

# STREAM INVENTORY REPORT

## Burbeck Creek

### INTRODUCTION

A stream inventory was conducted from May 21 to May 23, 2013 on Burbeck Creek. The survey began at the confluence with the Noyo River and extended upstream 1.2 miles.

The Burbeck Creek 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 Burbeck Creek. 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

Burbeck Creek is a tributary to the Noyo River, which drains to the Pacific Ocean. It is located in Mendocino County, California (Map 1). Burbeck Creek's legal description at the confluence with the Noyo River is T18N R14W S08. Its location is 39.42837 degrees north latitude and 123.4413 degrees west longitude, LLID number 1234399394284. Burbeck Creek is a second order stream and has approximately 1.5 miles of blue line stream according to the USGS Burbeck 7.5 minute quadrangle. Burbeck Creek drains a watershed of approximately 1.8 square miles. Elevations range from about 660 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 and rural development. Vehicle access exists via Irmulco Road, off Highway 20, approximately seven miles west of Willits.

### METHODS

The habitat inventory conducted in Burbeck Creek 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 Watershed Stewards Project/AmeriCorps (WSP) 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

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their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

### HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Burbeck 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". Burbeck 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.

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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 Burbeck 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 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 Burbeck 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. 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 Burbeck 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 Burbeck 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.

## 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 Burbeck Creek. In addition, underwater observations were made at 10 sites using techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

## DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 2.0.18, a Visual Basic data entry program developed by Karen Wilson, Pacific States Marine Fisheries Commission in conjunction with the California Department of Fish and Wildlife. This program processes and summarizes the data, and produces the following ten tables:

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

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Graphics are produced from the tables using Microsoft Excel. Graphics developed for Burbeck 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 of May 21 to May 23, 2013 was conducted by M. Bray (CDFW) and E. Augustyn (WSP). The total length of the stream surveyed was 6,458 feet.

Stream flow was measured near the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.36 cfs on May 28, 2013.

Burbeck Creek is a B4 channel type for 2,895 feet of the stream surveyed (Reach 1) and an A4 channel type for 3,563 feet of the stream surveyed (Reach 2). B4 channels are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools, very stable plan and profile, stable banks and gravel-dominant substrates. A4 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 49 to 53 degrees Fahrenheit. Air temperatures ranged from 42 to 58 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 35% pool units, 33% flatwater units, and 32% riffle units (Graph 1). Based on total length of Level II habitat types there were 55% flatwater units, 23% riffle units, 21% pool units, and 2% culvert units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pool units, 29%; step run units, 25%; and high gradient riffle units, 17% (Graph 3). Based on percent total length, step run units made up 50%, mid-channel pool units 17%, high gradient riffle units 11%, and low gradient riffle units 11%.

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A total of 76 pools were identified (Table 3). Main channel pools were the most frequently encountered at 84% (Graph 4), and comprised 84% of the total length of all pools (Table 3).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seven of the 76 pools (9%) had a residual depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 76 pool tail-outs measured, 27 had a value of 1 (36%); 44 had a value of 2 (58%); five had a value of 3 (7%) (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 5, flatwater habitat types had a mean shelter rating of 6, and pool habitats had a mean shelter rating of 12 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 22. Main channel pools had a mean shelter rating of 11 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Burbeck Creek. Graph 7 describes the pool cover in Burbeck Creek. Boulders are the dominant pool cover type followed by large woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 37% of the pool tail-outs. Small cobble was the next most frequently observed dominant substrate type and occurred in 26% of the pool tail-outs.

The mean percent canopy density for the surveyed length of Burbeck Creek was 98%. Two percent of the canopy was open. Of the canopy present, the mean percentages of hardwood and coniferous trees were 53% and 47%, respectively. Graph 9 describes the mean percent canopy in Burbeck Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 96%. The mean percent left bank vegetated was 91%. The dominant elements composing the structure of the stream banks consisted of 45% cobble/gravel, 32% sand/silt/clay, 21% boulders, and 1% bedrock (Graph 10). Coniferous trees were the dominant vegetation type observed in 46% of the units surveyed. Additionally, 29% of the units surveyed had hardwood trees as the dominant vegetation type, and 20% had brush as the dominant vegetation type (Graph 11).

## **BIOLOGICAL INVENTORY RESULTS**

Survey teams conducted a snorkel survey at 10 sites for species composition and distribution in Burbeck Creek on September 9, 2013. The sites were sampled by B. Leonard and M. Groff (CDFW).

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In Reach 1, which comprised the first 2,895 feet of stream, 10 sites were sampled. The reach sites yielded four young-of-the-year steelhead/rainbow trout (SH/RT), two age 1+ SH/RT, two age 2+ SH/RT, and two sculpin.

The following chart displays the information yielded from these sites:

2013 Burbeck Creek underwater observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: B4 Channel Type									
09/09/13	1	003	Pool	95	1	0	0	0	0
	2	005	Pool	149	1	1	0	0	0
	3	012	Pool	316	0	0	0	0	0
	4	016	Pool	467	2	1	1	0	0
	5	027	Pool	863	0	0	1	0	0
	6	031	Pool	934	0	0	0	0	0
	7	036	Pool	1,099	0	0	0	0	0
	8	041	Pool	1,213	0	0	0	0	0
	9	048	Pool	1,417	0	0	0	0	0
	10	051	Pool	1,533	0	0	0	0	0

## DISCUSSION

Burbeck Creek is a B4 channel type for the first 2,895 feet of stream surveyed and an A4 channel type for the remaining 3,563 feet. The suitability of B4 and A4 channel types for fish habitat improvement structures is as follows: B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors, and log cover. A4 channels are generally not suitable for fish habitat improvement projects.

The water temperatures recorded on the survey days May 21 to May 23, 2013 ranged from 49 to 53 degrees Fahrenheit. Air temperatures ranged from 42 to 58 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 55% of the total length of this survey, riffles 23%, and pools 21%. Seven of the 76 (9%) 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

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flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

Seventy-one of the 76 pool tail-outs measured had embeddedness ratings of 1 or 2. Five of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered not suitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Burbeck Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Forty-eight of the 76 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 12. The shelter rating in the flatwater habitats is 6. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in Burbeck Creek. Boulders are the dominant cover type in pools followed by large woody debris. Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy density for the stream was 98%. Reach 1 had a canopy density of 97% and Reach 2 had a canopy density of 98%. The percentage of right and left bank covered with vegetation was 96% and 91%, respectively.

## **RECOMMENDATIONS**

- 1) Burbeck 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) In Reach 1, increase woody cover in the pools and flatwater habitat units. Most of the existing cover in the pools is from boulders. Adding high quality complexity with woody cover in the pools is desirable.
- 4) Due to the wooden box culvert under the railroad at 467 feet, access for migrating salmonids is an ongoing problem. A fish passage assessment should be conducted at this site. If the assessment finds the culvert to be a barrier to fish passage it should be replaced with a structure that provides unimpeded fish passage. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish.



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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 the Noyo River. The channel is a B4.
173	0007.00	Ford crosses through dry section of the stream.
467	0017.00	The railroad crosses the channel. The crossing is a 6.8' high x 7' wide x 137' long culvert with a concrete apron and wooden supports under the road fill. The slope of the culvert is 1.9% and there is a 2' high plunge at the outlet. The maximum depth within 5' of the outlet is 3.1'. The culvert floor is missing a wooden plank, which has constricted the water into a 1' wide channel at base flow.
2354	0076.00	A road crosses the channel. The crossing is a 12' wide x 30' long x 7' high metal boxcar bridge.
2895	0095.00	The channel changes from a B4 to an A4.
3131	0105.00	Log debris accumulation (LDA) #01 contains three pieces of large woody debris (LWD) and measures 5.5' high x 29' wide x 10' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to boulders and measures 25' wide x 25' long x 2' deep. There is a 3' high plunge over the LDA. Fish were observed above the LDA.
3653	0119.00	LDA #02 contains more than 30 pieces of LWD and measures 8' high x 32' wide x 31' long. Water does not flow through the LDA; there is a 15' long dry section within it. There are no visible gaps in the LDA. Retained sediment ranges from silt to cobble and measures 32' wide x 67' long x 6' deep. There is an 8' high plunge over the LDA with no jump pool below it. Fish were observed above the LDA.
3901	0129.00	Tributary #01 enters on the right bank. The first 100' feet of the tributary are dry. The slope of the tributary is approximately 8%. Approximately 100' upstream of where the road crosses the tributary there is a 7' headcut where the channel is down cutting through a sediment wedge.
4629	0153.00	A road crosses the channel. The crossing is a 13' wide x 52' long x 7.5' high railcar bridge with logs for abutments.

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4800	0159.00	LDA #03 contains two pieces of LWD and measures 4.5' high x 18' wide x 6' long. Water flows through the LDA and there are no visible gaps in it. Retained sediment ranges from silt to boulders and measures 15' wide x 58' long x 4' deep. There is a 2.5' high plunge over the LDA. Fish were observed above the LDA.
5480	0178.00	There is a 2' high plunge.
5571	0180.00	There is a 1.5' high plunge.
5640	0183.00	There is a 2' high plunge.
6004	0200.00	There is a 1.7' high plunge.
6042	0202.00	There is a 2.6' high plunge.
6082	0205.00	There is a 2' high plunge.
6444	0220.00	End of survey at 10' high bedrock sheet located approximately 75' downstream of the Mendocino Redwood Company property line at the confluence with the upper left bank tributary. The slope increases to greater than 10% in both the mainstem and the tributary above the confluence. A 4" long SH/RT was observed in the pool directly above the bedrock sheet.

## 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: Burbeck Creek

LLID: 1234399394284 Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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
1	0	CULVERT	0.5	137	137	2.1									
73	12	FLATWATER	33.2	48	3523	54.6	6.4	0.5	0.8	188	13709	98	7127		6
76	76	POOL	34.5	17	1329	20.6	7.2	0.5	1.0	123	9318	122	9273	74	12
70	14	RIFFLE	31.8	21	1469	22.7	6.2	0.4	0.6	92	6459	34	2398		5
<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>		
220	102				6458					29486			18798		

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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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 (%)
31	7	LGR	14.1	24	730	11.3	6	0.4	0.9	114	3530	44	1366		5	98
38	6	HGR	17.3	19	725	11.2	8	0.4	0.9	82	3098	28	1081		6	97
1	1	BRS	0.5	14	14	0.2	2	0.1	0.4	6	6	1	1		0	100
17	4	RUN	7.7	18	302	4.7	6	0.5	0.9	102	1731	53	905		6	98
56	8	SRN	25.5	58	3221	49.9	7	0.5	1	231	12923	120	6710		6	98
63	63	MCP	28.6	17	1087	16.8	7	0.4	2.8	111	7022	92	5780	48	11	97
1	1	STP	0.5	31	31	0.5	8	0.8	1.3	211	211	253	253	169	5	97
3	3	CRP	1.4	15	46	0.7	7	0.3	1.7	115	346	130	390	122	25	97
9	9	PLP	4.1	18	165	2.6	11	1.0	2.6	193	1740	317	2850	228	21	99
1	0	CUL	0.5	137	137	2.1										

Total Units  
220

Total Units Fully Measured  
102

Total Length (ft.)  
6458

Total Area (sq.ft.)  
30605

Total Volume (cu.ft.)  
19335

**Table 3 - Summary of Pool Types**

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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
64	64	MAIN	84	17	1118	84	6.7	0.4	113	7233	50	3078	11
12	12	SCOUR	16	18	211	16	9.8	0.8	174	2085	209	2298	22

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
76	76	1329	9318	5377

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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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
63	MCP	83	40	63	21	33	2	3	0	0	0	0
1	STP	1	0	0	1	100	0	0	0	0	0	0
3	CRP	4	2	67	1	33	0	0	0	0	0	0
9	PLP	12	1	11	3	33	5	56	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
76	43	57	26	34	7	9	0	0	0	0

Mean Maximum Residual Pool Depth (ft.): 1

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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Dry Units: 0

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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
31	7	LGR	0	3	0	3	0	0	0	94	0
38	6	HGR	0	0	0	8	0	0	0	92	0
1	1	BRS	0	0	0	0	0	0	0	0	0
70	14	TOTAL RIFFLE	0	2	0	5	0	0	0	93	0
17	4	RUN	0	13	0	13	0	0	0	75	0
56	8	SRN	4	1	0	3	0	0	0	93	0
73	12	TOTAL FLAT	3	5	0	6	0	0	0	87	0
63	63	MCP	6	8	11	11	0	0	2	63	0
1	1	STP	0	0	0	0	0	0	0	100	0
3	3	CRP	57	13	0	0	0	0	8	22	0
9	9	PLP	9	2	10	11	0	0	12	56	0
76	76	TOTAL POOL	8	7	10	10	0	0	3	61	0
1	0	CUL									
220	102	TOTAL	6	6	8	9	0	0	3	68	0



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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Dry Units: 0

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

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
31	7	LGR	0	0	43	14	0	43	0
38	6	HGR	0	0	17	0	17	67	0
1	1	BRS	0	0	0	0	0	0	100
17	4	RUN	0	0	0	25	25	50	0
56	8	SRN	0	0	25	13	13	50	0
63	63	MCP	0	2	43	17	16	22	0
1	1	STP	0	0	100	0	0	0	0
3	3	CRP	0	0	33	67	0	0	0
9	9	PLP	0	0	67	0	22	11	0

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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
98	47	53	0	96	91

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: Burbeck Creek LLID: 1234399394284 Drainage: Noyo River  
 Survey Dates: 5/21/2013 to 5/23/2013 Survey Length (ft.): 6458 Main Channel (ft.): 6458 Side Channel (ft.): 0  
 Confluence Location: Quad: BURBECK Legal Description: T18NR14WS08 Latitude: 39:25:42.0N Longitude: 123:26:24.0W

**Summary of Fish Habitat Elements By Stream Reach**

**STREAM REACH: 1**

Channel Type: B4	Canopy Density (%): 97.0	Pools by Stream Length (%): 19.6
Reach Length (ft.): 2895	Coniferous Component (%): 49.0	Pool Frequency (%): 31.9
Riffle/Flatwater Mean Width (ft.): 6.1	Hardwood Component (%): 51.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Brush	< 2 Feet Deep: 97
Range (ft.): 10 to 20	Vegetative Cover (%): 91.2	2 to 2.9 Feet Deep: 3
Mean (ft.): 15	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 2	Dominant Bank Substrate Type: Sand/Silt/Clay	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.4	Occurrence of LWD (%): 8	Mean Max Residual Pool Depth (ft.): 0.9
Water (F): 49 - 53 Air (F): 42 - 57	LWD per 100 ft.:	Mean Pool Shelter Rating: 11
Dry Channel (ft): 0	Riffles: 1	
	Pools: 3	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 30 Sm Cobble: 17 Lg Cobble: 40 Boulder: 13 Bedrock: 0		
Embeddedness Values (%): 1. 16.7 2. 80.0 3. 3.3 4. 0.0 5. 0.0		

**STREAM REACH: 2**

Channel Type: A4	Canopy Density (%): 97.9	Pools by Stream Length (%): 21.4
Reach Length (ft.): 3563	Coniferous Component (%): 45.0	Pool Frequency (%): 36.5
Riffle/Flatwater Mean Width (ft.): 6.4	Hardwood Component (%): 55.0	Residual Pool Depth (%):
BFW:	Dominant Bank Vegetation: Coniferous Trees	< 2 Feet Deep: 87
Range (ft.): 14 to 27	Vegetative Cover (%): 94.7	2 to 2.9 Feet Deep: 13
Mean (ft.): 20	Dominant Shelter: Boulders	3 to 3.9 Feet Deep: 0
Std. Dev.: 3	Dominant Bank Substrate Type: Cobble/Gravel	>= 4 Feet Deep: 0
Base Flow (cfs.): 0.4	Occurrence of LWD (%): 8	Mean Max Residual Pool Depth (ft.): 1.1
Water (F): 49 - 51 Air (F): 47 - 58	LWD per 100 ft.:	Mean Pool Shelter Rating: 13
Dry Channel (ft): 0	Riffles: 4	
	Pools: 7	
	Flat: 2	
Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 41 Sm Cobble: 33 Lg Cobble: 13 Boulder: 13 Bedrock: 0		
Embeddedness Values (%): 1. 47.8 2. 43.5 3. 8.7 4. 0.0 5. 0.0		

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

Stream Name: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

Latitude: 39:25:42.0N

Longitude: 123:26:24.0W

**Mean Percentage of Dominant Stream Bank Substrate**

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	2	1	1.5
Boulder	20	23	21.1
Cobble / Gravel	42	50	45.1
Sand / Silt / Clay	38	28	32.4

**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	7	5	5.9
Brush	19	21	19.6
Hardwood Trees	30	29	28.9
Coniferous Trees	46	47	45.6
No Vegetation	0	0	0.0

**Total Stream Cobble Embeddedness Values:** 2

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

StreamName: Burbeck Creek

LLID: 1234399394284

Drainage: Noyo River

Survey Dates: 5/21/2013 to 5/23/2013

Confluence Location: Quad: BURBECK

Legal Description: T18NR14WS08

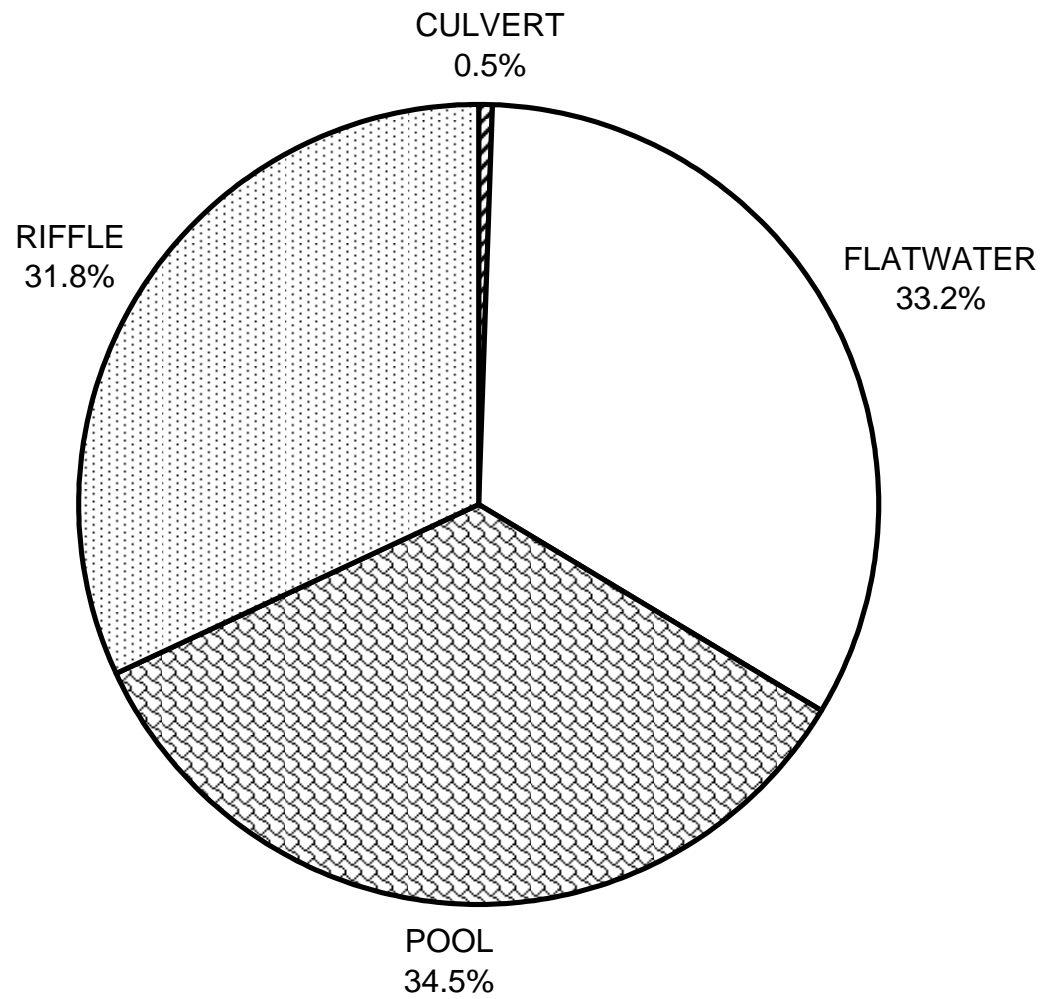
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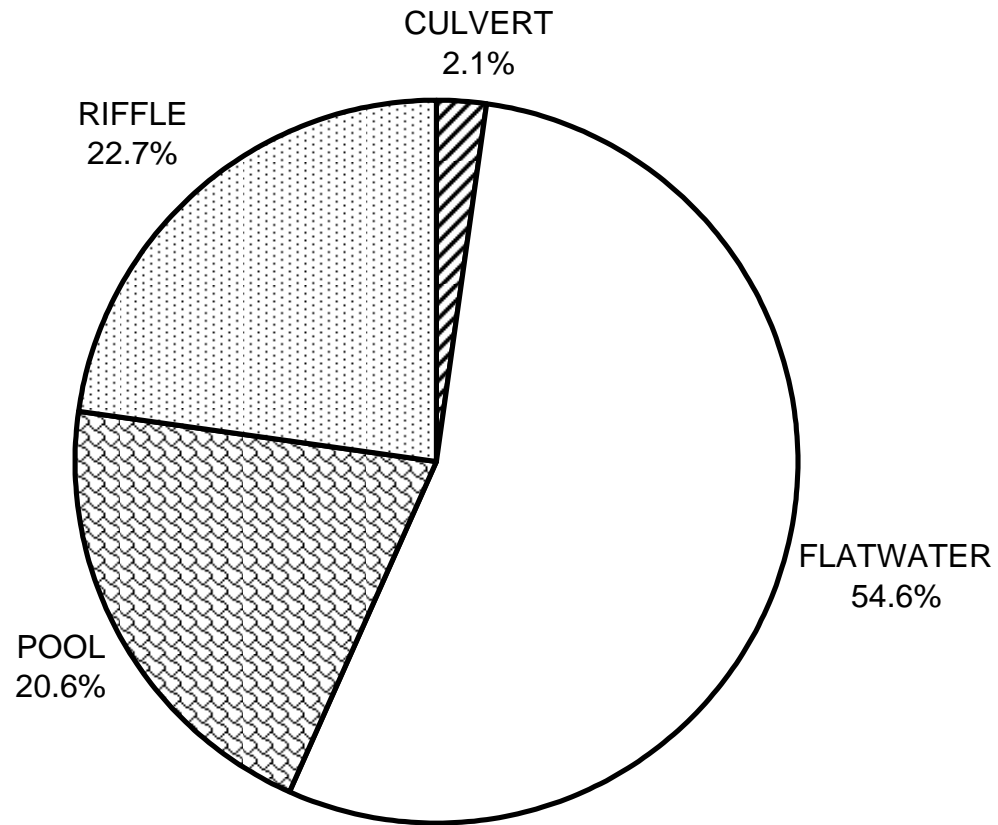
	<b>Riffles</b>	<b>Flatwater</b>	<b>Pools</b>
UNDERCUT BANKS (%)	0	3	8
SMALL WOODY DEBRIS (%)	2	5	7
LARGE WOODY DEBRIS (%)	0	0	10
ROOT MASS (%)	5	6	10
TERRESTRIAL VEGETATION (%)	0	0	0
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	0	0	3
BOULDERS (%)	93	87	61
BEDROCK LEDGES (%)	0	0	0

# BURBECK CREEK 2013 HABITAT TYPES BY PERCENT OCCURRENCE



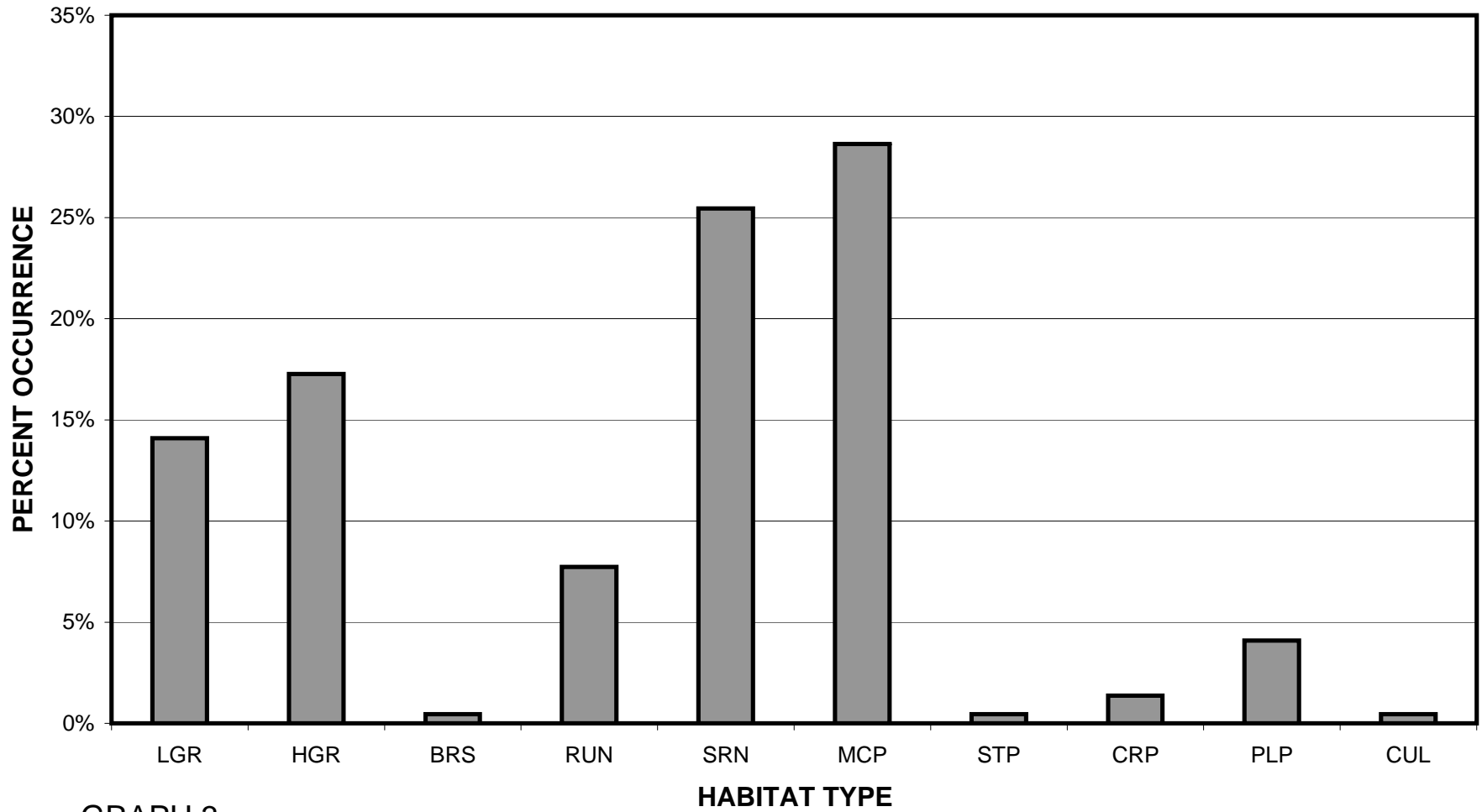
GRAPH 1

# BURBECK CREEK 2013 HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

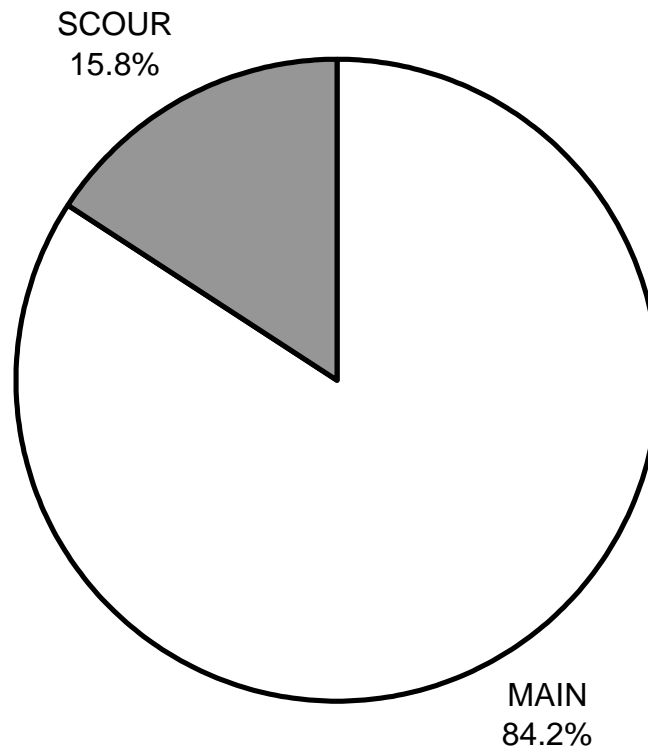
# BURBECK CREEK 2013 HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

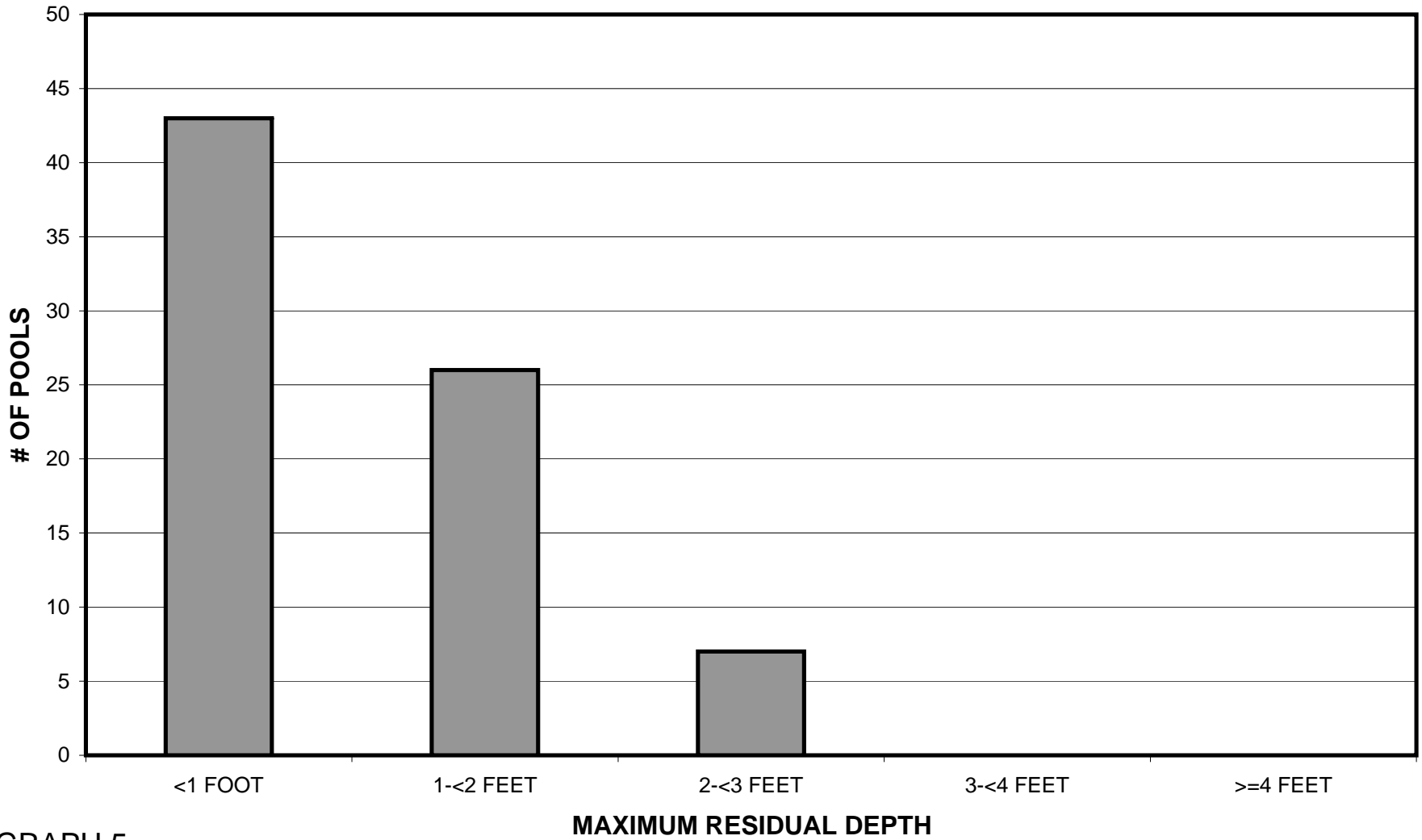


# BURBECK CREEK 2013 POOL TYPES BY PERCENT OCCURRENCE



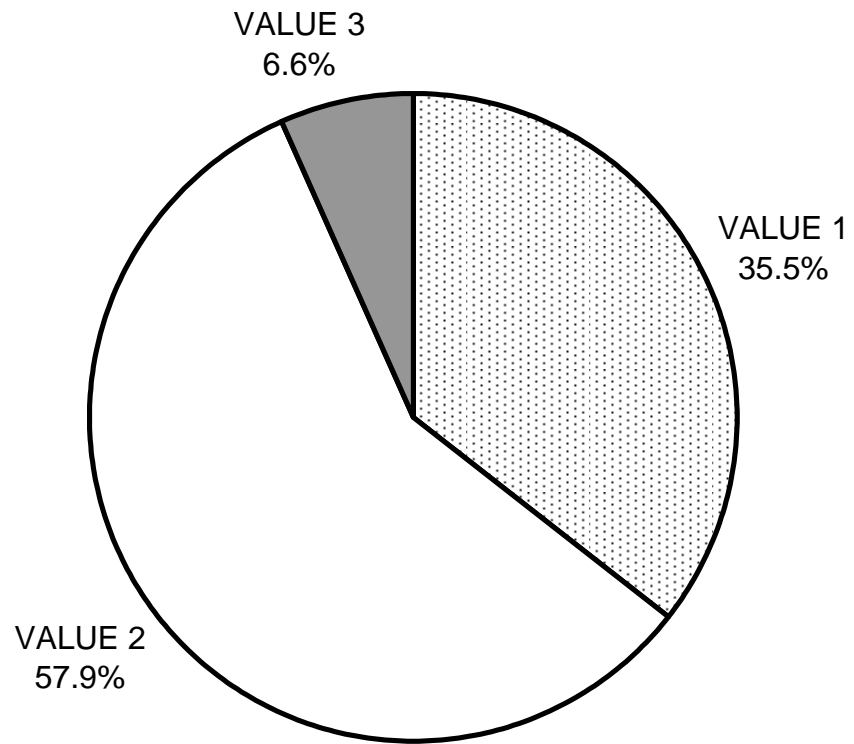
GRAPH 4

# BURBECK CREEK 2013 MAXIMUM DEPTH IN POOLS



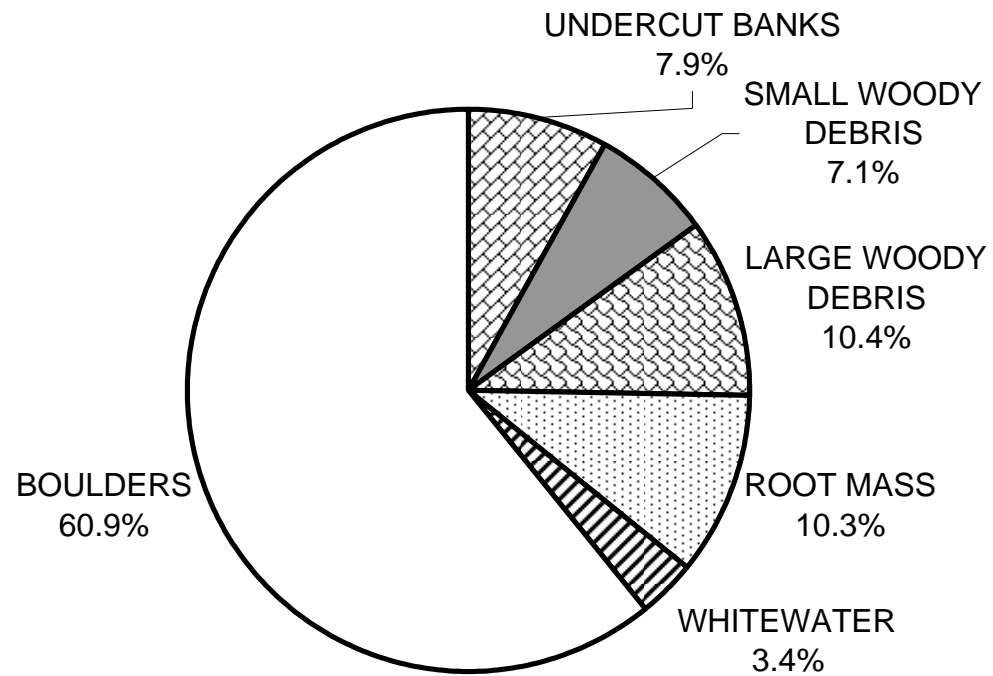
GRAPH 5

# BURBECK CREEK 2013 PERCENT EMBEDDEDNESS



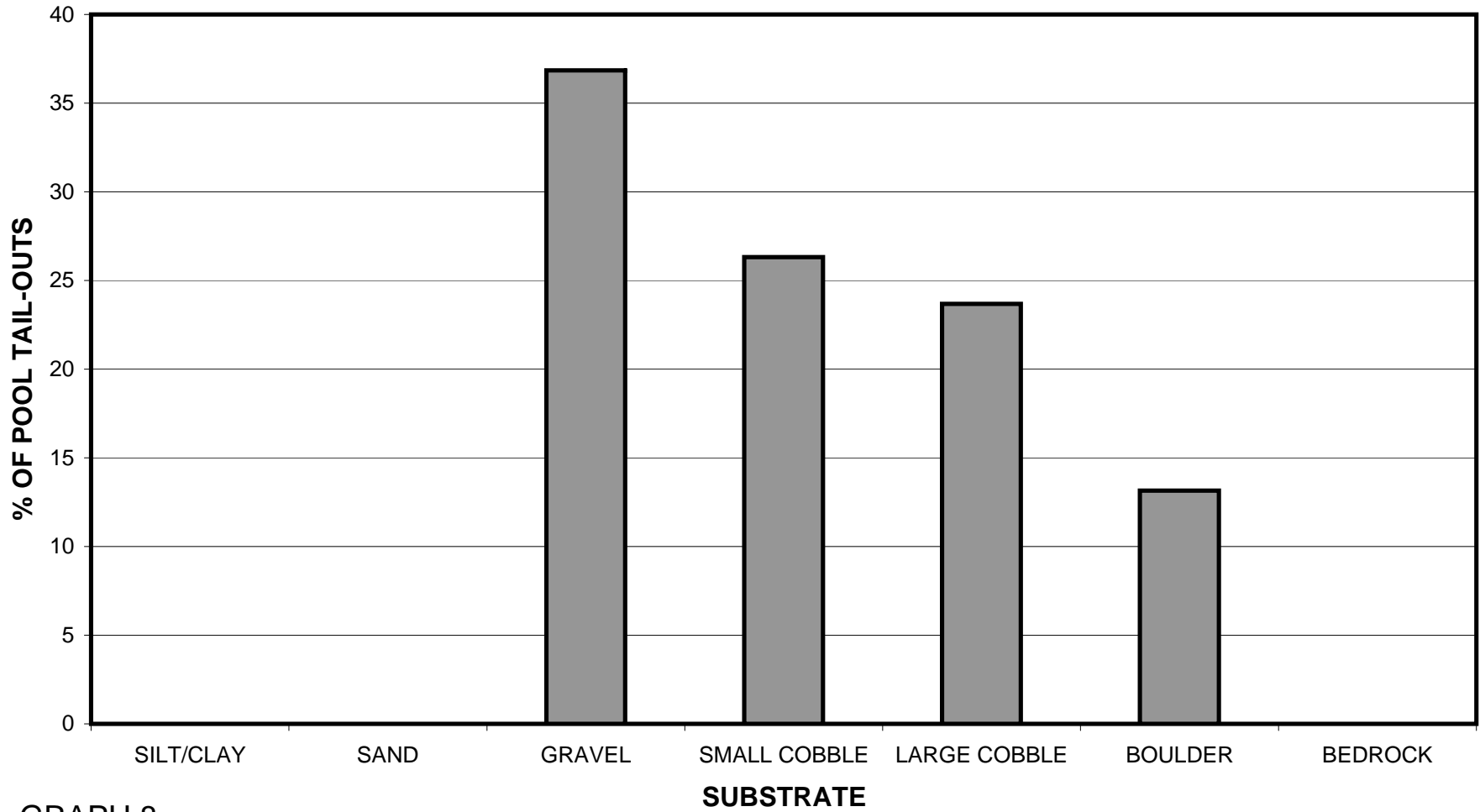
GRAPH 6

# BURBECK CREEK 2013 MEAN PERCENT COVER TYPES IN POOLS



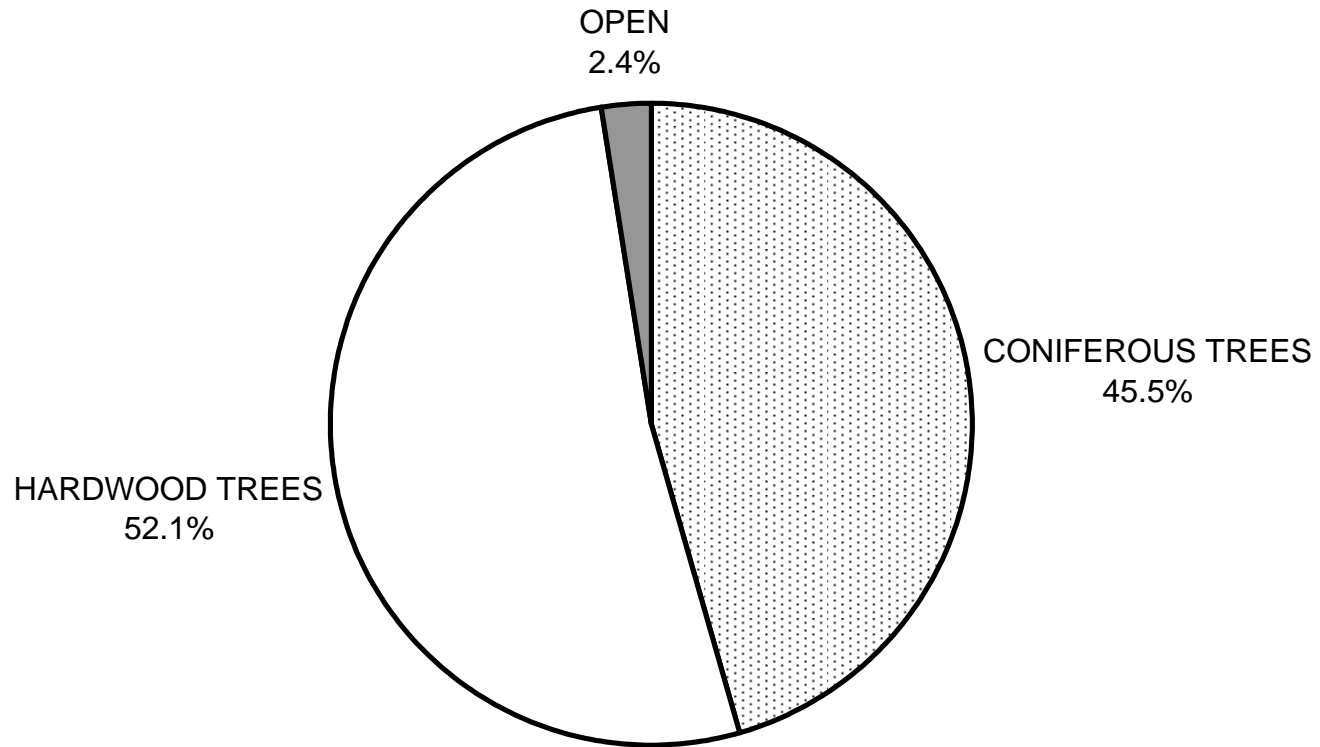
GRAPH 7

# BURBECK CREEK 2013 SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



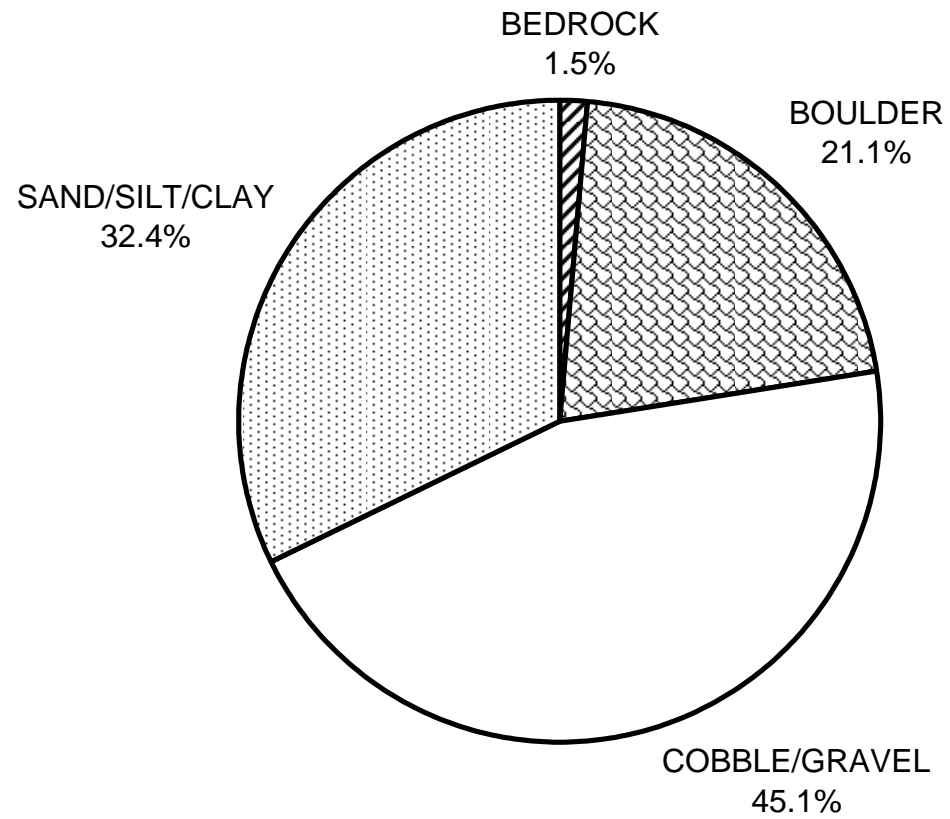
GRAPH 8

# BURBECK CREEK 2013 MEAN PERCENT CANOPY



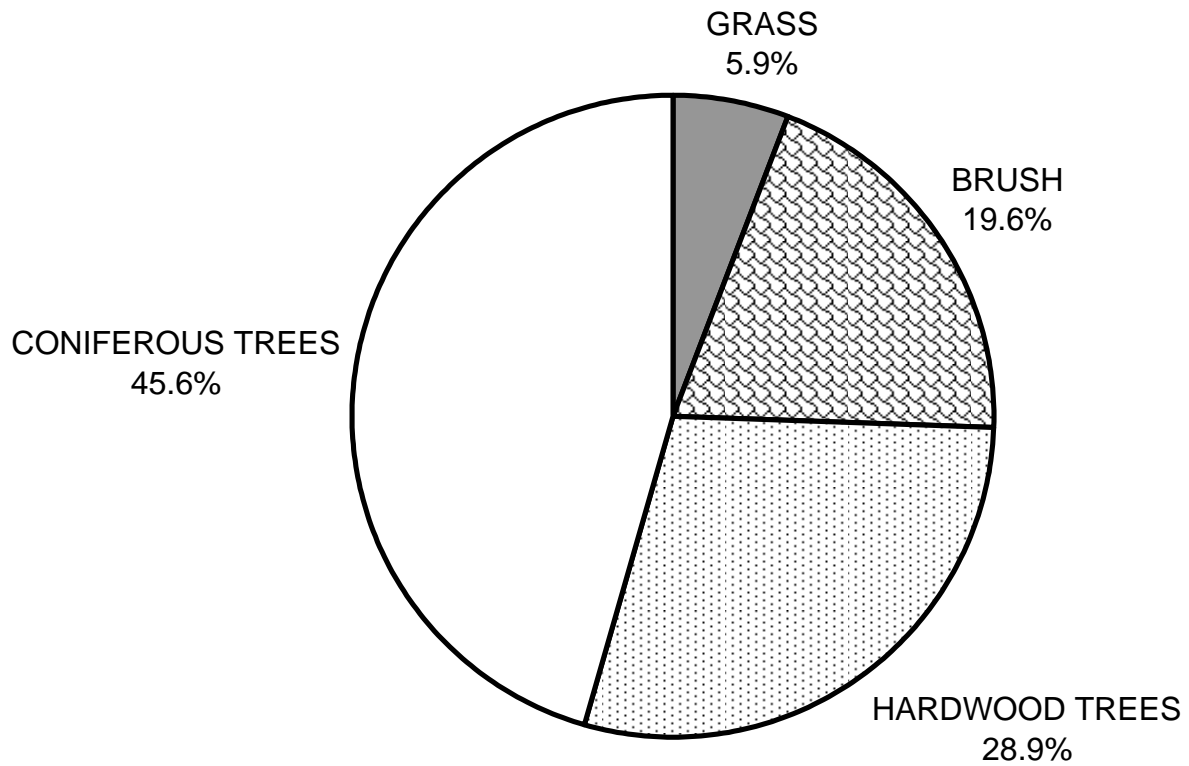
GRAPH 9

# BURBECK CREEK 2013 DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

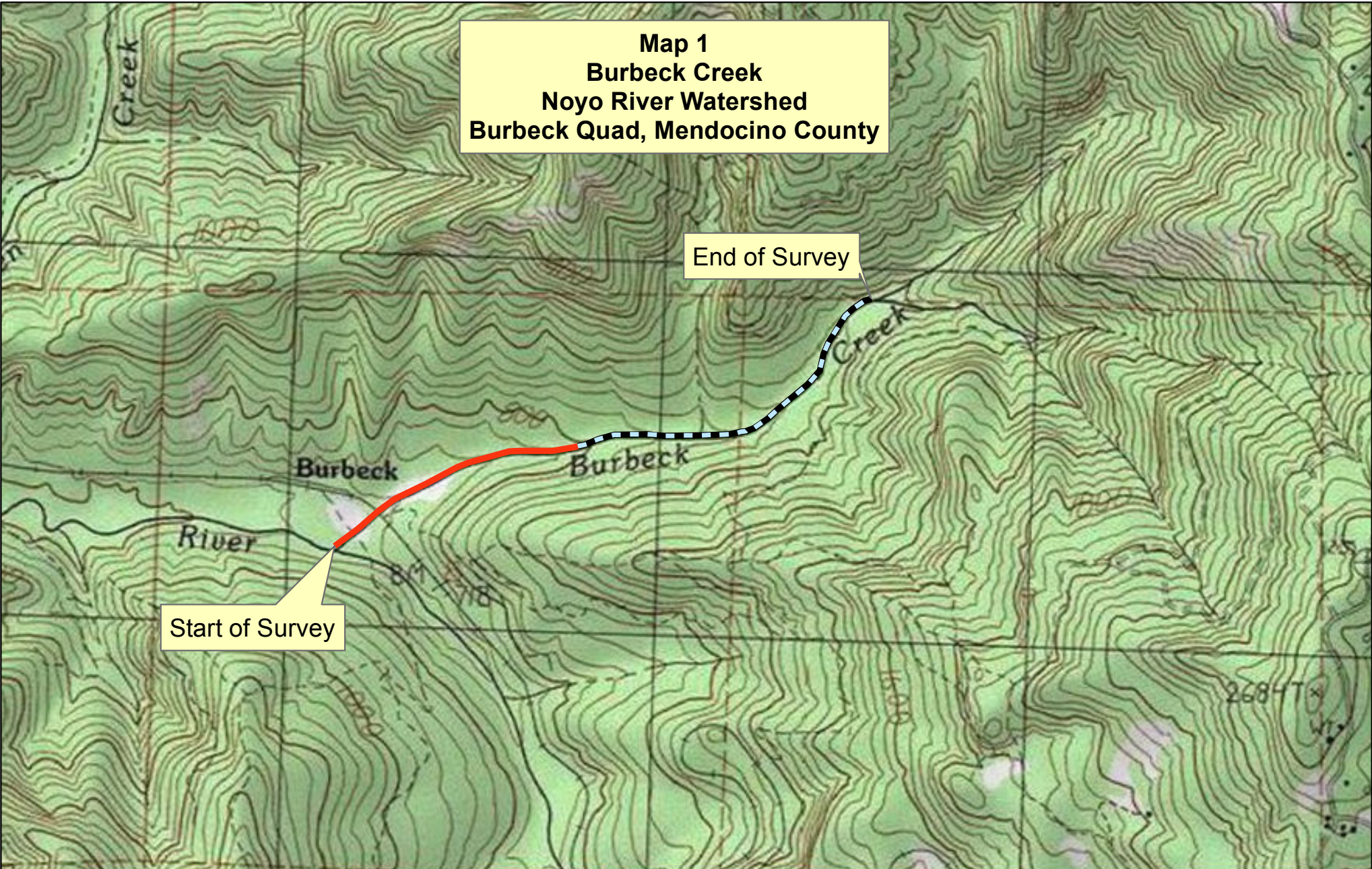
# BURBECK CREEK 2013 DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

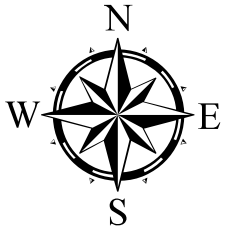


**Map 1**  
**Burbeck Creek**  
**Noyo River Watershed**  
**Burbeck Quad, Mendocino County**



Start of Survey

End of Survey



- Reach 1, Channel Type B4
- - - Reach 2, Channel Type A4

