STREAM INVENTORY REPORT

Burbeck Creek

INTRODUCTION

A stream inventory was conducted from June 18 to June 23, 2003 on Burbeck Creek. The survey began at the confluence with Noyo River and extended upstream 6,637 feet.

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, a tributary to the Pacific Ocean River, located in Mendocino County, California (Map 1). Burbeck Creek's legal description at the confluence with Noyo River is T18N R14W S08. Its location is 39°25′42″ north latitude and 123°26′24″ west longitude. Burbeck Creek is a second order stream and has approximately 7,815 feet of solid blue line stream and 660 feet of dashed 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 2,680 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Highway 20 and Irmulco Road, approximately 7 miles west of Willits. Follow Irmulco Road approximately 4.5 miles to Shake City Road. Follow Shake City Road 0.8 miles to Mendocino Redwood Company (MRC) gate. Follow MRC logging roads through the gate 2.9 miles to the confluence of Burbeck Creek and Noyo River.

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 Game Scientific Aid and the Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Member 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 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 nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at 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 (1985 rev. 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 (1988). 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.

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 unsuited for spawning due to inappropriate substrate particle size, bedrock, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide 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. 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 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. 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 densiometers 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 evergreen or deciduous 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.

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, three sites were electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat 8.4, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following seven tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types
- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Burbeck Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

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HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of June 18 to 23, 2003, was conducted by S. Sellars (WSP) and B. Budnick (DFG). The total length of the stream surveyed was 6,637 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.77 cfs on June 18, 2003.

Burbeck Creek is a B3 channel type for the entire 6,637 feet of the stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile, stable banks and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 59 degrees Fahrenheit. Air temperatures ranged from 55 to 73 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% riffle units, 37% pool units, 19% flatwater units (Graph 1). Based on total length of Level II habitat types there were 63% riffle units, 23% flatwater units, and 12% pool units (Graph 2).

Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low-gradient riffles, 38%; mid-channel pools, 25%; and step runs, 13% (Graph 3). Based on percent total length, low-gradient riffles made up 61%, step runs 21%, and mid-channel pools 8%.

A total of 38 pools were identified (Table 3). Main channel pools were the most frequently encountered, at 68%, and comprised 70% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eight of the 37 measured pools (22%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 41 pool tail-outs measured, 0 had a value of 1 (0%); 1 had a value of 2 (2%); 3 had a value of 3 (7%); 4 had a value of 4 (10%); and 33 had a value of 5 (80%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Riffle habitat types had a mean shelter rating of 22, flatwater habitat types had a mean shelter rating of 9, and pool habitats had a mean shelter rating of 28 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 35. Main channel pools had a mean shelter rating of 24 (Table 3).

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Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Burbeck Creek. Graph 7 describes the pool cover in Burbeck Creek. Boulders are the dominant pool cover types followed by undercut banks.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Large cobble was the dominant substrate observed in 46% of pool tail-outs while boulders were the next most frequently observed substrate type, at 27%.

The mean percent canopy density for the surveyed length of Burbeck Creek was 91%. The mean percentages of evergreen and deciduous trees were 86% and 5%, respectively with 9% of the canopy open. Graph 9 describes the mean percent canopy in Burbeck Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 22%. The mean percent left bank vegetated was 25%. The dominant elements composing the structure of the stream banks consisted of 95% sand/silt/clay, 5% boulder, and 3% bedrock (Graph 10). Evergreen trees were the dominant vegetation type observed in 79% of the units surveyed. Additionally, 26% of the units surveyed had brush as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished for species composition and distribution in Burbeck Creek on July 8, 2003. Water temperatures taken during the electrofishing period 0945 and 1046 were 55 degrees Fahrenheit. Air temperatures ranged from 60 to 63 degrees Fahrenheit. The sites were sampled by S. Monday and J. Crews (DFG). Steelhead rainbow trout (SH) were the only salmonid species observed. Other aquatic species identified were Pacific giant salamanders (PGS) (Table A).

Site 1 was located approximately 85 feet from the confluence with Noyo River. The first site yielded one steelhead trout and one Pacific giant salamander.

Site 2 was located approximately 105 feet above the creek mouth. The site yielded one steelhead trout and one Pacific giant salamander.

Site 3 was located approximately 150 feet above the creek mouth. The site yielded no salmonids and one Pacific giant salamander.

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The following chart displays the information yielded from these sites:

2003 Burbeck Creek electrofishing observations.

Date	Survey Site #	Habitat Unit #	Habitat Type	Approx. Dist. from mouth (ft.)	SH/RT			Coho	
					YOY	1+	2+	YOY	1+
Reach 1: B3 Channel Type									
07/08/03	1	002	4.2	85	1	0	0	0	0
07/08/03	2	004	4.2	105	1	0	0	0	0
07/08/03	3	007	4.2	150	0	0	0	0	0

DISCUSSION

Burbeck Creek is a B3 channel type for the entire 6,637 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: B3 channel types are excellent for plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover.

The water temperatures recorded during the survey period of June 18 to 23, 2003 ranged from 55 to 56 degrees Fahrenheit. Air temperatures ranged from 52 to 59 degrees Fahrenheit. Air temperatures ranged from 55 to 73 degrees Fahrenheit. This is a suitable water temperature range for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Riffle habitat types comprised 63% of the total length of this survey, flatwater 23%, and pools 12%. The pools are relatively shallow, with only 8 of the 37 (22%) measured pools having a maximum 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 depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended 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.

One of the 41 pool tail-outs measured had embeddedness ratings of 1 or 2. Seven of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-eight of the pool tail-outs had a rating of 5, which is considered unsuitable 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.

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Thirty of the 41 pool tail-outs measured had silt or sand/large cobble or boulders as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean shelter for flatwater was 9. The mean shelter rating for pools was 28. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, whitewater contributes a small amount. 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 91%.

The percentage of right and left bank covered with vegetation was low at 22% and 25%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic trees species, in conjunction with bank stabilization, is recommended.

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) The Skunk Train culvert crossing at 455' is a barrier to juvenile and adult anadromous salmonids and should be upgraded to provide unimpeded fish passage.

4) 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.

5) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with log and root wad cover is desirable.

6) 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.

7) Active and potential sediment sources need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

8) Suitable size spawning substrate on Burbeck Creek is limited to relatively few reaches.

Projects should be designed at suitable sites to trap and sort spawning gravel.

9) There are several log debris accumulations present on Burbeck Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

COMMENTS AND LANDMARKS

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

Position (ft.):	Habitat Unit #:	Comments:
0	0001.00	Start of survey at the confluence with the Noyo River.
85	0003.00	Begin full sampling upstream of the Noyo River influence.
428	0010.00	There is a 1.5' plunge from the Skunk Train culvert.
455	0011.00	Skunk Train culvert is an inline, concrete box, lined with wood and measures 6.5' high x 6.5' wide x 135' long.
590	0012.00	Non-active erosion on right bank.
803	0016.00	Pacific giant salamanders and frogs observed.
1182	0021.00	There is a 3 inch unidentified fish.
1281	0023.00	Banks erosion.
1445	0029.00	Channel type measured at beginning of unit and is a B3.
2386	0040.00	Log debris accumulation (LDA) is retaining gravel.
2569	0046.00	Gradient increases.
3176	0057.00	There is a decommissioned road crossing in this unit.
3591	0062.00	Bank erosion is nearly vertical at bends and is approximately 20' high.
4341	0075.0	At 172' the banks below a road are eroded nearly vertical, 20' high x 50' long. At 315' a road crosses through creek.

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4732	0076.00	At 31' there is a right bank spring. At the end of the unit there is left bank erosion, 12' high x 50' long.
4804	0078.00	There is a 2' plunge from LDA which is retaining 5' of gravel.
4926	0080.00	LDA over pool includes 4 pieces of large wood and small wood. It is not a barrier.
5979	0095.00	LDA at the beginning of the unit mostly on the right bank. It includes 9 pieces of large wood and small wood combined.
6126	0096.00	Juvenile salamanders observed. Unidentified fish. Root mass retaining 2' of boulders and gravel.
6526	0102.00	End of survey at the fork in creek. There is an LDA. The survey continued up south branch which had approximately equal flow to mainstem but was larger and not blocked by LDA. The mainstem is steep and blocked by a large LDA. After the steep section the creek levels off and becomes surveyable.

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]	

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TABLES AND GRAPHS

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

Stream Name: Burbeck Creek　　Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003

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.)	Percent 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	1	CULVERT	1.0	135	135	2.0	1.1	0.3	0.3	149	149	45	45		0
19	4	FLATWATER	18.6	80	1515	22.8	8.0	0.7	1.1	280	5324	193	3658		9
38	37	POOL	37.3	21	794	12.0	8.2	0.7	1.5	174	6600	206	7809	144	28
44	9	RIFFLE	43.1	95	4193	63.2	9.3	0.5	1.0	582	25613	292	12845		22

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
102	51	6637	37685.62	24357.12

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Burbeck Creek Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003

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 (%)
39	7	LGR	38.2	103	4024	60.6	10	0.5	1.4	696	27154	345	13466		21	87
4	1	HGR	3.9	39	156	2.4	12	0.6		336	1344	202	806		50	94
1	1	BRS	1.0	13	13	0.2	2	0.3	0.4	29	29	9	9		0	97
1	1	GLD	1.0	16	16	0.2	10	0.5	0.9	152	152	76	76		10	92
5	1	RUN	4.9	24	119	1.8	8	0.8	1.2	160	798	128	638		5	93
13	2	SRN	12.7	106	1380	20.8	7	0.7	1.1	405	5260	283	3682		10	93
25	24	MCP	24.5	21	516	7.8	8	0.7	2.6	169	4220	182	4552	119	24	92
1	1	STP	1.0	41	41	0.6	6	0.3	0.9	246	246	197	197	74	30	80
2	2	CRP	2.0	26	52	0.8	6	0.6	1.5	145	289	130	260	87	10	92
2	2	LSR	2.0	18	37	0.6	6	0.8	1.9	111	222	116	232	89	55	94
8	8	PLP	7.8	18	148	2.2	10	0.9	3.3	202	1618	318	2544	255	36	92
1	1	CUL	1.0	135	135	2.0	1	0.3	0.3	149	149	45	45		0	98

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
102	51	6637	41480.89	26508.31

Table 3 - Summary of Pool Types

Stream Name: Burbeck Creek Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003

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
26	25	MAIN	68	21	557	70	7.9	0.6	172	4469	118	3059	24
12	12	SCOUR	32	20	237	30	8.8	0.9	177	2129	199	2391	35

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
38	37	794	6598.4	5449.504

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

Stream Name: Burbeck Creek Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003

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
24	MCP	65	5	21	14	58	5	21	0	0	0	0
1	STP	3	1	100	0	0	0	0	0	0	0	0
2	CRP	5	0	0	2	100	0	0	0	0	0	0
2	LSR	5	0	0	2	100	0	0	0	0	0	0
8	PLP	22	1	13	4	50	2	25	1	13	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
37	7	19	22	59	7	19	1	3	0	0

Mean Maximum Residual Pool Depth (ft.): 1.5

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Burbeck Creek Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003 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
39	7	LGR	0	6	4	0	1	2	19	67	0
4	1	HGR	0	25	0	25	0	0	25	25	0
1	1	BRS	0	0	0	0	0	0	0	0	0
44	9	TOTAL RIFFLE	0	8	3	3	1	2	18	55	0
1	1	GLD	0	0	0	100	0	0	0	0	0
5	1	RUN	0	0	0	0	50	0	0	50	0
13	2	SRN	0	0	5	0	0	0	25	70	0
19	4	TOTAL FLAT	0	0	3	25	13	0	13	48	0
25	24	MCP	17	14	10	10	0	1	15	33	0
1	1	STP	0	5	0	0	5	0	25	65	0
2	2	CRP	50	0	0	0	0	0	25	25	0
2	2	LSR	48	0	0	45	0	0	5	3	0
8	8	PLP	11	5	6	24	0	0	24	31	0
38	37	TOTAL POOL	19	10	8	14	0	1	17	31	0
1	1	CUL	0	0	0	0	0	0	0	0	0
102	51	TOTAL	14	9	7	13	1	1	16	36	0

Table 6 - Summary of Dominant Substrates By Habitat Type

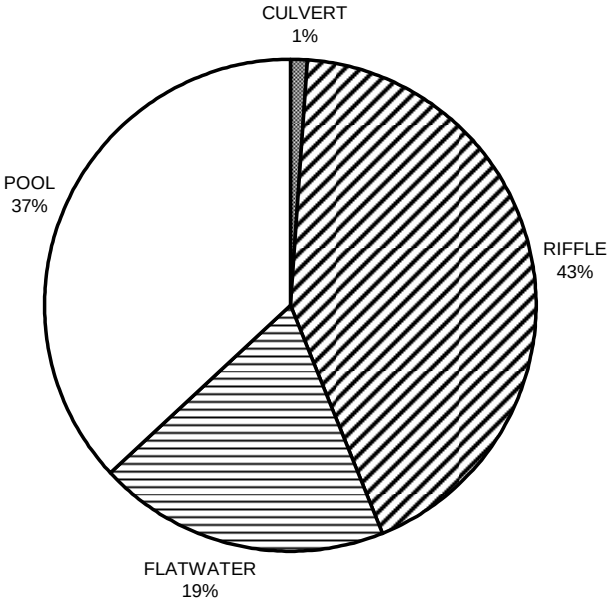
Stream Name: Burbeck Creek Drainage: Noyo River

Survey Dates: 6/18/2003 to 6/23/2003 Dry Units: 0

Confluence Location: Quad: BURBECK Legal Description: T18NR14WS08 Latitude: 39:25:42.0N Longitude: 123:26:24.0W

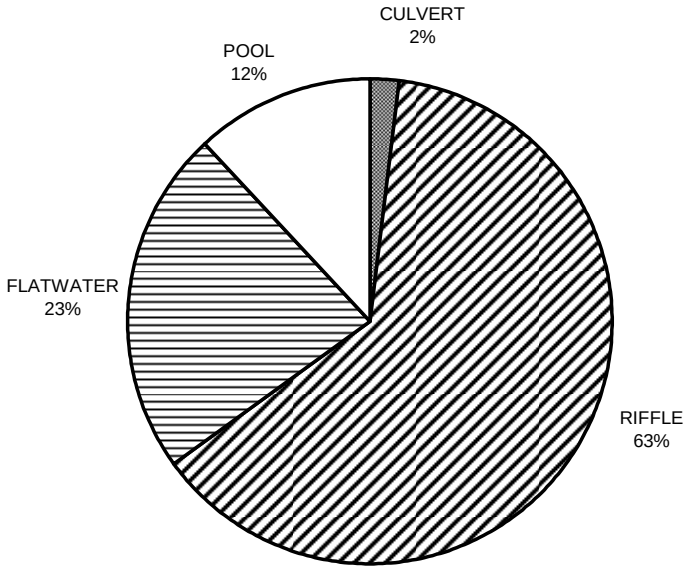
Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
39	7	LGR	0	0	0	0	86	14	0
4	0	HGR	0	0	0	0	0	0	0
1	1	BRS	0	0	0	0	0	0	100
1	1	GLD	0	0	0	0	100	0	0
5	1	RUN	0	0	0	100	0	0	0
13	2	SRN	0	0	0	0	50	50	0
25	4	MCP	0	0	25	0	50	25	0
1	1	STP	0	0	0	0	100	0	0
2	1	CRP	0	0	0	0	100	0	0
2	1	LSR	0	0	0	0	0	100	0
8	1	PLP	0	0	0	0	100	0	0

BURBECK CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



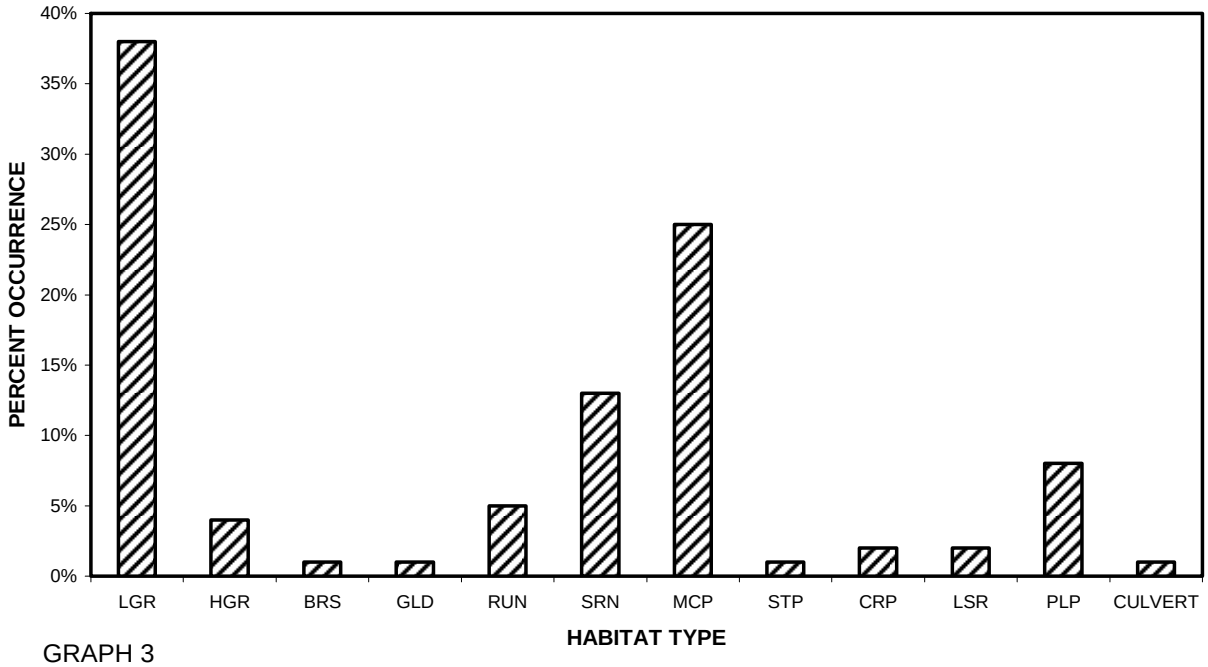
GRAPH 1

BURBECK CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



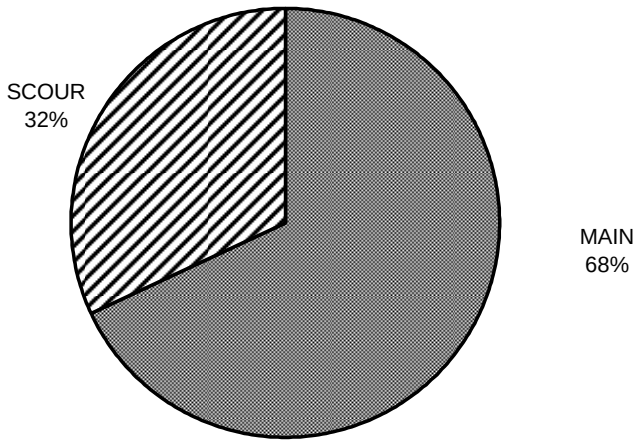
GRAPH 2

BURBECK CREEK
HABITAT UNIT TYPES BY PERCENT OCCURRENCE

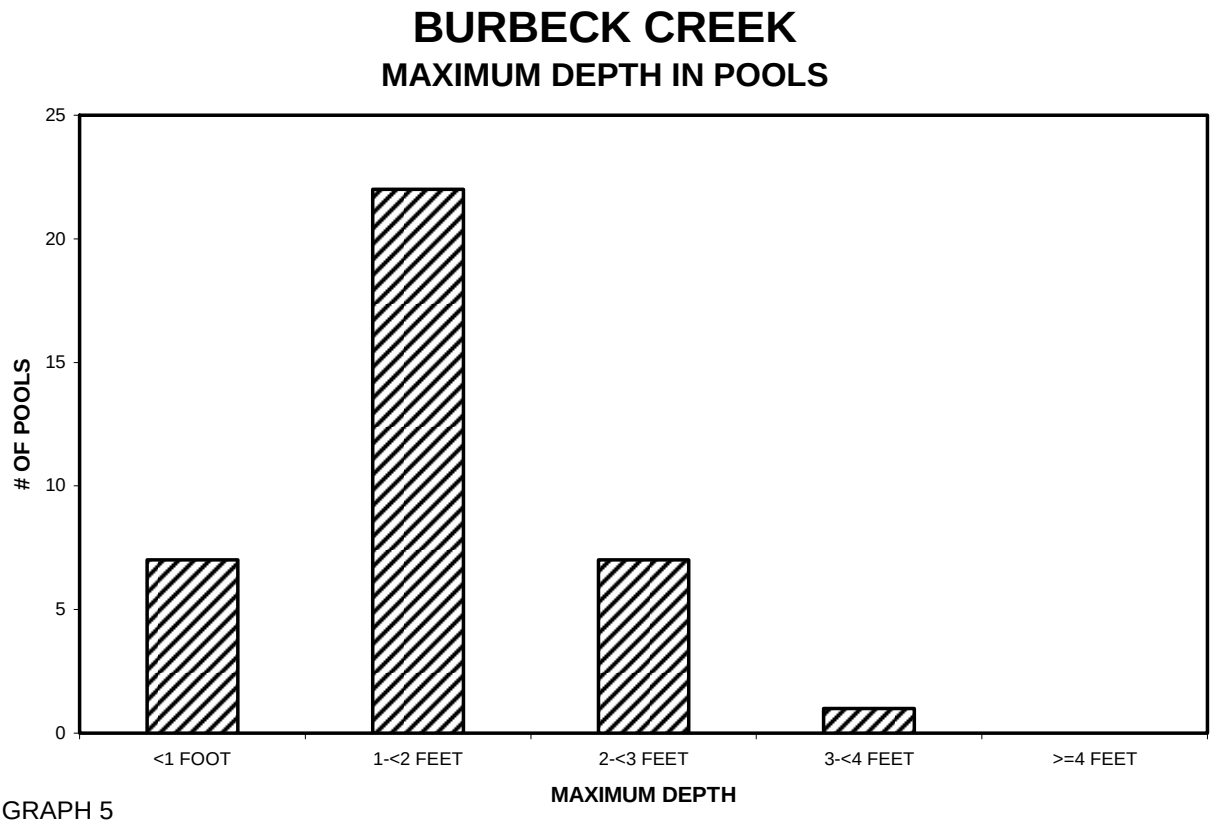


GRAPH 3

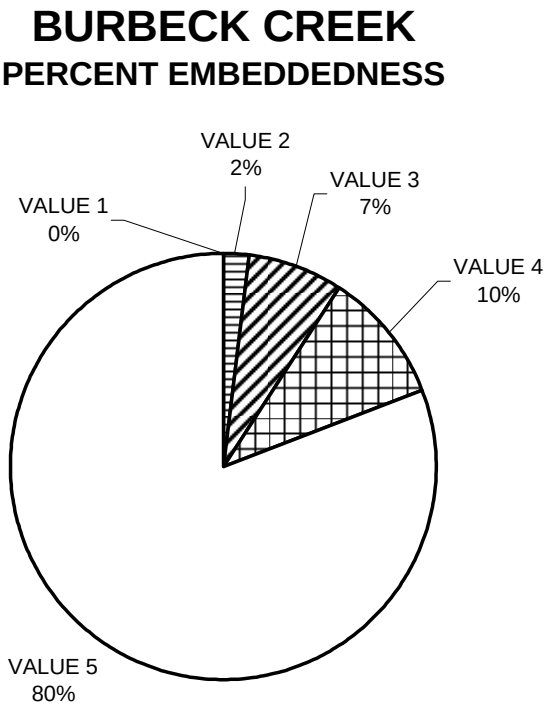
BURBECK CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

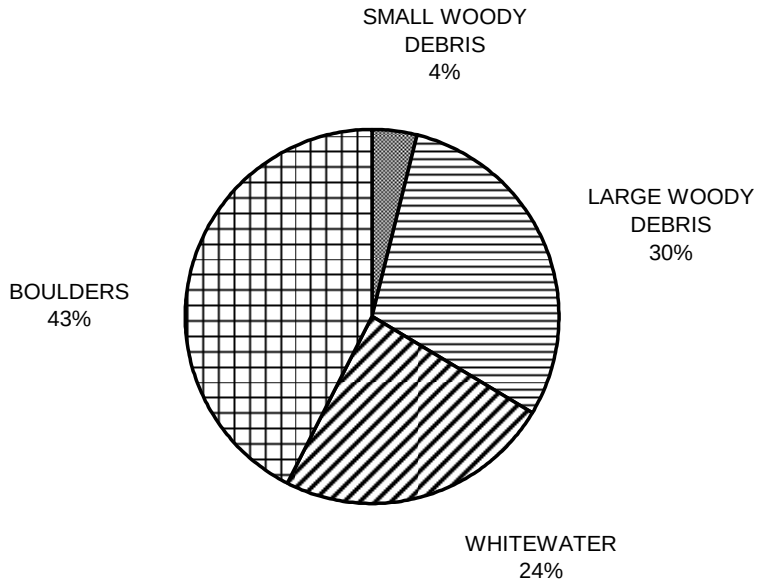


GRAPH 5



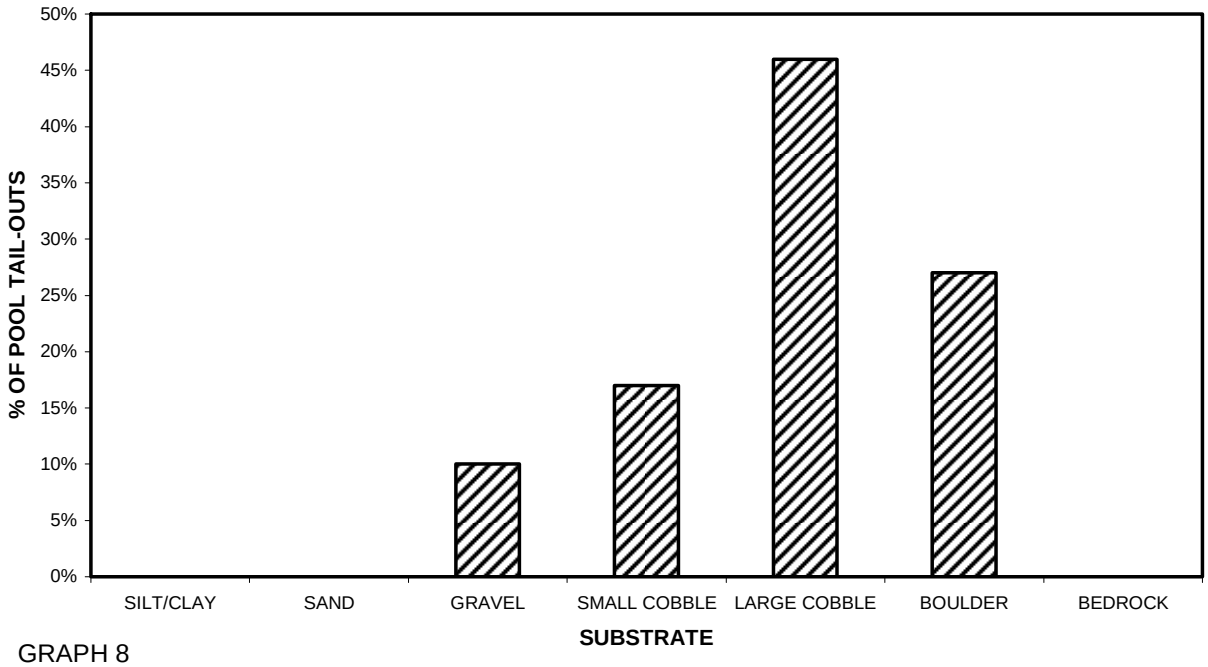
GRAPH 6

BURBECK CREEK
MEAN PERCENT COVER TYPES IN POOLS



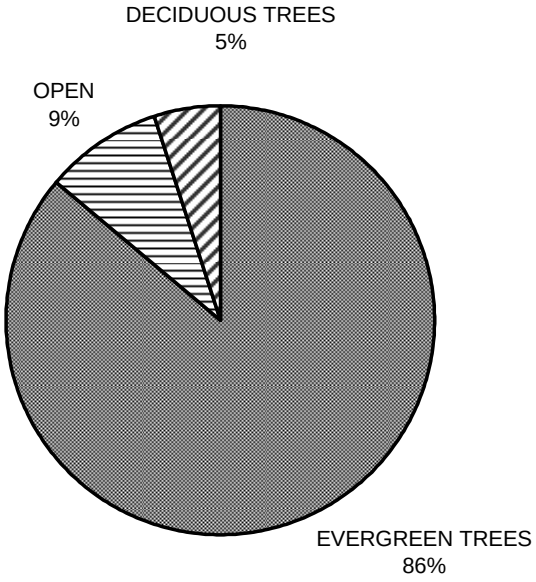
GRAPH 7

BURBECK CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



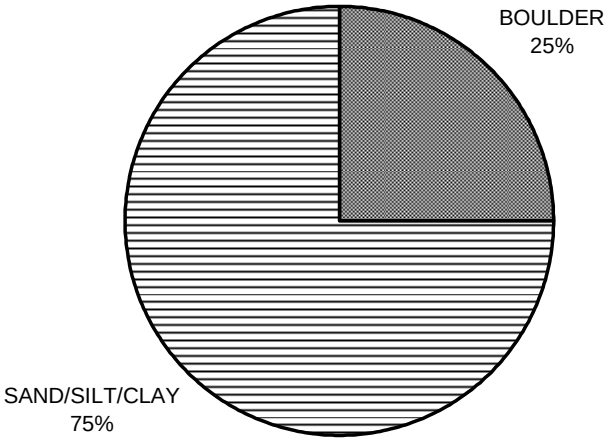
GRAPH 8

BURBECK CREEK
MEAN PERCENT CANOPY



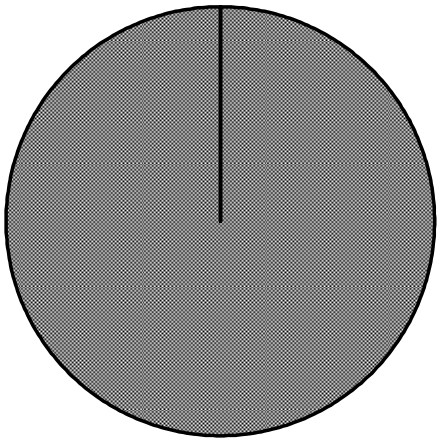
GRAPH 9

BURBECK CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

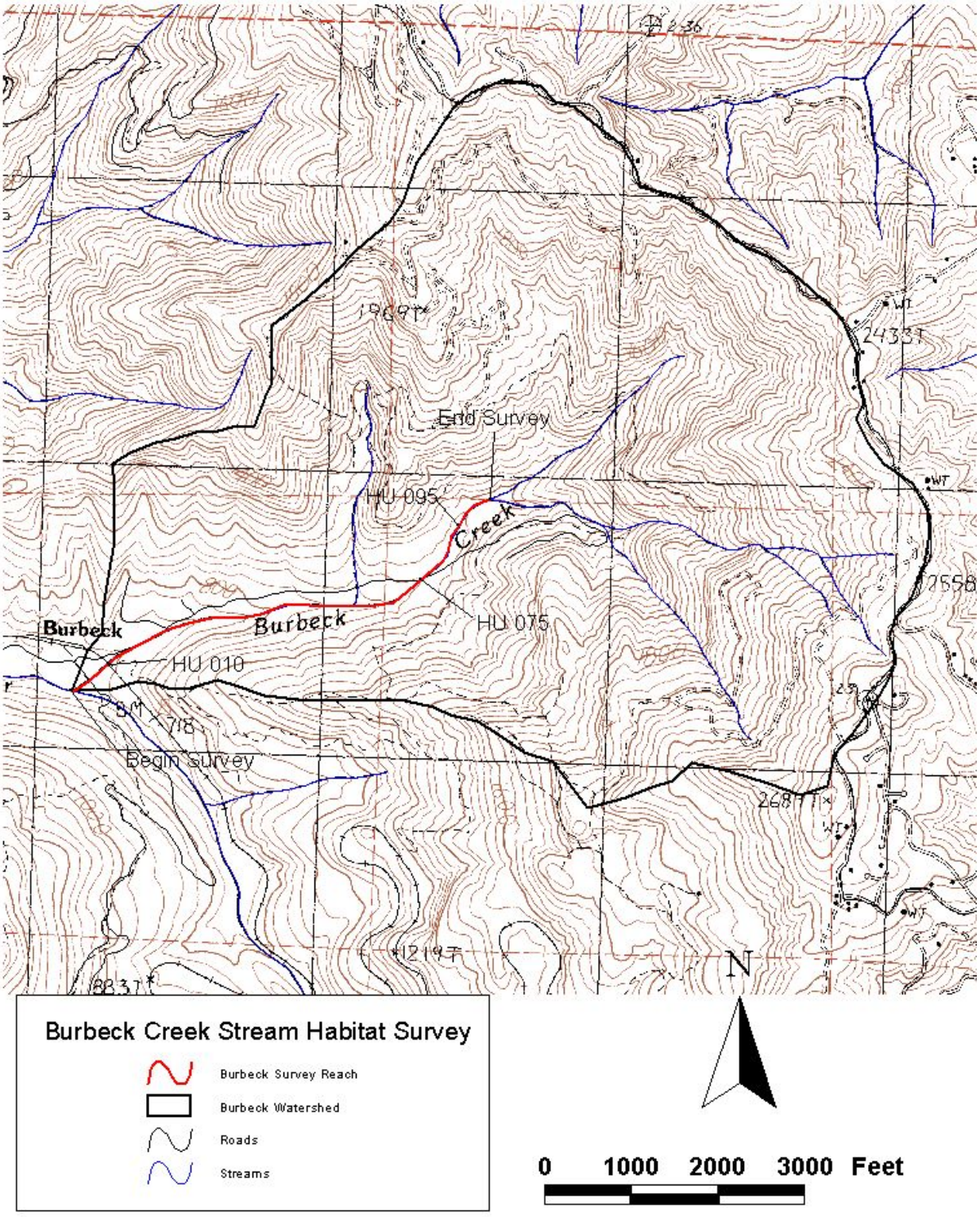
BURBECK CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



EVERGREEN TREES
100%

GRAPH 11

Burbeck Creek



Map 1. Map showing Burbeck Creek watershed and stream habitat survey reach.