STREAM INVENTORY REPORT

Gulch C

INTRODUCTION

A stream inventory was conducted from July 1 to July 2, 2003 on Gulch C. The survey began at the confluence with Noyo River and extended upstream 6,684.5 feet.

The Gulch C 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 Gulch C. 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

Gulch C is a tributary to the Noyo River, which drains to the Pacific Ocean, located in Mendocino County, California (Map 1). Gulch C's legal description at the confluence with Noyo River is T18N R15W S12. Its location is 39°25′52″ north latitude and 123°28′23″ west longitude. Gulch C is a first order stream and has approximately 6,753 feet of solid blue line stream and 2,761 feet of dashed blue line stream according to the USGS Burbeck 7.5 minute quadrangle. Gulch C drains a watershed of approximately 1.03 square miles. Elevations range from about 478 feet at the mouth of the creek to 1,835 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production, rangeland, and recreation. Vehicle access exists via highway 20 and Irmulco Road approximately seven miles west of Willits. Mendocino Redwood Company and Soper Wheeler logging roads are used to access the stream.

METHODS

The habitat inventory conducted in Gulch C follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The California Department of Fish and Game field crew 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 Gulch C 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". Gulch C 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 Gulch C, 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 Gulch C, 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 Gulch C, 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 Gulch C, 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 Gulch C. In addition, ten 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 Gulch C 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 July 1 to July 2, 2003, was conducted by B. Budnick and S. Monday (DFG). The total length of the stream surveyed was 6,684 feet.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.01 cfs on July 9, 2003.

Gulch C is an F4 channel type for the first 4,635.5 feet, a B4 for 115 feet, and an A4 for the remaining 1,934 feet of the stream surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile with stable banks and gravel-dominant substrates. A4 channels are steep, narrow, cascading, step-pool streams with high energy/debris transport associated with depositional soils, and gravel-dominant channels.

Water temperatures taken during the survey period ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 57 to 76 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 36% riffle units, 36% pool units, and 17% flatwater units (Graph 1). Based on total length of Level II habitat types there were 59% riffle units, 16% flatwater units, and 11% pool units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low-gradient riffles, 37%; mid-channel pools, 24%; and runs, 14% (Graph 3). Based on percent total length, low-gradient riffles made up 59%, runs 12%, and mid-channel pools 7%.

A total of 45 pools were identified (Table 3). Main-channel pools were the most frequently encountered, at 71%, and comprised 71% 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. Six of the 45 measured pools (13%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 45 pool tail-outs measured, 2 had a value of 1 (4%); 24 had a value of 2 (53%); 11 had a value of 3 (24%); 3 had a value of 4 (7%); and 5 had a value of 5 (11%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

Pool habitats had a mean shelter rating of 37, flatwater habitat types had a mean shelter rating of 16, and riffle habitat types had a mean shelter rating of 7, (Table 1). Of the pool types, the main-channel pools had the highest mean shelter rating at 41. Scour pools had a mean shelter rating of

25 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris was the dominant cover type in Gulch C. Graph 7 describes the pool cover in Gulch C. Large woody debris is the dominant pool cover type followed by undercut banks.

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 73% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 16%.

The mean percent canopy density for the surveyed length of Gulch C was 96%. The mean percentages of evergreen and deciduous trees were 90% and 6%, respectively with 4% of the canopy open. Graph 9 describes the mean percent canopy in Gulch C.

For the stream reach surveyed, the mean percent right bank vegetated was 28%. The mean percent left bank vegetated was 31%. The dominant elements composing the structure of the stream banks consisted of 99% sand/silt/clay and 1% bedrock (Graph 10). Evergreen trees were the dominant vegetation type observed in 86% of the units surveyed. Additionally, 7% of the units surveyed had grass as the dominant vegetation type, 5% had brush as the dominant vegetation type and 1% had deciduous tree as the dominant vegetation type (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Ten sites were electrofished on July 8, 2003 by J. Crews and S. Monday (DFG). Sites 1-3 were located below the railroad culvert with sites 4-10 located above. Coho young-of-the-year (YOY), steelhead rainbow trout young-of-the-year (SH YOY) and steelhead yearling (SH Y+) were found both below and above a perched culvert with a four foot jump.

Date	Site ID	Coho YOY	SH YOY	SH 1+
7/8/2003	1	3	3	0
7/8/2003	2	3	3	0
7/8/2003	3	2	1	0
7/8/2003	4	2	3	0
7/8/2003	5	2	1	0
7/8/2003	6	0	2	0
7/8/2003	7	2	0	0
7/8/2003	8	1	2	0
7/8/2003	9	0	1	0
7/8/2003	10	2	0	0

DISCUSSION

Gulch C is an F4 channel type for 4,635.5 feet, a B4 for 115 feet, and an A4 for 1,934 feet of stream surveyed. The suitability of F4, B4, and A4 channel types for fish habitat improvement

structures are as follows: F4 channel types are good for bank-placed boulders; fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover. B4 channel types are excellent for low-stage plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing-deflectors, and log cover. A4 channel types are good for bank-placed boulders; fair for plunge weirs, opposing wing-deflectors, and log cover.

The water temperatures recorded during the survey period of July 1 to July 2, 2003 ranged from 54 to 60 degrees Fahrenheit. Air temperatures ranged from 57 to 76 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 59% of the total length of this survey, flatwater 16%, and pools 11%. The pools are relatively shallow, with only 6 of the 45 (13%) 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.

Twenty-six of the 45 pool tail-outs measured had embeddedness ratings of 1 or 2. Fourteen of the pool tail-outs had embeddedness ratings of 3 or 4. Five 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.

Forty of the 45 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter for flatwater was 16. The mean shelter rating for pools was 37. 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 all habitat types. Additionally, undercut banks contribute a small amount.

The mean percent canopy density for the stream was 96%. Reach 1 had a canopy density of 95% while Reaches 2 and 3 had canopy densities of 98% and 97%, respectively.

The percentage of right and left bank covered with vegetation was low at 28% and 31%, 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.

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RECOMMENDATIONS

1) Gulch C should be managed as an anadromous, natural production stream.

2) Due to a culvert perched four foot high above the water surface, near the mouth of Gulch C, access for migrating salmonids is an ongoing potential problem. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved where possible.

3) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

4) 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.

5) There are several log debris accumulations present on North Fork Noyo River 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.

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) 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.

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 confluence with Noyo River.
261	0002.00	Within confluence of mainstem Noyo River.
452	0003.00	Salmonid young-of-the-year (YOY) observed.
490	0005.00	Water pipes in stream.

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526	0006.00	There is a 4.5’ jump into a 60” diameter corrugated metal pipe culvert. The culvert is 30’ feet long with a very low gradient. The banks have eroded around the culvert outlet leaving it perched.
556	0007.00	No gradient to culvert.
619	0008.00	House and outbuilding on right bank, presently abandoned. YOY salmonids above culvert.
674	0009.00	One foot culvert on right bank.
682	0010.00	Five foot culvert at grade. The first 38 feet is flat and the next 23 feet is sloped up to next unit.
743	0011.00	YOY salmonids above culvert.
961	0018.00	Large woody debris (LWD) together with small woody debris (SWD) in channel, approximately 4' high x 30' wide x 15' long.
1018	0020.00	Channel type taken at the end of the unit. Result was an F4.
1151	0022.00	Stream is very overgrown by blackberries, willow, and poison oak.
1213	0023.00	Log debris accumulation (LDA), 20' high x 20' long x 4' high, not retaining sediment. YOY observed.
1416	0028.00	YOY salmonids present.
1433	0029.00	Decommissioned road periodically appears on left bank and right bank.
1831	0036.00	One foot plunge over LDA retaining sediment.
1898	0038.00	YOY salmonid observed.
2011	0041.00	Right bank erosion creating LDA at 15’ into unit. Impassable to survey crew.
2056	0042.00	Last unit salmonids are observed.
2295	0046.00	LDA consists of 7 pieces of LWD and SWD and is 4' high x 20' wide x 15' long. Sediment is not being retained.
2315	0047.00	LDA at 21' into unit retaining 3' of gravel and fine sediment.
2381	0048.00	Road on left bank.

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2539	0050.00	Stream subsurface above pool. Sediment is retained 1.5' high.
2857	0056.00	LDA at 43' into unit not retaining gravel, 5' high x 15' wide x 12' long.
3418	0068.00	Dry right bank tributary.
3424	0069.00	Thirty-six inch culvert on right bank, 53' into unit coming from under road.
3741.5	0078.00	LDA in stream at 24', wood is from a decommissioned Humboldt crossing.
3866.5	0079.00	Dry right bank tributary at beginning of unit.
3997.5	0083.00	Humboldt crossing from main road crossing to left bank.
4628.5	0085.00	Gradient is increasing.
4628.5	0085.00	Dry left bank tributary at top of unit. Road on right bank.
4635.5	0086.00	Change to B4 channel type.
4750.5	0090.00	Channel type change to A4
4931.5	0093.00	On right bank above the road, there is a large slide, approximately 100' high x 40' wide x 30' deep. LDA retaining sediment and creating 5' high jump to next unit.
4939.5	0094.00	Large wood came down with bank erosion covering the road.
5657.5	0100.00	Dry right bank tributary at 61'.
5772.5	0101.00	Jump 2.5' up to next unit.
5911.5	0105.00	Two 3’ jumps in this unit.
5934.5	0106.00	Slope is greater than 4%.
6186.5	0110.00	Wet right bank tributary at top of unit.
6259.5	0111.00	Erosion from right bank decommissioned road, there is a slide into stream 20' high.
6276.5	0112.00	Wet right bank spring.

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6684.5 0120.00 End of survey. End of anadromy due to high gradient.

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: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003

Confluence Location: Quad: BURBECK Legal Description: T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

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
2	1	CULVERT	1.7	62	124	1.9	1.0	0.2	0.2	63	126	13	25		
6	0	DRY	5.0	92	551	8.2									
20	7	FLATWATER	16.7	54	1070	16.0	4.4	0.4	0.9	240	4799	105	2096		16
2	0	NOSURVEY	1.7	118	236	3.5									
45	45	POOL	37.5	16	733	11.0	6.9	0.8	1.6	117	5246	136	6112	115	37
45	9	RIFFLE	37.5	88	3970.5	59.4	3.2	0.2	0.5	123	5522	27	1218		7

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
120	62	6684.5	15692.12	9450.634

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003

Confluence Location: Quad: BURBECK Legal Description: T18NR15WS12 Latitude: 39:25.52.0N Longitude: 123:28:24.0W

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 (%)
44	8	LGR	36.7	90	3967	59.3	4	0.2	1	138	6065	30	1339		8	94
1	1	BRS	0.8	4	4	0.1	0	0.1	0.1	2	2	0	0		0	95
1	1	GLD	0.8	57	57	0.9	6	0.4	0.8	325	325	130	130		20	98
17	4	RUN	14.2	48	817	12.2	4	0.5	1.2	182	3088	80	1363		13	97
2	2	SRN	1.7	98	196	2.9	3	0.4	1.3	314	628	141	283		20	95
29	29	MCP	24.2	15	445	6.7	7	0.7	3	103	2980	89	2571	69	41	96
3	3	STP	2.5	26	78	1.2	6	0.9	1.85	153	460	160	481	128	47	99
4	4	CRP	3.3	21	84	1.3	5	0.6	1.8	102	409	83	331	65	15	93
1	1	LSR	0.8	16	16	0.2	6	0.4	1.3	96	96	58	58	38	10	98
8	8	PLP	6.7	14	110	1.6	9	1.3	4.8	163	1302	334	2671	310	33	96
6	0	DRY	5.0	92	551	8.2										98
2	1	CUL	1.7	62	124	1.9	1	0.2	0.2	63	126	13	25			
2	0	NS	1.7	118	236	3.5										

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
120	62	6684.5	15479.45	9251.896

Table 3 - Summary of Pool Types

Stream Name: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003

Confluence Location: Quad: BURBECK Legal Description: T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

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
32	32	MAIN	71	16	523	71	6.6	0.7	107	3439	74	2381	41
13	13	SCOUR	29	16	210	29	7.5	1.0	139	1807	214	2776	25

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
45	45	733	5246.05	5156.737

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

Stream Name: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003

Confluence Location: Quad: BURBECK T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

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
29	MCP	64	2	7	25	86	1	3	1	3	0	0
3	STP	7	0	0	3	100	0	0	0	0	0	0
4	CRP	9	0	0	4	100	0	0	0	0	0	0
1	LSR	2	0	0	1	100	0	0	0	0	0	0
8	PLP	18	1	13	3	38	2	25	1	13	1	13

Total Units	Total 1 Foot Max Resid. Depth	< 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
45	3	7	36	80	3	7	2	4	1	2

Mean Maximum Residual Pool Depth (ft): 1.6

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003 Dry Units: 6

Confluence Location: Quad: BURBECK Legal Description: T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

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
44	8	LGR	8	14	32	0	20	0	0	1	0
1	1	BRS	0	0	0	0	0	0	0	0	0
45	9	TOTAL RIFFLE	7	13	28	0	18	0	0	1	0
1	1	GLD	0	95	5	0	0	0	0	0	0
17	4	RUN	70	8	23	0	0	0	0	0	0
2	2	SRN	0	10	40	0	25	0	0	25	0
20	7	TOTAL FLAT	40	21	25	0	7	0	0	7	0
29	29	MCP	24	17	43	6	4	2	0	0	0
3	3	STP	8	17	60	0	0	0	5	10	0
4	4	CRP	39	13	18	0	6	0	0	0	0
1	1	LSR	0	0	0	100	0	0	0	0	0
8	8	PLP	16	12	53	4	1	0	6	9	0
45	45	TOTAL POOL	23	15	43	7	3	1	1	2	0
2	0	CUL									
2	0	NS									
120	61	TOTAL	22	15	39	5	6	1	1	3	0

Gulch C

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Gulch Creek Drainage: Noyo River

Survey Dates: 7/1/2003 to 7/2/2003 Dry Units: 6

Confluence Location: Quad: BURBECK Legal Description: T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

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
44	8	LGR	0	0	100	0	0	0	0
1	1	BRS	0	0	0	0	0	0	100
1	1	GLD	0	0	100	0	0	0	0
17	4	RUN	0	0	100	0	0	0	0
2	2	SRN	0	0	100	0	0	0	0
29	17	MCP	6	0	76	18	0	0	0
3	3	STP	0	0	100	0	0	0	0
4	2	CRP	0	0	100	0	0	0	0
1	1	LSR	0	0	100	0	0	0	0
8	7	PLP	0	0	43	43	14	0	0

Gulch C

Table 8 - Fish Habitat Inventory Data Summary

Stream Name: Gulch Creek
Drainage: Noyo River
Survey Dates: 7/1/2003 to 7/2/2003
Survey Length (ft.): 6684.5 Main Channel (ft.): 6684.5 Side Channel (ft.): 0
Confluence Location: Quad: BURBECK
Legal Description: T18NR15WS12 Latitude: 39:25:52.0N Longitude: 123:28:24.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 4635.5
Riffle/Flatwater Mean Width (ft.): 4.0
BFW:
Range (ft.): 0 to 8
Mean (ft.): 7
Std. Dev.: 1
Base Flow (cfs.): 0.1
Water (F): 54 - 60 Air (F): 57 - 76
Dry Channel (ft): 275

Canopy Density (%): 95
Coniferous Component (%): 91
Deciduous Component (%): 9
Dominant Bank Vegetation: Evergreen Trees
Vegetative Cover (%): 52
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 35
LWD per 100 ft.:
Riffles: 2
Pools: 12
Flat: 3

Pools by Stream Length (%): 12
Pool Frequency (%): 36
Residual Pool Depth (%):
< 2 Feet Deep: 87
2 to 2.9 Feet Deep: 3
3 to 3.9 Feet Deep: 6
>= 4 Feet Deep: 3
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 37

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 81 Sm Cobble: 13 Lg Cobble: 3 Boulder: 0 Bedrock: 3
Embeddedness Values (%): 1. 6 2. 58 3. 19 4. 10 5. 6

STREAM REACH: 2

Channel Type: B4
Reach Length (ft.): 115
Riffle/Flatwater Mean Width (ft.):
BFW:
Range (ft.): 8 to 8
Mean (ft.): 8
Std. Dev.: 0
Base Flow (cfs.): 0.1
Water (F): 55 - 55 Air (F): 63 - 63
Dry Channel (ft): 64

Canopy Density (%): 98
Coniferous Component (%): 100
Deciduous Component (%): 0
Dominant Bank Vegetation: Evergreen Trees
Vegetative Cover (%): 30
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 55
LWD per 100 ft.:
Riffles: 0
Pools: 17
Flat:

Pools by Stream Length (%): 21
Pool Frequency (%): 50
Residual Pool Depth (%):
< 2 Feet Deep: 50
2 to 2.9 Feet Deep: 50
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 2.0
Mean Pool Shelter Rating: 35

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 100 Sm Cobble: 0 Lg Cobble: 0 Boulder: 0 Bedrock: 0
Embeddedness Values (%): 1. 0 2. 50 3. 50 4. 0 5. 0

Gulch C

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: A4
Reach Length (ft.): 1934
Riffle/Flatwater Mean Width (ft.): 2.5
BFW:
Range (ft.): 8 to 8
Mean (ft.): 8
Std. Dev.: 0
Base Flow (cfs.): 0.1
Water (F): 55 - 55 Air (F): 63 - 63
Dry Channel (ft): 212

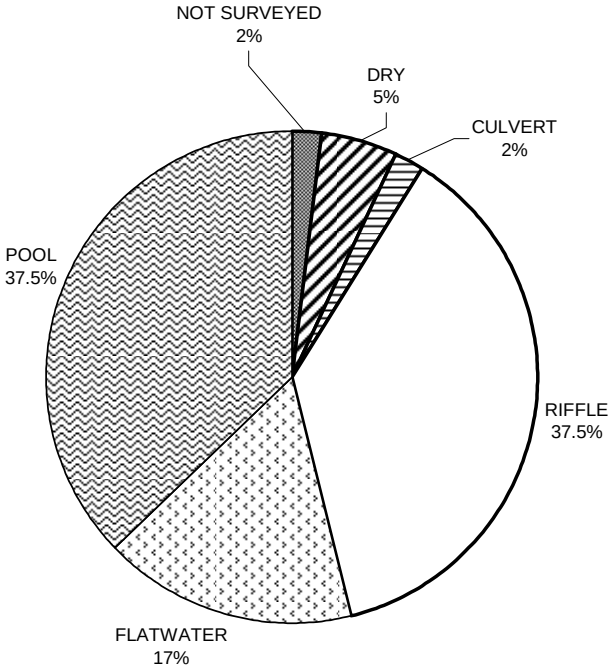
Canopy Density (%): 97
Coniferous Component (%): 100
Deciduous Component (%): 0
Dominant Bank Vegetation: Evergreen Trees
Vegetative Cover (%): 37
Dominant Shelter: Large Woody Debris
Dominant Bank Substrate Type: Sand/Silt/Clay
Occurrence of LWD (%): 47
LWD per 100 ft.:
Riffles: 4
Pools: 20
Flat: 0

Pools by Stream Length (%): 9
Pool Frequency (%): 39
Residual Pool Depth (%):
< 2 Feet Deep: 92
2 to 2.9 Feet Deep: 8
3 to 3.9 Feet Deep: 0
>= 4 Feet Deep: 0
Mean Max Residual Pool Depth (ft.): 1.6
Mean Pool Shelter Rating: 37

Pool Tail Substrate (%): Silt/Clay: 0 Sand: 0 Gravel: 75 Sm Cobble: 0 Lg Cobble: 17 Boulder: 8 Bedrock: 0
Embeddedness Values (%): 1. 0 2. 42 3. 33 4. 0 5. 25

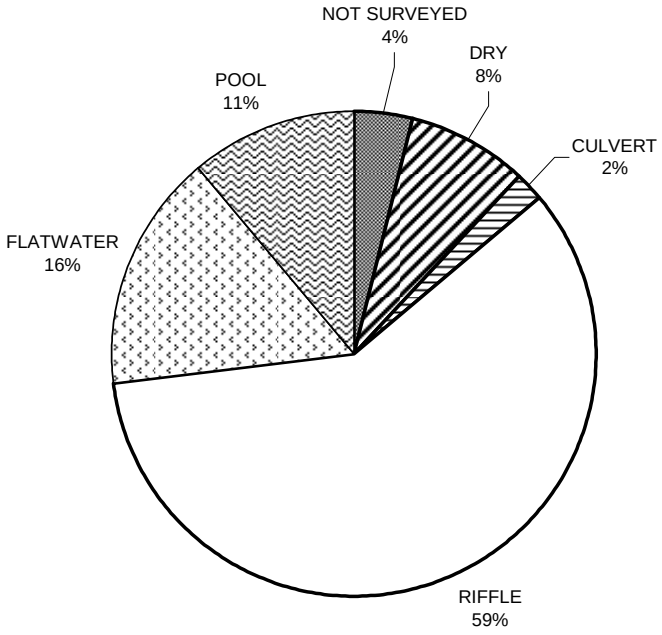
GULCH CREEK

HABITAT TYPES BY PERCENT OCCURRENCE



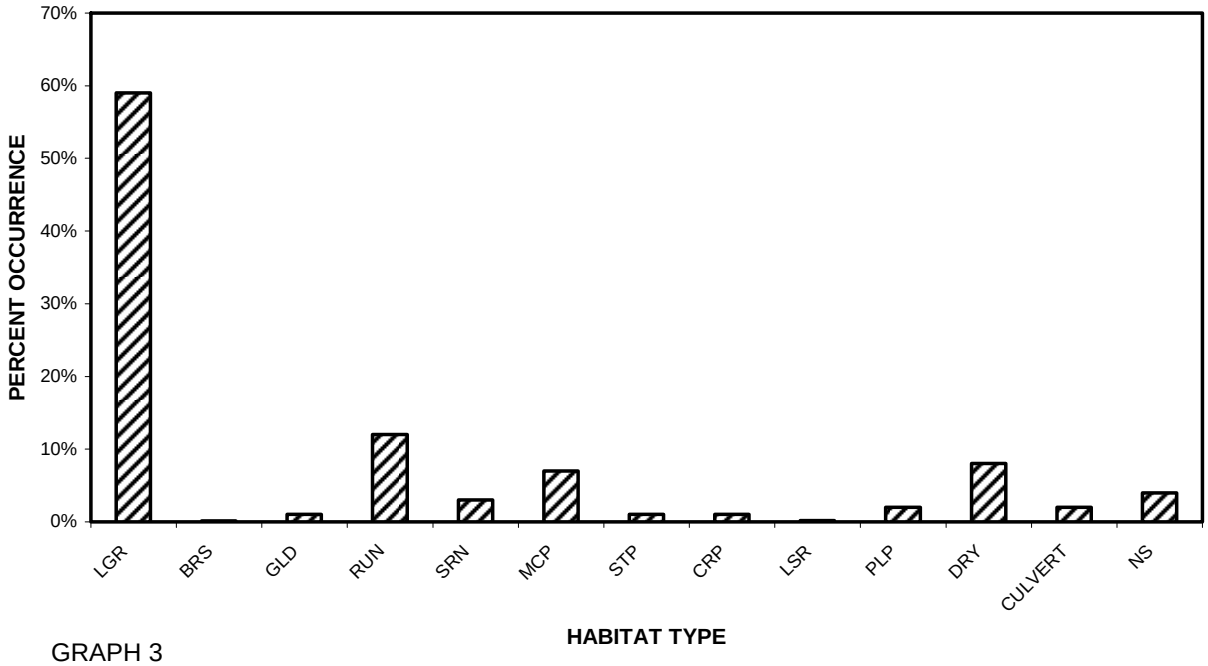
GRAPH 1

GULCH CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

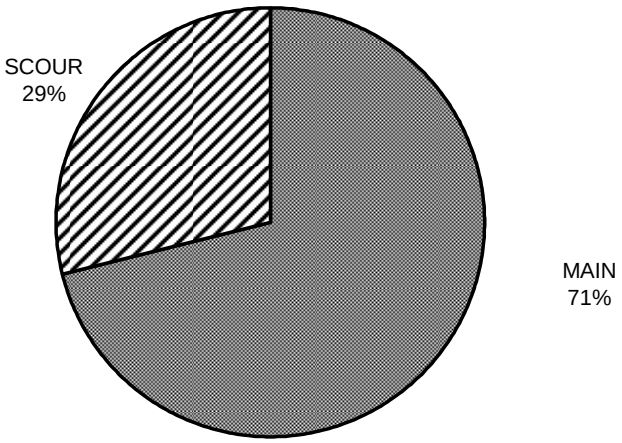
GULCH CREEK
HABITAT UNIT TYPES BY PERCENT OCCURRENCE



GRAPH 3

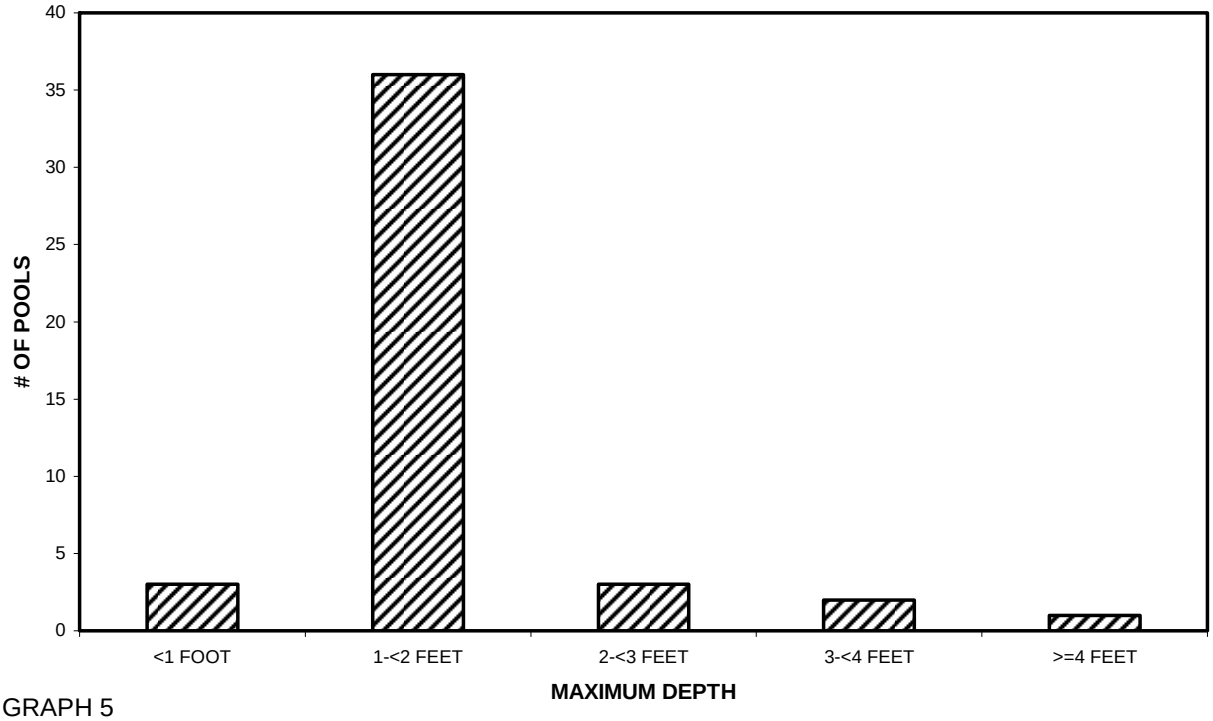
Gulch C

GULCH CREEK
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

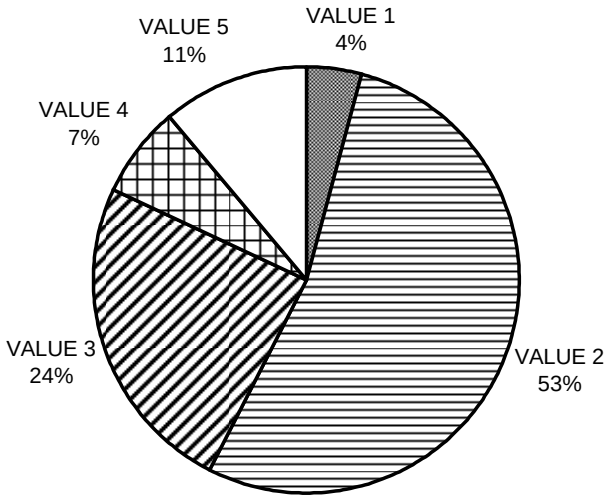
GULCH CREEK
MAXIMUM DEPTH IN POOLS



GRAPH 5

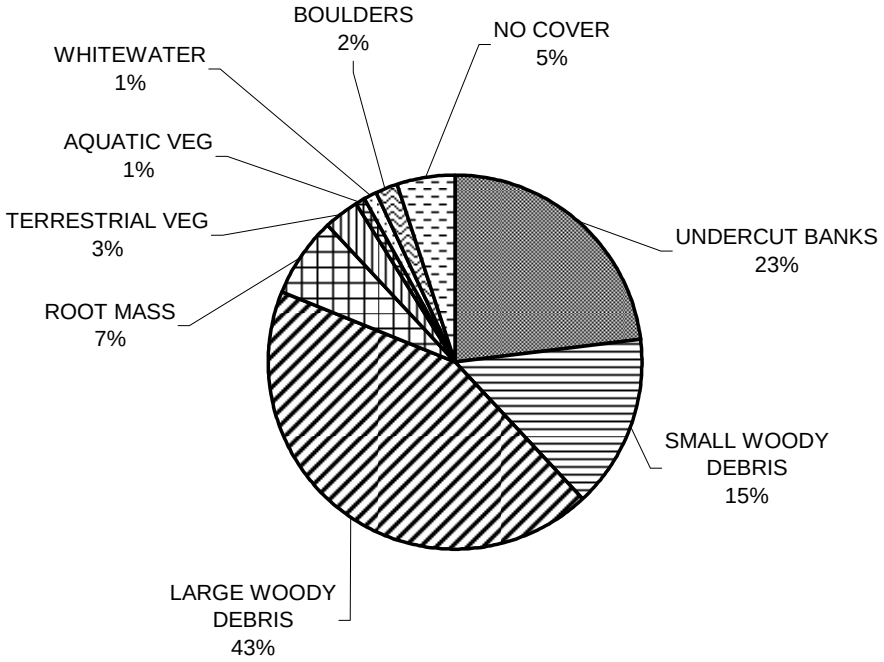
Gulch C

GULCH CREEK
PERCENT EMBEDDEDNESS



GRAPH 6

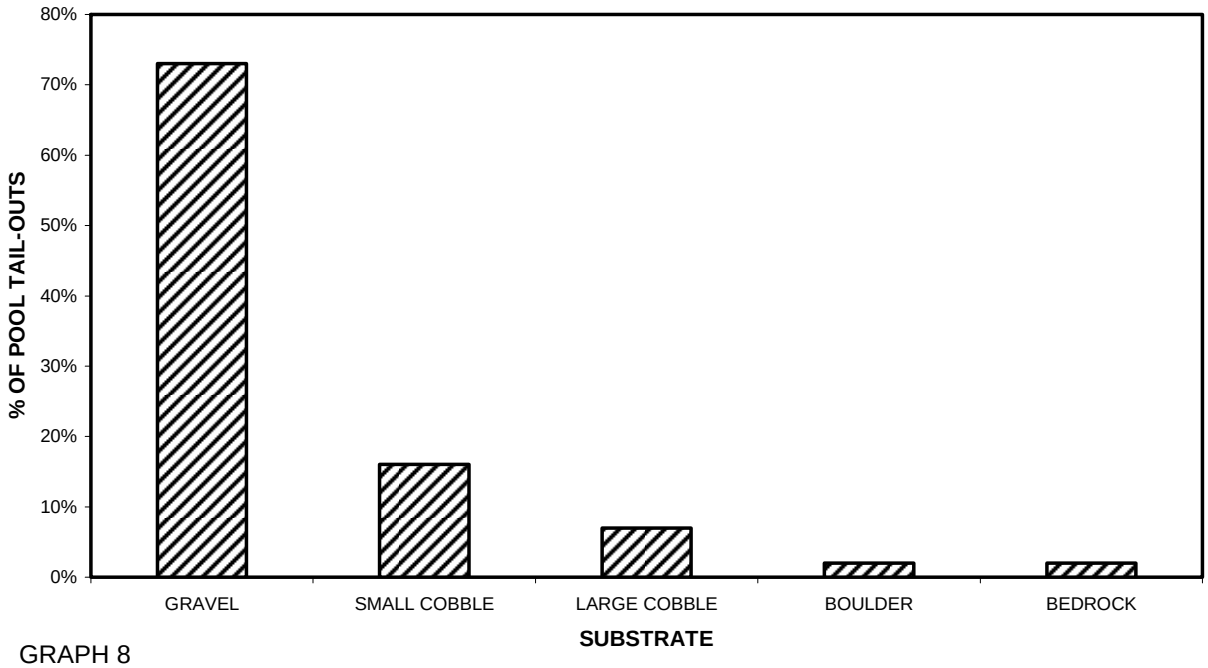
GULCH CREEK
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

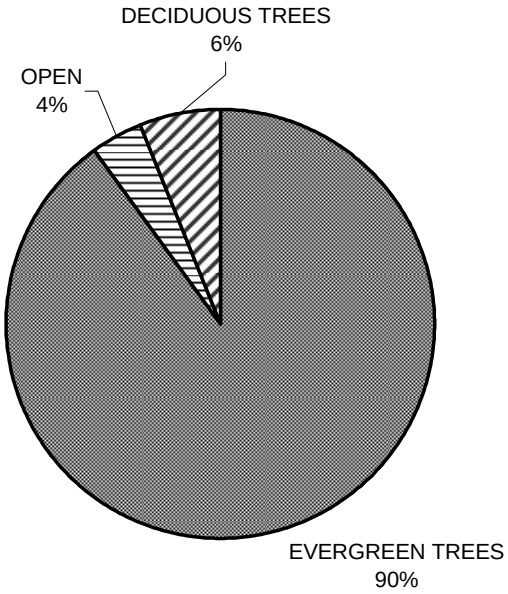
Gulch C

GULCH CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



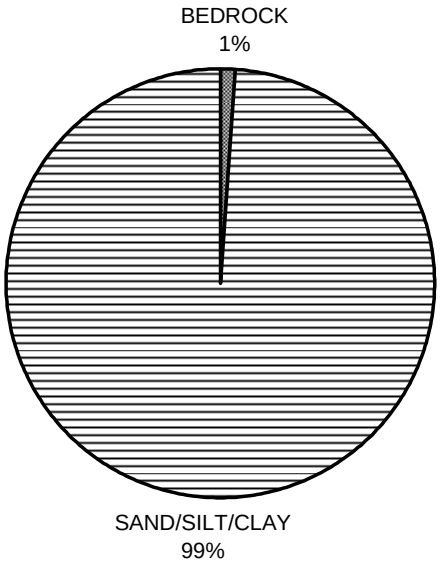
GRAPH 8

GULCH CREEK
MEAN PERCENT CANOPY



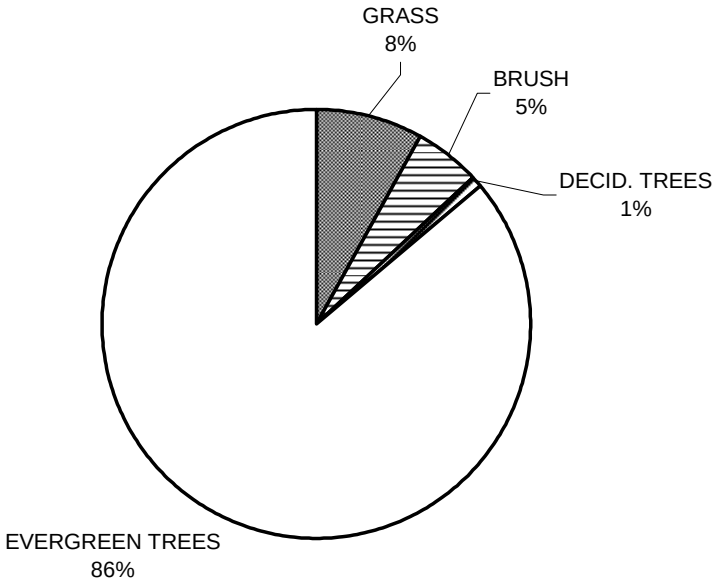
GRAPH 9

GULCH CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



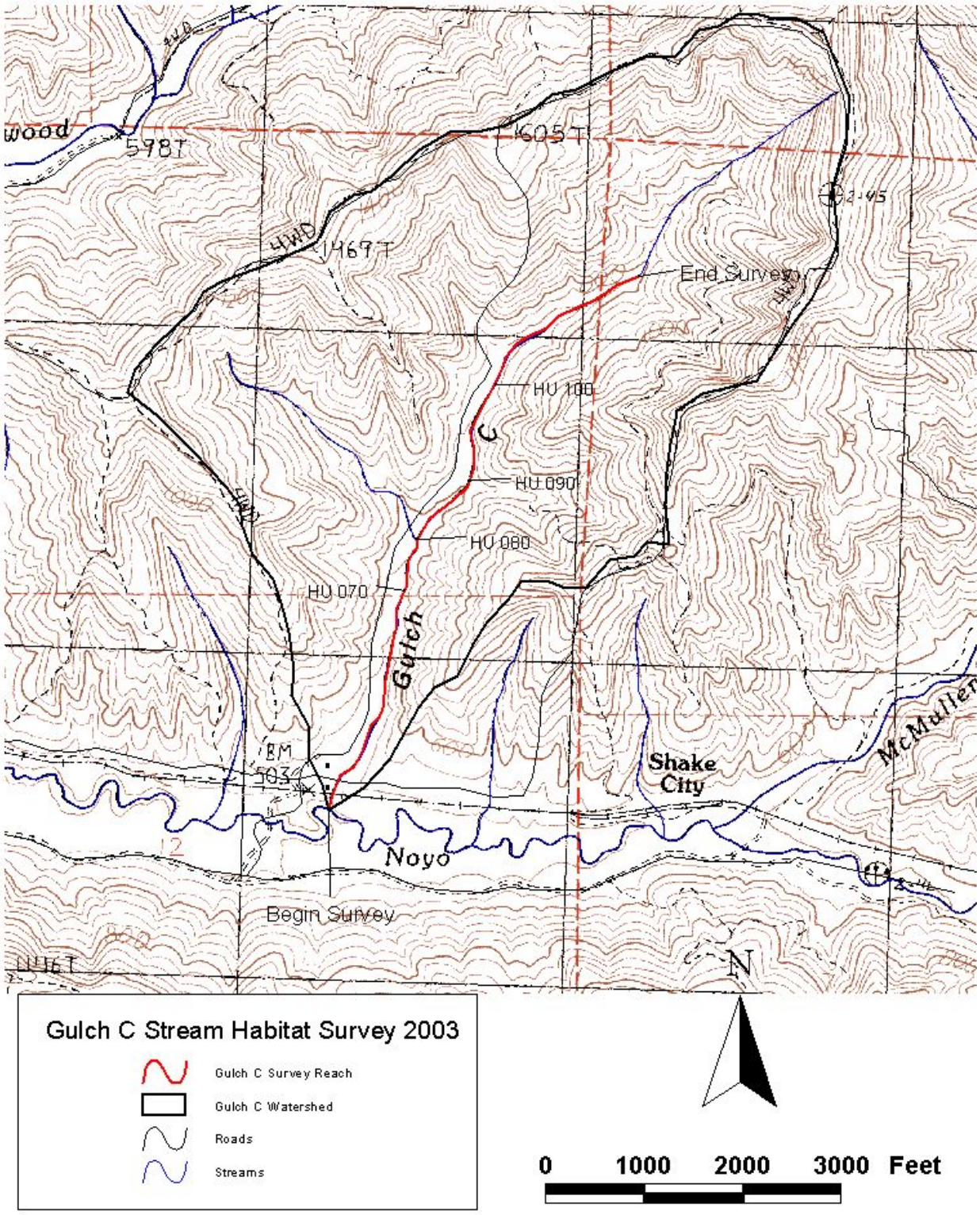
GRAPH 10

GULCH CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Gulch C



Map 1. Map showing Gulch C watershed and stream survey reach.