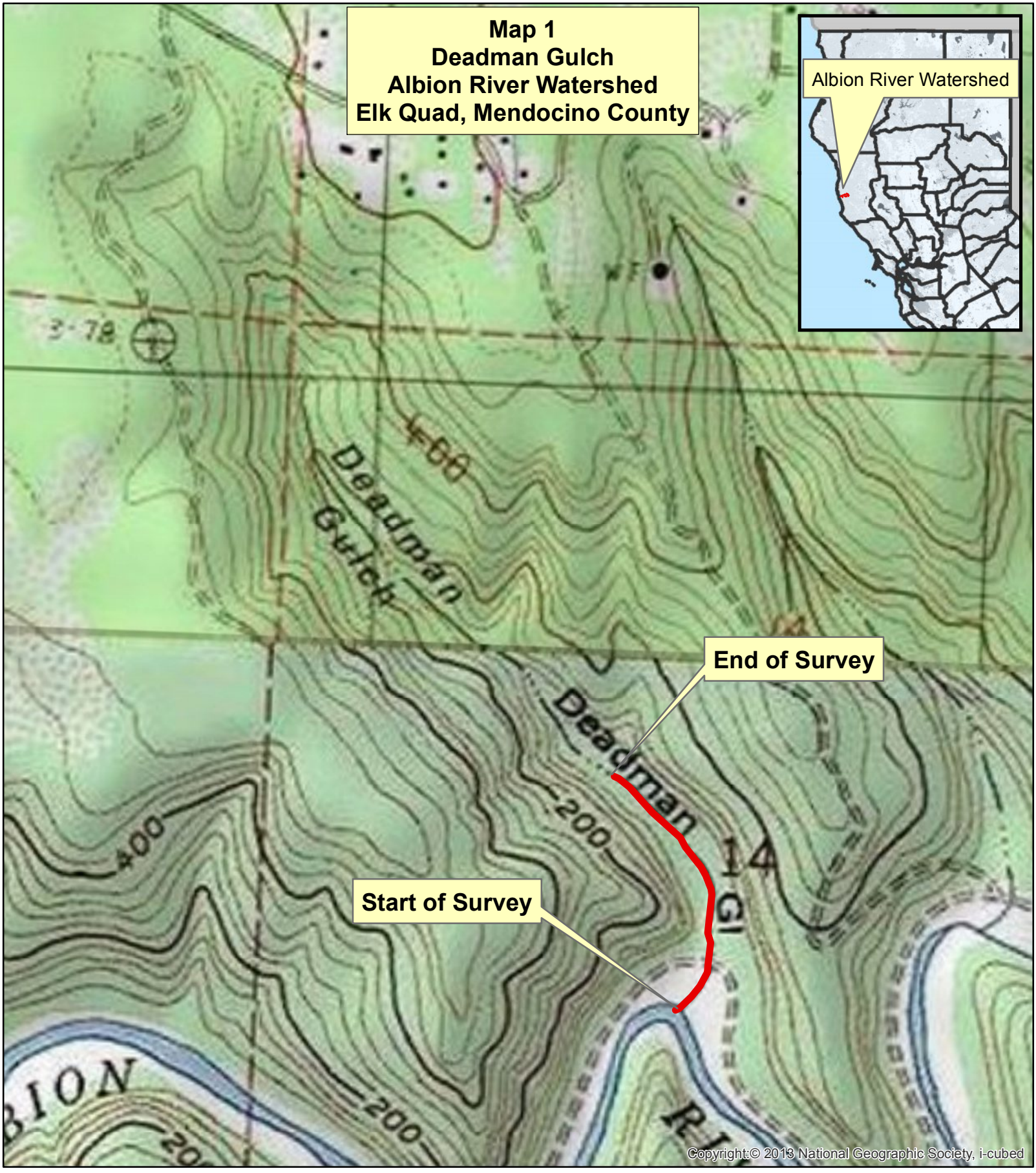
Position (ft):	Habitat unit #:	Comments:
0	0001.00	Start of survey at the confluence with the Albion River. The channel is a C6 for the entire length of the survey. The first 188 feet of Deadman Gulch were not surveyed because of tidal influence and marsh.
1150	0018.00	Tributary #01 enters on the left bank. The water temperature of the tributary was 59 degrees Fahrenheit.
2071	0040.00	End of survey due to time constraints and poor habitat.

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]	



N
W E
S

C6 Channel Type

0 0.05 0.1 0.2
Miles

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

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0

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
19	3	FLATWATER	47.5	81	1535	71.4	4.7	0.3	0.8	336	6389	103	1957		10
1	0	MARSH-NS	2.5	188	188	8.7									
6	6	POOL	15.0	14	82	3.8	5.1	0.8	1.7	69	416	63	378	56	28
14	3	RIFFLE	35.0	25	344	16.0	3.5	0.2	0.3	60	843	10	144		22

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
40	12	2149	7648	2479

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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 (%)
13	2	LGR	32.5	25	324	15.1	4	0.2	0.3	63	824	10	130		30	99
1	1	HGR	2.5	20	20	0.9	3	0.2	0.3	54	54	11	11		5	100
19	3	SRN	47.5	81	1535	71.4	5	0.3	1.2	336	6389	103	1957		10	99
5	5	MCP	12.5	14	69	3.2	5	0.9	2.7	68	338	68	339	61	29	97
1	1	CRP	2.5	13	13	0.6	6	0.4	0.9	78	78	39	39	31	20	92
1	0	MAR	2.5	188	188	8.7										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
40	12	2149	7682	2476

Table 3 - Summary of Pool Types

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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
5	5	MAIN	83	14	69	84	4.9	0.9	68	338	61	305	29
1	1	SCOUR	17	13	13	16	6.0	0.4	78	78	31	31	20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
6	6	82	416	336

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

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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
5	MCP	83	0	0	3	60	2	40	0	0	0	0
1	CRP	17	1	100	0	0	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
6	1	17	3	50	2	33	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.7

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015 Dry Units: 0

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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
13	2	LGR	0	30	30	0	40	0	0	0	0
1	1	HGR	0	50	0	0	50	0	0	0	0
14	3	TOTAL RIFFLE	0	40	15	0	45	0	0	0	0
19	3	SRN	0	57	3	0	37	0	3	0	0
19	3	TOTAL FLAT	0	57	3	0	37	0	3	0	0
5	5	MCP	23	40	25	0	10	0	3	0	0
1	1	CRP	10	40	40	0	10	0	0	0	0
6	6	TOTAL POOL	20	40	28	0	10	0	2	0	0
1	0	MAR									
40	12	TOTAL	10	45	18	0	25	0	2	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015 Dry Units: 0

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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
13	2	LGR	50	0	50	0	0	0	0
1	1	HGR	100	0	0	0	0	0	0
19	3	SRN	100	0	0	0	0	0	0
5	5	MCP	100	0	0	0	0	0	0
1	1	CRP	100	0	0	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	81	19	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: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015 Survey Length (ft.): 2149 Main Channel (ft.): 2149 Side Channel (ft.): 0

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: C6
Reach Length (ft.): 2149
Riffle/Flatwater Mean Width (ft.): 4.1
BFW:
Range (ft.): 4 to 7
Mean (ft.): 6
Std. Dev.: 1
Base Flow (cfs.): 0.0
Water (F): 54 - 70 Air (F): 69 - 81
Dry Channel (ft): 0

Canopy Density (%): 98.1
Coniferous Component (%): 81.2
Hardwood Component (%): 18.8
Dominant Bank Vegetation: Brush
Vegetative Cover (%): 100.0
Dominant Shelter: Small Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 15
LWD per 100 ft.:
Riffles: 3
Pools: 9
Flat: 3

Pools by Stream Length (%): 3.8
Pool Frequency (%): 15.0
Residual Pool Depth (%):
< 2 Feet Deep: 67
2 to 2.9 Feet Deep: 33
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.7
Mean Pool Shelter Rating: 28

Pool Tail Substrate (%): Silt/Clay: 67 Sand: 0 Gravel: 33 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0

Embeddedness Values (%): 1. 0.0 2. 0.0 3. 0.0 4. 33.3 5. 66.7

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

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	12	12	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	1	1	8.3
Brush	6	6	50.0
Hardwood Trees	1	1	8.3
Coniferous Trees	4	4	33.3
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 5

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

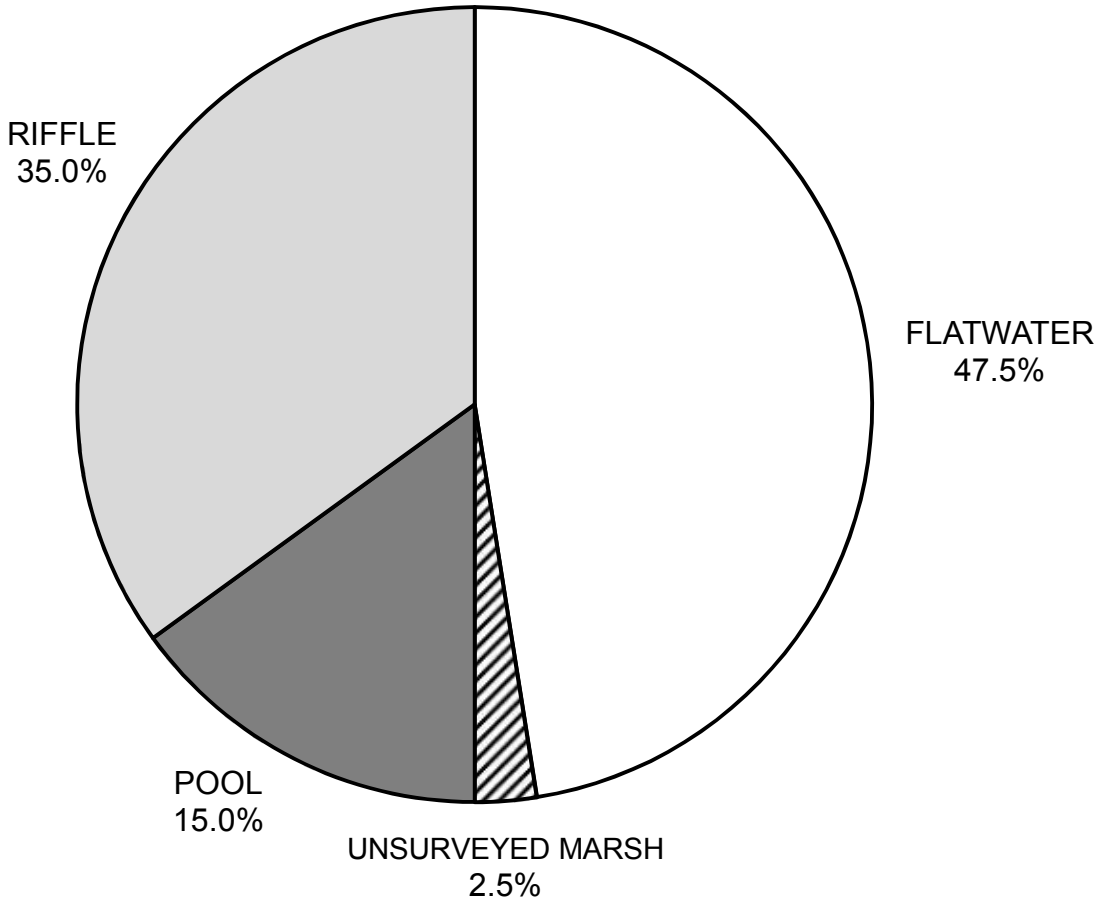
StreamName: Deadman Gulch LLID: 1237243392447 Drainage: Albion River

Survey Dates: 7/29/2015 to 7/30/2015

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR17WS14 Latitude: 39:14:41.0N Longitude: 123:43:27.0W

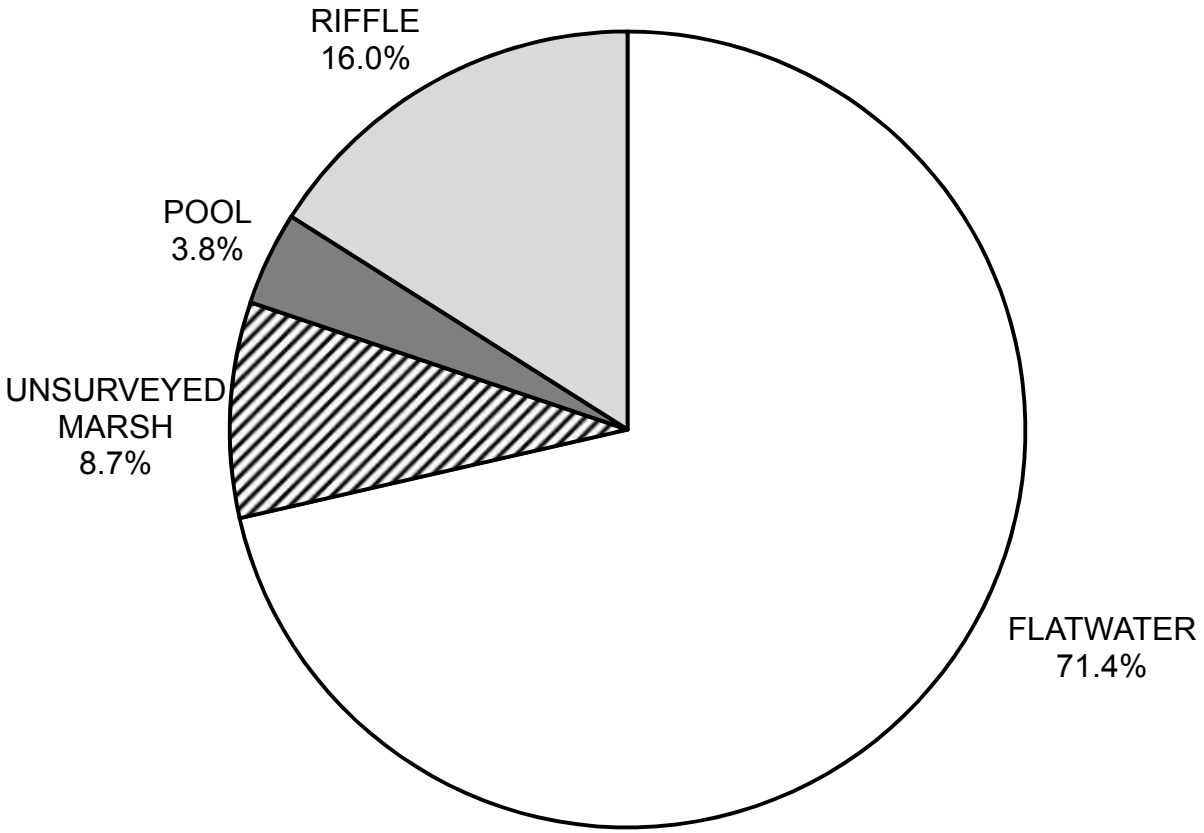
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	20
SMALL WOODY DEBRIS (%)	40	57	40
LARGE WOODY DEBRIS (%)	15	3	28
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	45	37	10
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	3	2
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

DEADMAN GULCH 2015
HABITAT TYPES BY PERCENT OCCURRENCE



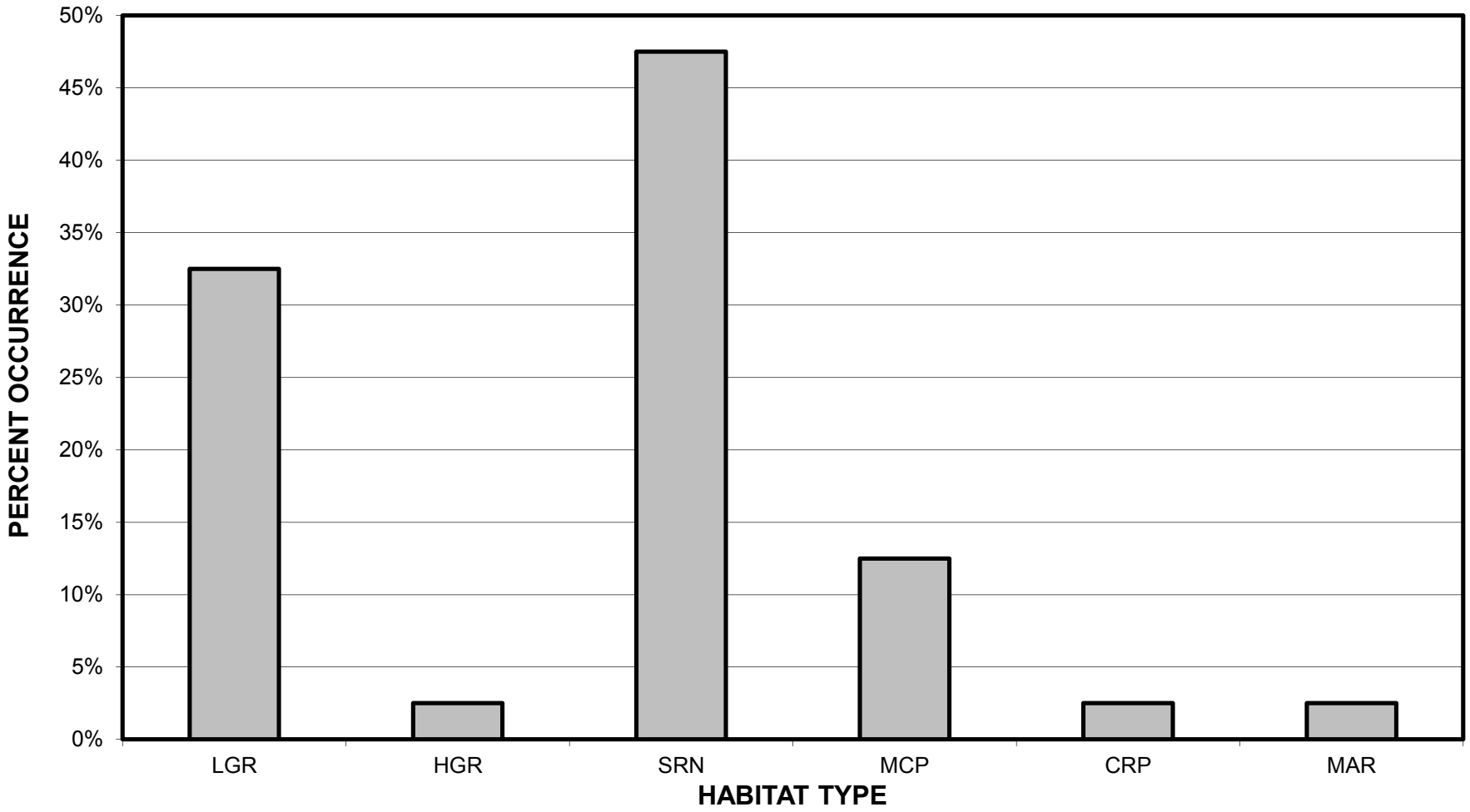
GRAPH 1

DEADMAN GULCH 2015
HABITAT TYPES BY PERCENT TOTAL LENGTH



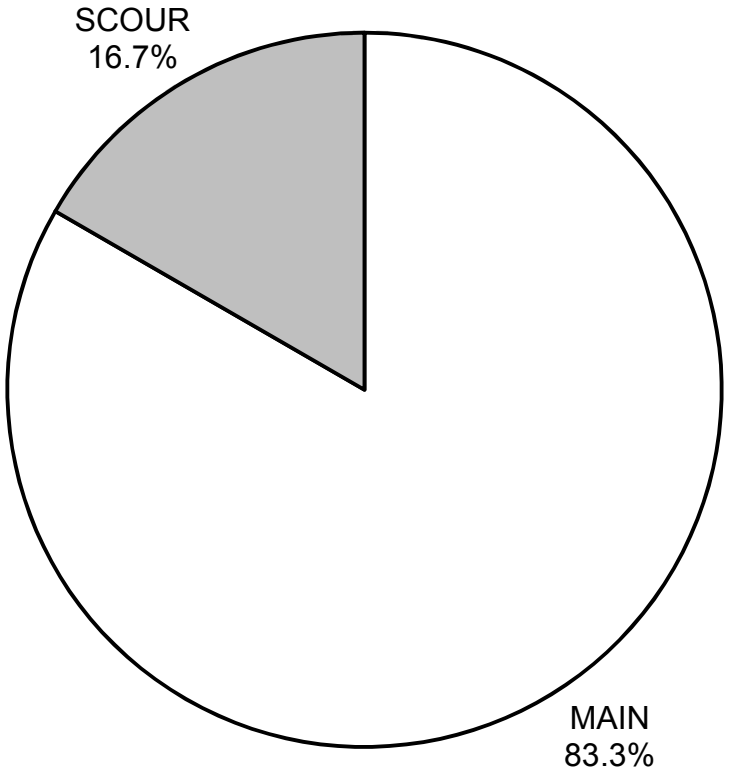
GRAPH 2

DEADMAN GULCH 2015
HABITAT TYPES BY PERCENT OCCURRENCE



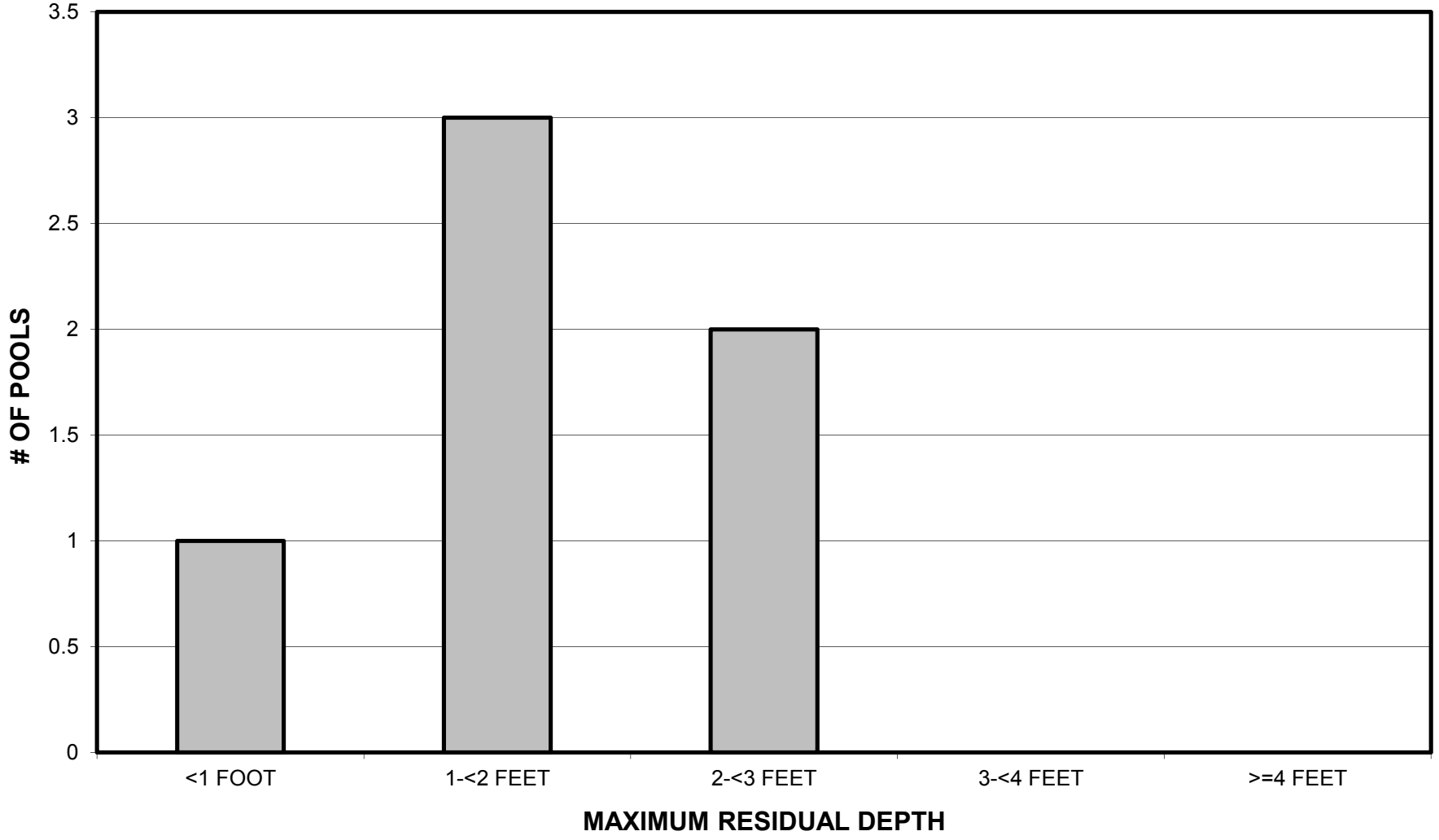
GRAPH 3

DEADMAN GULCH 2015
POOL TYPES BY PERCENT OCCURRENCE



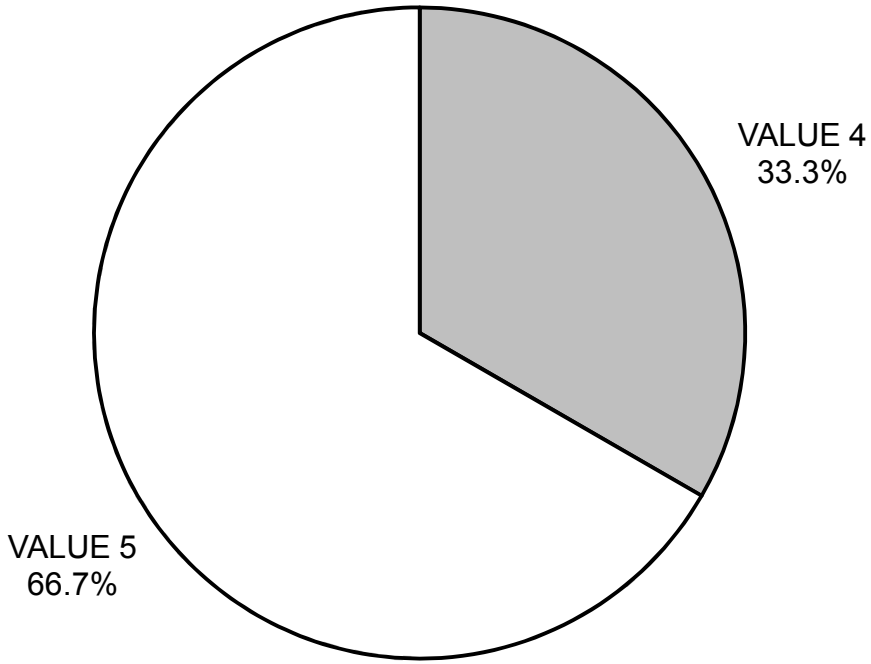
GRAPH 4

DEADMAN GULCH 2015
MAXIMUM DEPTH IN POOLS



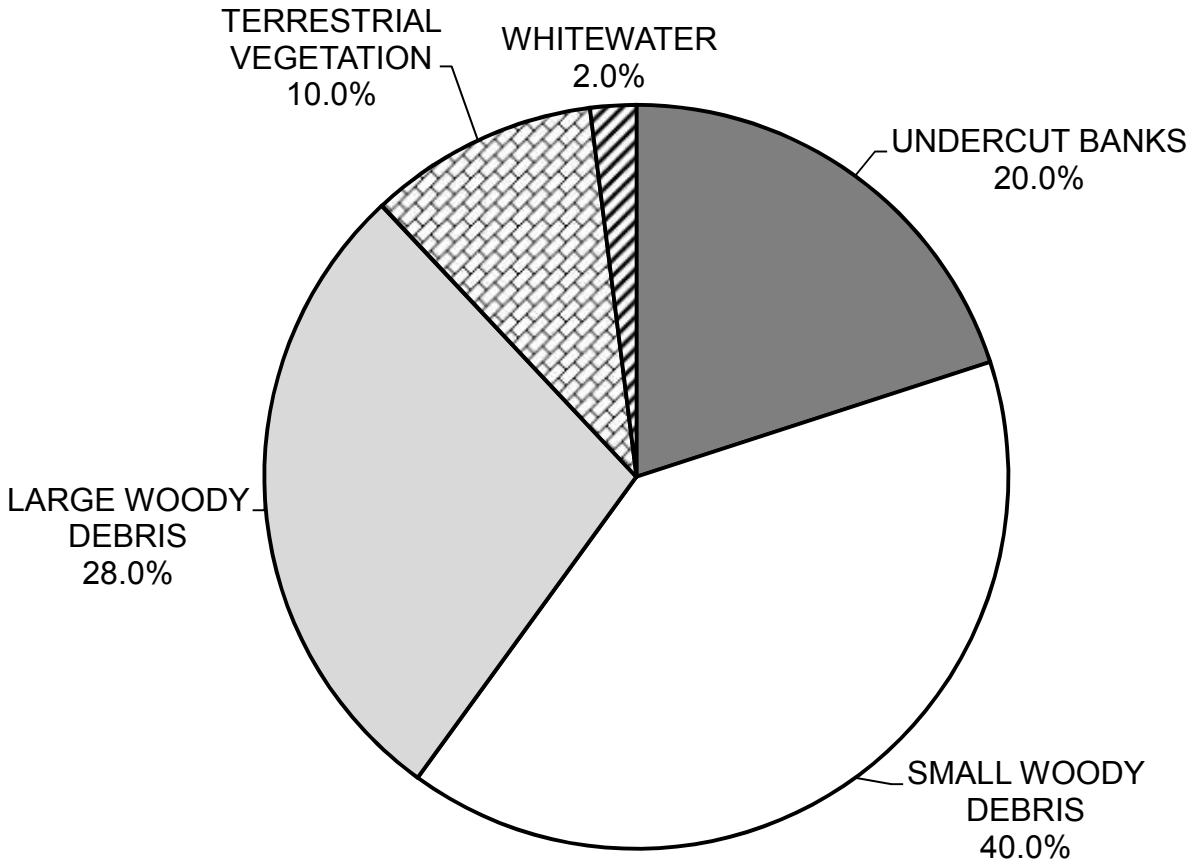
GRAPH 5

DEADMAN GULCH 2015
PERCENT EMBEDDEDNESS



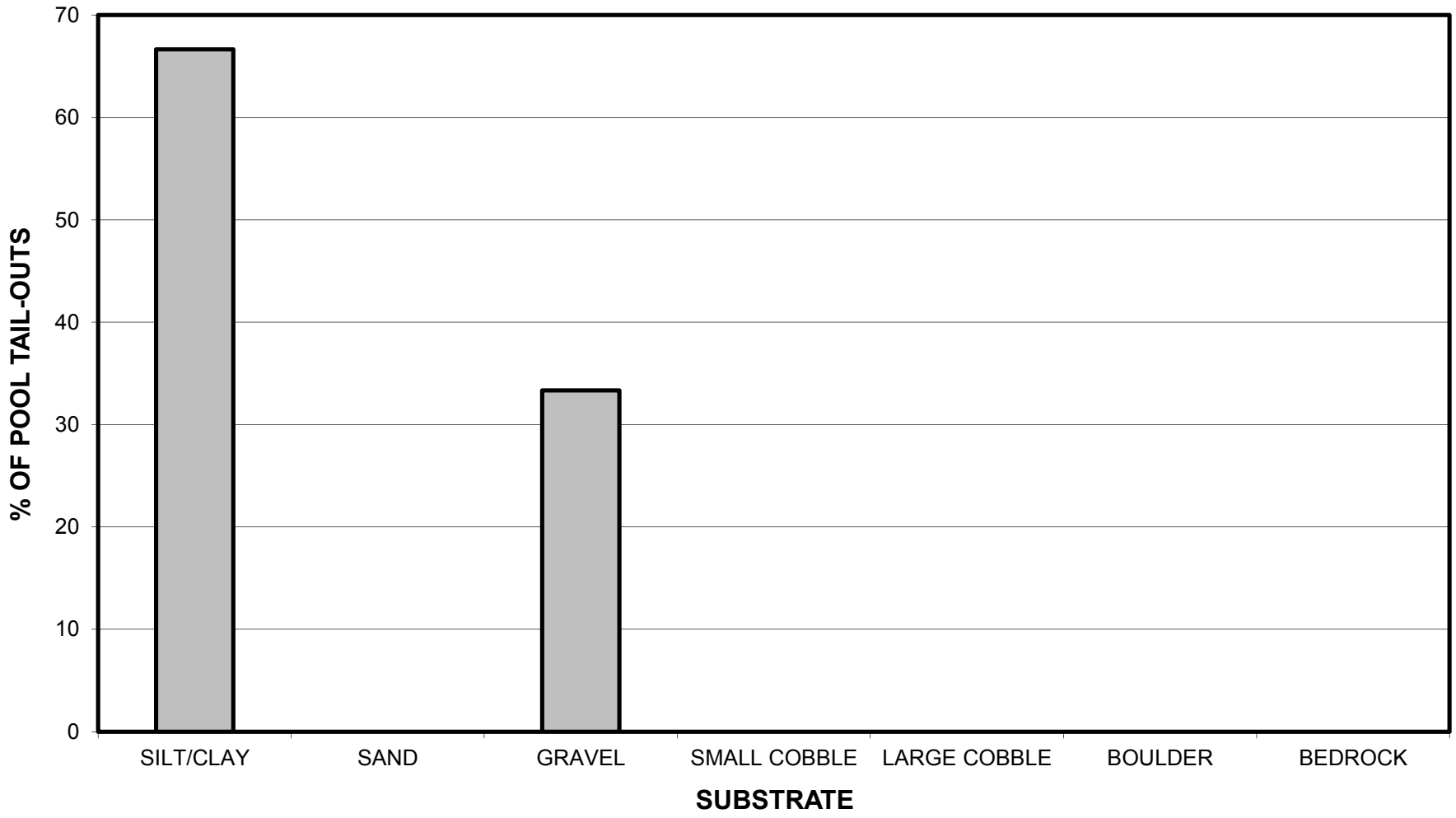
GRAPH 6

DEADMAN GULCH 2015
MEAN PERCENT COVER TYPES IN POOLS



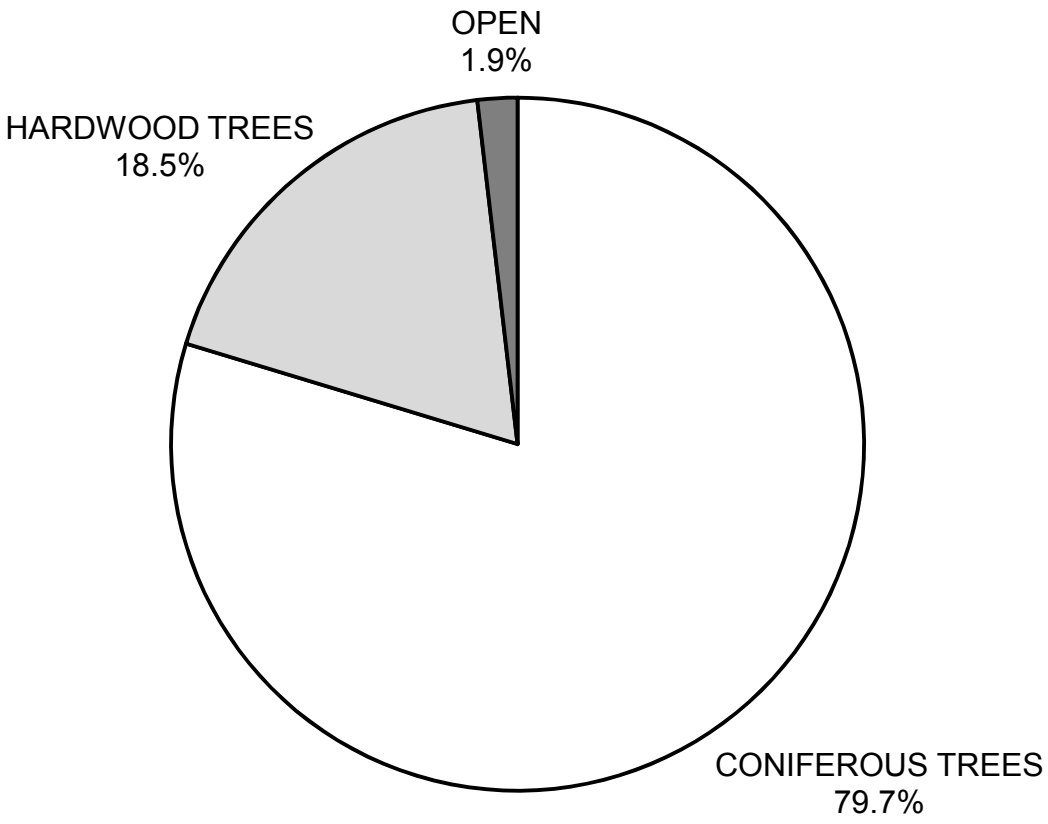
GRAPH 7

DEADMAN GULCH 2015
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



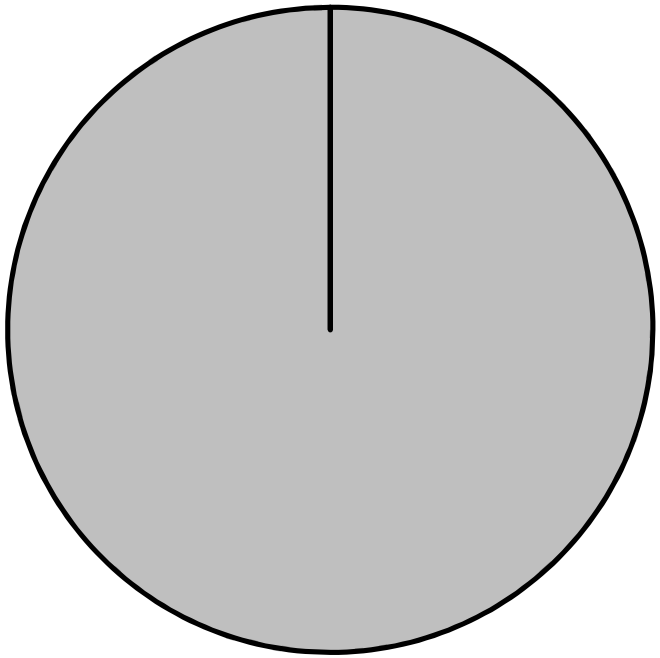
GRAPH 8

DEADMAN GULCH 2015
MEAN PERCENT CANOPY



GRAPH 9

DEADMAN GULCH 2015
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

DEADMAN GULCH 2015
DOMINANT BANK VEGETATION IN SURVEY REACH

GRAPH 11