

STREAM INVENTORY REPORT

“Walters Gulch”

INTRODUCTION

A stream inventory was conducted on June 12, 2008 on an unnamed tributary to Chadbourne Gulch commonly known and hereinafter referred to as Walters Gulch. The survey began at the confluence with Chadbourne Gulch and extended upstream 0.4 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Walters Gulch.

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

Walters Gulch is a tributary to Chadbourne Gulch, a tributary to the Pacific Ocean, located in Mendocino County, California. Walters Gulch's legal description at the confluence with Chadbourne Gulch is T20N R17W S08. Its location is 39.6124 north latitude and 123.7729 west longitude, LLID number 1237721396127. Walters Gulch is a first order stream and has approximately 0.9 miles of blue line stream according to the USGS Inglenook 7.5 minute quadrangle. Walters Gulch drains a watershed of approximately 0.4 square miles. Elevations range from about 50 feet at the mouth of the creek to 600 feet in the headwater areas. Mixed hardwood and conifer forest dominates the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via Highway 1.

METHODS

The habitat inventory conducted in Walters Gulch follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Pacific States Marine Fisheries Commission (PSMFC) Fisheries Technicians that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

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

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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. All pools except step-pools are fully sampled.

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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 Sample Creek 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.

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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". Sample Creek 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 Sample Creek, 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 unsuited 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 Sample Creek, 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 Sample Creek, 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

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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 Sample Creek, 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.

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 Game. 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

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- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Sample Creek 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 on June 12, 2008 was conducted by W. Holloway and D. Wright (PSMFC). The total length of the stream surveyed was 2,021 feet.

Stream flow was not measured on Walters Gulch.

Walters Gulch is a B3 channel type for 2,021 feet of the stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle-dominated channel with infrequently spaced pools, very stable plan and profile, stable banks, and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 58 to 66 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 39% pool units, 35% flatwater units, and 26% riffle units (Graph 1). Based on total length of Level II habitat types there were 63% flatwater units, 25% riffle units, and 12% 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, 35%; lateral scour pool - log enhanced units, 35%; and low gradient riffle units, 24% (Graph 3). Based on percent total length, step run units made up 63%, low gradient riffle units 24%, and lateral scour pool - log enhanced 10% units.

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A total of 18 pools were identified (Table 3). Scour pools were the most frequently encountered, at 89%, and comprised 80% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. None of the 18 pools had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, none had a value of 1 (0%); 2 had a value of 2 (11.1%); 10 had a value of 3 (55.6%); 6 had a value of 4 (33.3%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst.

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 70, flatwater habitat types had a mean shelter rating of 74, and pool habitats had a mean shelter rating of 83 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 86. Main channel pools had a mean shelter rating of 60 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Terrestrial vegetation is the dominant cover type in Walters Gulch. Graph 7 describes the pool cover in Walters Gulch. Large woody debris is the dominant pool cover type followed by terrestrial vegetation.

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 72% of the pool tail-outs. Small cobble was the next most dominant substrate type and occurred in 28% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Walters Gulch was 96%. Four percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 89% and 11%, respectively. Graph 9 describes the mean percent canopy in Walters Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 94%. The mean percent left bank vegetated was 92%. The dominant elements composing the structure of the stream banks consisted of 100% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 98% of the units surveyed. Additionally, 2% of the units surveyed had grass as the dominant vegetation type (Graph 11).

DISCUSSION

Walters Gulch is a B3 channel type for the entire 2,021 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: B3 channels are excellent for plunge weirs, boulder clusters and bank placed boulders, single and opposing wing-deflectors and log cover.

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The water temperatures recorded on June 12, 2008 ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 58 to 66 degrees Fahrenheit. To make any conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 63% of the total length of this survey, riffles 25%, and pools 12%. None of the 18 pools had a maximum residual depth greater than 2 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 channels width. Installing structures that will increase or deepen pool habitat is recommended

Two of the 18 pool tail-outs measured had embeddedness ratings of 1 or 2. Sixteen of the pool tail-outs had embeddedness ratings of 3 or 4. 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 Walters Gulch should be mapped and rated according to their potential sediment yields, and control measures should be taken.

All of the 18 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 was 83. The shelter rating in the flatwater habitats was 74. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by terrestrial vegetation in Walters Gulch. Large woody debris is the dominant cover type in pools followed by terrestrial vegetation. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 96%.

The percentage of right and left bank covered with vegetation was high at 94% and 92%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

- 1) Walters 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.

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- 3) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large woody debris. Adding high quality complexity with more woody cover in the pools is desirable.
- 5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 6) 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.

COMMENTS AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft.):	Habitat Unit #:	Comments:
0	0001.00	Start of survey at confluence with Chadbourne Gulch.
19	0002.00	ATV crossing, salmonid year-plus observed.
79	0003.00	Dense brush throughout unit.
133	0004.00	There are several bank failures in this unit. Channel has downcut.
263	0005.00	There are several bank failures in this unit. Channel has downcut.
371	0009.00	There are left bank failures in this unit.
441	0011.00	Salmonid young-of-the-year (YOY) observed in this unit.
461	0012.00	Right bank failures throughout unit. Non-active right bank landslide at end of the unit is 40' high x 50' long and has been revegetated.
631	0015.00	Right bank channel downcut and bank failures throughout unit.
700	0017.00	There are bank failures and undercutting in this unit.

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886	0020.00	Decommissioned bridge crossing 65' into unit.
976	0021.00	Salmonid YOY observed in this unit.
1052	0025.00	Gradient is beginning to increase and more boulders are present in the channel.
1235	0031.00	Large woody debris (LWD) forms 4.5' jump with no pool below. This is a possible barrier for juveniles.
1325	0032.00	Bank failures in unit.
1387	0033.00	Bank failures throughout unit. There is active erosion on the left bank along with undercutting.
1516	0035.00	Revegetated landslide on left bank is 70' high and 60' long.
1533	0036.00	Landslide continues into this unit. There are bank failures in unit.
1602	0038.00	Bank failures throughout unit.
1673	0040.00	Bank failures in this unit. Redwood has fallen into upper end of unit.
1719	0042.00	Redwood in creek and dense vegetation in this unit.
2021	0046.00	End of survey. Gradient increases, channel is smaller and no fish were observed above a possible barrier which may be modified to allow fish passage.

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: 1237721396127

LLID: 1237721396127 Drainage: Rockport

Survey Dates: 6/12/2008 to 6/12/2008

Confluence Location: Quad: INGLENOOK Legal Description: T20NR17WS08 Latitude: 39:36:46.0N Longitude: 123:46:20.0

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
16	7	FLATWATER	34.8	80	1283	63.5	5.1	0.3	0.7	234	3748	86	1384		74
18	18	POOL	39.1	13	239	11.8	6.7	0.7	1.1	85	1533	76	1362	60	83
12	1	RIFFLE	26.1	42	499	24.7	7.0	0.2	0.3	56	672	11	134		70
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
46	26				2021					5953			2880		

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

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 (%)
16	1	LGR	32.0	24	382	32.1	3	0.1	0.4	198	3168	16	253		0	85
5	1	HGR	10.0	36	178	15.0	3	0.1	0.6	20	99	2	10		150	98
1	0	CAS	2.0	4	4	0.3										
8	1	RUN	16.0	17	138	11.6	5	0.5	0.7	95	763	48	382		30	96
5	0	SRN	10.0	38	192	16.1										87
10	10	MCP	20.0	17	173	14.6	5	0.8	4.9	97	965	98	982	72	27	91
3	3	LSL	6.0	14	42	3.5	7	0.6	1.25	101	303	78	235	61	82	89
1	0	DRY	2.0	39	39	3.3										
1	0	CUL	2.0	41	41	3.4										

Total Units
50

Total Units Fully Measured
16

Total Length (ft.)
1189

Total Area (sq.ft.)
5299

Total Volume (cu.ft.)
1862

Table 3 - Summary of Pool Types

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

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
10	10	MAIN	77	17	173	80	5.4	0.8	97	965	72	651	27
3	3	SCOUR	23	14	42	20	7.2	0.6	101	303	61	184	82

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
13	13	215	1269	835

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

Stream Name: 1240251408144 LLID: 1240251408144 Drainage: Eureka Plain
 Survey Dates: 7/28/2008 to 7/29/2008
 Confluence Location: Quad: ARCATA SOUTH Legal Description: T05NR01ES14 Latitude: 40:48:52.0N Longitude: 124:01:30.0W

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
10	MCP	77	3	30	5	50	1	10	0	0	1	10
3	LSL	23	1	33	2	67	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
13	4	31	7	54	1	8	0	0	1	8

Mean Maximum Residual Pool Depth (ft.): 1.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Dry Units: 1

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

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
16	1	LGR	0	60	0	0	40	0	0	0	0
5	1	HGR	0	20	0	0	10	0	0	70	0
1	0	CAS									
22	2	TOTAL RIFFLE	0	40	0	0	25	0	0	35	0
8	1	RUN	90	10	0	0	0	0	0	0	0
5	0	SRN									
13	1	TOTAL FLAT	90	10	0	0	0	0	0	0	0
10	10	MCP	15	13	18	8	8	0	0	40	0
3	3	LSL	45	15	20	0	15	0	0	5	0
13	13	TOTAL POOL	20	13	18	6	9	0	0	34	0
1	0	CUL									
50	16	TOTAL	22	16	15	5	11	0	0	32	0

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Dry Units: 1

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

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
16	0	LGR	0	0	0	0	0	0	0
5	1	HGR	0	0	0	0	100	0	0
1	0	CAS	0	0	0	0	0	0	0
8	1	RUN	0	0	100	0	0	0	0
5	0	SRN	0	0	0	0	0	0	0
10	9	MCP	0	11	44	0	11	33	0
3	3	LSL	0	0	67	33	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
91	74	26	0	96	96

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: 1240251408144 LLID: 1240251408144 Drainage: Eureka Plain
 Survey Dates: 7/28/2008 to 7/29/2008 Survey Length (ft.): 1189 Main Channel (ft.): 1132 Side Channel (ft.): 57
 Confluence Location: Quad: ARCATA SOUTH Legal Description: T05NR01ES14 Latitude: 40:48:52.0N Longitude: 124:01:30.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type:	Canopy Density (%): 90.8	Pools by Stream Length (%): 18.1
Reach Length (ft.): 1132	Coniferous Component (%): 74.2	Pool Frequency (%): 26.0
Riffle/Flatwater Mean Width (ft.): 3.8	Hardwood Component (%): 25.8	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 85
Range (ft.): 9 to 13	Vegetative Cover (%): 95.9	2 to 2.9 Feet Deep: 8
Mean (ft.): 11	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 8
Base Flow (cfs.): 0.0	Occurrence of LWD (%): 14	Mean Max Residual Pool Depth (ft.): 1.5
Water (F): 52 - 56 Air (F): 50 - 64	LWD per 100 ft.:	Mean Pool Shelter Rating: 39
Dry Channel (ft): 39	Riffles: 2	
	Pools: 5	
	Flat: 3	
Pool Tail Substrate (%): Silt/Clay: 15 Sand: 8 Gravel: 54 Sm Cobble: 23 Lg Cobble: 0 Boulder: 0 Bedrock: 0		
Embeddedness Values (%): 1. 38.5 2. 46.2 3. 7.7 4. 0.0 5. 7.7		

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Confluence Location: Quad: ARCATA SOUTH

Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

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	2	5	21.9
Cobble / Gravel	9	4	40.6
Sand / Silt / Clay	5	7	37.5

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	2	7	28.1
Brush	1	4	15.6
Hardwood Trees	5	1	18.8
Coniferous Trees	8	4	37.5
No Vegetation	0	0	0.0

Total Stream Cobble Embeddedness Values:

2

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

StreamName: 1240251408144

LLID: 1240251408144

Drainage: Eureka Plain

Survey Dates: 7/28/2008 to 7/29/2008

Confluence Location: Quad: ARCATA SOUTH

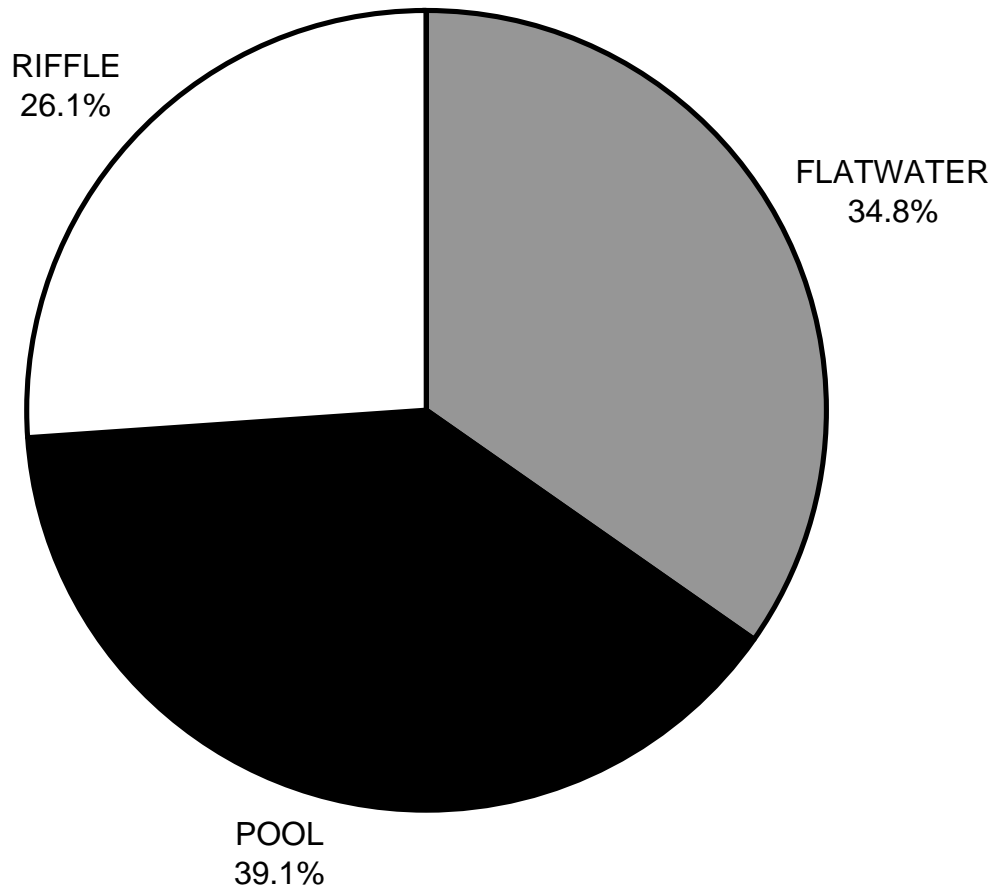
Legal Description: T05NR01ES14

Latitude: 40:48:52.0N

Longitude: 124:01:30.0W

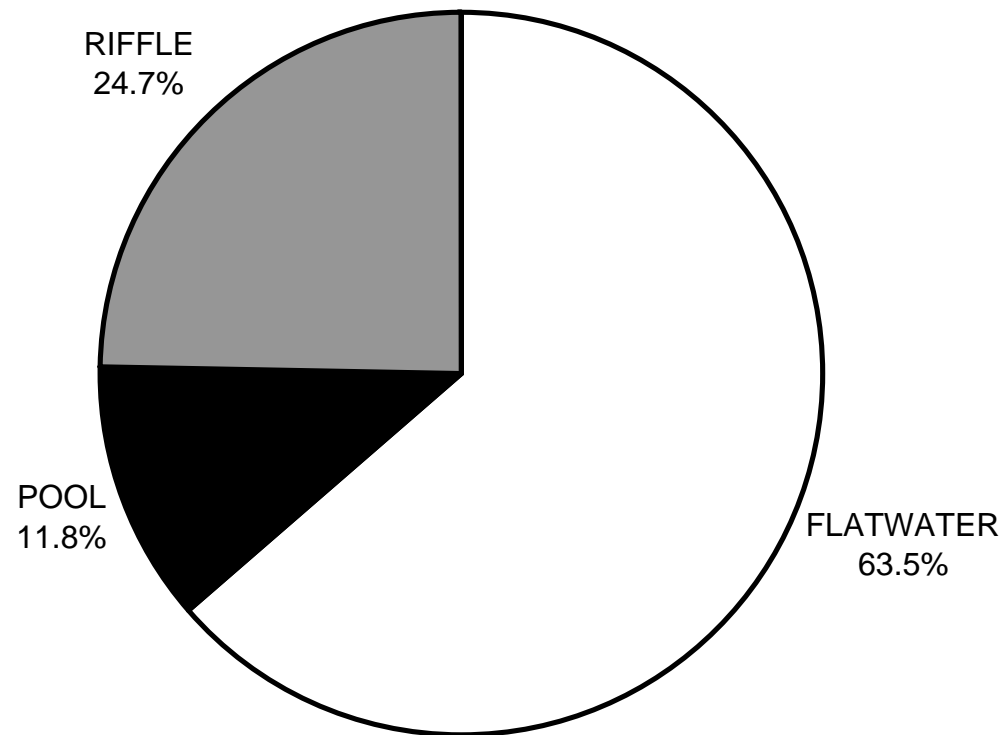
	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	90	20
SMALL WOODY DEBRIS (%)	40	10	13
LARGE WOODY DEBRIS (%)	0	0	18
ROOT MASS (%)	0	0	6
TERRESTRIAL VEGETATION (%)	25	0	9
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	0
BOULDERS (%)	35	0	34
BEDROCK LEDGES (%)	0	0	0

1237721396127 2008
HABITAT TYPES BY PERCENT OCCURRENCE



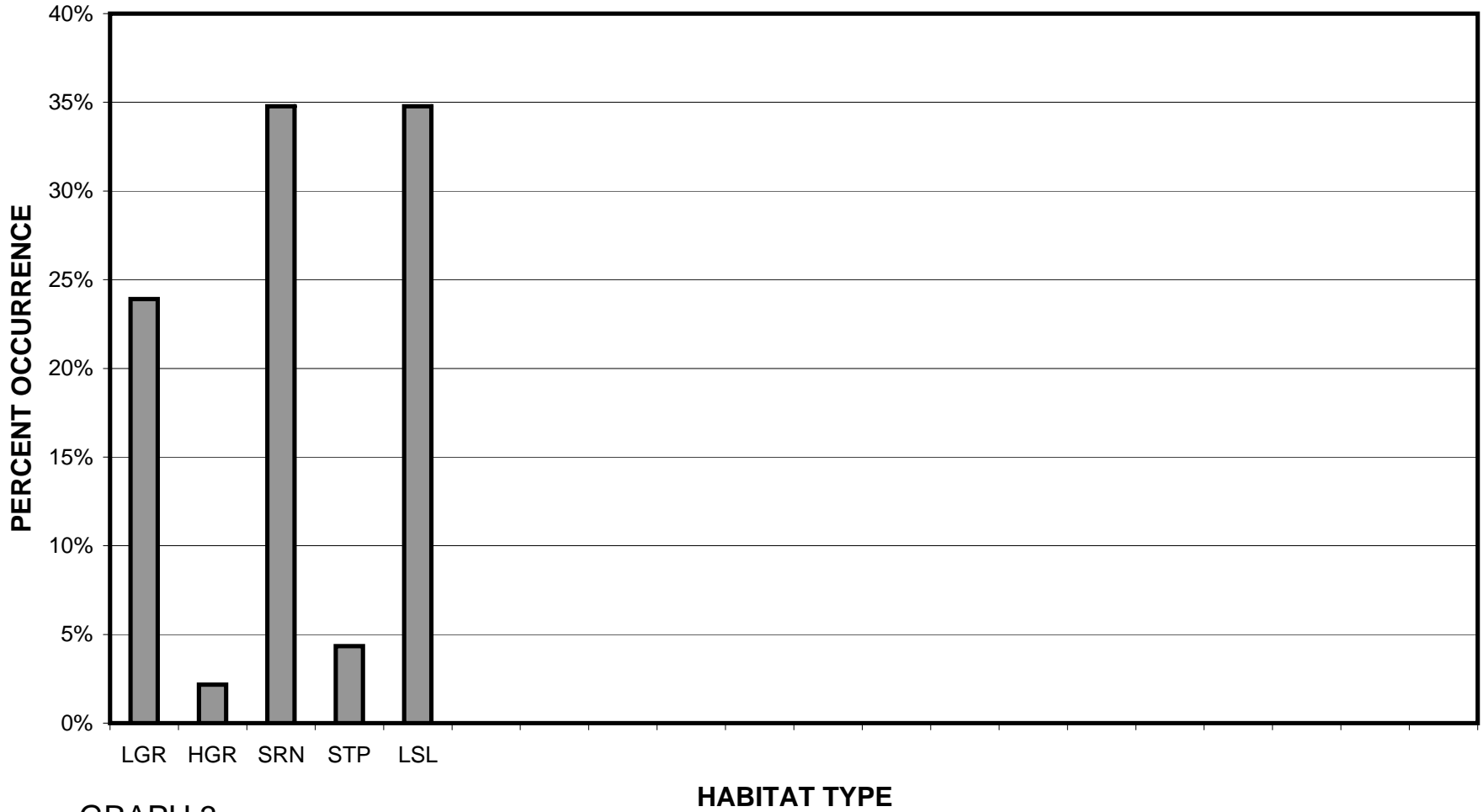
GRAPH 1

1237721396127 2008
HABITAT TYPES BY PERCENT TOTAL LENGTH



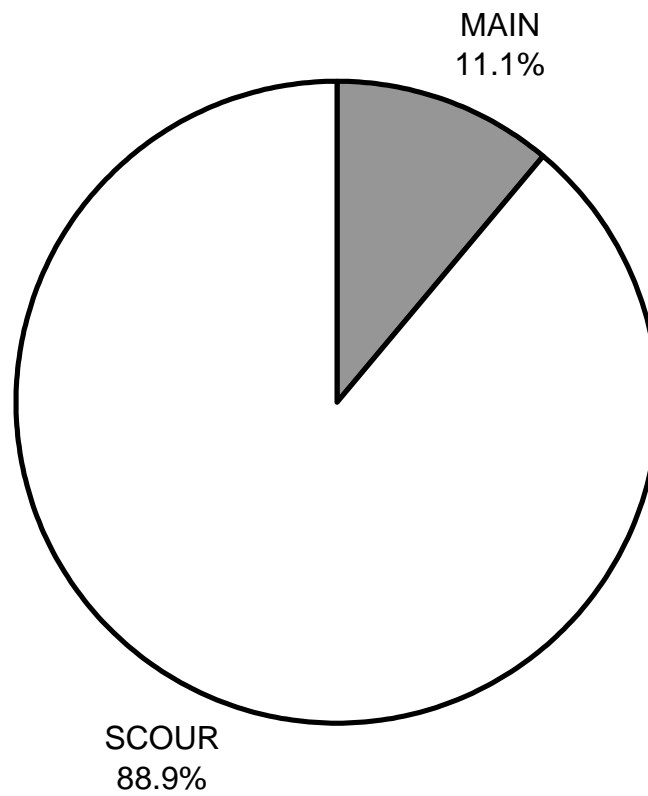
GRAPH 2

1237721396127 2008
HABITAT TYPES BY PERCENT OCCURRENCE



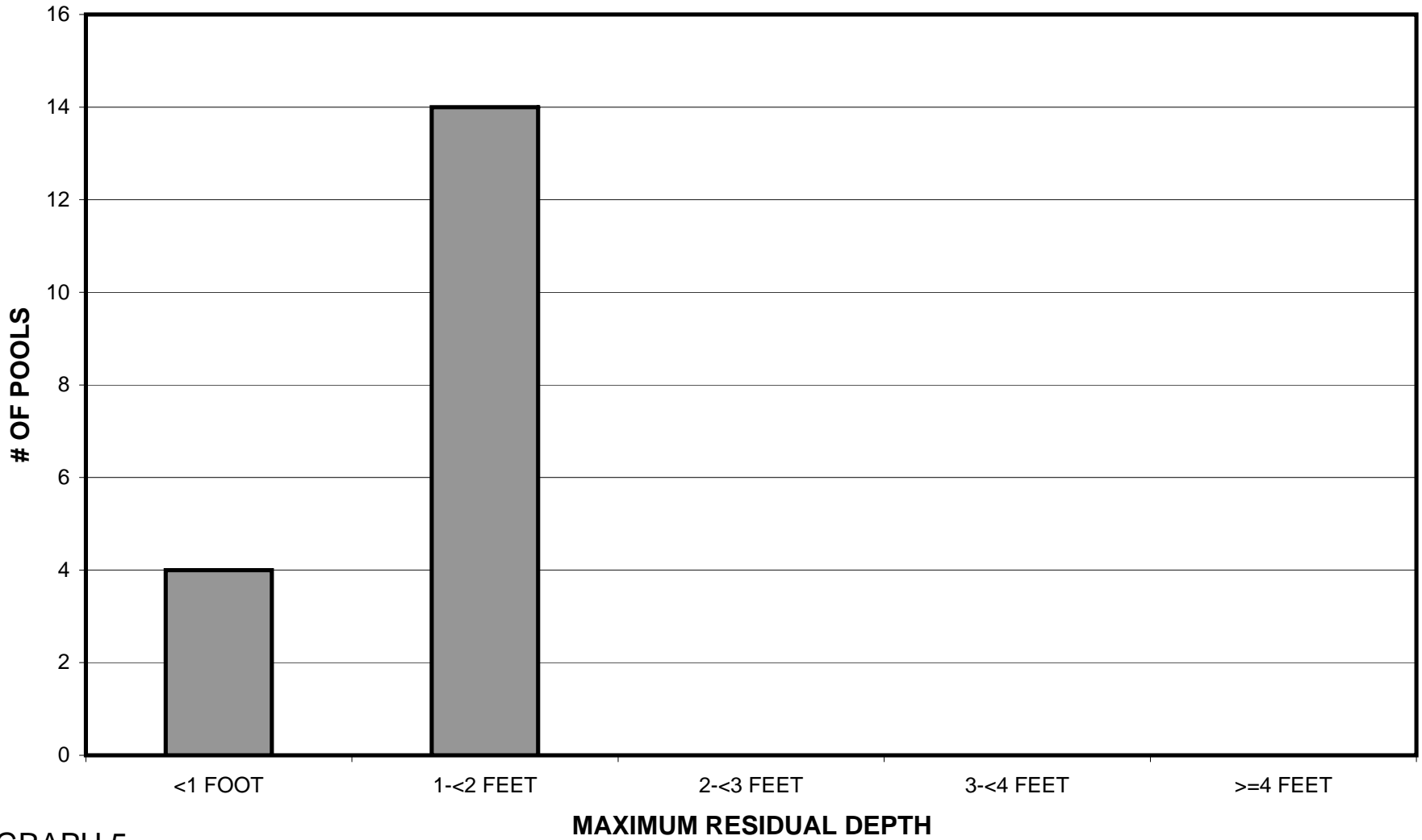
GRAPH 3

1237721396127 2008
POOL TYPES BY PERCENT OCCURRENCE



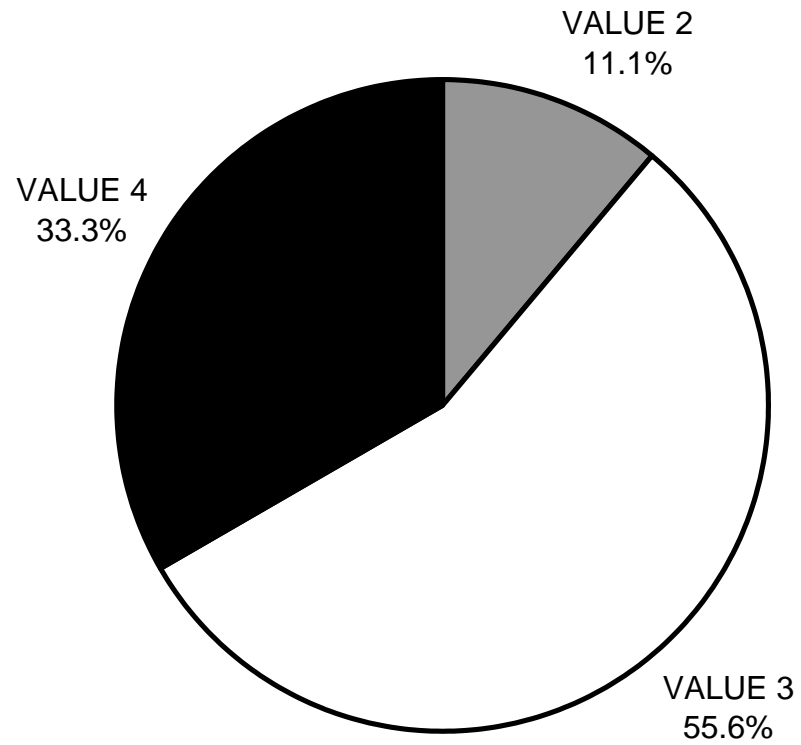
GRAPH 4

1237721396127 2008
MAXIMUM DEPTH IN POOLS



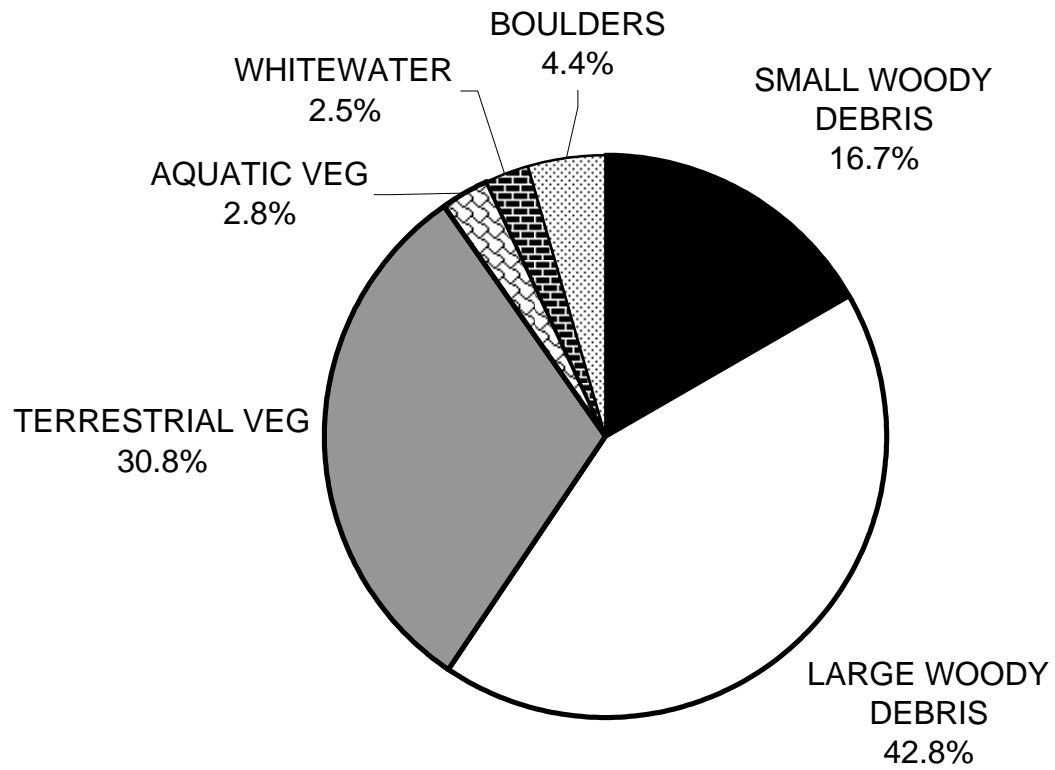
GRAPH 5

1237721396127 2008
PERCENT EMBEDDEDNESS



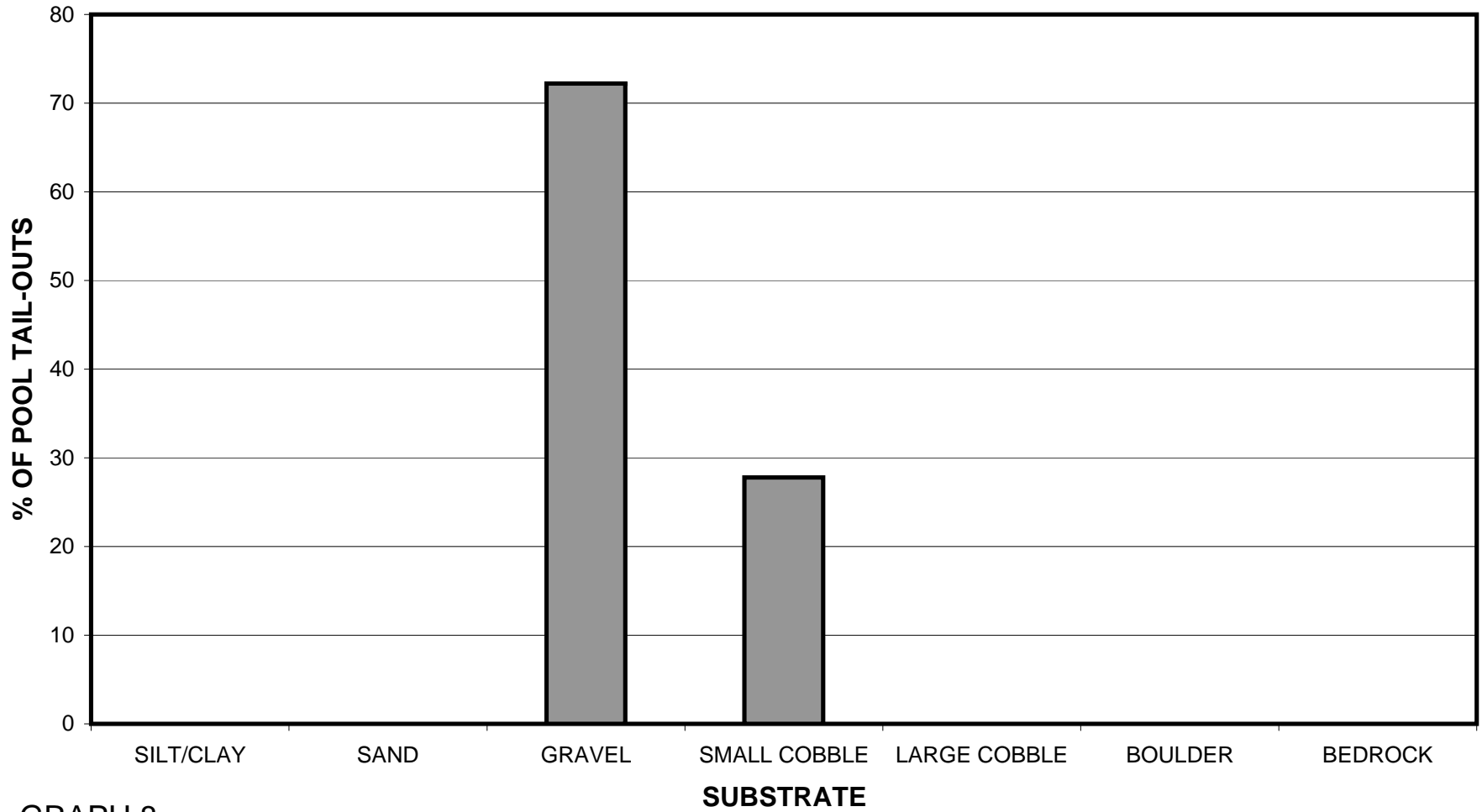
GRAPH 6

1237721396127 2008
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

1237721396127 2008
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



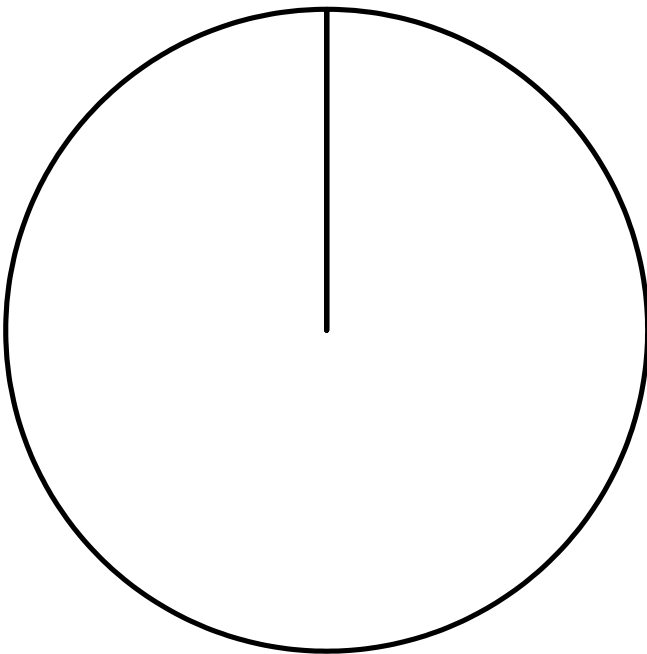
GRAPH 8

1237721396127 2008
MEAN PERCENT CANOPY



GRAPH 9

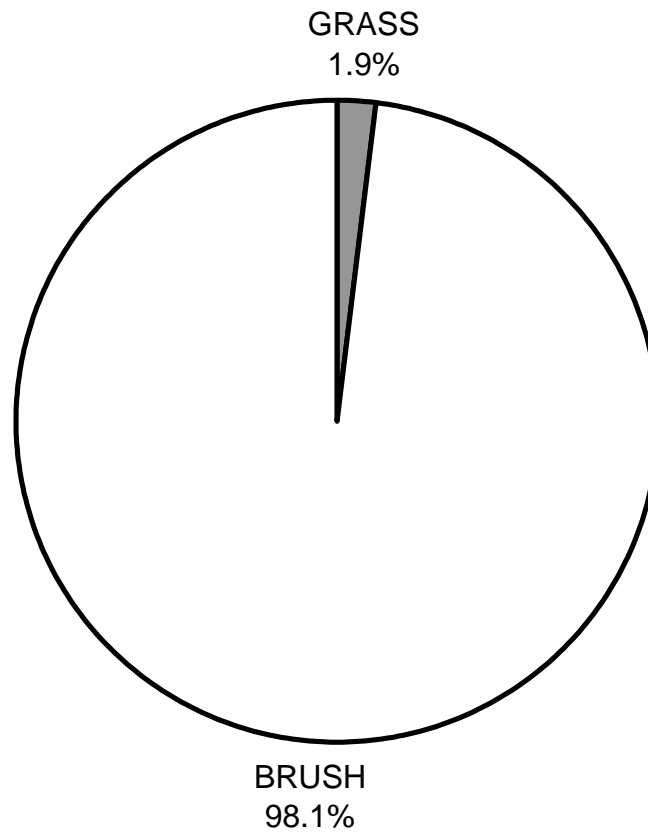
1237721396127 2008
DOMINANT BANK COMPOSITION IN SURVEY REACH



SAND/SILT/CLAY
100.0%

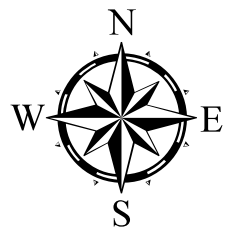
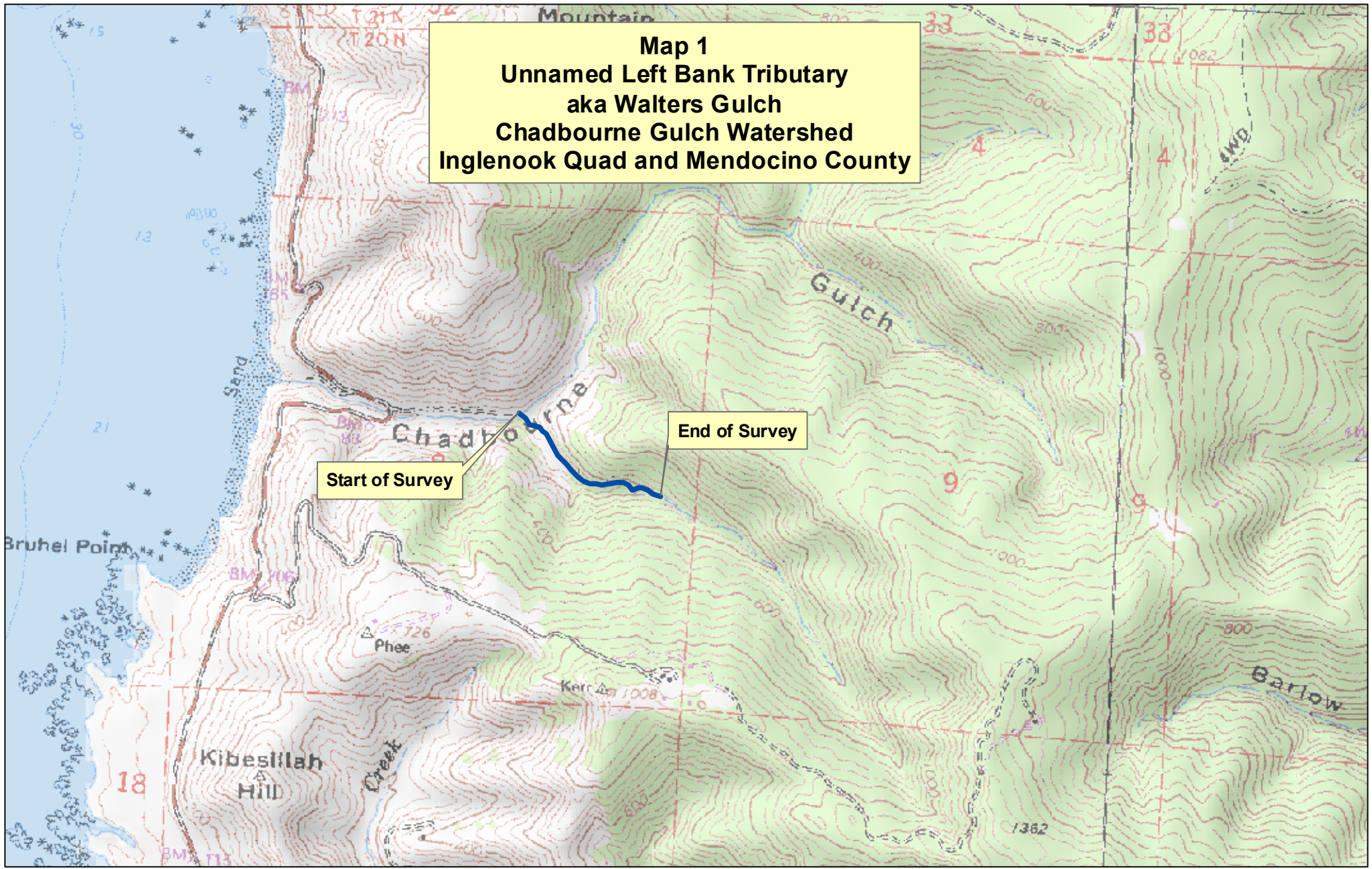
GRAPH 10

1237721396127 2008
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Map 1
Unnamed Left Bank Tributary
aka Walters Gulch
Chadbourne Gulch Watershed
Inglenook Quad and Mendocino County



Legend

 Walters Gulch Survey 2008

