

STREAM INVENTORY REPORT

Morrison Gulch

INTRODUCTION

A stream inventory was conducted from October 1 to October 2, 2013 on Morrison Gulch. The survey began at the confluence with the Albion River and extended upstream 0.6 miles.

The Morrison 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 Morrison 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

Morrison Gulch is a tributary to the Albion River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Morrison Gulch's legal description at the confluence with the Albion River is T16N R16W S11. Its location is 39.2606 degrees north latitude and 123.6099 degrees west longitude, LLID number 1236099392606. Morrison Gulch is a second order stream and has approximately 0.7 miles of blue line stream according to the USGS Comptche 7.5 minute quadrangle. Morrison Gulch drains a watershed of approximately 0.5 square miles. Elevations range from about 140 feet at the mouth of the creek to 450 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 Comptche-Ukiah Road, west of Comptche, CA.

METHODS

The habitat inventory conducted in Morrison 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 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

Morrison Gulch

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 Morrison Gulch to record measurements and observations. There are eleven components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) near the bottom of the stream survey reach using a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Morrison 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.

Morrison Gulch

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 Morrison 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 Morrison 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 Morrison 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 Morrison 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.

Morrison Gulch

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 Morrison Gulch. In addition, underwater observations were made at nine 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

Morrison Gulch

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Morrison 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 October 1 to October 2, 2013 was conducted by M.Scott and N. Massa (CDFW). The total length of the stream surveyed was 3,420 feet.

Stream flow was not measured on Morrison Gulch.

Morrison Gulch is a B6 channel type for the entire length of the survey, 3,420 feet. B6 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and silt-dominant substrates.

Water temperatures taken during the survey period ranged from 50 to 57 degrees Fahrenheit. Air temperatures ranged from 54 to 90 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 31% flatwater units, 28% pool units, 23% dry units, and 19% riffle units (Graph 1). Based on total length of Level II habitat types there were 41% dry units, 28% flatwater units, 24% pool units, and 7% riffle units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were run units, 24%; dry units, 23%; and mid channel pool units, 21% (Graph 3). Based on percent total length, dry units made up 41%, mid channel pool units 17%, and step run units 16%.

A total of 36 pools were identified (Table 3). Main channel pools were the most frequently encountered at 86% (Graph 4), and comprised 90% of the total length of all pools (Table 3).

Morrison Gulch

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eight of the 36 pools (22%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 36 pool tail-outs measured, 16 had a value of 1 (44%); seven had a value of 2 (19%); four had a value of 3 (11%); one had a value of 4 (3%); eight had a value of 5 (22%); (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 the highest mean shelter rating at 10. Scour pools had a mean shelter rating of 8 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in Morrison Gulch. Graph 7 describes the pool cover in Morrison Gulch. Undercut banks are 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 71% of the pool tail-outs. Silt/clay was the next most frequently observed dominant substrate type and occurred in 23% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Morrison Gulch was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 49% and 51%, respectively. Graph 9 describes the mean percent canopy in Morrison 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 92% sand/silt/clay, 4% bedrock, and 4% cobble/gravel (Graph 10). Hardwood trees were the dominant vegetation type observed in 53% of the units surveyed. Additionally, 47% of the units surveyed had coniferous trees as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Survey teams conducted a snorkel survey at nine sites for species composition and distribution in Morrison Gulch on October 29, 2013. The sites were sampled by B. Leonard and J. Hollis (CDFW).

Morrison Gulch

The reach sites yielded no fish.

The following chart displays the information yielded from these sites:

2013 Morrison Gulch underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
B6 Channel Type									
10/29/13	1	014	Pool	194	0	0	0	0	0
	2	023	Pool	361	0	0	0	0	0
	3	026	Pool	389	0	0	0	0	0
	4	049	Pool	846	0	0	0	0	0
	5	052	Pool	921	0	0	0	0	0
	6	056	Pool	975	0	0	0	0	0
	7	063	Pool	1,151	0	0	0	0	0
	8	069	Pool	1,508	0	0	0	0	0
	9	071	Pool	1,538	0	0	0	0	0

DISCUSSION

Morrison Gulch is a B6 channel type for the entire length of the survey. The suitability of B6 channel types for fish habitat improvement structures is as follows: B6 channel types are excellent for bank-placed boulders and log cover and good for plunge weirs, single and opposing wing-deflectors and channel constrictors and fair for boulder clusters.

The water temperatures recorded on the survey days October 1 to October 2, 2013 ranged from 50 to 57 degrees Fahrenheit. Air temperatures ranged from 54 to 90 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 28% of the total length of this survey, riffles 7%, and pools 24%. Eight of the 36 (22%) 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.

Twenty-three of the 36 pool tail-outs measured had embeddedness ratings of 1 or 2. Five of the pool tail-outs had embeddedness ratings of 3 or 4. Eight of the pool tail-outs had a rating of 5,

Morrison Gulch

which is considered not suitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Twenty-five of the 35 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 undercut banks in Morrison Gulch. Undercut banks are 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 97%. The percentage of right and left bank covered with vegetation was 100% and 100%, respectively.

RECOMMENDATIONS

- 1) Morrison Gulch should be managed as an anadromous, natural production stream.
- 2) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for three to five years.
- 3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from undercut banks. Adding high quality complexity with woody cover in the pools is desirable.

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 B6 channel type for the entire length of the survey
988	0058.00	There is a 3' high plunge over log and root mass.
1141	0063.00	Dry tributary enters on the right bank.

Morrison Gulch

1523	0071.00	There is a 5' high plunge over substrate.
1652	0078.00	There is a 4' high plunge over substrate.
2599	0103.00	There is a 1.5' high plunge over log.
3248	0118.00	There is a 2' high plunge over log.
3420	0130.00	End of survey. Channel is overgrown with grass, small oaks and pines. The number of dry units is increasing. Crew scouted 300' upstream of the end of survey point and observed small isolated pools with mud, sand, and silt as the dominant substrates. No fish were observed from the banks during the survey.

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.

Morrison Gulch

LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE

Low Gradient Riffle	(LGR)	[1.1]	{ 1 }
High Gradient Riffle	(HGR)	[1.2]	{ 2 }

CASCADE

Cascade	(CAS)	[2.1]	{ 3 }
Bedrock Sheet	(BRS)	[2.2]	{24}

FLATWATER

Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}

MAIN CHANNEL POOLS

Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}

SCOUR POOLS

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

BACKWATER POOLS

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

ADDITIONAL UNIT DESIGNATIONS

Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	

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

Stream Name: Morrison Gulch

LLID: 1236099392606 Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE Legal Description: T16NR16WS11 Latitude: 39:15:38.0N Longitude: 123:36:36.0W

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
30	0	DRY	23.1	47	1411	41.3									0
40	5	FLATWATER	30.8	24	951	27.8	4.5	0.5	0.8	104	4156	57	2275		0
36	36	POOL	27.7	23	811	23.7	5.2	0.6	1.6	115	4124	89	3203	70	9
24	5	RIFFLE	18.5	10	247	7.2	2.8	0.1	0.2	15	364	2	36		0
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
130	46				3420					8644			5514		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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 (%)
19	4	LGR	14.6	11	205	6.0	3	0.1	0.3	15	292	2	29		0	97
5	1	HGR	3.8	8	42	1.2	2	0.1	0.3	14	72	1	7			94
1	0	GLD	0.8	4	4	0.1										
31	3	RUN	23.8	13	412	12.0	4	0.4	0.9	74	2279	28	860		0	97
8	2	SRN	6.2	67	535	15.6	4	0.6	1.2	150	1196	101	805		0	100
27	27	MCP	20.8	22	584	17.1	5	0.6	4.9	111	2989	79	2126	63	10	97
1	1	CCP	0.8	32	32	0.9	3	0.4	1	96	96	58	58	38	0	100
3	3	STP	2.3	39	116	3.4	4	0.5	2	175	524	130	389	75	10	94
5	5	PLP	3.8	16	79	2.3	7	1.0	3.5	103	515	126	630	110	8	96
30	0	DRY	23.1	47	1411	41.3									0	94

Total Units
130

Total Units Fully Measured
46

Total Length (ft.)
3420

Total Area (sq.ft.)
7962

Total Volume (cu.ft.)
4903

Table 3 - Summary of Pool Types

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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
31	31	MAIN	86	24	732	90	5.0	0.6	116	3609	64	1973	10
5	5	SCOUR	14	16	79	10	6.6	1.0	103	515	110	548	8

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
36	36	811	4124	2521

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

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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
27	MCP	75	7	26	16	59	3	11	0	0	1	4
1	CCP	3	0	0	1	100	0	0	0	0	0	0
3	STP	8	0	0	2	67	1	33	0	0	0	0
5	PLP	14	0	0	2	40	2	40	1	20	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
36	7	19	21	58	6	17	1	3	1	3

Mean Maximum Residual Pool Depth (ft.): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Dry Units: 30

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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
19	4	LGR	0	0	0	0	0	0	0	0	0
5	0	HGR									
24	4	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
1	0	GLD									
31	4	RUN	0	0	0	0	0	0	0	0	0
8	2	SRN	0	0	0	0	0	0	0	0	0
40	6	TOTAL FLAT	0	0	0	0	0	0	0	0	0
27	27	MCP	35	15	50	0	0	0	0	0	0
1	1	CCP	0	0	0	0	0	0	0	0	0
3	3	STP	50	25	25	0	0	0	0	0	0
5	5	PLP	67	0	0	0	0	0	33	0	0
36	36	TOTAL POOL	42	14	38	0	0	0	6	0	0
130	47	TOTAL	42	14	38	0	0	0	6	0	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Dry Units: 30

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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
19	4	LGR	0	50	50	0	0	0	0
5	1	HGR	0	0	0	0	0	0	100
1	0	GLD	0	0	0	0	0	0	0
31	4	RUN	50	50	0	0	0	0	0
8	2	SRN	0	0	50	0	0	0	50
27	27	MCP	30	33	37	0	0	0	0
1	1	CCP	0	100	0	0	0	0	0
3	3	STP	0	67	33	0	0	0	0
5	5	PLP	20	60	20	0	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	51	49	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: Morrison Gulch LLID: 1236099392606 Drainage: Albion River
 Survey Dates: 10/1/2013 to 10/2/2013 Survey Length (ft.): 3420 Main Channel (ft.): 3420 Side Channel (ft.): 0
 Confluence Location: Quad: COMPTCHE Legal Description: T16NR16WS11 Latitude: 39:15:38.0N Longitude: 123:36:36.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: B6	Canopy Density (%): 96.8	Pools by Stream Length (%): 23.7
Reach Length (ft.): 3420	Coniferous Component (%): 50.6	Pool Frequency (%): 27.7
Riffle/Flatwater Mean Width (ft.): 3.7	Hardwood Component (%): 49.4	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Hardwood Trees	< 2 Feet Deep: 78
Range (ft.): 7 to 29	Vegetative Cover (%): 100.0	2 to 2.9 Feet Deep: 17
Mean (ft.): 16	Dominant Shelter: Undercut Banks	3 to 3.9 Feet Deep: 3
Std. Dev.: 7	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 3
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 14	Mean Max Residual Pool Depth (ft.): 1.6
Water (F): 50 - 57 Air (F): 54 - 90	LWD per 100 ft.:	Mean Pool Shelter Rating: 9
Dry Channel (ft): 1411	Riffles: 3	
	Pools: 4	
	Flat: 3	
Pool Tail Substrate (%): Silt/Clay: 23 Sand: 6 Gravel: 71 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 44.4 2. 19.4 3. 11.1 4. 2.8 5. 22.2		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

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	2	2	4.1
Boulder	0	0	0.0
Cobble / Gravel	3	1	4.1
Sand / Silt / Clay	44	46	91.8

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	0	0	0.0
Hardwood Trees	31	21	53.1
Coniferous Trees	18	28	46.9
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values: 2

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

StreamName: Morrison Gulch

LLID: 1236099392606

Drainage: Albion River

Survey Dates: 10/1/2013 to 10/2/2013

Confluence Location: Quad: COMPTCHE

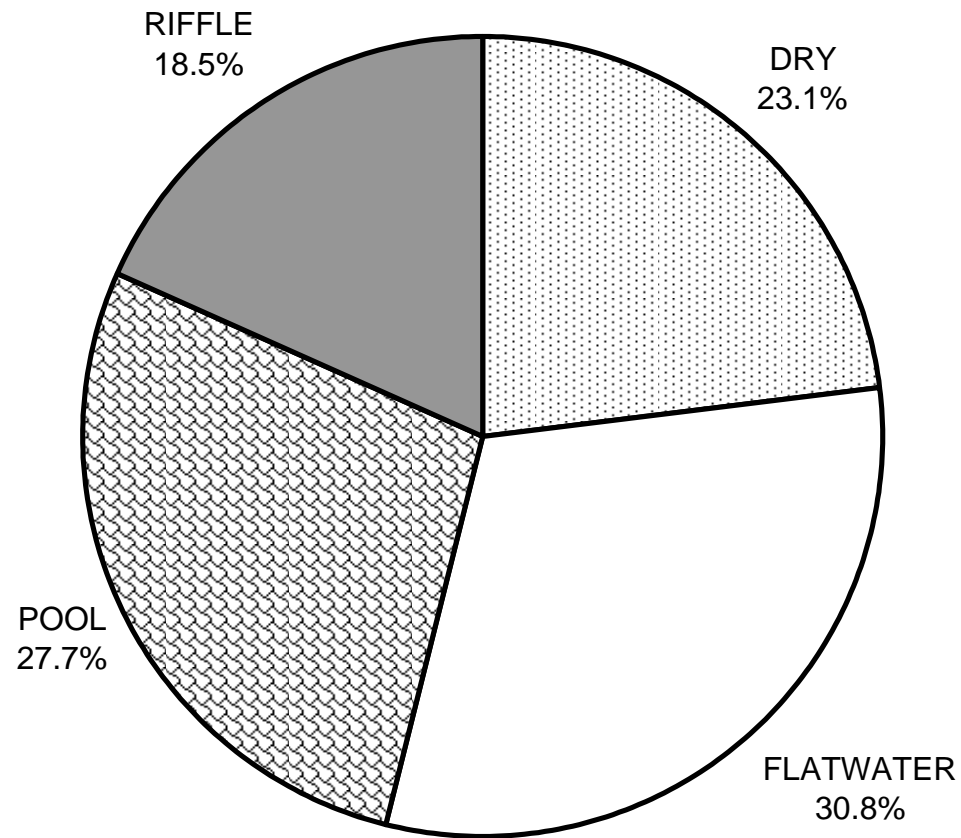
Legal Description: T16NR16WS11

Latitude: 39:15:38.0N

Longitude: 123:36:36.0W

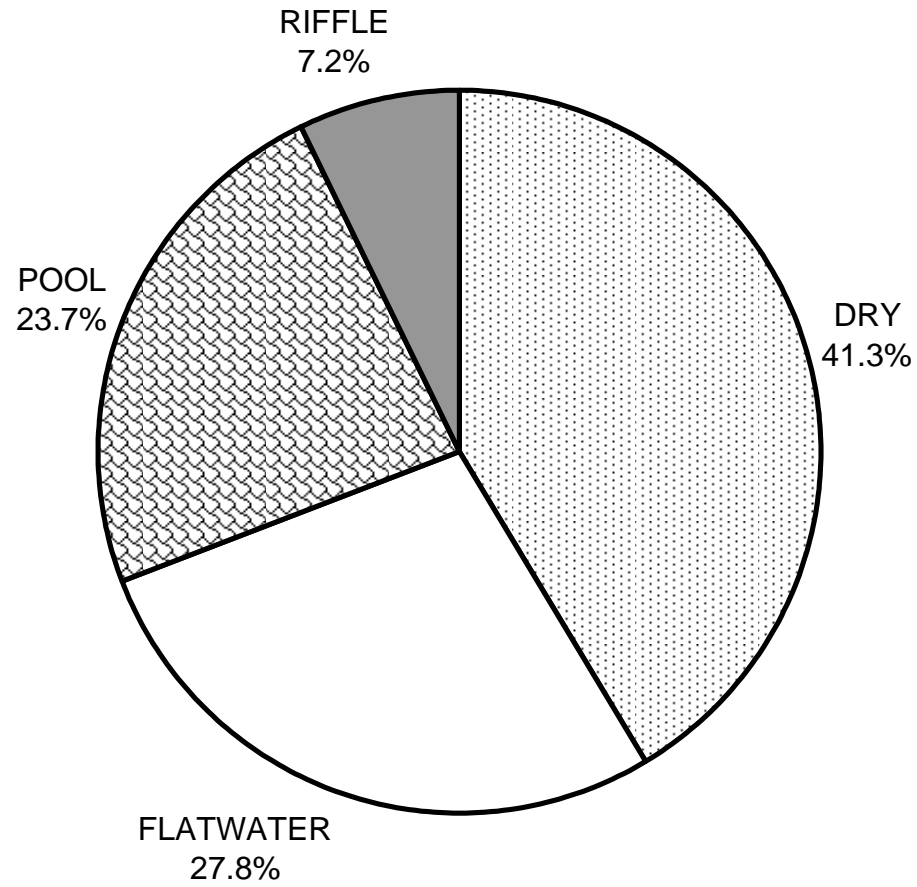
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	0	42
SMALL WOODY DEBRIS (%)	0	0	14
LARGE WOODY DEBRIS (%)	0	0	38
ROOT MASS (%)	0	0	0
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	6
BOULDERS (%)	0	0	0
BEDROCK LEDGES (%)	0	0	0

MORRISON GULCH 2013 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

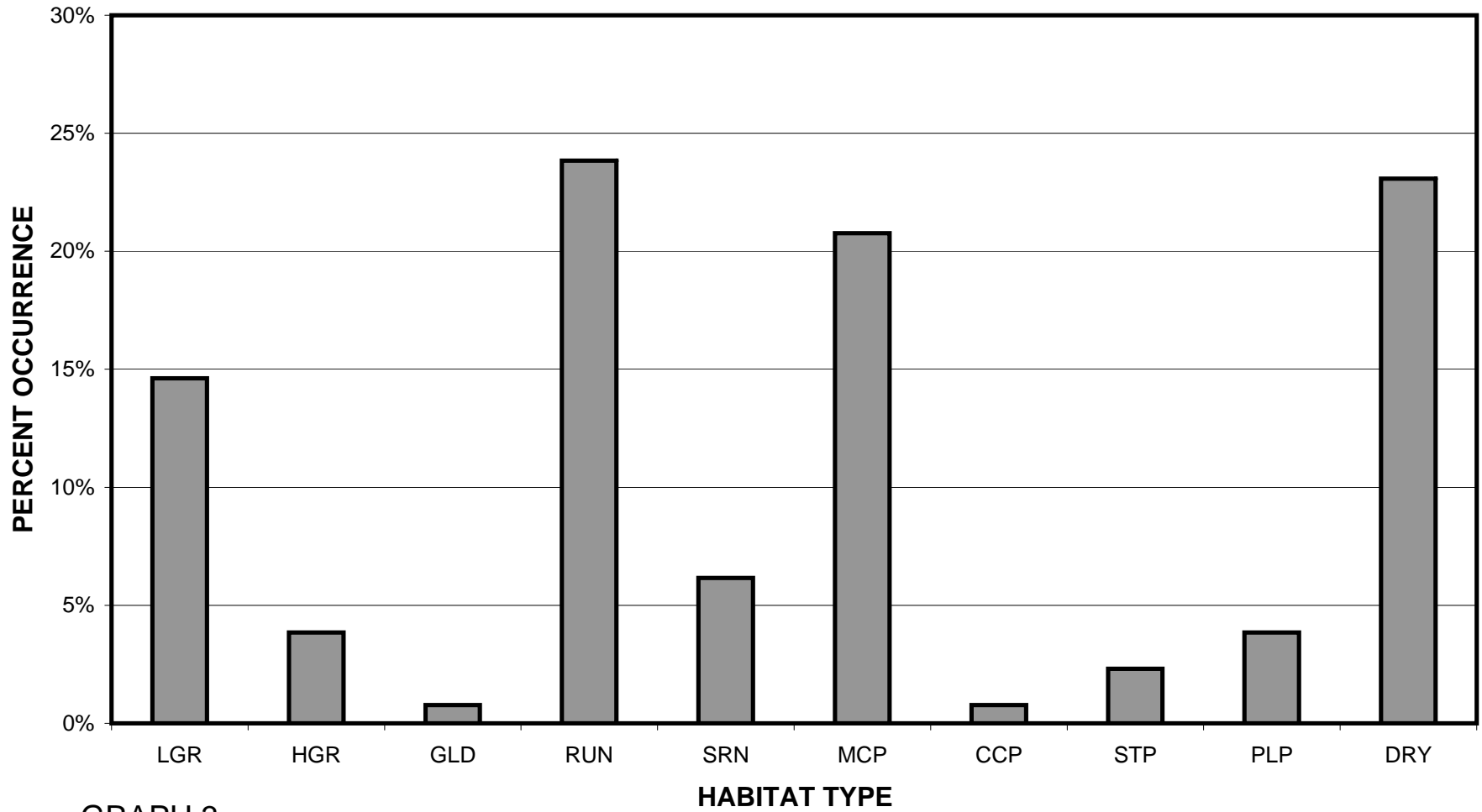
MORRISON GULCH 2013 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

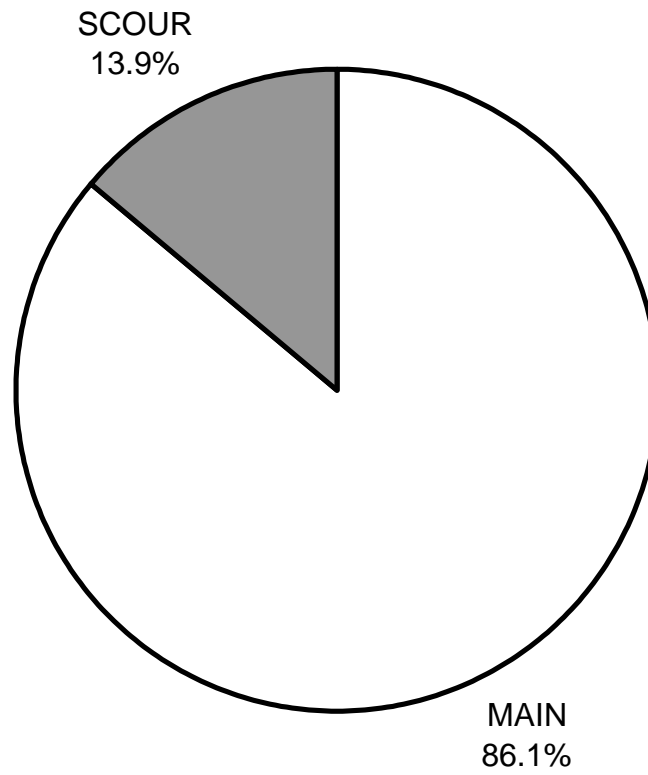
MORRISON GULCH 2013

HABITAT TYPES BY PERCENT OCCURRENCE



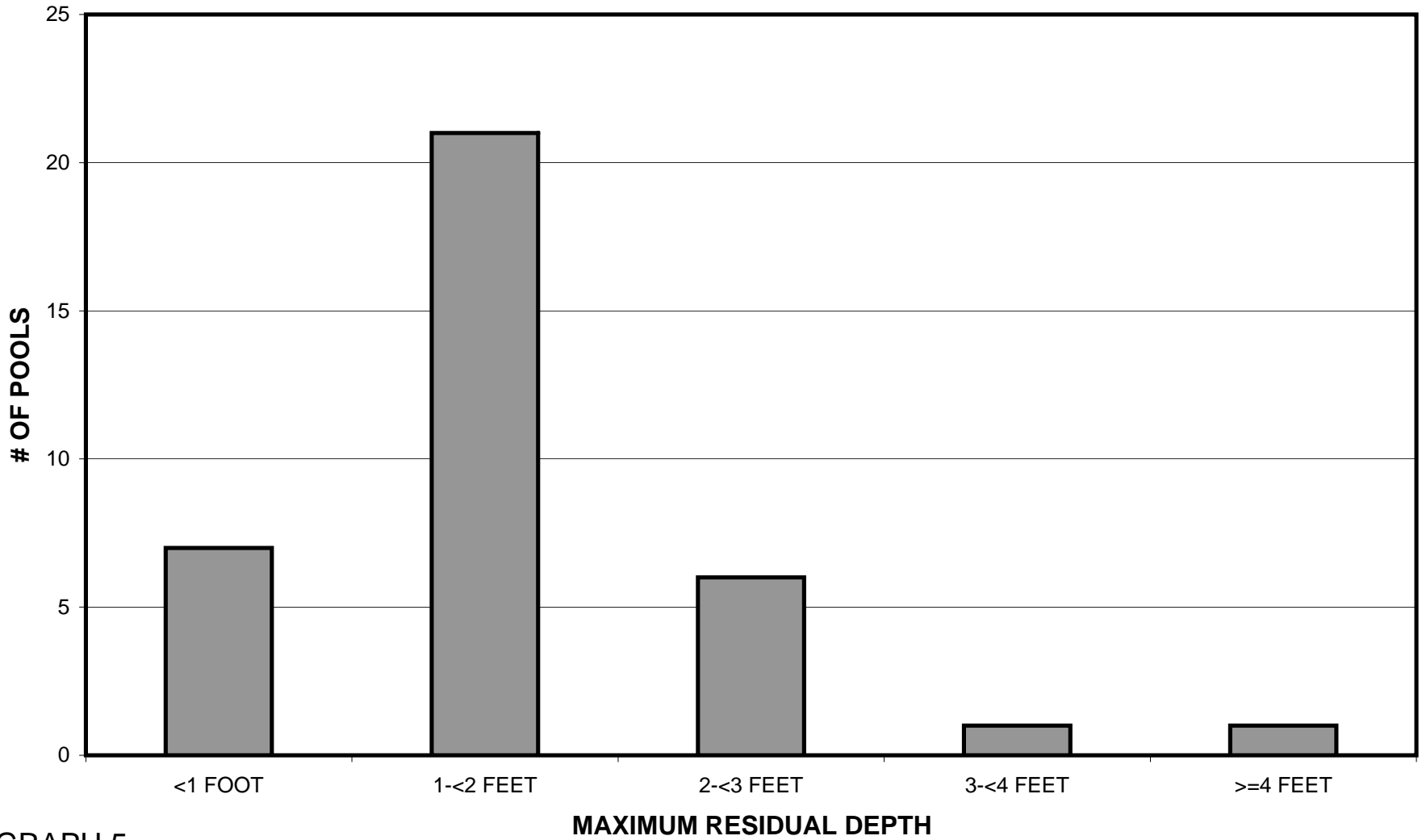
GRAPH 3

MORRISON GULCH 2013 POOL TYPES BY PERCENT OCCURRENCE



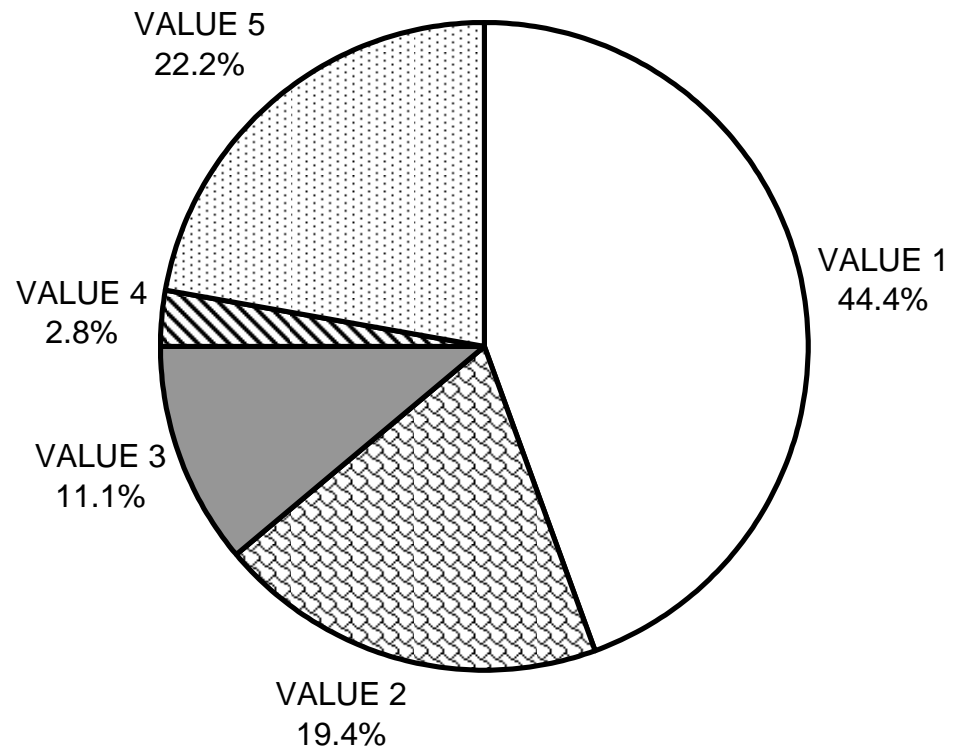
GRAPH 4

MORRISON GULCH 2013 MAXIMUM DEPTH IN POOLS



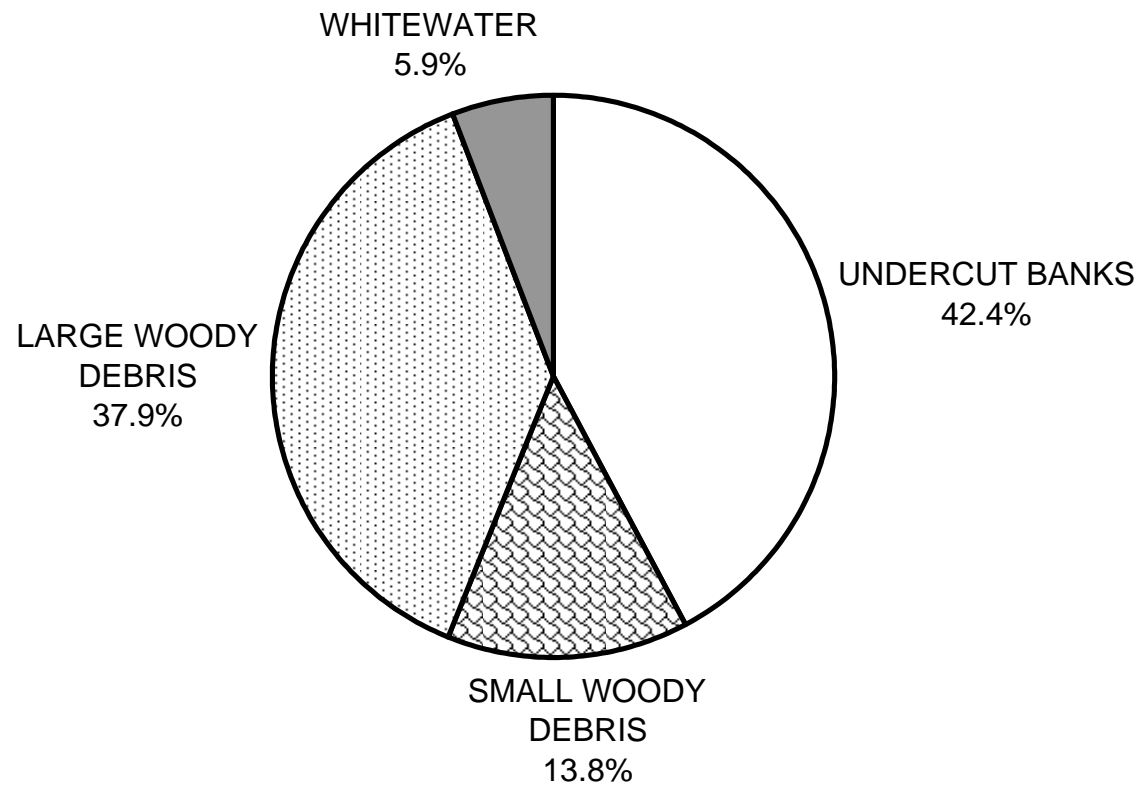
GRAPH 5

MORRISON GULCH 2013 PERCENT EMBEDDEDNESS



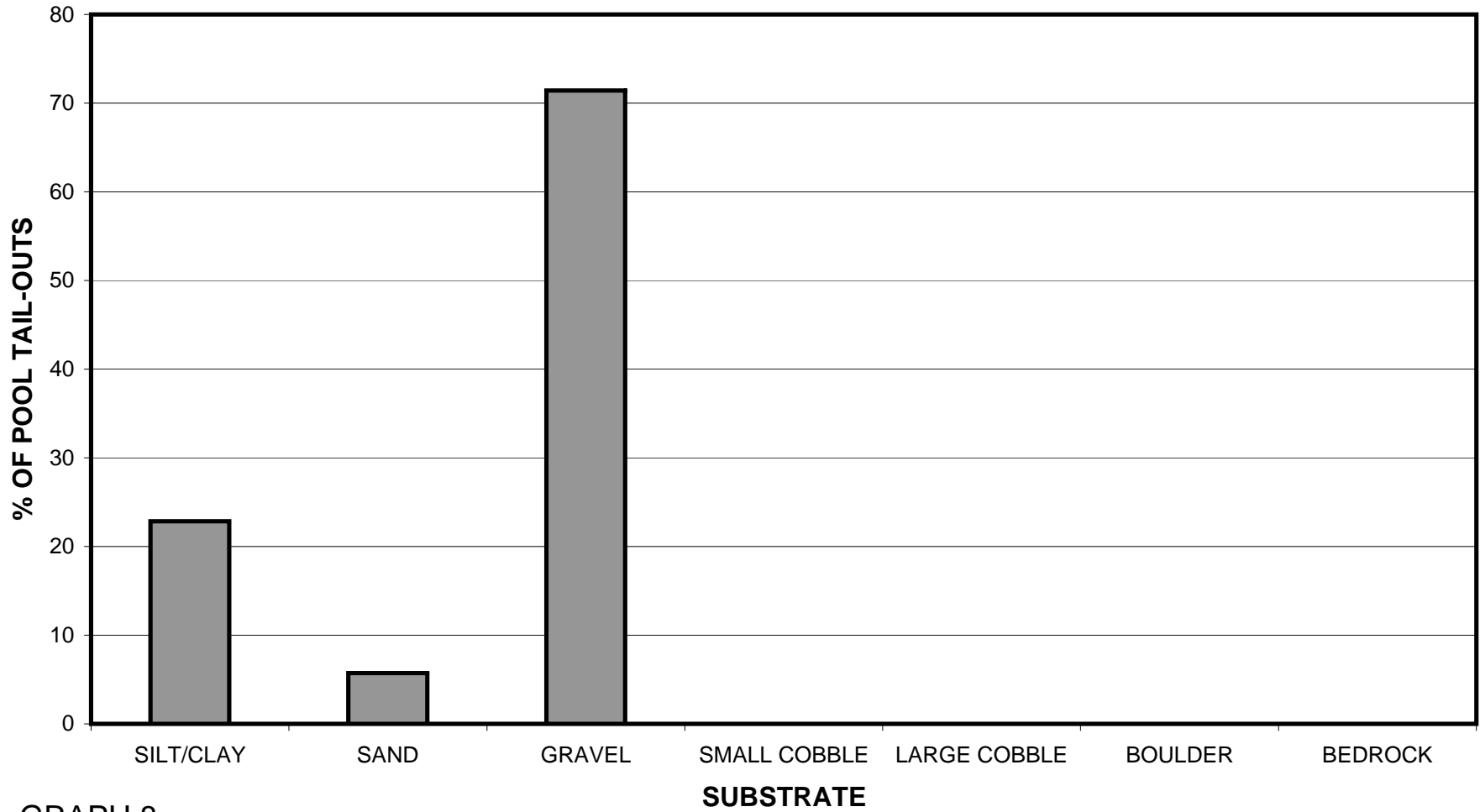
GRAPH 6

MORRISON GULCH 2013 MEAN PERCENT COVER TYPES IN POOLS



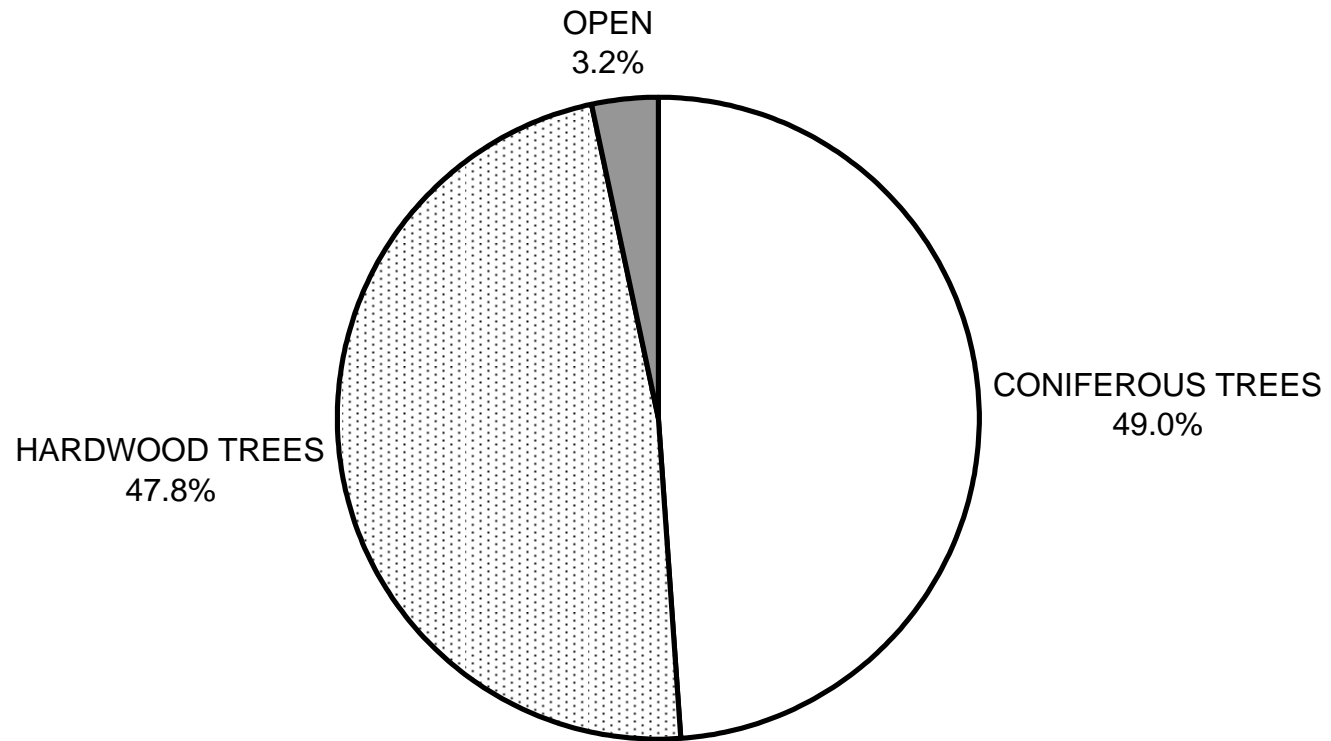
GRAPH 7

MORRISON GULCH 2013 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



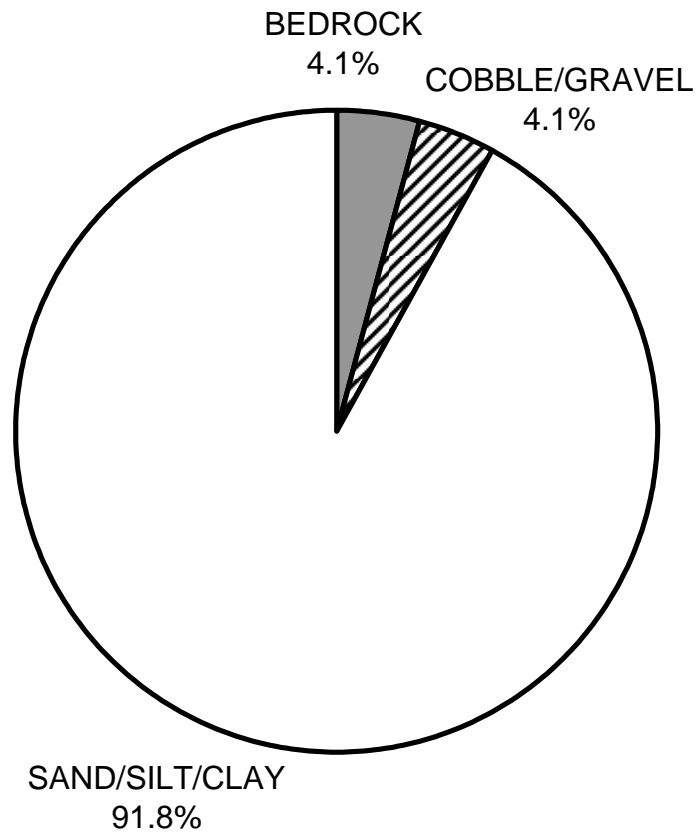
GRAPH 8

MORRISON GULCH 2013 MEAN PERCENT CANOPY



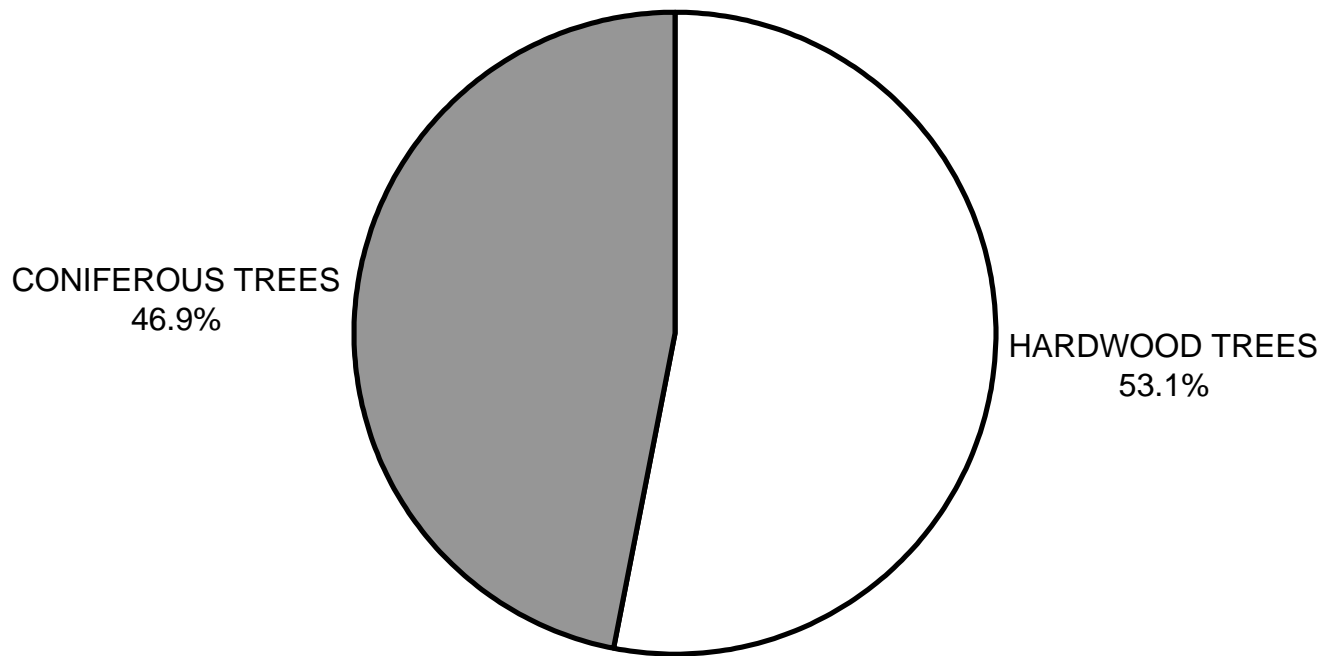
GRAPH 9

**MORRISON GULCH 2013
DOMINANT BANK COMPOSITION IN SURVEY REACH**



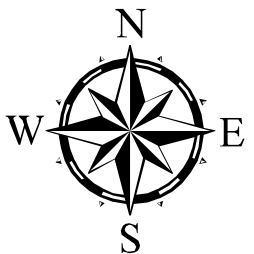
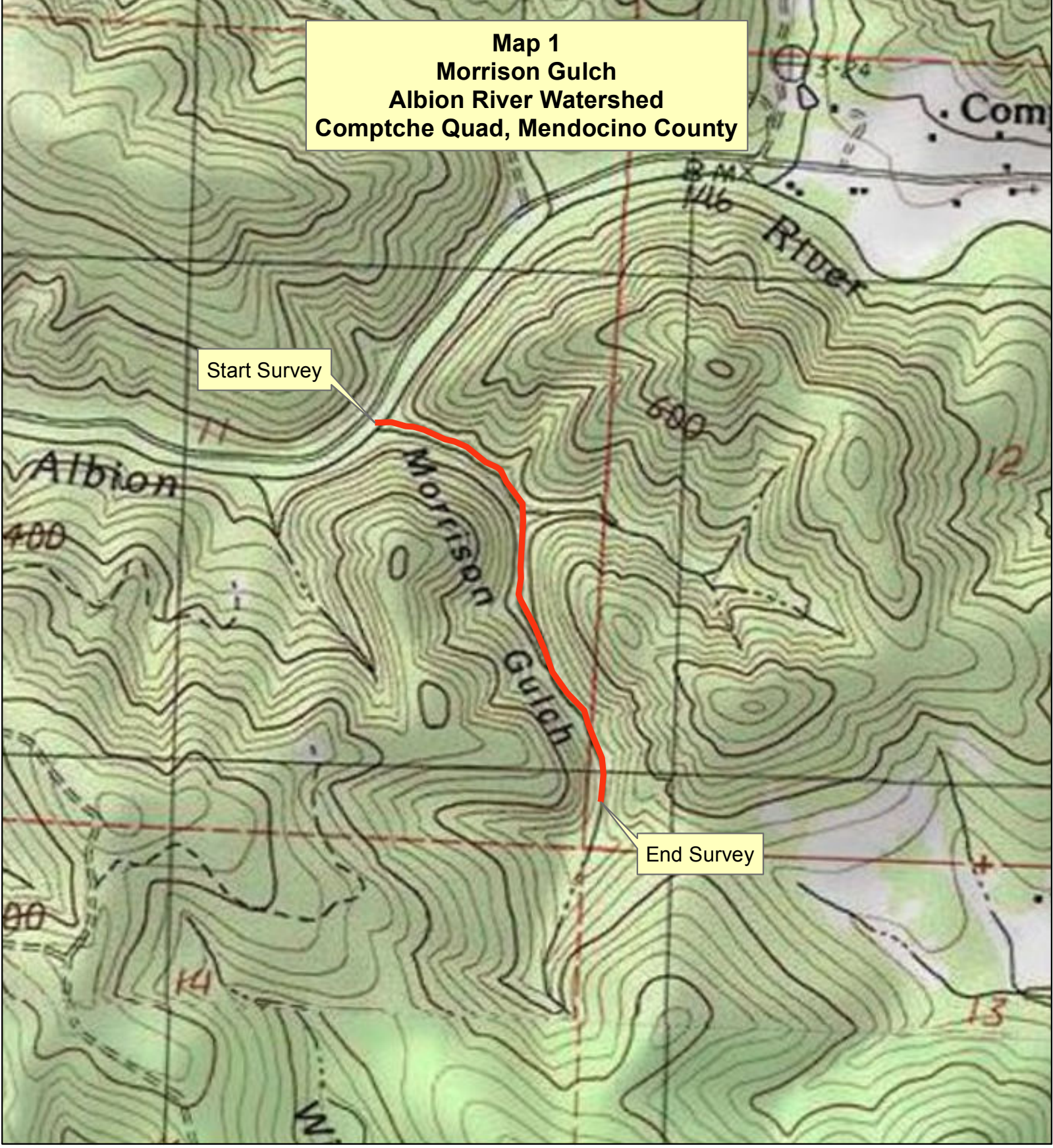
GRAPH 10

**MORRISON GULCH 2013
DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

**Map 1
Morrison Gulch
Albion River Watershed
Comptche Quad, Mendocino County**



— Channel Type B4

