

# STREAM INVENTORY REPORT

## Kaisen Gulch

### INTRODUCTION

A stream inventory was conducted from September 23 to September 26, 2013 on Kaisen Gulch. The survey began at the confluence with the Albion River and extended upstream 0.9 miles. A stream inventory and report was completed for one tributary to Kaisen Gulch.

The Kaisen 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 Kaisen 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

Kaisen Gulch is a tributary to the Albion River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Kaisen Gulch's legal description at the confluence with the Albion River is T16N R16W S08. Its location is 39.2622 degrees north latitude and 123.6681 degrees west longitude, LLID number 1236688392622. Kaisen Gulch is an intermittent stream according to the USGS Mathison Peak 7.5 minute quadrangle. Kaisen Gulch drains a watershed of approximately 1.5 square miles. Elevations range from about 45 feet at the mouth of the creek to 600 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 logging road off Comptche-Ukiah Road, west of Comptche, CA.

### METHODS

The habitat inventory conducted in Kaisen 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 and California Conservation Corps (CCC) members that conducted the inventory were trained in standardized habitat inventory methods by the CDFW. This inventory was conducted by a two-person team.

### SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail

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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 Kaisen 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". Kaisen 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.

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### 5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Kaisen 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is classified according to a list of nine cover types. In Kaisen 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 for each fully-described habitat unit by multiplying shelter value and percent cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

### 7. Substrate Composition:

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

### 8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Kaisen 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 Kaisen 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.

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### 10. Large Woody Debris Count:

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

### 11. Average Bankfull Width:

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

## BIOLOGICAL INVENTORY

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

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.19, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Residual Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type
- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Kaisen 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 September 23 to September 26, 2013 was conducted by B. Leonard (CDFW) and B. Brengettsey, (CCC). The total length of the stream surveyed was 4,532 feet.

Stream flow was estimated to be 0.1 cfs during the survey period.

Kaisen Gulch is a G4 channel type for the entire length of the survey, 4,532 feet. G4 channels are entrenched “gully” step-pool channels on moderate gradients with low width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 51 to 58 degrees Fahrenheit. Air temperatures ranged from 50 to 65 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 34% flatwater units, 32% pool units, 28% riffle units, and 6% dry units (Graph 1). Based on total length of Level II habitat types there were 51% flatwater units, 25% riffle units, 19% pool units, and 4% dry units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 32%; low gradient riffle units, 23%; and run units, 18% (Graph 3). Based on percent total length, step run units made up 37%, low gradient riffle units 19%, and mid-channel pool units 18%.

A total of 54 pools were identified (Table 3). All of the pools encountered were main channel pools.

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Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Six of the 54 pools (11%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 54 pool tail-outs measured, 14 had a value of 1 (26%); 29 had a value of 2 (54%); nine had a value of 3 (17%); two had a value of 5 (4%) (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 8, and pool habitats had a mean shelter rating of 40 (Table 1).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Kaisen Gulch. Graph 7 describes the pool cover in Kaisen 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 92% of the pool tail-outs. Small cobble and boulders were the next most frequently observed dominant substrate types; each occurred in 4% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Kaisen Gulch was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 45% and 55%, respectively. Graph 9 describes the mean percent canopy in Kaisen Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 96%. The mean percent left bank vegetated was 96%. The dominant elements composing the structure of the stream banks consisted of 76% sand/silt/clay, 21% cobble/gravel, 1% boulders, and 1% bedrock (Graph 10). Brush was the dominant vegetation type observed in 38% of the units surveyed. Additionally, 30% of the units surveyed had coniferous trees as the dominant vegetation type, and 17% had grass as the dominant vegetation type (Graph 11).

## **BIOLOGICAL INVENTORY RESULTS**

Survey teams conducted a snorkel survey at twelve sites for species composition and distribution in Kaisen Gulch on October 3, 2013. The sites were sampled by B. Leonard (CDFW), and B. Brengettsey (California Conservation Corps).

The reach sites yielded 21 young-of-the-year coho salmon.

The following chart displays the information yielded from these sites:

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2013 Kaisen Gulch underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
G4 Channel Type									
10/03/13	1	008	Pool	358	0	0	0	9	0
	2	014	Pool	477	0	0	0	4	0
	3	018	Run	543	0	0	0	8	0
	4	026	Pool	760	0	0	0	0	0
	5	029	Pool	871	0	0	0	0	0
	6	040	Pool	1,200	0	0	0	0	0
	7	046	Pool	1,286	0	0	0	0	0
	8	048	Pool	1,341	0	0	0	0	0
	9	050	Pool	1,367	0	0	0	0	0
	10	052	Pool	1,382	0	0	0	0	0
	11	054	Pool	1,429	0	0	0	0	0
	12	062	Pool	1,585	0	0	0	0	0

## DISCUSSION

Kaisen Gulch is a G4 channel type for the entire length of the survey. The suitability of G4 channel types for fish habitat improvement structures is as follows: G4 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey days September 23 to September 26, 2013 ranged from 51 to 58 degrees Fahrenheit. Air temperatures ranged from 50 to 65 degrees Fahrenheit. This is a good 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 51% of the total length of this survey, riffles 25%, and pools 19%. Six of the 54 (11%) 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.

Forty-three of the 54 pool tail-outs measured had embeddedness ratings of 1 or 2. Nine of the pool tail-outs had embeddedness ratings of 3 or 4. Two of the pool tail-outs had a rating of 5, which is considered not suitable for spawning. Cobble embeddedness measured to be 25% or

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less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

Forty-nine of the 51 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools is 40. The shelter rating in the flatwater habitats is 8. 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 Kaisen 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 96% and 96%, respectively.

### RECOMMENDATIONS

- 1) Kaisen 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 3 to 5 years.
- 3) 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.

### 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 G4 channel type for the entire survey.
324	0008.00	Tributary #1 enters on the left bank. It contributes to approximately 50% of Kaisen Gulch's flow. The water temperature of the tributary is 60 degrees Fahrenheit, the water temperature downstream of the



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tributary is 57 degrees Fahrenheit, and the water temperature upstream of the tributary is 59 degrees Fahrenheit.

- |      |         |   |
|------|---------|---|
| 753  | 0026.00 | There is a 2.6' high plunge.  |
| 1223 | 0043.00 | Log debris accumulation (LDA) #1 contains four pieces of large woody debris (LWD) and measures 4' high x 3.6' wide x 11' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from sand to gravel and measures 3' wide x 40' long x 2' deep. Fish were not observed above the LDA. |
| 1367 | 0051.00 | Series of 2'to 4' high plunges with dry sections above them.  |
| 1376 | 0052.00 | There is a 2.5' high plunge.  |
| 1928 | 0073.00 | LDA #2 contains five pieces of LWD and measures 6' high x 4' wide x 10' long. Water flows through the LDA and there are visible visible gaps in it. Retained sediment ranges from silt to gravel and measures 10' wide x 20' long x 2' deep.  |
| 2329 | 0091.00 | There is a 4.2' high plunge over log and associated sediment accumulation.  |
| 3142 | 0120.00 | Root mass with tree in the middle of channel creating 3.5' high plunge.   |
| 3156 | 0121.00 | Dry tributary enters on the left bank.  |
| 3300 | 0123.00 | There is a 2' high plunge over old growth redwood roots.  |
| 3872 | 0140.00 | Pool is covered with old growth logs.   |
| 4532 | 0168.00 | End of survey. The gradient increases to approximately 7%. The stream is largely dry, clogged with debris, and approximately three feet wide. No fish observed for approximately 4000'.   |

## REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

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### LEVEL III and LEVEL IV HABITAT TYPES

#### RIFFLE

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

#### CASCADE

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

#### FLATWATER

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

#### MAIN CHANNEL POOLS

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

#### SCOUR POOLS

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

#### BACKWATER POOLS

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

#### ADDITIONAL UNIT DESIGNATIONS

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

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

Stream Name: Kaisen Gulch

LLID: 1236688392622 Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK Legal Description: T16NR16WS08 Latitude: 39:15:44.0N Longitude: 123:40:08.0W

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
10	1	DRY	6.0	20	200	4.4	2.0	0.2	0.5	5	45	1	9		
57	6	FLATWATER	33.9	41	2330	51.4	3.1	0.4	0.6	86	4878	36	2065		8
54	54	POOL	32.1	16	861	19.0	5.1	0.6	1.2	82	4429	59	3193	50	40
47	8	RIFFLE	28.0	24	1141	25.2	2.7	0.1	0.2	43	2000	6	260		0
<b>Total Units</b>	<b>Total Units Fully Measured</b>				<b>Total Length (ft.)</b>					<b>Total Area (sq.ft.)</b>			<b>Total Volume (cu.ft.)</b>		
168	69				4532					11353			5527		

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

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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 (%)
38	7	LGR	22.6	23	879	19.4	3	0.1	0.4	46	1757	6	231		0	97
9	1	HGR	5.4	29	262	5.8	2	0.1	0.1	17	152	2	15			98
30	2	RUN	17.9	22	653	14.4	4	0.3	0.6	43	1296	13	389		8	98
27	4	SRN	16.1	62	1677	37.0	3	0.4	1	107	2883	48	1292		9	98
53	53	MCP	31.5	16	827	18.2	5	0.6	2.7	78	4157	55	2921	46	40	98
1	1	CCP	0.6	34	34	0.8	8	1.0	1.2	272	272	272	272	272	5	94
10	1	DRY	6.0	20	200	4.4	2	0.2	0.5	5	45	1	9			98

Total Units  
168

Total Units Fully Measured  
69

Total Length (ft.)  
4532

Total Area (sq.ft.)  
10562

Total Volume (cu.ft.)  
5129

**Table 3 - Summary of Pool Types**

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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
54	54	MAIN	100	16	861	100	5.1	0.6	82	4429	50	2711	40

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
54	54	861	4429	2711

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

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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
53	MCP	98	20	38	27	51	6	11	0	0	0	0
1	CCP	2	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
54	20	37	28	52	6	11	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1.2

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

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Dry Units: 10

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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
38	4	LGR	0	0	0	0	0	0	0	0	0
9	0	HGR									
47	4	TOTAL RIFFLE	0	0	0	0	0	0	0	0	0
30	2	RUN	0	0	0	0	0	0	0	100	0
27	4	SRN	10	35	25	0	5	0	0	25	0
57	6	TOTAL FLAT	5	18	12	0	2	0	0	63	0
53	53	MCP	20	32	31	7	1	0	0	9	0
1	1	CCP	40	40	0	0	0	0	0	20	0
54	54	TOTAL POOL	21	32	30	6	1	0	0	9	0
168	64	TOTAL	19	31	29	6	1	0	0	13	0

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

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Dry Units: 10

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08 Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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
38	7	LGR	0	0	86	14	0	0	0
9	1	HGR	0	0	0	100	0	0	0
30	2	RUN	0	0	100	0	0	0	0
27	4	SRN	0	0	75	0	0	0	25
53	53	MCP	6	0	92	0	2	0	0
1	1	CCP	0	0	100	0	0	0	0



**Table 7 - Summary of Mean Percent Canopy for Entire Stream**

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

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Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	55	45	0	96	96

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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 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

Latitude: 39:15:44.0N

Longitude: 123:40:08.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	1	0	0.7
Boulder	1	1	1.4
Cobble / Gravel	11	19	21.4
Sand / Silt / Clay	57	50	76.4

**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	14	10	17.1
Brush	23	30	37.9
Hardwood Trees	9	12	15.0
Coniferous Trees	24	18	30.0
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:**

2

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

StreamName: Kaisen Gulch

LLID: 1236688392622

Drainage: Albion River

Survey Dates: 9/23/2013 to 9/26/2013

Confluence Location: Quad: MATHISON PEAK

Legal Description: T16NR16WS08

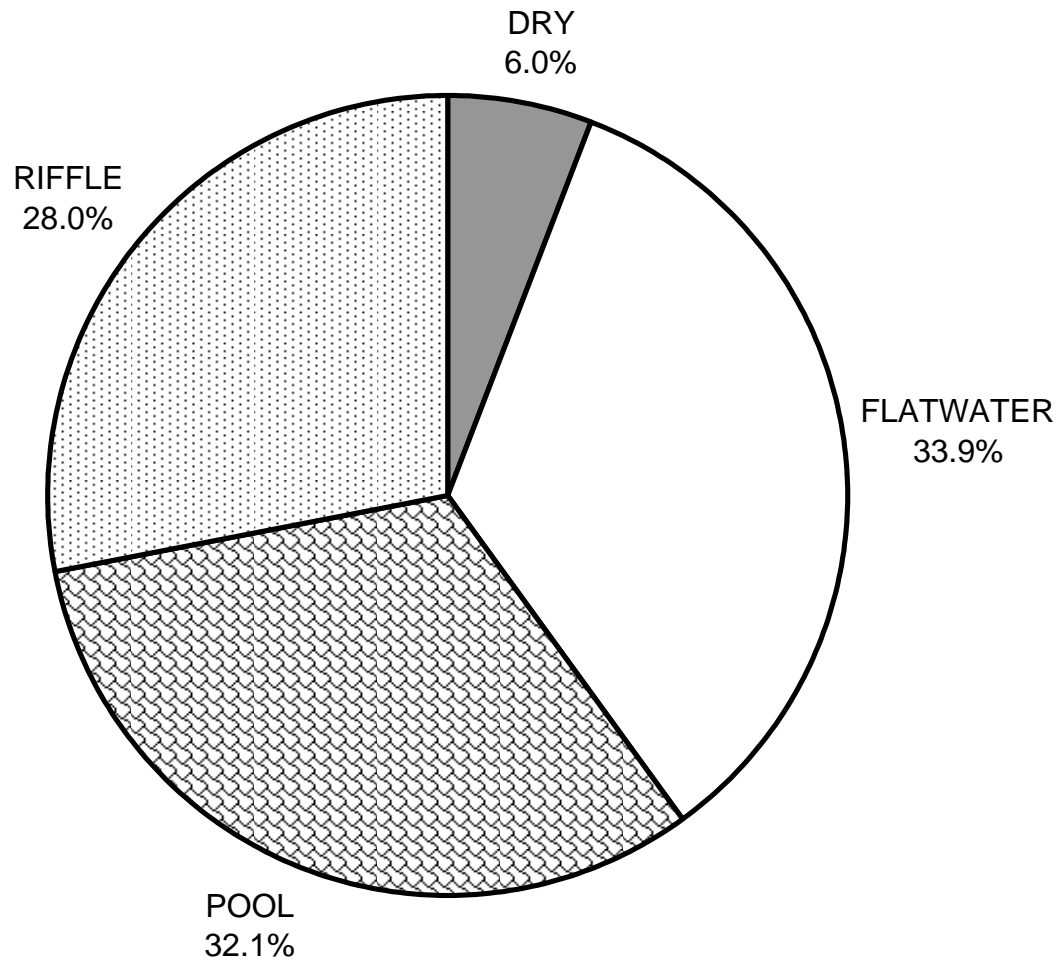
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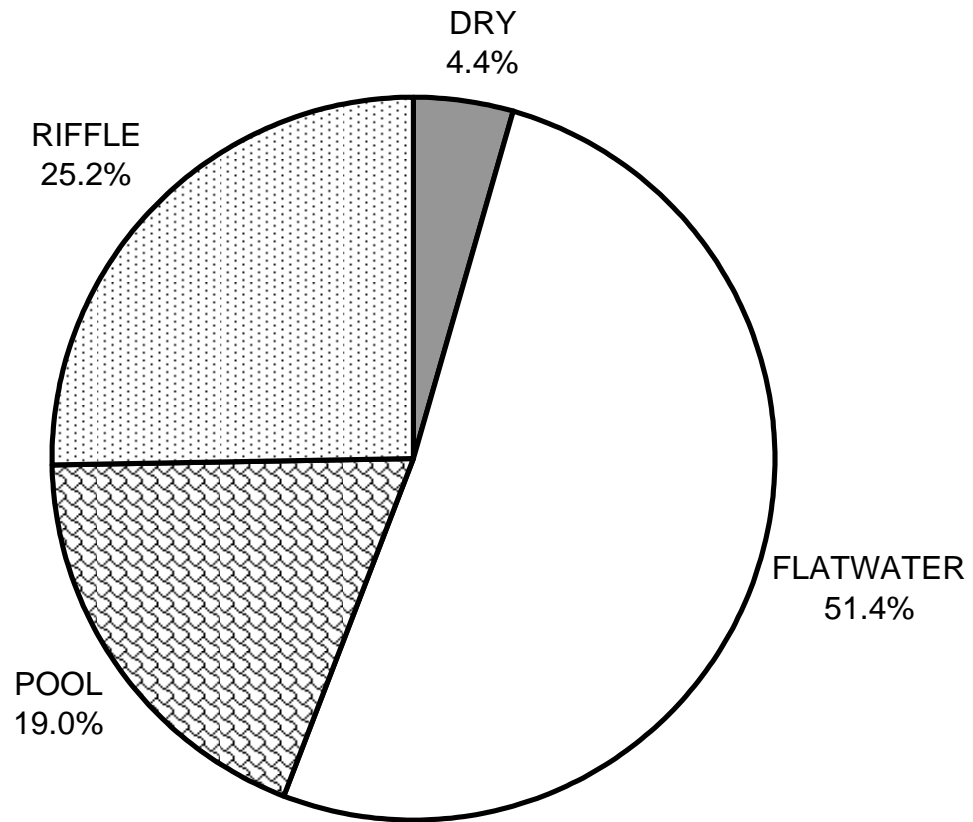
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	5	21
SMALL WOODY DEBRIS (%)	0	18	33
LARGE WOODY DEBRIS (%)	0	12	30
ROOT MASS (%)	0	0	6
TERRESTRIAL VEGETATION (%)	0	2	1
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	0	63	9
BEDROCK LEDGES (%)	0	0	0

# KAISEN GULCH 2013 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 1

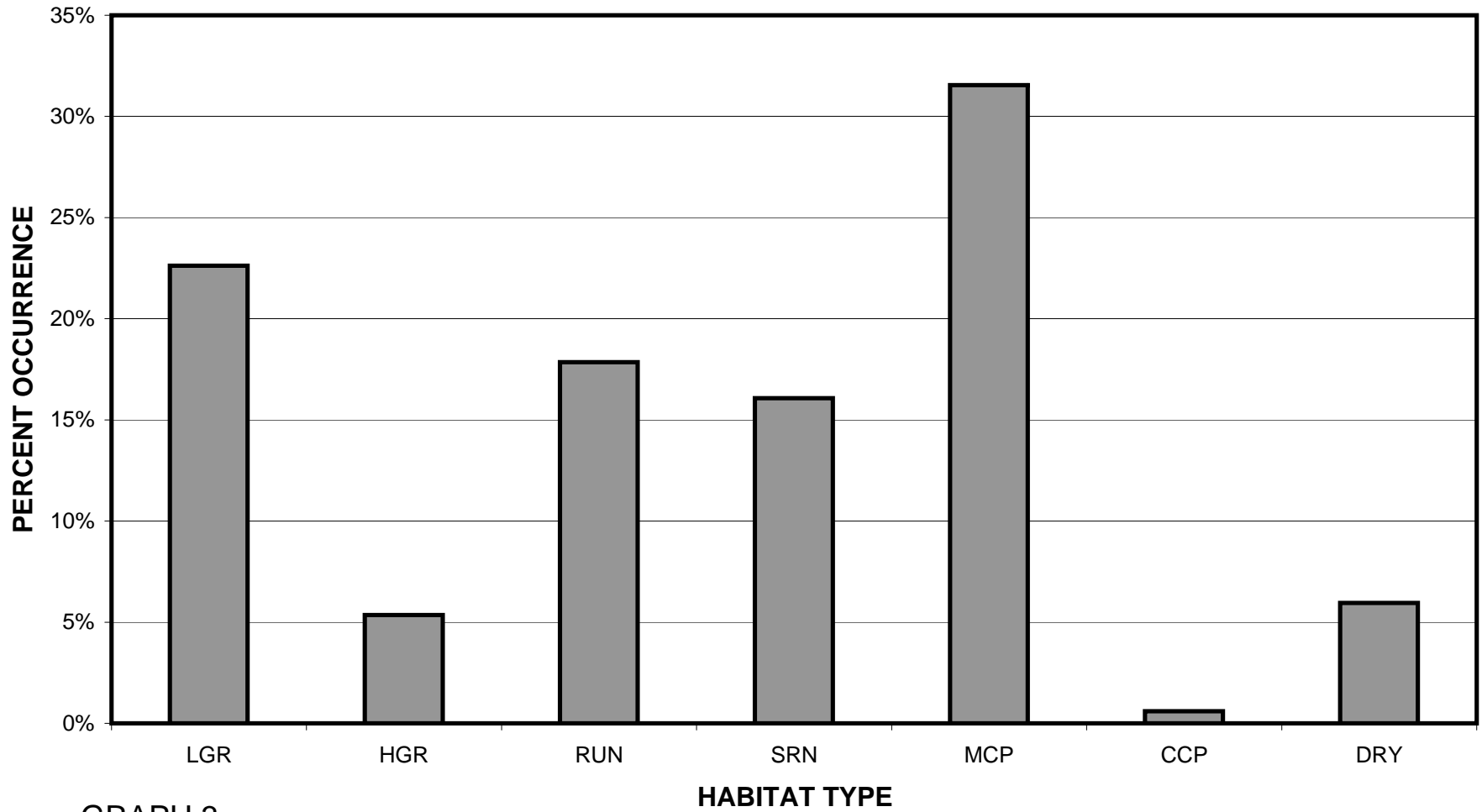
# KAISEN GULCH 2013 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

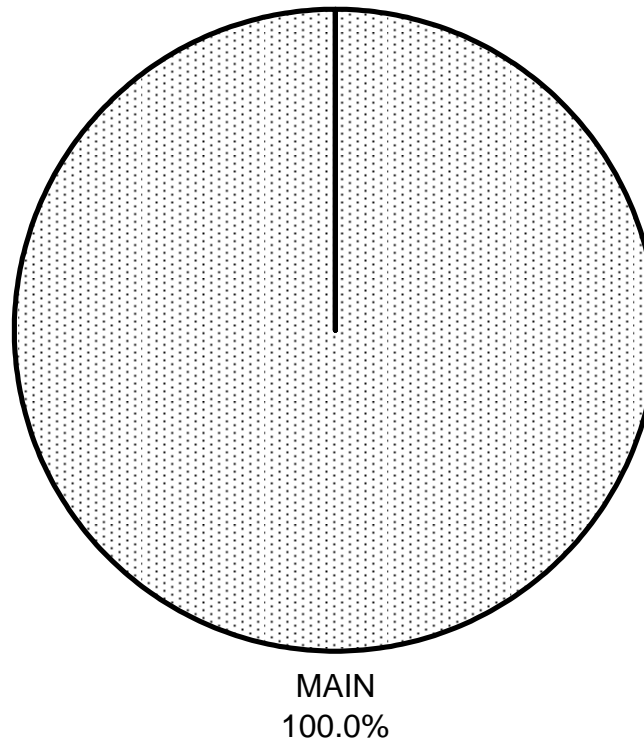
# KAISEN GULCH 2013

## HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

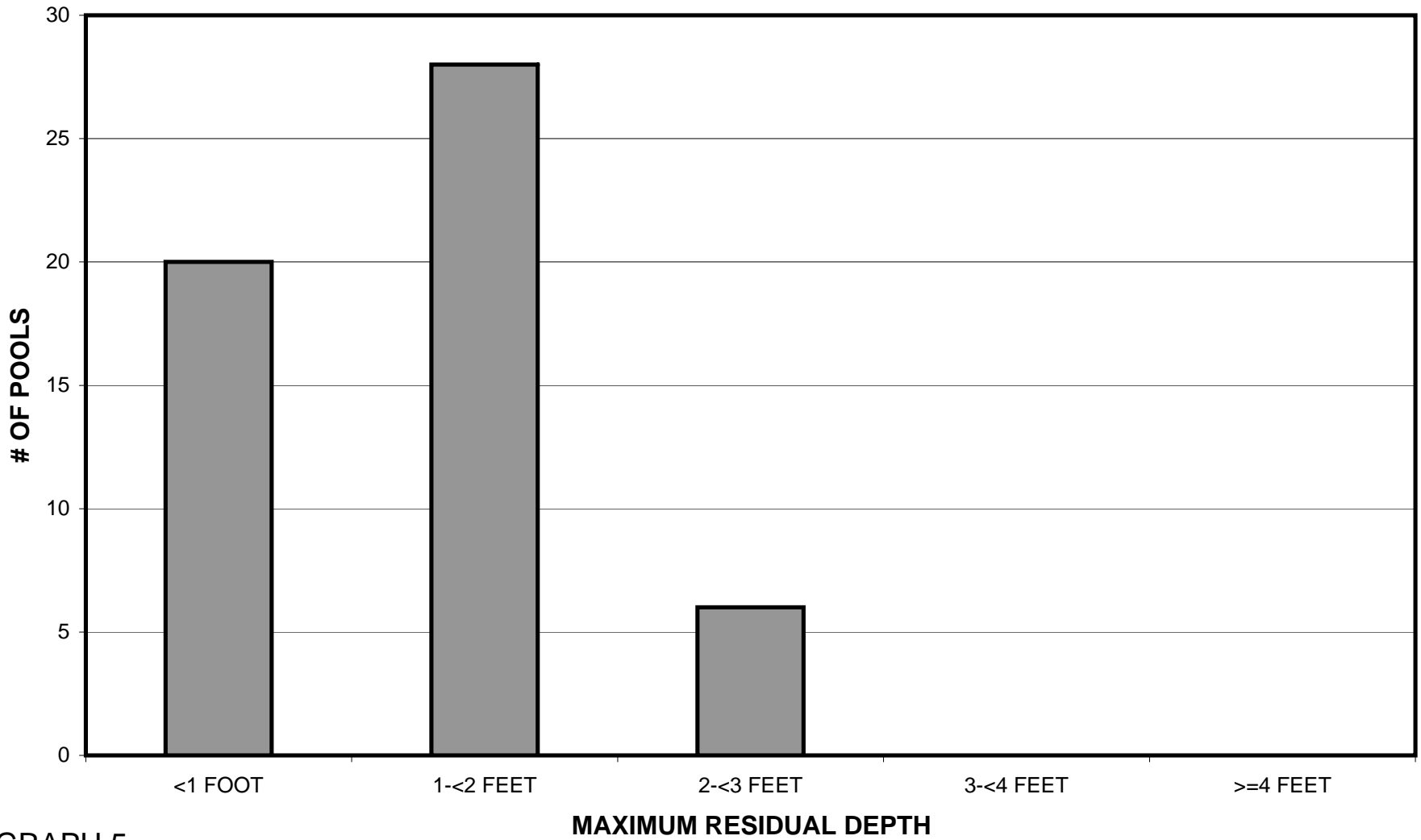
**KAISEN GULCH 2013  
POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

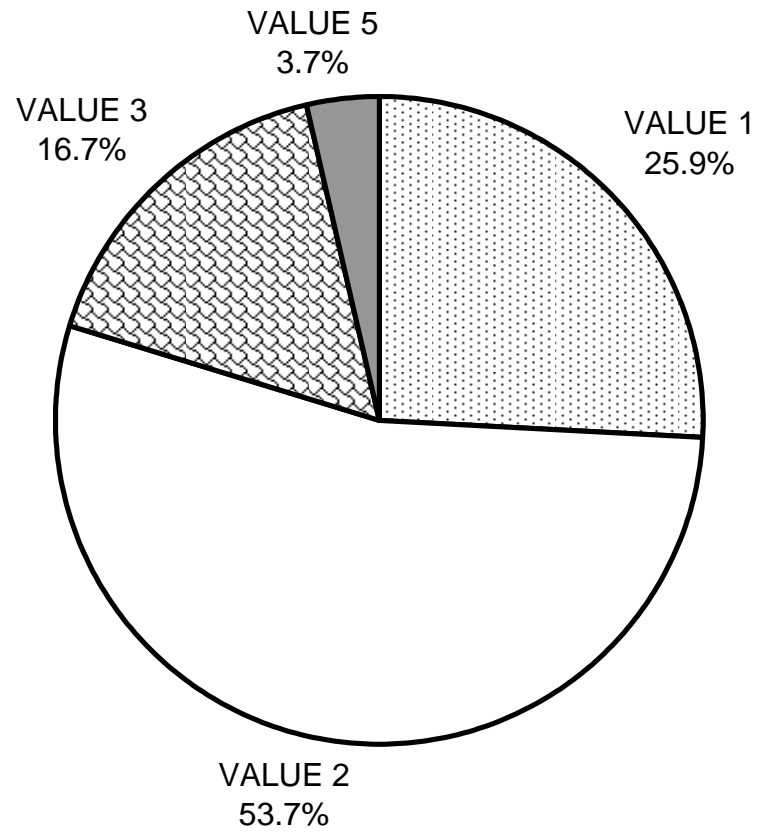


# KAISEN GULCH 2013 MAXIMUM DEPTH IN POOLS



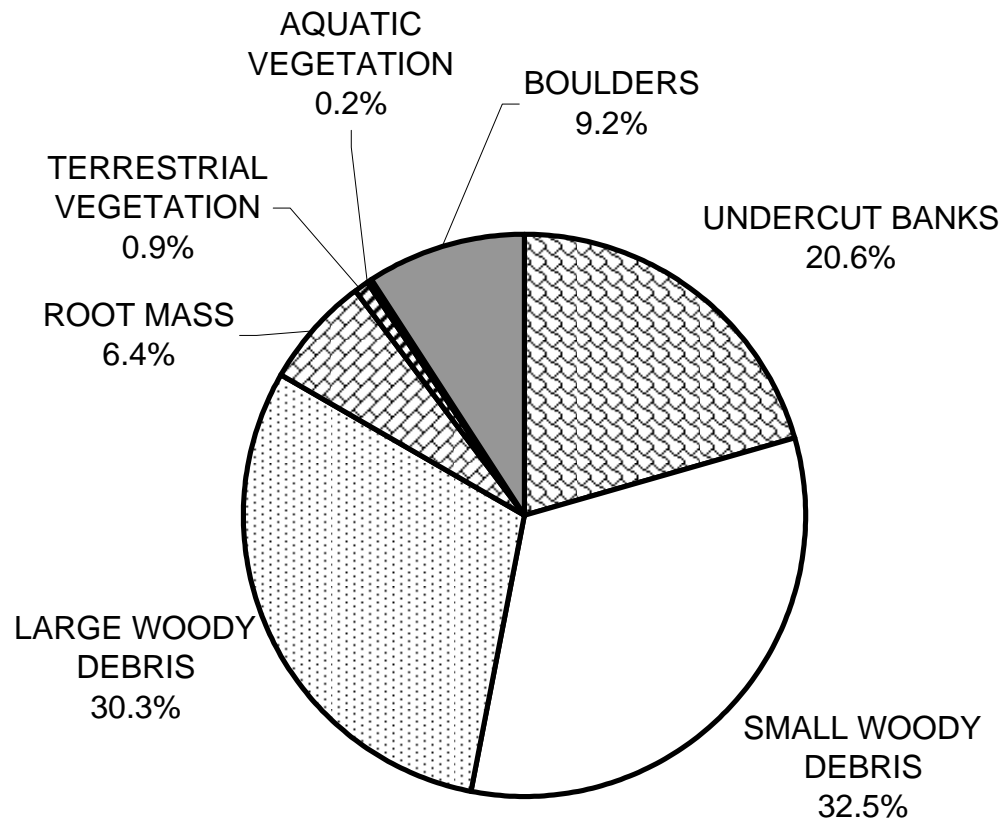
GRAPH 5

# KAISEN GULCH 2013 PERCENT EMBEDDEDNESS



GRAPH 6

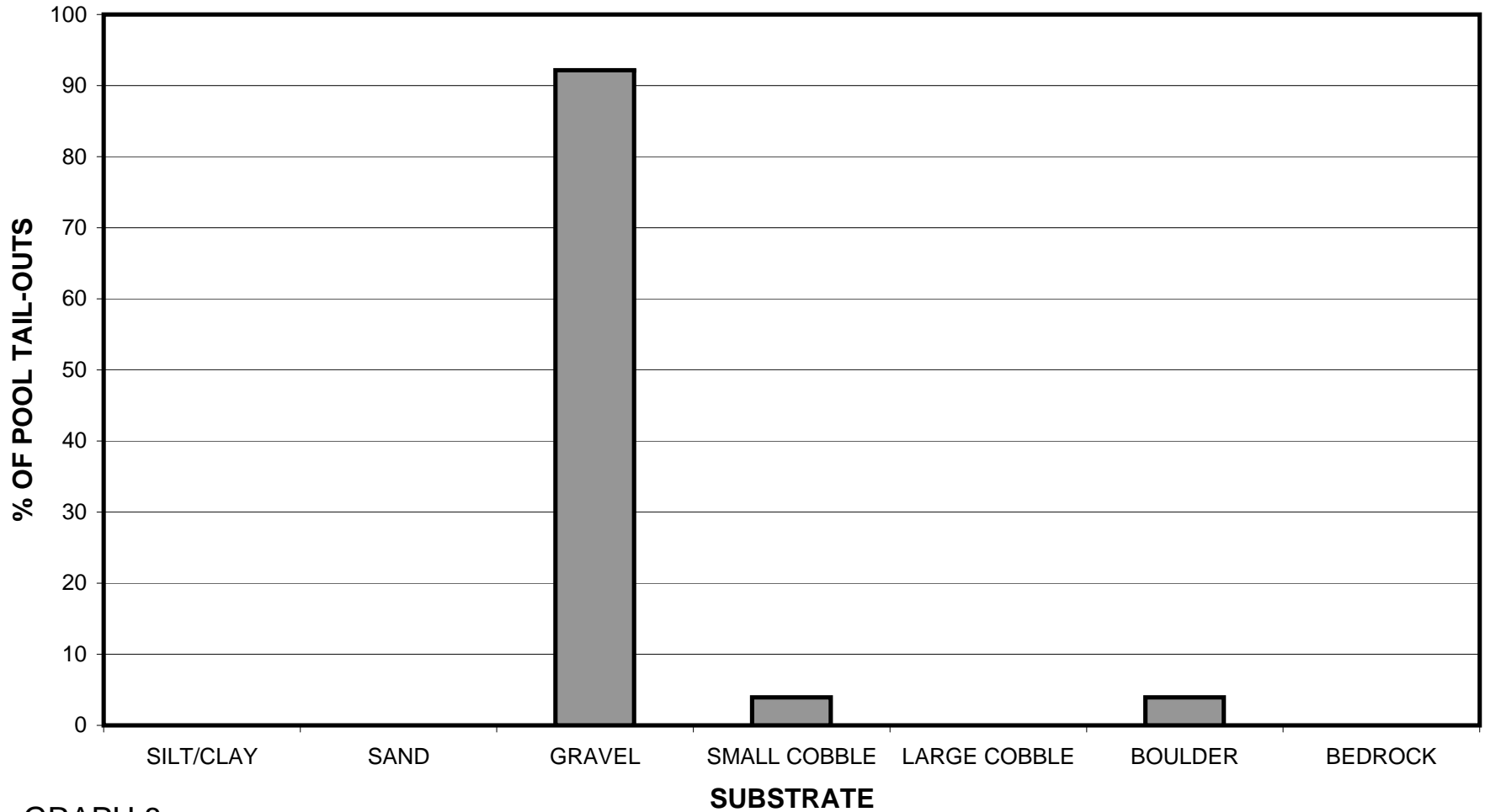
# KAISEN GULCH 2013 MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

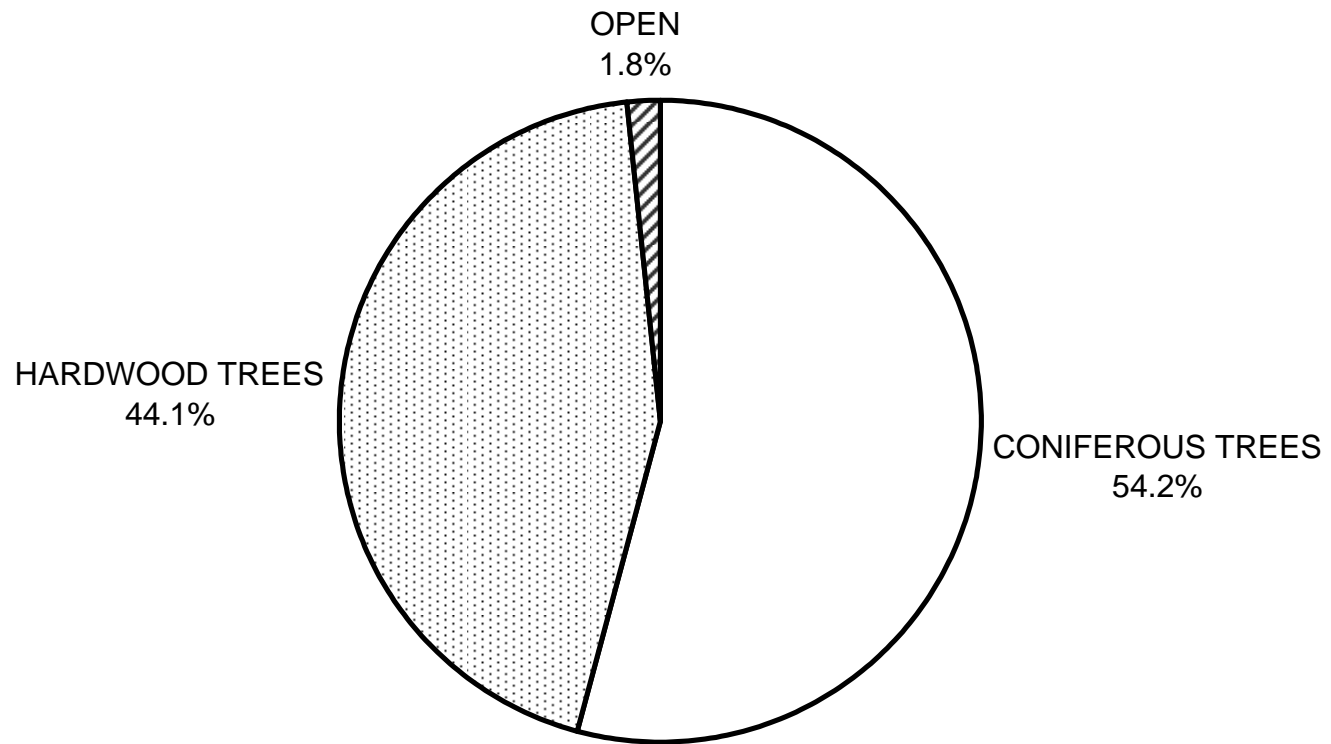
# KAISEN GULCH 2013

## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



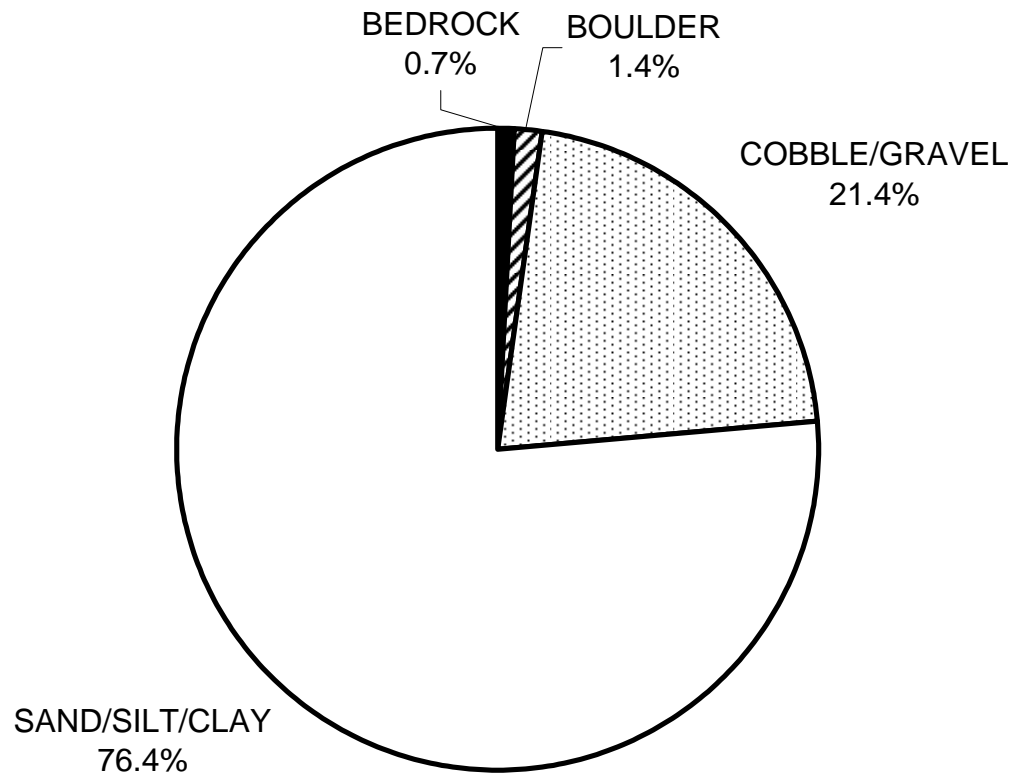
GRAPH 8

# KAISEN GULCH 2013 MEAN PERCENT CANOPY



GRAPH 9

# KAISEN GULCH 2013 DOMINANT BANK COMPOSITION IN SURVEY REACH



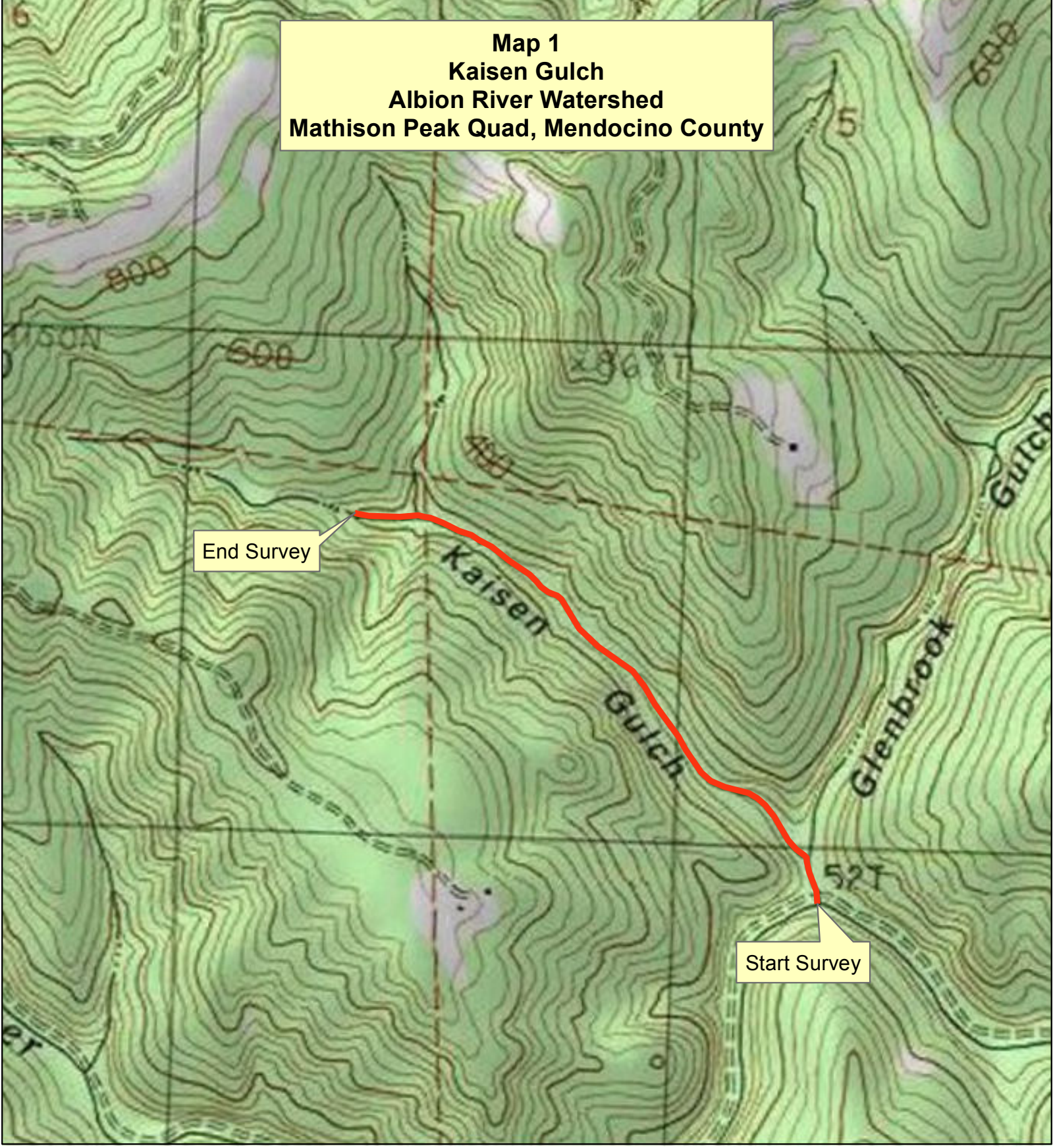
GRAPH 10

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



GRAPH 11

**Map 1  
Kaisen Gulch  
Albion River Watershed  
Mathison Peak Quad, Mendocino County**



End Survey

Start Survey

— Channel Type, G4

0 500 1,000 Feet

