

# STREAM INVENTORY REPORT

## Julias Creek

### INTRODUCTION

A stream inventory was conducted June 6, 2006 to July 12, 2006 on Julias Creek. The survey began at the confluence with South Fork Usal Creek and extended upstream 1.4 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Julias Creek.

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

Julias Creek is a tributary to South Fork Usal Creek, tributary to Usal Creek, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Julias Creek's legal description at the confluence with South Fork Usal Creek is T23N R18W. Its location is 39.8352 north latitude and 123.8063 west longitude, LLID number 1238063398354. Julias Creek is a first order stream and has approximately 1.1 miles of blue line stream according to the USGS Hales Grove 7.5 minute quadrangle. Julias Creek drains a watershed of approximately 2.8 square miles. Elevations range from about 155 feet at the mouth of the creek to 1,800 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 private road from Highway 1.

### METHODS

The habitat inventory conducted in Julias Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The Watershed Stewards Project/AmeriCorps (WSP) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and 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 embeddedness. Habitat unit types encountered for the first time are measured for all the

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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 Julias 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.

#### 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". Julias 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 Julias Creek, embeddedness was

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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 Julias 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 Julias 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 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 Julias 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.

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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.

## **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 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
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Julias 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

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- 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 June 6, 2006 to July 12, 2006, was conducted by L. Schepman and M. Lee (WSP). The total length of the stream surveyed was 7,604 feet.

Stream flow was estimated to be 0.8 cfs during the survey period.

Julias Creek is an F4 channel type for 7,604 feet of the entire stream surveyed. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 61 degrees Fahrenheit. Air temperatures ranged from 55 to 71 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 45% pool units, 41% riffle units, and 14% flatwater units (Graph 1). Based on total length of Level II habitat types there were 65% riffle units, 18% flatwater units, and 17% pool units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle units, 34%; plunge pool units, 12%; and mid-channel pool units, 11% (Graph 3). Based on percent total length, low gradient riffle units made up 62%, step run units 12%, and run units 5%.

A total of 55 pools were identified (Table 3). Scour pools were the most frequently encountered at 65% (Graph 4), and comprised 62% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eighteen of the 55 pools (33%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 55 pool tail-outs measured, 9 had a value of 1 (16.4%); 29 had a value of 2 (52.7%); 17 had a value of 3 (30.9%) (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 unsuited for spawning due to inappropriate substrate such as bedrock, log sills, boulders, or other considerations.

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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 32, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 51 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 58. Main channel pools had a mean shelter rating of 37 and backwater pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Julias Creek. Graph 7 describes the pool cover in Julias Creek. Large woody debris is the dominant pool cover type followed by root mass.

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 75% of the pool tail-outs. Small cobble 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 Julias Creek was 97%. Three percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 74% and 26%, respectively. Graph 9 describes the mean percent canopy in Julias Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 95%. The mean percent left bank vegetated was 90%. The dominant elements composing the structure of the stream banks consisted of 89% sand/silt/clay, 6% cobble/gravel, and 5% bedrock (Graph 10). Hardwood trees were the dominant vegetation type observed in 52.4% of the units surveyed. Additionally, 33.1% of the units surveyed had coniferous trees as the dominant vegetation type (Graph 11). Hardwood trees were the dominant vegetation type observed in 52.4% of the units surveyed. Additionally, 33.1% of the units surveyed had coniferous trees as the dominant vegetation type (Graph 11).

## **DISCUSSION**

Julias Creek is an F4 channel type for 7,604 feet of the stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperatures recorded on the survey days June 6, 2006 to July 12, 2006, ranged from 54 to 61 degrees Fahrenheit. Air temperatures ranged from 55 to 71 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 18% of the total length of this survey, riffles 65%, and pools 17%. Eighteen of the 55 (33%) pools had a maximum residual depth greater than 2 feet. In

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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 structure that will increase or deepen pool habitat is recommended.

Thirty-eight of the 55 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen 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 Julias Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Fifty-two of the 53 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 51. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by large woody debris in Julias Creek. Large woody debris is the dominant cover type in pools followed by root mass. 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 97%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 95% and 90%, 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) Julias Creek 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) 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.
- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from large wood. Adding high quality complexity with woody cover in the pools is desirable.

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### 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 South Fork Usal Creek. The first habitat unit not fully surveyed due to being in the influence of South Fork Usal Creek.
297	0010.00	Juvenile salmonids observed throughout the first 10 habitat units.
748	0021.00	Right bank tributary.
939	0024.00	Right bank tributary.
1342	0027.00	Log debris accumulation (LDA).
1354	0028.00	LDA creating a step pool with a 3.7 foot jump.
1537	0030.00	Young-of-the-year salmonids present.
1813	0035.00	Left bank tributary.
2306	0036.00	Bank erosion associated with a road failure. Erosion is 50' wide x 50' tall x 10' deep.
2306	0036.00	LDA with associated road failure.
2578	0043.00	LDA.
2726	0047.00	Left bank tributary.
3021	0050.00	LDA
3368	0053.00	LDA
3469	0056.00	LDA
4437	0069.00	Very large Humboldt crossing.
4561	0070.00	Right bank tributary.



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4792	0072.00	Left bank tributary.
4994	0076.00	Salmonid present.
5952	0095.00	Unnamed tributary on right bank enters main stem at end of HU 095.
6486	0106.00	Bank erosion 30' long x 20' wide x 7' high.
6540	0108.00	LDA at 128' into HU 108 and is 20' long x 10' wide x 6' high. Height of jump is 5.5'.
6753	0109.00	LDA is 30' long x 18' wide x 10' high and forms step pools.
7386	0120.00	LDA
7604	0122.00	End of 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.

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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:   Julias CreekLLID: 1238063398354   Drainage:   Rockport  
Survey Dates:   6/6/2006 to 7/12/2006  
Confluence Location:   Quad:   HALES GROVE       Legal Description:   T000R000S00   Latitude: 39:50:07.0N   Longitude: 123:48:23.0W

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
17	2	FLATWATER	13.9	80	1355	17.8	8.5	0.6	1.1	404	6870	240	4074		8
55	55	POOL	45.1	23	1289	17.0	11.5	0.8	1.8	263	14439	320	17621	208	51
50	5	RIFFLE	41.0	99	4960	65.2	11.3	0.6	1.1	1476	73825	1101	55056		32
Total Units	Total Units Fully Measured				Total Length (ft.)					Total Area (sq.ft.)			Total Volume (cu.ft.)		
122	62				7604					95133			76751		

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

Stream Name: Julius Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

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 (%)
41	3	LGR	33.6	114	4692	61.7	10	0.7	1.8	2187	89653	1726	70746		37	97
9	2	HGR	7.4	30	268	3.5	14	0.4	0.7	411	3701	165	1481		25	97
1	0	GLD	0.8	19	19	0.2										
9	1	RUN	7.4	43	390	5.1	6	0.5	1	432	3888	216	1944		10	98
7	1	SRN	5.7	135	946	12.4	11	0.7	1.2	376	2633	263	1843		5	100
14	14	MCP	11.5	22	301	4.0	11	0.8	3.4	249	3491	307	4302	218	25	97
4	4	STP	3.3	45	179	2.4	13	0.7	2.6	532	2128	669	2676	396	81	98
1	1	CRP	0.8	36	36	0.5	8	0.7	2	299	299	329	329	209	30	90
12	12	LSL	9.8	22	259	3.4	12	0.9	2.9	251	3017	320	3840	220	88	98
4	4	LSR	3.3	25	99	1.3	10	0.9	2	265	1059	348	1394	251	30	98
2	2	LSBk	1.6	26	52	0.7	7	0.7	1.7	175	351	210	421	114	45	98
2	2	LSBo	1.6	16	32	0.4	10	1.0	3	157	314	235	471	152	20	99
15	15	PLP	12.3	21	319	4.2	12	0.7	3.4	235	3529	262	3936	149	51	98
1	1	DPL	0.8	12	12	0.2	21	0.7	1.7	252	252	252	252	176	20	80

Total Units  
122

Total Units Fully Measured  
62

Total Length (ft.)  
7604

Total Area (sq.ft.)  
114314

Total Volume (cu.ft.)  
93635

**Table 3 - Summary of Pool Types**

Stream Name: Julias Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

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
18	18	MAIN	33	27	480	37	11.7	0.8	312	5620	260	4415	37
36	36	SCOUR	65	22	797	62	11.1	0.8	238	8567	184	6624	58
1	1	BACKWATER	2	12	12	1	21.0	0.7	252	252	176	176	20
Total Units	Total Units Fully Measured				Total Length (ft.)				Total Area (sq.ft.)			Total Volume (cu.ft.)	
55	55				1289				14439			11215	

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

Stream Name: Julius Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

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
14	MCP	25	1	7	9	64	3	21	1	7	0	0
4	STP	7	0	0	2	50	2	50	0	0	0	0
1	CRP	2	0	0	0	0	1	100	0	0	0	0
12	LSL	22	1	8	5	42	6	50	0	0	0	0
4	LSR	7	1	25	2	50	1	25	0	0	0	0
2	LSBk	4	0	0	2	100	0	0	0	0	0	0
2	LSBo	4	0	0	1	50	0	0	1	50	0	0
15	PLP	27	0	0	12	80	2	13	1	7	0	0
1	DPL	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
55			3	5	34	62	15	27	3	5	0	0

Mean Maximum Residual Pool Depth (ft.): 1.8

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

Stream Name: Julius Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Dry Units: 0

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

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
41	3	LGR	0	35	43	3	0	0	3	15	0
9	2	HGR	0	48	20	0	0	0	3	30	0
50	5	TOTAL RIFFLE	0	40	34	2	0	0	3	21	0
1	0	GLD									
9	1	RUN	60	0	0	0	40	0	0	0	0
7	1	SRN	0	0	0	0	0	0	100	0	0
17	2	TOTAL FLAT	30	0	0	0	20	0	50	0	0
14	14	MCP	10	8	36	21	0	0	2	22	0
4	4	STP	1	28	44	10	0	0	5	13	0
1	1	CRP	90	0	0	5	5	0	0	0	0
12	12	LSL	15	15	48	15	5	0	0	1	0
4	4	LSR	34	5	5	46	8	0	0	3	0
2	2	LSBk	0	0	0	100	0	0	0	0	0
2	2	LSBo	38	0	0	15	0	0	3	45	0
15	15	PLP	11	16	59	4	1	0	6	3	0
1	1	DPL	0	50	50	0	0	0	0	0	0
55	55	TOTAL POOL	15	13	41	17	2	0	3	10	0
122	62	TOTAL	14	15	39	15	3	0	4	10	0

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

Stream Name: Julias Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Dry Units: 0

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

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
41	3	LGR	0	0	67	33	0	0	0
9	2	HGR	0	0	50	50	0	0	0
1	0	GLD	0	0	0	0	0	0	0
9	1	RUN	0	0	100	0	0	0	0
7	1	SRN	0	0	0	0	100	0	0
14	14	MCP	0	71	14	7	0	7	0
4	4	STP	0	25	50	25	0	0	0
1	1	CRP	0	100	0	0	0	0	0
12	12	LSL	0	50	33	17	0	0	0
4	4	LSR	0	50	50	0	0	0	0
2	2	LSBk	0	0	100	0	0	0	0
2	2	LSBo	0	50	50	0	0	0	0
15	15	PLP	0	53	47	0	0	0	0
1	1	DPL	0	0	100	0	0	0	0



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

Stream Name: Julias Creek LLID: 1238063398354 Drainage: Rockport  
Survey Dates: 6/6/2006 to 7/12/2006  
Confluence Location: Quad: HALES GROVE Legal Description: T000R000S00 Latitude: 39:50:07.0N Longitude: 123:48:23.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
97	26	74	0	95	90

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.

Stream Name:	Julius Creek	LLID:	1238063398354	Drainage:	Rockport
Survey Dates:	6/6/2006 to 7/12/2006	Survey Length (ft.):	7604	Main Channel (ft.):	7604
				Side Channel (ft.):	0
Confluence Location:	Quad: HALES GROVE	Legal Description:	T000R000S00	Latitude:	39:50:07.0N
				Longitude:	123:48:23.0W

<b>STREAM REACH: 1</b>									
Channel Type: F4			Canopy Density (%): 97.4				Pools by Stream Length (%): 17.0		
Reach Length (ft.): 7604			Coniferous Component (%): 25.7				Pool Frequency (%): 45.1		
Riffle/Flatwater Mean Width (ft.): 10.5			Hardwood Component (%): 74.3				Residual Pool Depth (%):		
BFW:			Dominant Bank Vegetation: Hardwood Trees				< 2 Feet Deep: 67		
Range (ft.): 12 to 29			Vegetative Cover (%): 92.2				2 to 2.9 Feet Deep: 27		
Mean (ft.): 20			Dominant Shelter: Large Woody Debris				3 to 3.9 Feet Deep: 5		
Std. Dev.: 5			Dominant Bank Substrate Type: Sand/Silt/Clay				>= 4 Feet Deep: 0		
Base Flow (cfs.): 0.8			Occurrence of LWD (%): 38				Mean Max Residual Pool Depth (ft.): 1.8		
Water (F): 54 - 61			Air (F): 55 - 71				Mean Pool Shelter Rating: 51		
Dry Channel (ft): 0			LWD per 100 ft.:						
			Riffles: 2						
			Pools: 19						
			Flat: 0						
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 75 Sm Cobble: 23 Lg Cobble: 0 Boulder: 2 Bedrock: 0									
Embeddedness Values (%): 1. 16.4 2. 52.7 3. 30.9 4. 0.0 5. 0.0									

**Table 9 - Mean Percentage of Dominant Substrate and Vegetation**

Stream Name: Julius Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

Latitude: 39:50:07.0N

Longitude: 123:48:23.0W

**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	6	4.8
Boulder	0	0	0.0
Cobble / Gravel	4	4	6.5
Sand / Silt / Clay	58	52	88.7

**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	5	11	12.9
Hardwood Trees	38	27	52.4
Coniferous Trees	19	22	33.1
No Vegetation	0	2	1.6

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: Julius Creek

LLID: 1238063398354

Drainage: Rockport

Survey Dates: 6/6/2006 to 7/12/2006

Confluence Location: Quad: HALES GROVE

Legal Description: T000R000S00

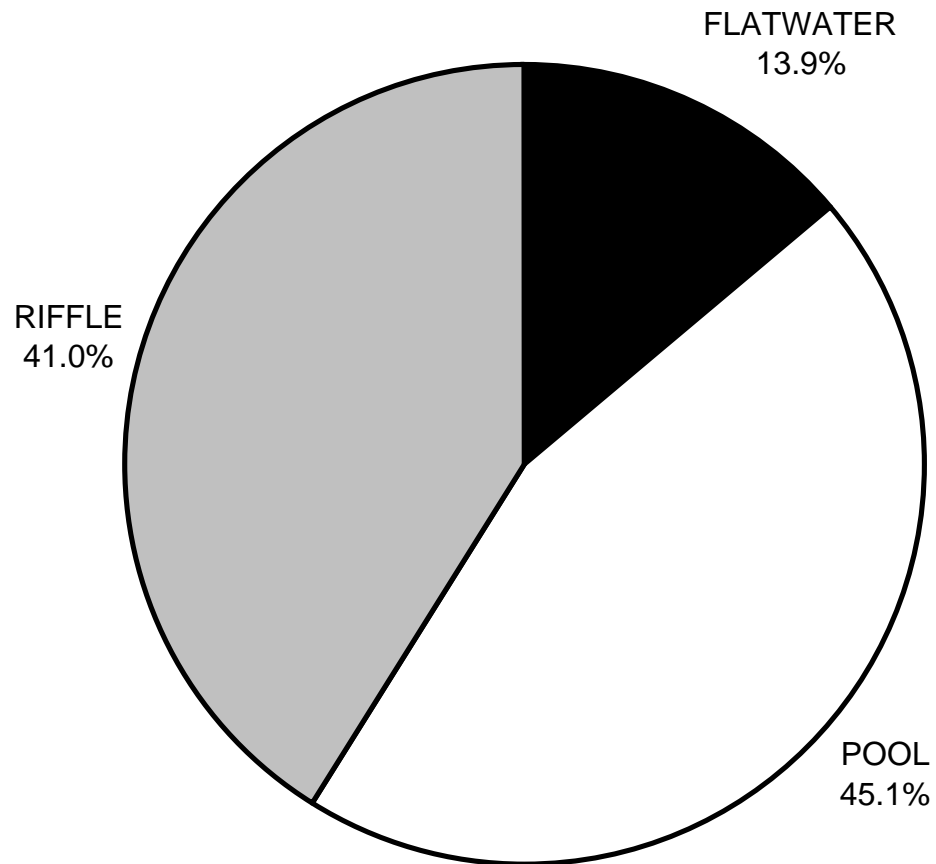
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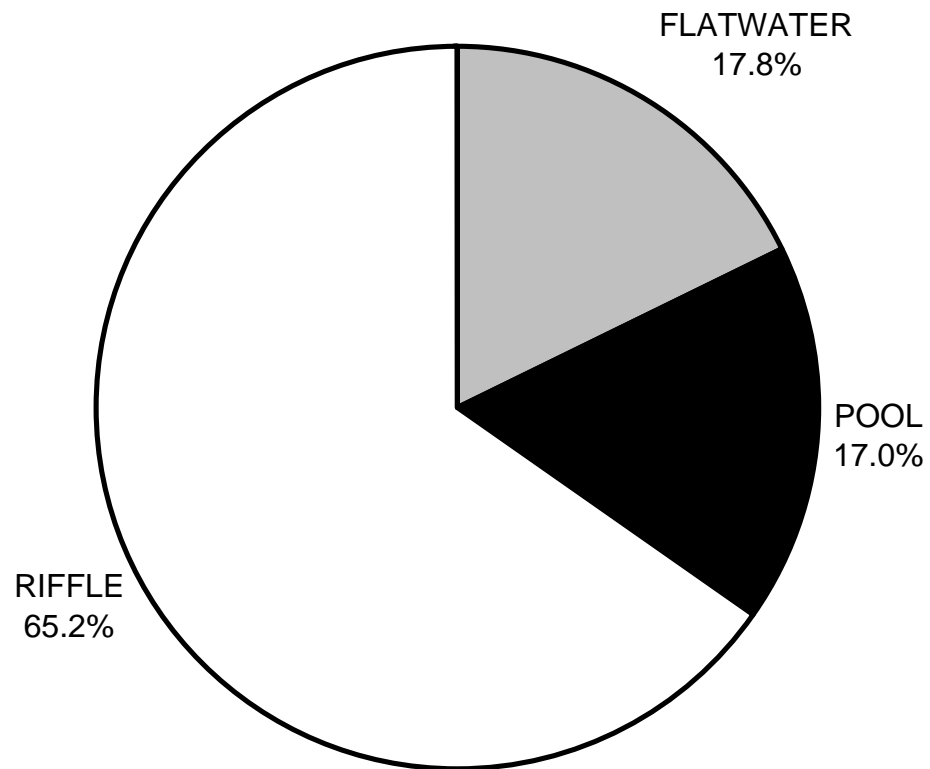
	Riffles	Flatwater	Pools
<hr/>			
UNDERCUT BANKS (%)	0	30	15
SMALL WOODY DEBRIS (%)	40	0	13
LARGE WOODY DEBRIS (%)	34	0	41
ROOT MASS (%)	2	0	17
TERRESTRIAL VEGETATION (%)	0	20	2
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	3	50	3
BOULDERS (%)	21	0	10
BEDROCK LEDGES (%)	0	0	0

**JULIAS CREEK 2006**  
**HABITAT TYPES BY PERCENT OCCURRENCE**



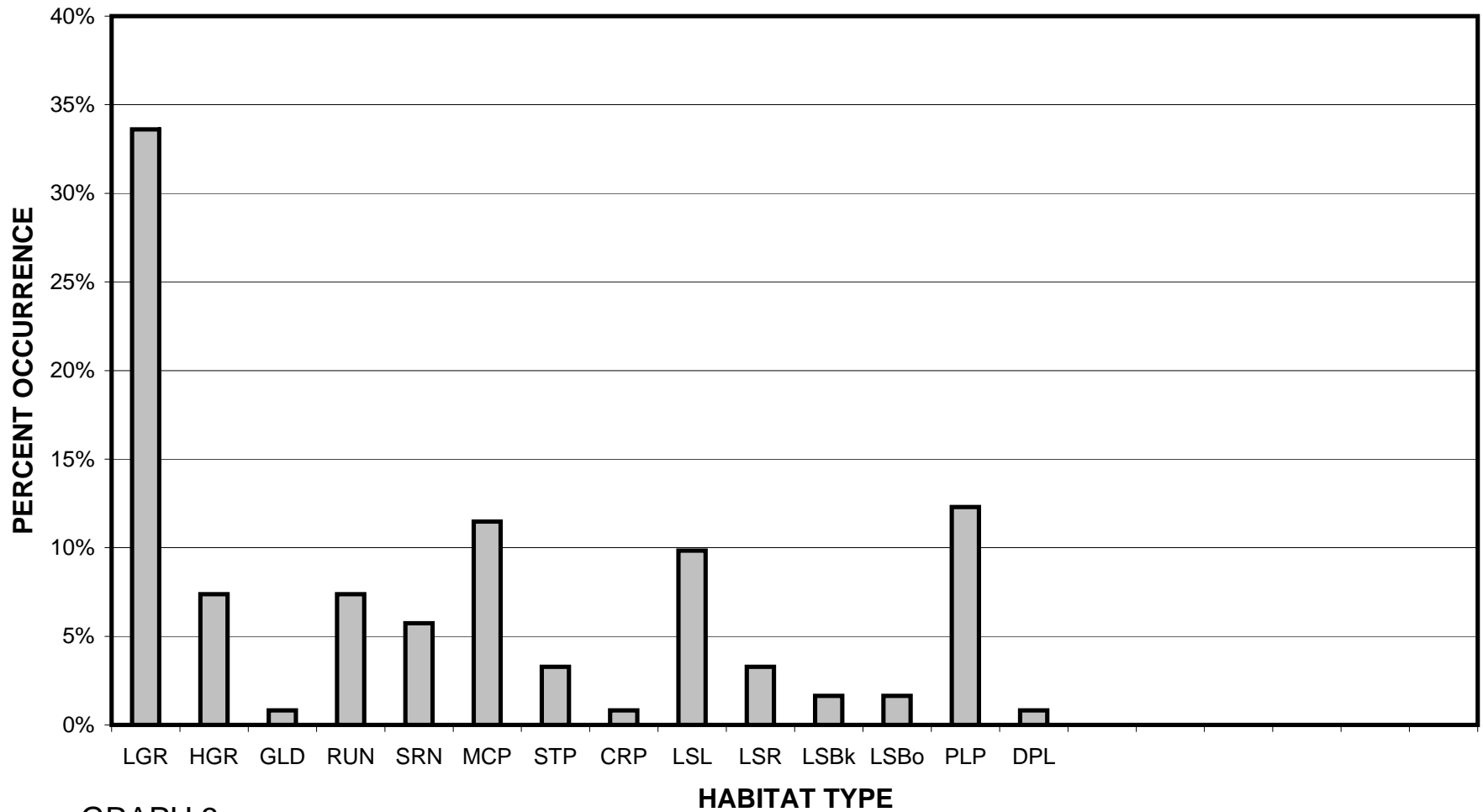
GRAPH 1

**JULIAS CREEK 2006**  
**HABITAT TYPES BY PERCENT TOTAL LENGTH**



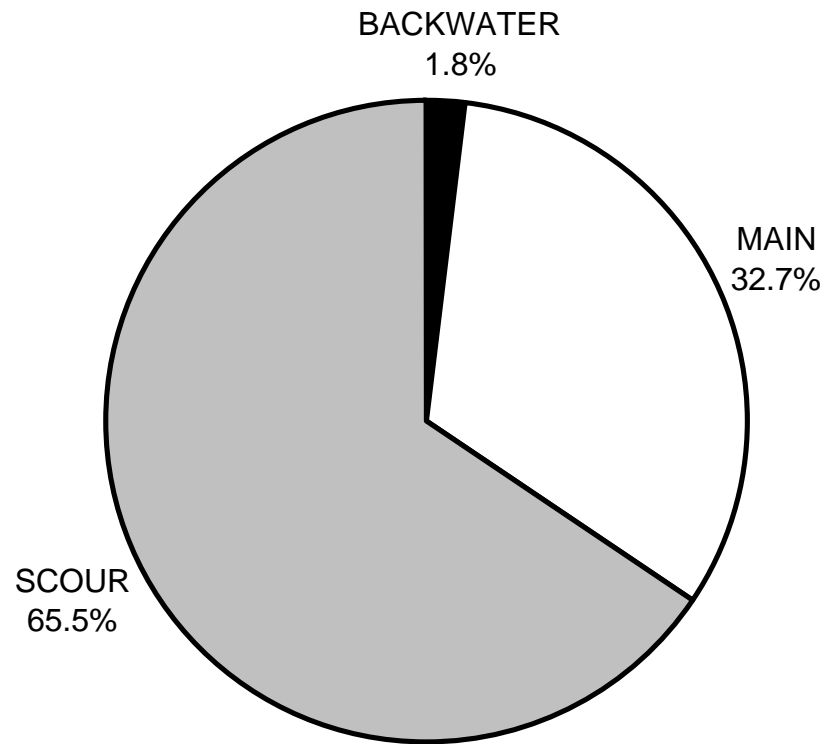
GRAPH 2

# **JULIAS CREEK 2006** **HABITAT TYPES BY PERCENT OCCURRENCE**



GRAPH 3

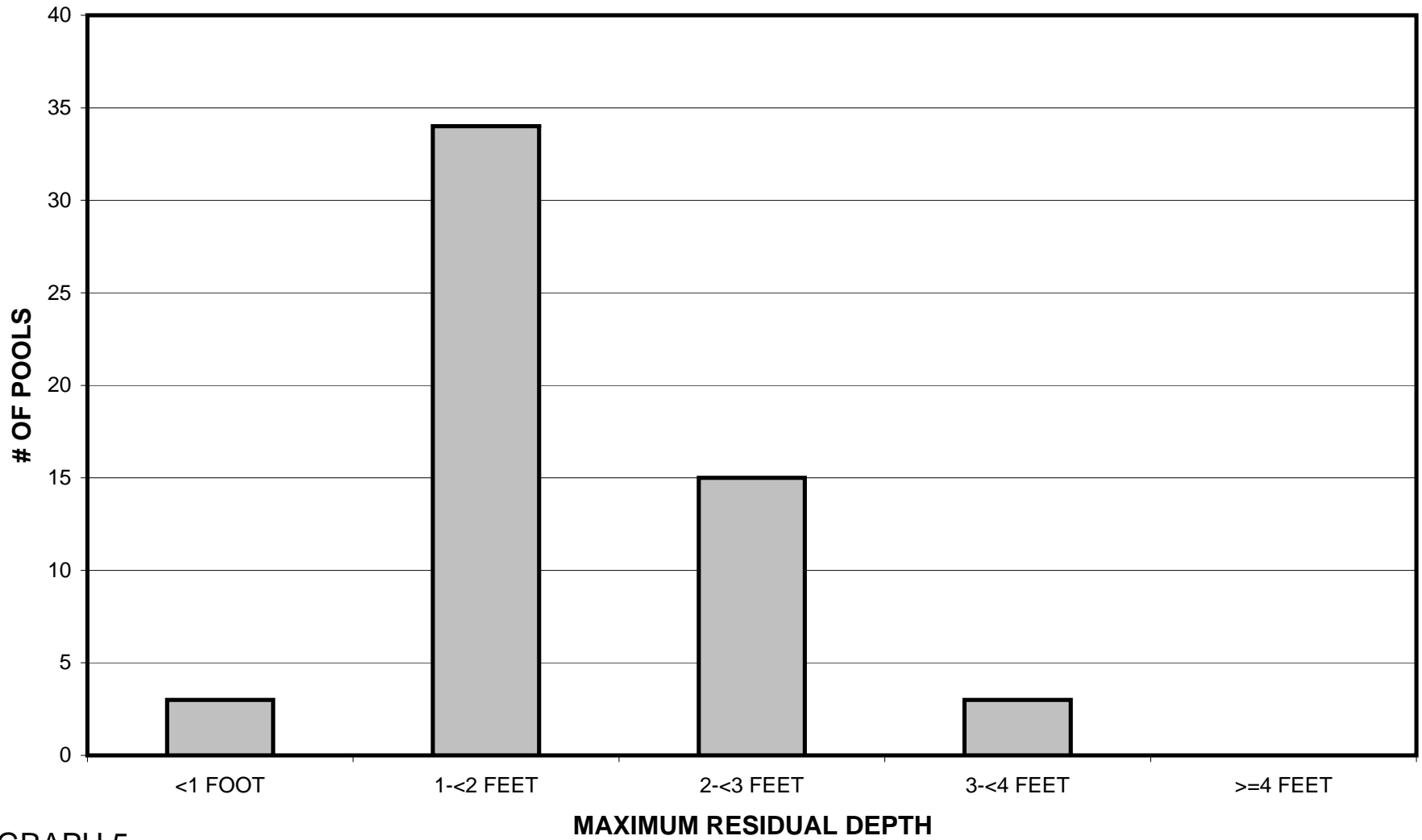
**JULIAS CREEK 2006**  
**POOL TYPES BY PERCENT OCCURRENCE**



GRAPH 4

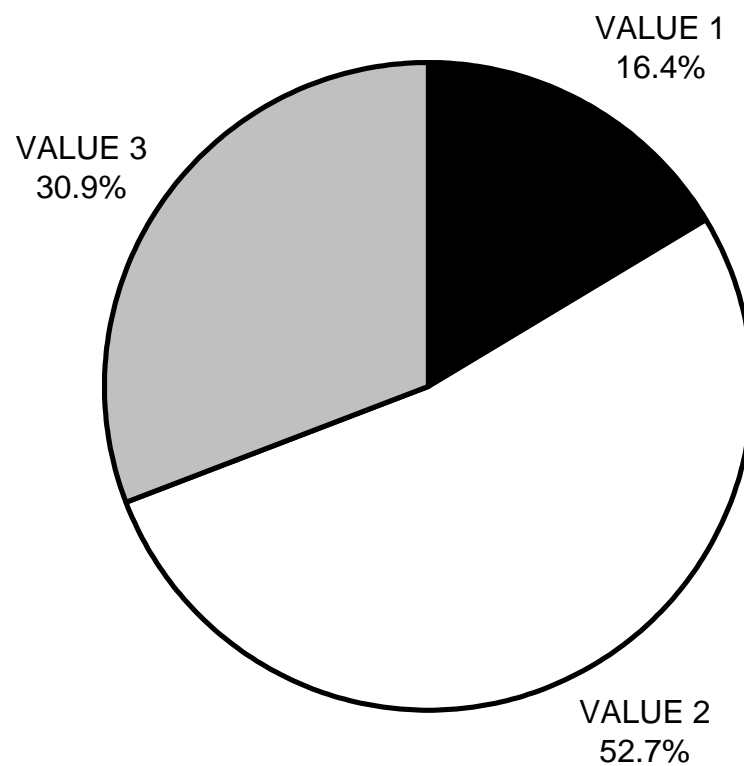


# **JULIAS CREEK 2006 MAXIMUM DEPTH IN POOLS**



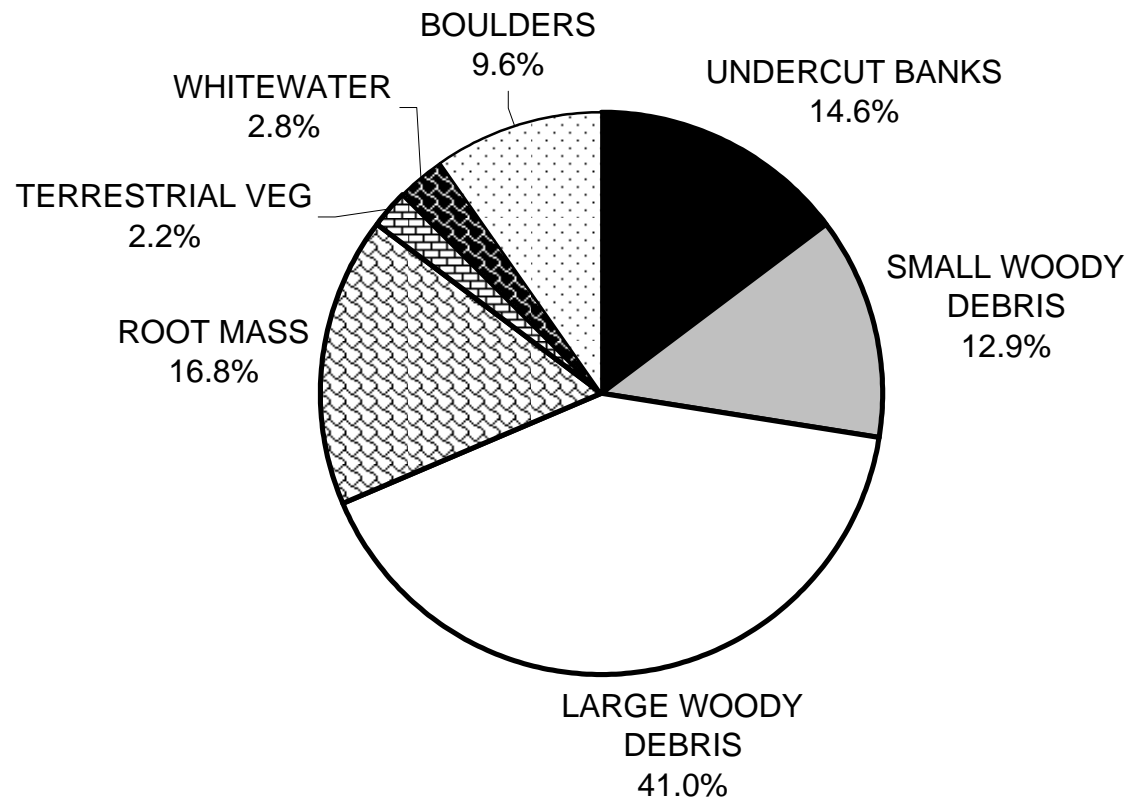
GRAPH 5

# JULIAS CREEK 2006 PERCENT EMBEDDEDNESS



GRAPH 6

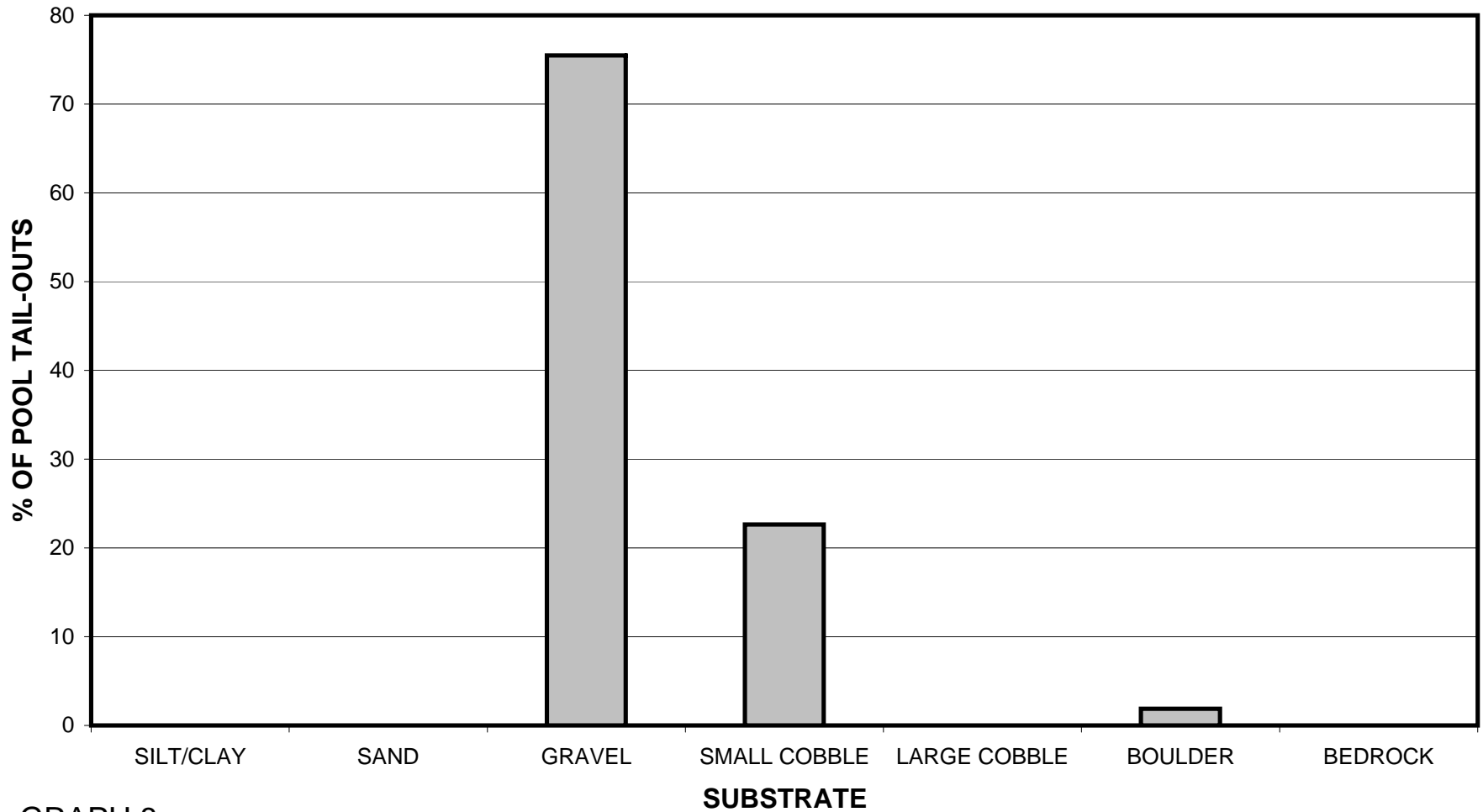
# **JULIAS CREEK 2006 MEAN PERCENT COVER TYPES IN POOLS**



GRAPH 7

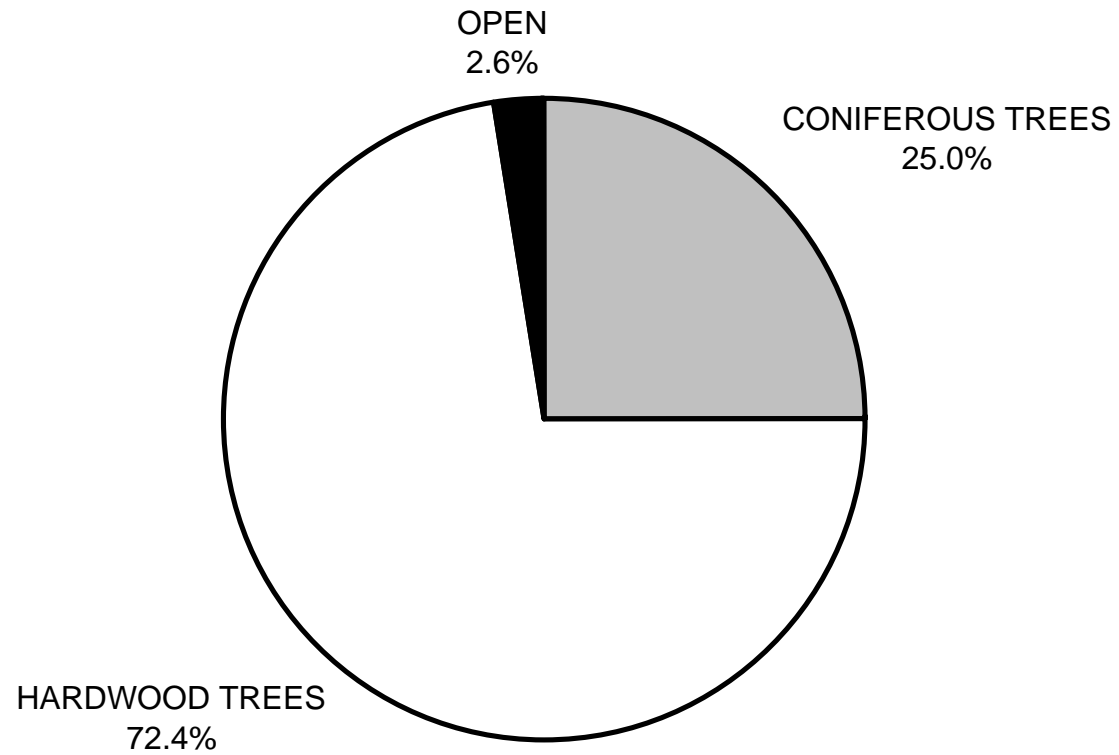
# **JULIAS CREEK 2006**

## **SUBSTRATE COMPOSITION IN POOL TAIL-OUTS**



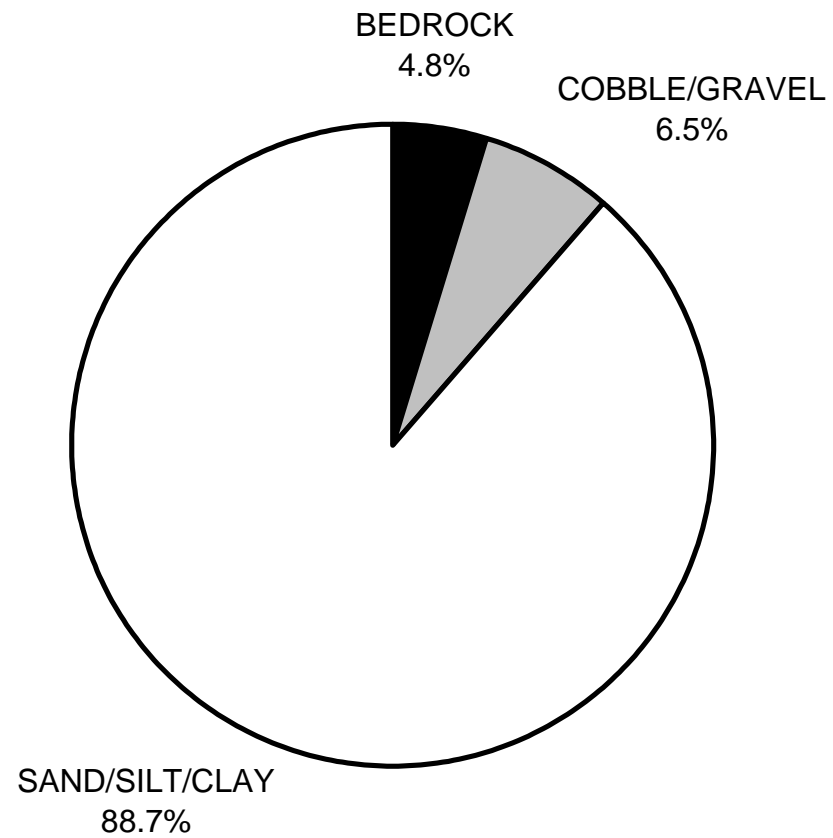
GRAPH 8

**JULIAS CREEK 2006  
MEAN PERCENT CANOPY**



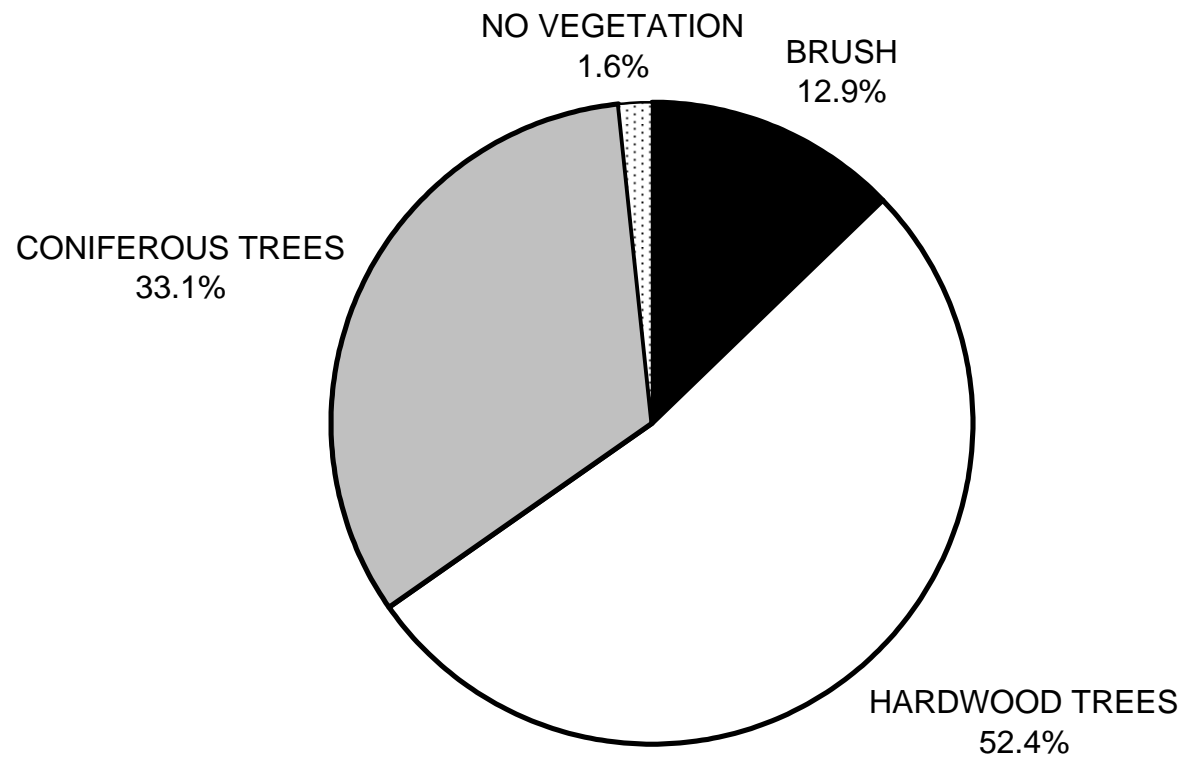
GRAPH 9

**JULIAS CREEK 2006**  
**DOMINANT BANK COMPOSITION IN SURVEY REACH**



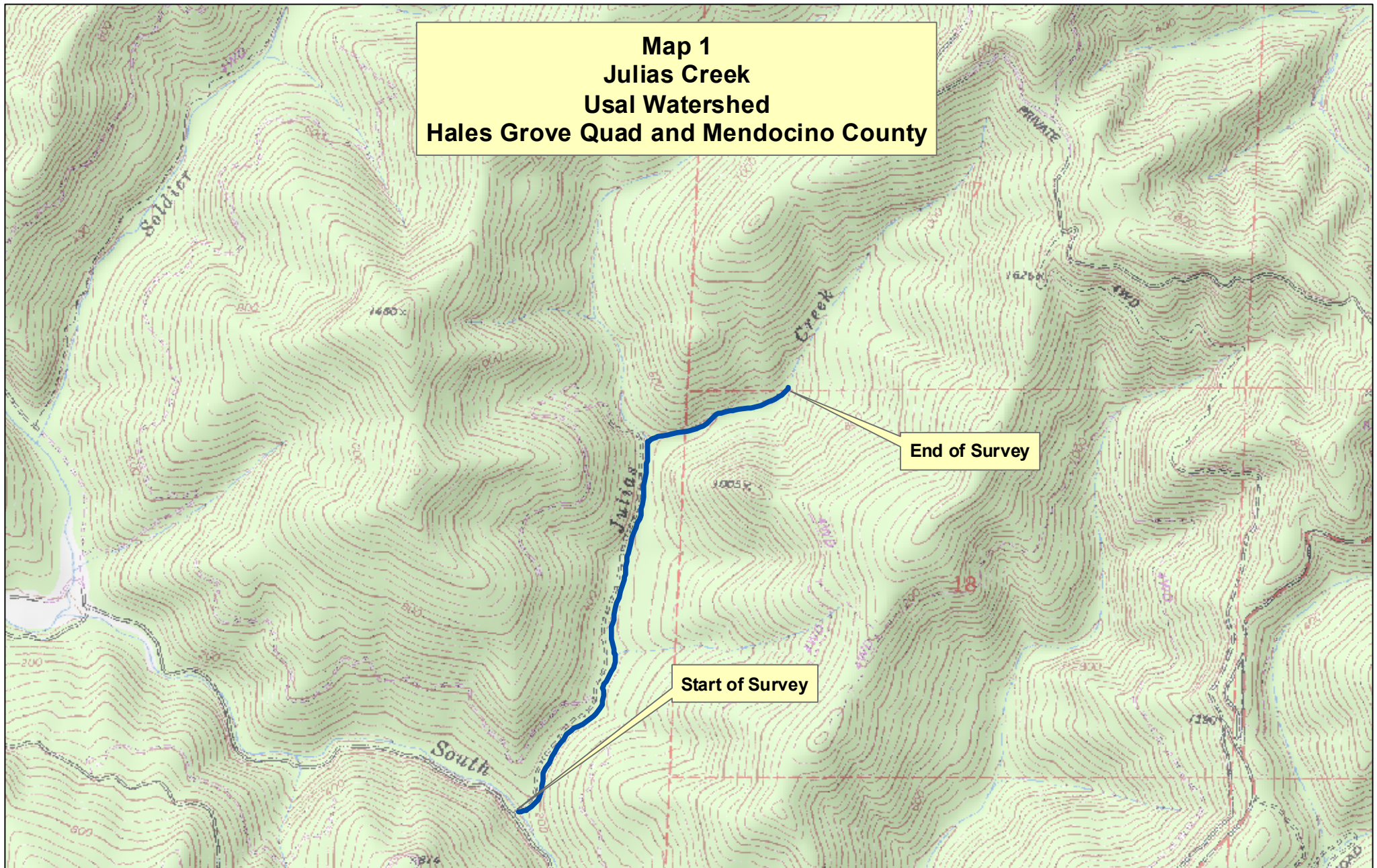
GRAPH 10

**JULIAS CREEK 2006**  
**DOMINANT BANK VEGETATION IN SURVEY REACH**



GRAPH 11

**Map 1**  
**Julias Creek**  
**Usal Watershed**  
**Hales Grove Quad and Mendocino County**



**Legend**

— Julias Creek Survey

0 1,400 2,800 Feet

