STREAM INVENTORY REPORT

GRIZZLY CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 2002 on Grizzly Creek. The survey began at the confluence with the North Fork Mattole River and extended upstream 0.42 miles. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Grizzly Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for chinook salmon, coho salmon, or steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Grizzly Creek is a tributary to the North Fork Mattole River, a tributary to the Mattole River, located in Humboldt County, California (Map 1). Grizzly Creek's legal description at the confluence with the North Fork Mattole River is T015 R02W S27. Its location is 40°21′15″ North latitude and 124°17′17″ West longitude. Grizzly Creek is a second order stream and has approximately 2.2 miles of blue line stream according to the USGS Petrolia 7.5 minute quadrangle. Grizzly Creek drains a watershed of approximately 2.2 square miles. Elevations range from about 60 feet at the mouth of the creek to 2,000 feet in the headwaters area.

METHODS

The habitat inventory conducted in Grizzly Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum

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

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 Grizzly 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". Grizzly 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 Grizzly 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 Grizzly 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 Grizzly 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 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 Grizzly 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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE 8.4 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 six tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

Graphics are produced from the tables using Quattro Pro. Graphics developed for Grizzly Creek include:

- Riffle, flatwater, pool habitats by percent occurrence
- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence
- Pool types by percent occurrence
- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in low gradient riffles
- Mean percent canopy

Grizzly Creek

- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 11 and 12, 2002 was conducted by Ruth Goodfield, Eel River Watershed Improvement Group (ERWIG) and Dave Kajtaniak (DFG). The total length of the stream surveyed was 2,237 feet.

Stream flow was not measured on Grizzly Creek.

Grizzly Creek is a B3 channel type for the entire 2,237 feet of the stream surveyed. B3 channels are moderately entrenched, moderate gradient, riffle dominated with infrequently spaced pools. They have stable banks, and cobble dominant substrates.

Water temperatures taken during the survey period ranged from 62 to 63 degrees Fahrenheit. Air temperatures ranged from 65 to 68 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 44% riffle units, 41% flatwater units, and 15% pool units (Graph 1). Based on total length of Level II habitat types there were 63% riffle units, 32% flatwater units, and 6% pool units (Graph 2).

Six Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle, 44%; run, 30%; and step run, 11% (Graph 3). Based on percent total length, low gradient riffle made up 63%, run 19%, and step run 13%.

A total of four pools were identified (Table 3). Main channel pools were the most often encountered, at 75%, and comprised 85% 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. All four of the pools had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 4 pool tail-outs measured, 0 had a value of 1 (0%); 0 had a value of 2 (0%); 4 had a value of 3 (100%); 0 had a value of 4 (0%); and 0 had a value of 5 (0%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

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 10, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 55 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 63. Scour pools had a mean shelter rating of 30 (Table 3).
Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Grizzly Creek. Large and small woody debris are lacking in nearly all habitat types. Grizzly Creek had an average of 0.09 pieces of large wood per 100 feet. Graph 7 describes the pool cover in Grizzly Creek. Boulders are 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. Small cobble was the dominant substrate observed in 67% of pool tail-outs while gravel was the next most frequently observed substrate type, at 33%.

The mean percent canopy density for the surveyed length of Grizzly Creek was 87%. The mean percentages of deciduous and coniferous trees were 80% and 7%, respectively, with 13% open. Graph 9 describes the mean percent canopy in Grizzly Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 83%. The mean percent left bank vegetated was 84%. The dominant elements composing the structure of the stream banks consisted of 72.2% cobble/gravel, 16.7% boulder, 9.3% bedrock, 1.9% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 67% of the units surveyed. Additionally, 29.6% of the units surveyed had brush as the dominant vegetation type, and 3.7% had brush as the dominant vegetation (Graph 11).

DISCUSSION

Grizzly Creek is a B3 channel type for the entire 2,237 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: excellent for plunge weirs, boulder clusters and bank placed boulders; single and opposing wing-deflectors; and log cover.

The water temperatures recorded on the survey days July 11 and 12, 2002, ranged from 62 to 63 degrees Fahrenheit. Air temperatures ranged from 65 to 68 degrees Fahrenheit. 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.

Flatwater habitat types comprised 32% of the total length of this survey, riffles 63%, and pools 6%. The pools are relatively deep, with all four (100%) of the 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.

All 3 of the pool tail-outs measured had embeddedness ratings of 3. Cobble embeddedness measured to be 25% or less, a rating of 1, indicates good quality spawning substrate for salmon and steelhead. Sediment sources in Grizzly Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

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

The mean shelter rating for pools was 55. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, undercut banks and large woody debris contribute 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 87%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 83% and 84%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

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

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

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.

0' Begin survey at confluence with North Fork Mattole River. Channel type is B3.

112' North Fork Road Bridge.

2,119' Dry tributary, right bank.

2,237' End of Survey. No landowner permission upstream. Stream gradient increases to approximately 4%.

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.

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]					

GRIZZLY CREEK — Drainage: MATTOLE RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN 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
12	12	RIFFLE	44	117	1400	63	7.1	0.3	664	7969	195	2338	0	10
11	11	FLATWATER	41	65	710	32	7.7	0.5	432	4756	213	2347	0	8
4	4	POOL	15	32	127	6	13.5	1.4	380	1519	502	2007	459	55

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
27	27	2237	14244	6691

GRIZZLY CREEK — Drainage: MATTOLE RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

HABITAT UNITS #	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA EST. sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME EST. cu.ft.	MEAN RESIDUAL POOL VOL cu.ft.	MEAN SHELTER RATING	MEAN CANOPY %
12	12	LGR	44	117	1400	63	7	0.3	0.9	664	7969	195	2338	0	10	83
8	8	RUN	30	52	419	19	8	0.5	1.6	373	2985	190	1522	0	6	96
3	3	SRN	11	97	291	13	6	0.4	1.8	590	1771	275	825	0	12	84
2	2	MCP	7	26	51	2	15	1.2	2.8	373	746	420	840	345	70	86
1	1	STP	4	57	57	3	9	1.4	2.6	487	487	682	682	718	50	70
1	1	PLP	4	19	19	1	15	1.7	2.3	285	285	485	485	428	30	98

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
27	27	2237	14244	6691

GRIZZLY CREEK — Drainage: MATTOLE RIVER

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
3	3	MAIN	75	36	108	85	13.0	1.2	411	1234	507	1522	470	63
1	1	SCOUR	25	19	19	15	15.0	1.7	285	285	485	485	428	30

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
4	4	127	1519	2007

GRIZZLY CREEK Drainage: MATTOLE RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH	>=4 FEET PERCENT OCCURRENCE
2	MCP	50	0	0	0	0	2	100	0	0	0	0
1	STP	25	0	0	0	0	1	100	0	0	0	0
1	PLP	25	0	0	0	0	1	100	0	0	0	0

TOTAL UNITS
4

GRIZZLY CREEK Drainage: MATTOLE RIVER

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

UNITS MEASURED	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
12	12	LGR	0	0	0	3	2	0	0	95	0
8	8	RUN	6	0	0	0	0	0	0	88	6
3	3	SRN	0	3	0	0	3	0	0	93	0
2	2	MCP	45	0	0	0	0	0	0	55	0
1	1	STP	0	0	20	0	0	0	0	80	0
1	1	PLP	0	0	70	0	0	0	0	30	0

GRIZZLY CREEK Drainage: MATTOLE RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 07/12/02

Confluence Location: QUAD: PETROLIA LEGAL DESCRIPTION: T01SR02WS27 LATITUDE:40°21'15" LONGITUDE:124°17'17"

TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
12	12	LGR	0	0	8	67	17	8	0
8	8	RUN	0	0	50	50	0	0	0
3	3	SRN	0	0	0	100	0	0	0
2	2	MCP	0	0	100	0	0	0	0
1	1	STP	0	0	0	0	0	100	0
1	1	PLP	0	0	100	0	0	0	0

Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Deciduous	Mean Percent Open units	Mean Right bank % Cover	Mean Left Bank % Cover
87	8	92	0	83.3	84.1

Note: Mean percent conifer and deciduous 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: GRIZZLY CREEK
SAMPLE DATES:
STREAM LENGTH: 2237 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: PETROLIA — Latitude: 40°21'15"
Legal Description: T01SR02WS27 — Longitude: 124°17'17"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: B3	Canopy Density: 87%
Channel Length: 2237 ft.	Coniferous Component: 8%
Riffle/flatwater Mean Width: 7 ft.	Deciduous Component: 92%
Total Pool Mean Depth: 1.4 ft.	Pools by Stream Length: 6%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 0%
Water: 062- 063°F Air: 065-068°F	Mean Pool Shelter Rtn: 55
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Vegetative Cover: 84%	Occurrence of LOD: 3%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2.0% 3. 100% 4. 0% 5. 0%

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Bedrock	2	3	9.3
Boulder	3	6	16.7
Cobble/Gravel	22	17	72.2
Silt/clay	0	1	1.9

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Grass	1	1	3.7
Brush	8	8	29.6
Decid. Trees	18	18	66.7
Conif. Trees	0	0	0
No Vegetation	0	0	0

Total stream average embeddedness value for pool 2.3

TABLE 10. MEAN PERCENT OF SHELTER COVER TYPES FOR ENTIRE STREAM

Stream: GRIZZLY CREEK Drainage: MATTOLE RIVER

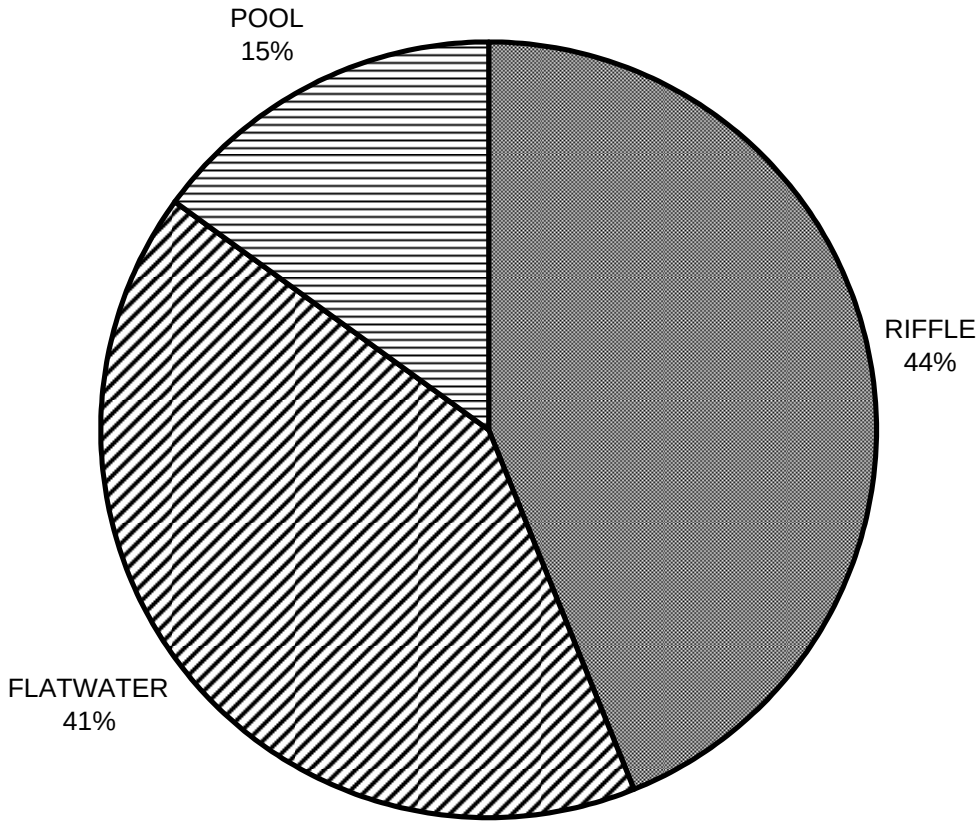
Survey Date: 07/12/02

	RIFFLES	FLATWATER	POOLS
UNDERCUT BANKS	5.2	4.5	22.5
SMALL WOODY DEBRIS	0.4	0.9	0
LARGE WOODY DEBRIS	3.3	0	22.5
ROOTS	1.5	0	0
TERRESTRIAL VEG	1.1	0.9	0
AQUATIC VEG	0	0	0
WHITEWATER	0	0	0
BOULDERS	86.7	89.1	55
BEDROCK LEDGES	1.9	4.5	0

Stream: GRIZZLY CREEK Drainage: MATTOLE RIVER

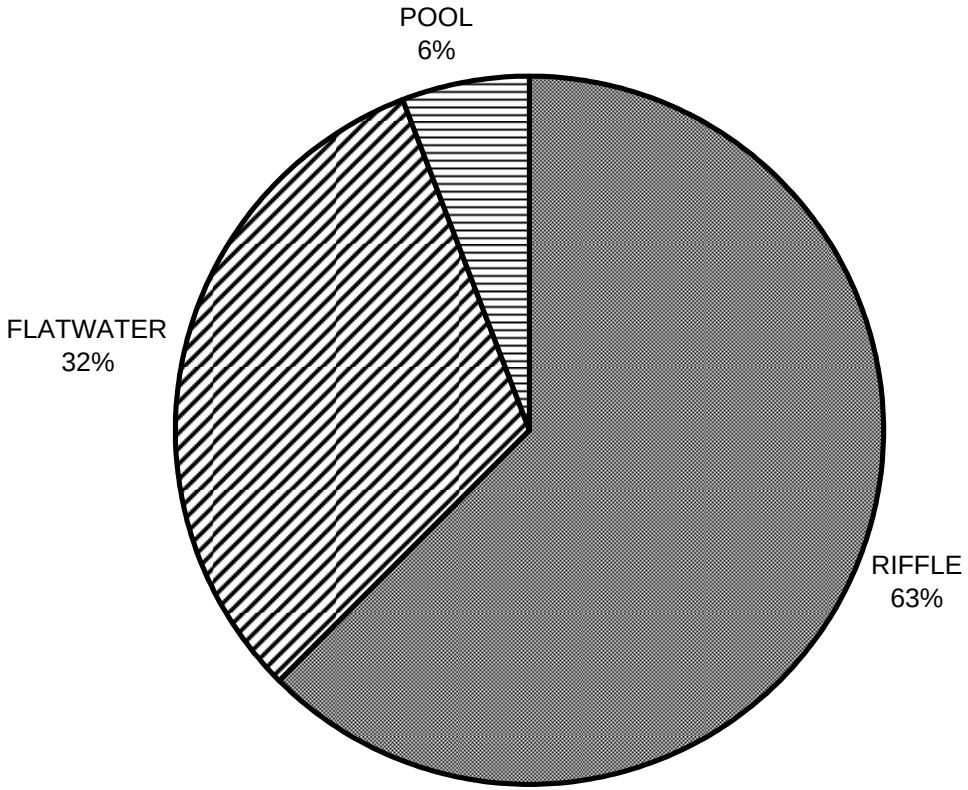
STRM_LGNTH	MEMO
78	BEGIN SURVEY. CONFLUENCE NF MATTOLE.
112	BRIDGE. (NF Road) crosses stream at top of unit (+34)
223	Pool tail substrate B. LWD 0.
437	Pool tail substrate C. LWD 1.
2095	Pool tail substrate C. LWD 0. TRIB. rt. bank at 24'. DRY.
2176	LWD 1.
2237	END OF SURVEY - No Landowner permission upstream. Gradient >4%.

GRIZZLY CREEK, 2002
HABITAT TYPES BY PERCENT OCCURENCE



GRAPH 1

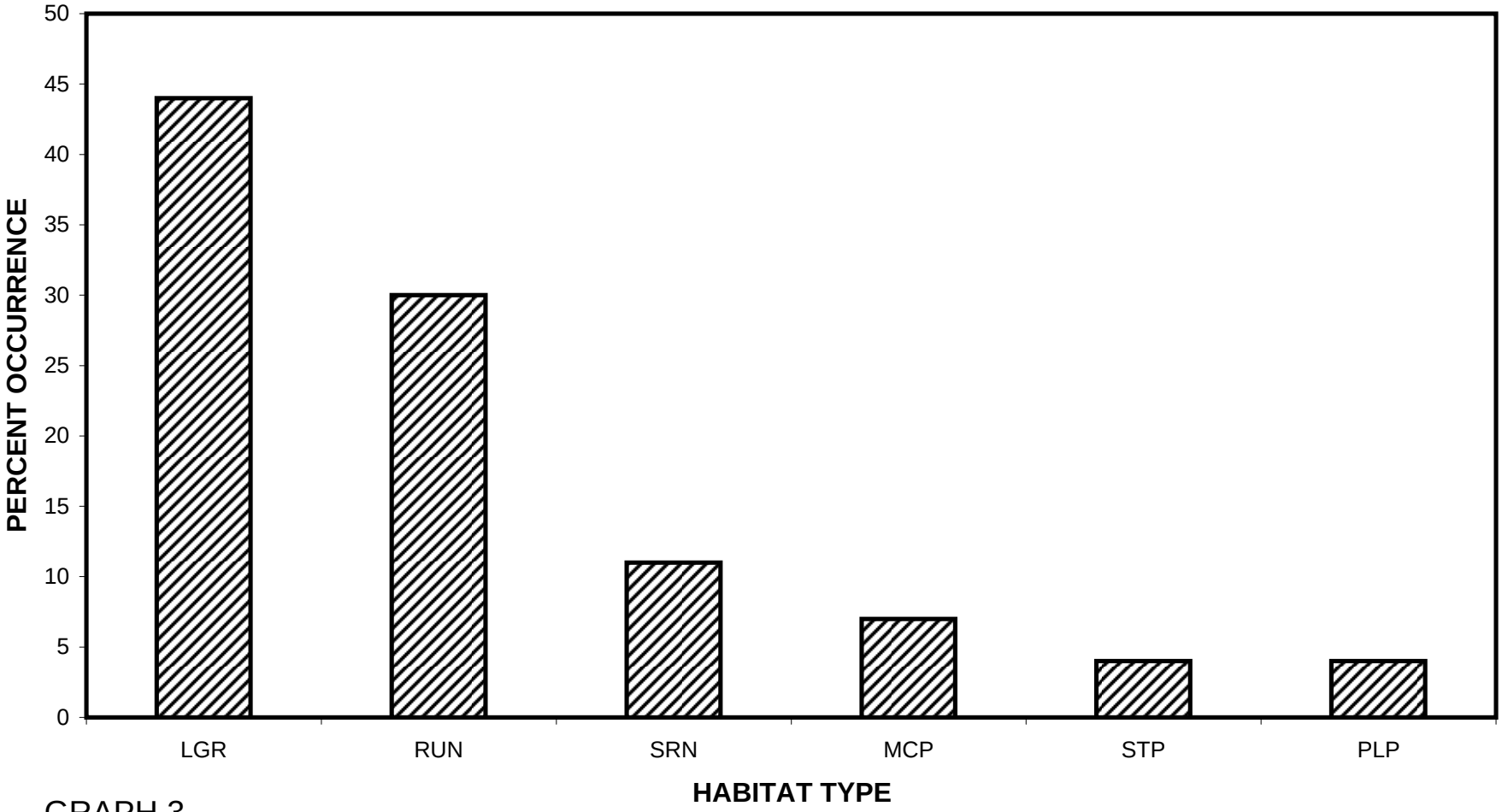
GRIZZLY CREEK, 2002
HABITAT TYPES BY PERCENT TOTAL LENGTH



GRAPH 2

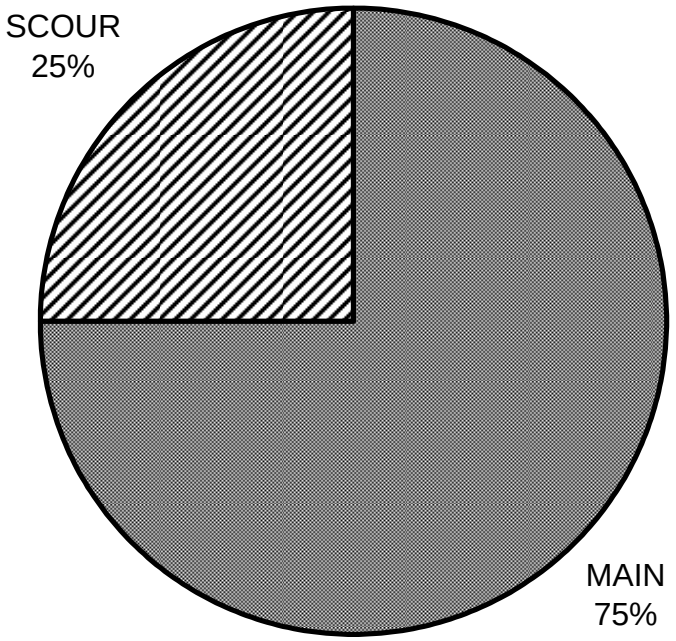
GRIZZLY CREEK, 2002

HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 3

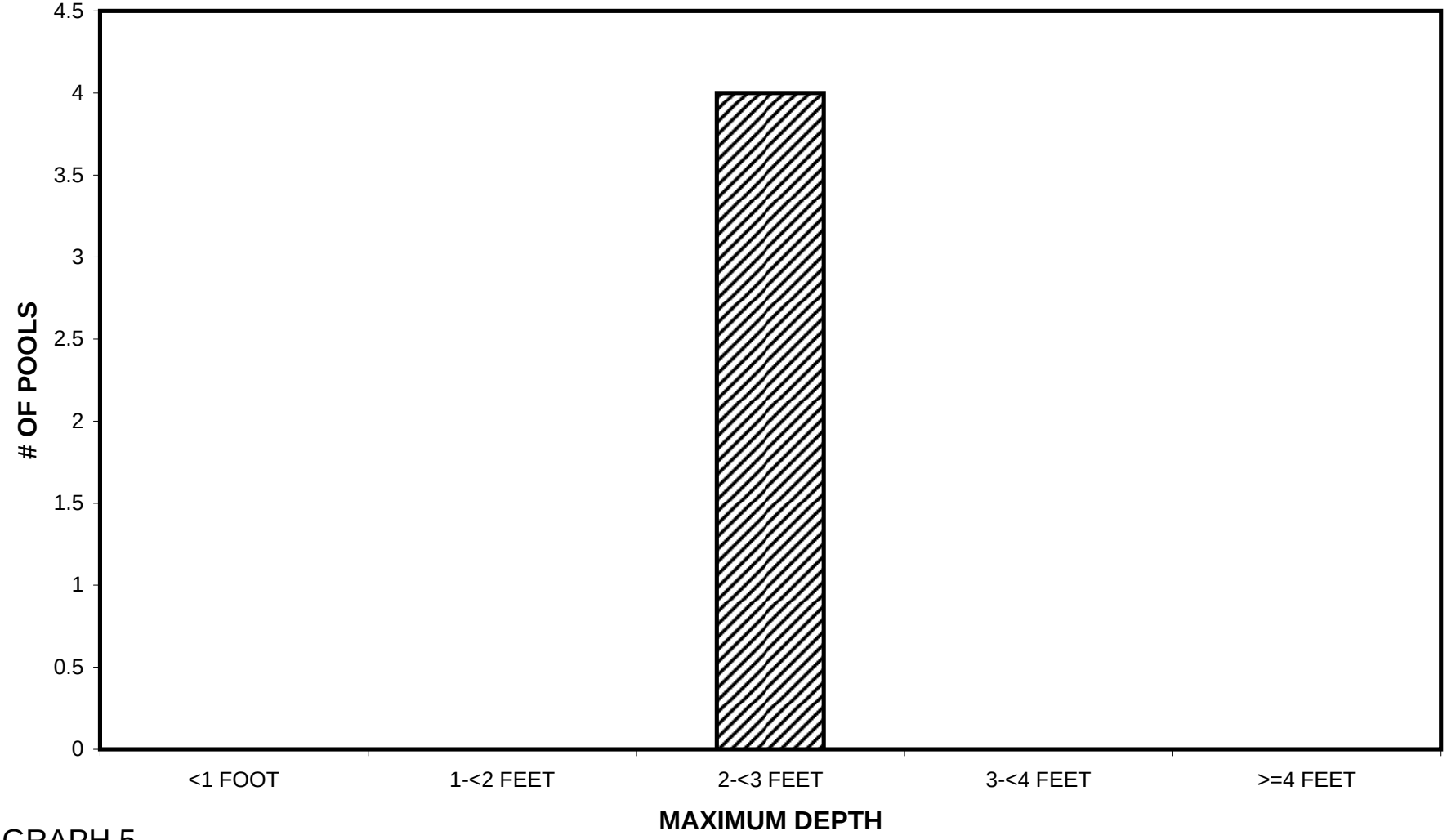
GRIZZLY CREEK, 2002
POOL HABITAT TYPES BY PERCENT OCCURRENCE



GRAPH 4

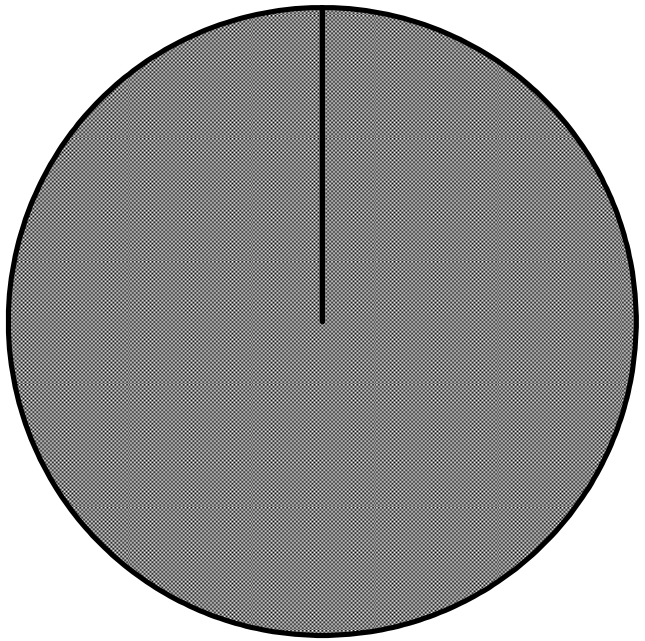
GRIZZLY CREEK, 2002

MAXIMUM DEPTH IN POOLS



GRAPH 5

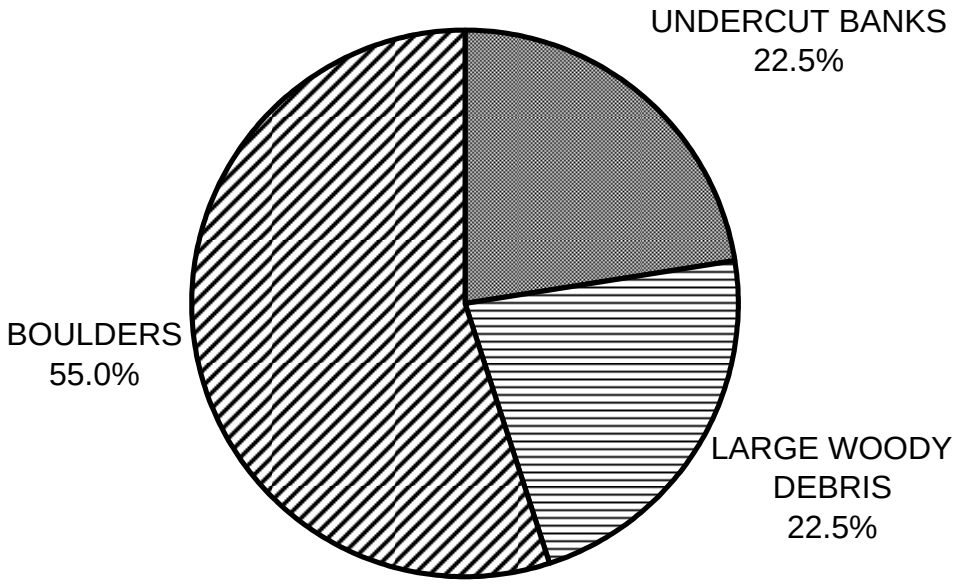
GRIZZLY CREEK, 2002
PERCENT EMBEDDEDNESS



VALUE 3
100%

GRAPH 6

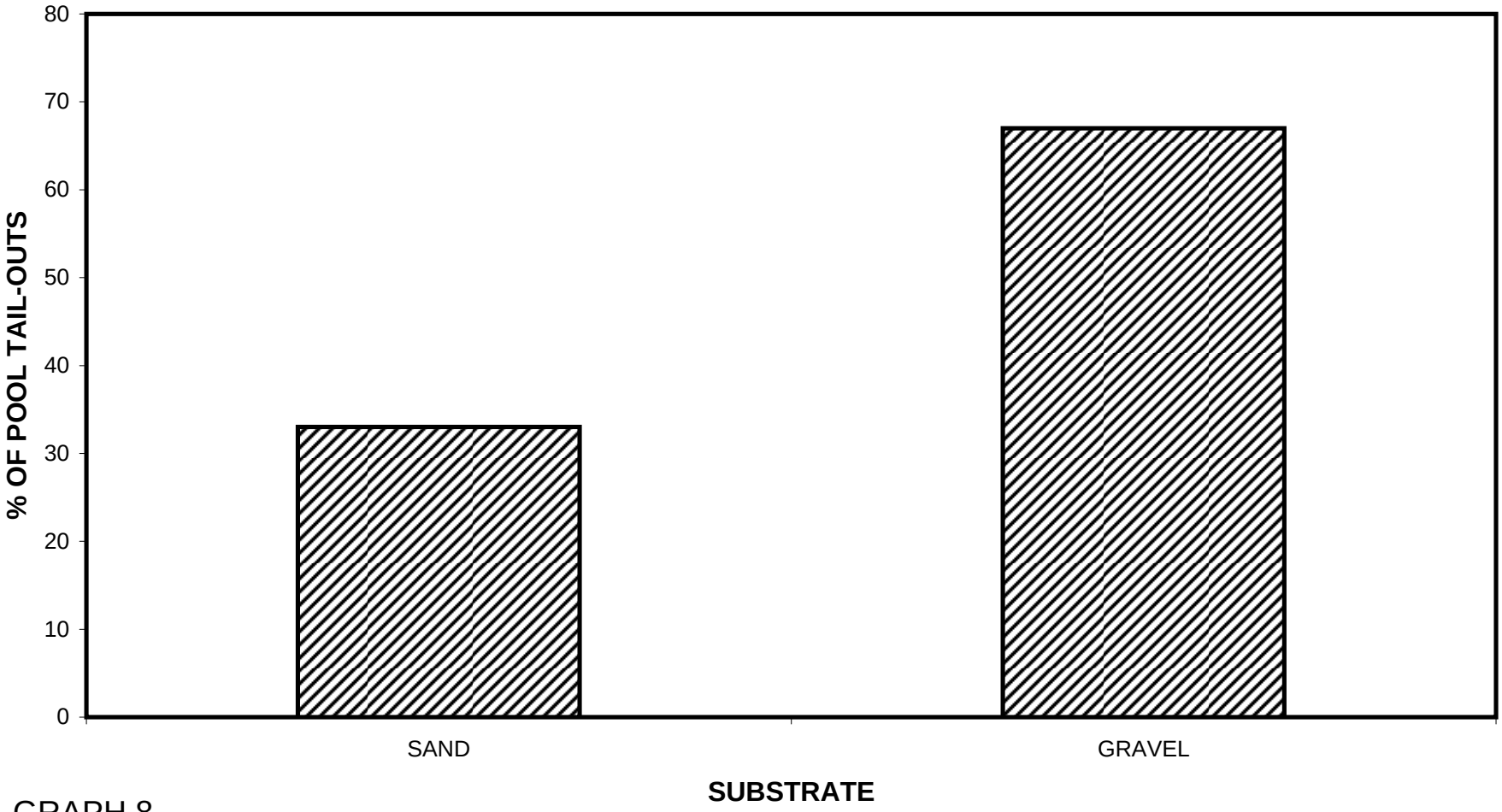
GRIZZLY CREEK, 2002
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

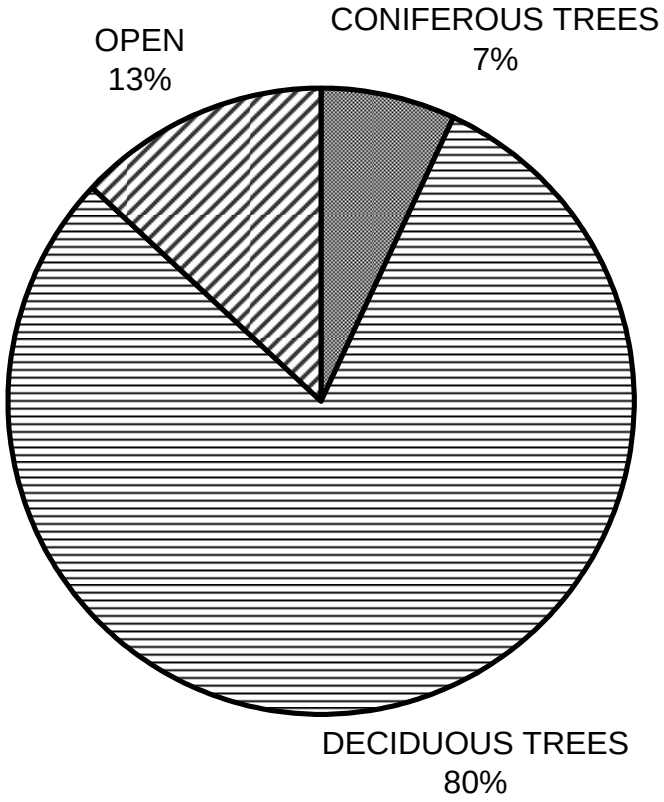
GRIZZLY CREEK, 2002

SUBSTRATE COMPOSITION IN POOL TAIL-OUTS



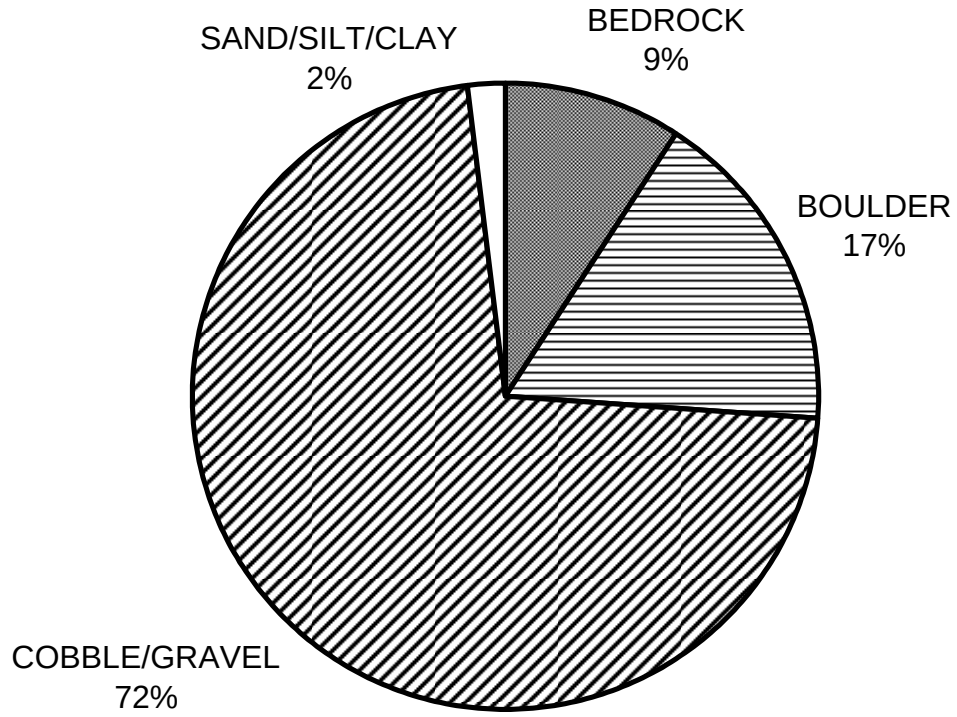
GRAPH 8

GRIZZLY CREEK, 2002
MEAN PERCENT CANOPY



GRAPH 9

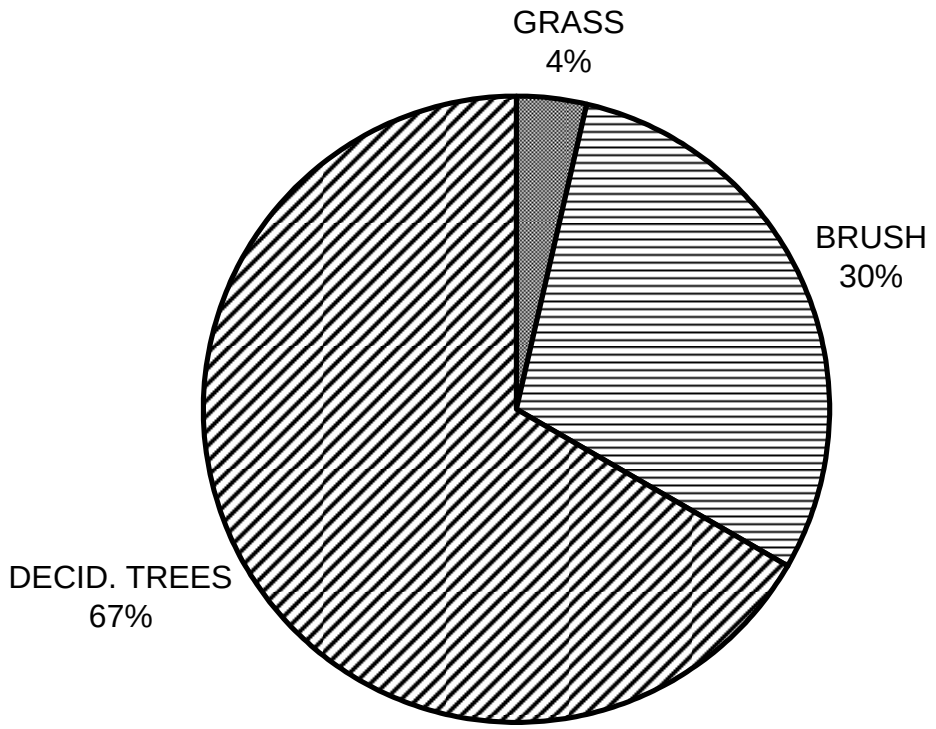
GRIZZLY CREEK, 2002
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

GRIZZLY CREEK, 2002

DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11