CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Freezeout Creek
Report revised April 14, 2006
Report Completed 2000
Assessment Completed 1995

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Freezeout Creek to assess habitat conditions for anadromous salmonids. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Freezeout Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution. After analysis of historical information and data gathered recently, stream restoration and enhancement recommendations are presented.

WATERSHED OVERVIEW

Freezeout Creek is a tributary to the Russian River, located in Sonoma County, California (see map page 2). The legal description at the confluence with the Russian River is T7N,R11W,S0. Its location is 38°27'01" N. latitude and 123°2'02" W. longitude. Year round vehicle access exists from Freezeout Rd. near Duncans Mills via Moscow Rd. via Highway 116.

Freezeout Creek is a second order stream and has approximately 4 miles of blue line stream, according to the USGS Duncans Mills 7.5 minute quadrangle. Freezeout Creek drains a basin of approximately 2.9 square miles. Summer flow was measured at approximately 2.7 cfs in July. Elevations range from about 40 feet at the mouth of the creek to 1320 feet in the headwater areas. Alder and willow trees dominate the lower watershed riparian zone, but there are mixed conifer in the upper watershed. The upper watershed is owned primarily by Louisiana-Pacific and is managed for timber production, the lower watershed is also privately owned and is cultivated rangeland.

The Northern Spotted Owl *(Strix occidentalis caurina)* and Osprey *(Pandion haliaetus)* were listed in DFG's Natural Diversity Database for Freezeout Creek watershed. No sensitive plants were listed.

METHODS

The habitat inventory conducted in Freezeout Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1994). The Americorps members that conducted the inventory were trained in standardized

habitat inventory methods by the California Department of Fish and Game (DFG) under the supervision of DFG's Russian River Basin Planner, Robert Coey in May of 1995. This inventory was conducted by a two person team.

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 Freezeout 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 standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

2. Channel Type:

Channel typing is conducted according to the classification system developed by David Rosgen (1985). 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 four measured parameters used to determine channel type: 1) water slope gradient, 2) channel confinement, 3) width/depth ratio, 4) substrate composition.

3. Temperatures:

Water and air temperatures, and time taken, are measured by crew members with handheld thermometers and recorded at each tenth unit typed. Temperatures are measured in 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". Freezeout 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. Channel dimensions were measured using hip chains, range finders, tape measures, and stadia rods. Unit measurements included mean length, mean width, mean depth, and maximum depth. Pool tail crest depth at each pool unit was

measured in the thalweg. All measurements were taken in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-outs is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Freezeout Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4).

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 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 Freezeout 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 habitat units, dominant and sub-dominant substrate elements were visually estimated using a list of seven size classes.

8. Canopy:

Stream canopy is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In Freezeout Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results recorded.

9. Bank Composition:

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 Freezeout Creek, the dominant composition type in both the right and left banks was selected from

a list of eight options on the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

DATA ANALYSIS

Data from the habitat inventory form are entered into the Habitat Program, a dBASE 6.1 data entry program developed by the California Department of Fish and Game (DFG). This program also processes and summarizes the data.

The Habitat Runtime program produces the following 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
- Shelter type areas by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Freezeout Creek include:

- Level II Habitat Types by % Occurrence
- Level IV Habitat Types by % Occurrence
- Pool Habitat Types by % Occurrence
- Maximum Depth in Pools
- Percent Embeddedness by Reach
- Percent Cover Types in Pools
- Substrate Composition in Low Gradient Riffles
- Mean Percent Canopy
- Percent Bank Composition
- Percent Canopy by Reach

HABITAT INVENTORY RESULTS

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

The Department of Fish and Game and Americorps conducted a stream survey on September 11-13, 1995. The surveyors were Pamela Higgins and John Fort. The survey covered the mouth of Freezeout Creek to the end of the anadromous run at a bedrock falls. The total length

of the stream surveyed was 6,859 feet, or approximately 1-1/4 miles. A general description of the watershed is summarized as follows:

Flows were measured to be 2.7 cfs on July 13, 1994.

This section of Freezeout Creek has two channel types: from the mouth to 6250 feet an F4 and the upper 609 feet an A2. F4 channels are entrenched, meandering, riffle/pool gravel channels on low gradients (<2%) with high width/depth ratios. A2 channels are steep, narrow, cascading step-pool streams. They consist predominantly of boulders and have a high energy/debris transport associated with depositional soils.

Water temperatures ranged from 57°F to 64°F. Air temperatures ranged from 58°F to 70°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, pools made up 43%, riffles 32%, and flatwater 23% (Graph 1). Flatwater habitat types made up 34% of the total survey **length**, pools 31%, and riffles 29%.

Fourteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat type by percent **occurrence** was low gradient riffles, making up 30% of the units. The percent occurrence of root wad scours was 24%, runs 13%, and glides 10% (Graph 2). By percent total **length**, runs made up 25%, low gradient riffles 24%, root wad scours 19% and glides 9%.

Seventy-one pools were identified (Table 3). Scour pools were most often encountered at 89%, and comprised 89% of the total length of pools (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Twenty-two of the 71 pools (31%) had a depth of two feet or greater (Graph 4).

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. Flatwater and pool types both rated 26. Riffles had virtually no shelter, rating 0 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 43. Backwater pools rated 27 and scour pools rated 24 (Table 3).

Table 10 summarizes total cover by habitat type. Root masses are the dominant cover type for pools in Freezeout Creek. Undercut banks and small woody debris are the next most common cover types. Although boulders were absent from Reach 1, the 609 feet of Reach 2 was dominated by boulders in all habitat types. Graph 6 describes the pool cover in Freezeout Creek as a whole.

Only 19% of Freezeout Creek lacked shade canopy. Fifty-two percent of the stream had canopy consisting of deciduous trees and 29% had a canopy of coniferous trees. Graph 8 describes the overall canopy in Freezeout Creek and graph 11 describes the canopy by reach.

For the stream reach surveyed, the mean percent right bank vegetated was 80% and the mean percent left bank vegetated was 88%. For the habitat units measured, the dominant bank vegetation types were: 63% deciduous trees, 26% coniferous trees and 11% brush. The dominant substrate for the stream banks were: 94% silt/clay/sand, 4% boulders and 2% bedrock (Graph 9).

SUBSTRATE SAMPLING

No mechanical gravel sampling was conducted in the 1995 surveys due to inadequate staffing levels, however, dominant substrate types observed and embeddedness ratings results are presented below.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in four of the five low gradient riffles where substrate composition was recorded (80%). Small cobble was the dominant substrate in the fifth low gradient riffle. (Graph 7).

The depth of cobble embeddedness was estimated at pool tail-outs. On a scale of 1 to 4, a value of one is best for fisheries. Of the 71 pool tail-outs measured, 6 had a value of one (8%); 21 had a value of two (30%); 25 had a value of three (35%); and 19 had a value of four (27%). On this scale, a value of one is best for fisheries. On a reach by reach comparison, a value of 4 was recorded in all of the 6 pools in Reach 2 because the substrate was bedrock, while Reach 1 had a value of 4 in 20%, a 3 in 38%, a 2 in 33% and a 1 in 9% of the pools (Graph 5).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

A biological inventory was taken on September 21, 1995 on Freezeout Creek to document the fish species composition and distribution within each reach. Each site was single pass electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species and returned to the stream. The range in air temperature was 57-63°F and the water temperature was 59°F. The observers were Bunzel and Fort.

The inventory of Reach one was started at Freezeout Rd. Bridge and included habitat units 10-95. In pool, glide, run and riffle habitat types 59 0+, and 17 1+ steelhead were observed along with 56 (Cottus Sp.) sculpin, 1 crayfish and 1 Rough Skinned Newt.

The inventory of Reach two was conducted in habitat units 155-165. In pool, run and riffle habitat types 1 coho, 22 0+, 13 1+ and 7 2+ steelhead were observed along with 16 sculpin, and 2 newts. The coho was 2-1/2" and was found near the upper end of the survey in a plunge pool with boulders. The 0+ steelhead were smaller and more numerous in this reach. No fish were observed upstream from unit 165.

SUMMARY OF SPECIES OBSERVED IN 1995 BY DFG IN FREEZEOUT CREEK

SPECIES	Native/Introduced
Coho	N
Steelhead	N
Sculpin (Cottus Sp.)	N
Crayfish	N
Rough Skinned Newt	N

ADULT SURVEYS:

Three spawning/carcass surveys were conducted on Freezeout Creek in the winter of 1996, by NEAP crews. A survey on January 5 began at the mouth and ended at the Hunting Camp upstream from habitat unit 140. Another survey on January 11 began at habitat unit 30 and extended to habitat unit 120. The last survey on February 7 began at habitat unit 60 and ended at the falls past habitat unit 90. No live salmonids, carcasses or redds were observed in any one of these surveys, though adequate spawning habitat, and conditions were present.

DISCUSSION

Freezeout Creek has two channel types: F4 and A2. The upper 609 feet of Freezeout Creek is an A2 channel type. The high energy and steep gradient of the A2 channel type makes it generally unsuitable for instream enhancement structures.

Most of the stream surveyed (91%) was an F4 channel type in Reach 1. This type is good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. There are 6250 feet (1-2/10 miles) of this channel type in Freezeout Creek. At the time of the survey, the riparian zone was deficient in tree saplings and bank vegetation. In summer 1996, a cattle exclusion fence was installed

to allow the riparian vegetation to regenerate. Most of the pools in this reach are root wad scours (60%) and corner pools (20%) and only three pools (4%) are log scours. Cover and scour logs increase pool cover and depth. Any work considered in Freezeout Creek would require very careful design, placement and construction.

The water temperatures recorded on the survey days September 11-13, 1995 ranged from 57°F to 64°F. Air temperatures ranged from 58°F to 70°F. The warmer water temperatures were recorded in Reach 1. These warmer temperatures, if sustained, are at the threshold stress level for salmonids. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months, and more extensive biological sampling needs to be conducted.

Pool habitat types comprised 31% of the total length of this survey. In 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. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat. The pools are relatively shallow with only 22 of the 71 pools having a maximum depth greater than 2 feet (31%).

All of the five low gradient riffles measured for substrate composition had either gravel or small cobble as a dominant substrate. This is generally considered good for spawning salmonids.

However, 62% of the pool tail-outs measured had embeddedness ratings of either three or four. Cobble embeddedness measured to be 25% or less, a rating of one, is considered best for the needs of salmon and steelhead.

The mean shelter rating in both the flatwater and pool habitats was 26. A pool shelter rating of approximately 100 is desirable. The relatively small amount of pool cover that now exists is being provided primarily by root masses in Reach 1. Additionally, undercut banks and small woody debris contribute to the cover. Cover structures in the pool and flatwater habitats improve both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean percent canopy for the survey reach was 81%. This is a good percentage of canopy, since 80 percent is generally considered desirable.

In general, both reaches of Freezeout Creek are "fair" for salmon

and steelhead habitat. Deep pools with adequate shelter are lacking. Although canopy is adequate in the surveyed reach, there is a lack of new tree saplings and bank cover due to cattle grazing in the riparian area in Reach 1. Although adequate spawning gravel exists, embeddedness levels are high, due to failing banks and eroded cattle trails. Stream temperatures are slightly high, possibly due to tributaries with low canopy. Any work considered in these reaches will require careful design, placement, and construction that must include protection for any unstable banks and high stream velocities.

In Reach 1, exclusionary fencing for livestock has been installed. In addition, single and opposing wing-deflectors, and riparian plantings are needed to offset erosion. Low-stage (low profile) weirs, boulder clusters, channel constrictors and log cover structures could be used to increase instream shelter.

GENERAL RECOMMENDATIONS

Freezeout Creek should be managed as an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

1) Identified sites from the road survey conducted in 2000 should be treated to reduce the amount of fine sediments entering the stream.

2) Monitor fish usage for coho index.

RESTORATION IMPLEMENTED

3) The winter of 1995 and 1996 storms brought down many large trees and other woody debris into the stream, which increased the number and quality of pools since the drought years. This woody debris, if left undisturbed, will provide fish cover and rearing habitat. Many signs of recent and historic tree and log removal were evident in the active channel during our survey. Past efforts to increase flood protection or improve fish access in the short run, have led to long term problems in the system. Landowners should be educated about the natural and positive role woody debris plays in the system, and

encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

4) Increase the riparian corridor on Freezeout Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy could be enhanced and stability added by eventual large trees (Reach 1).

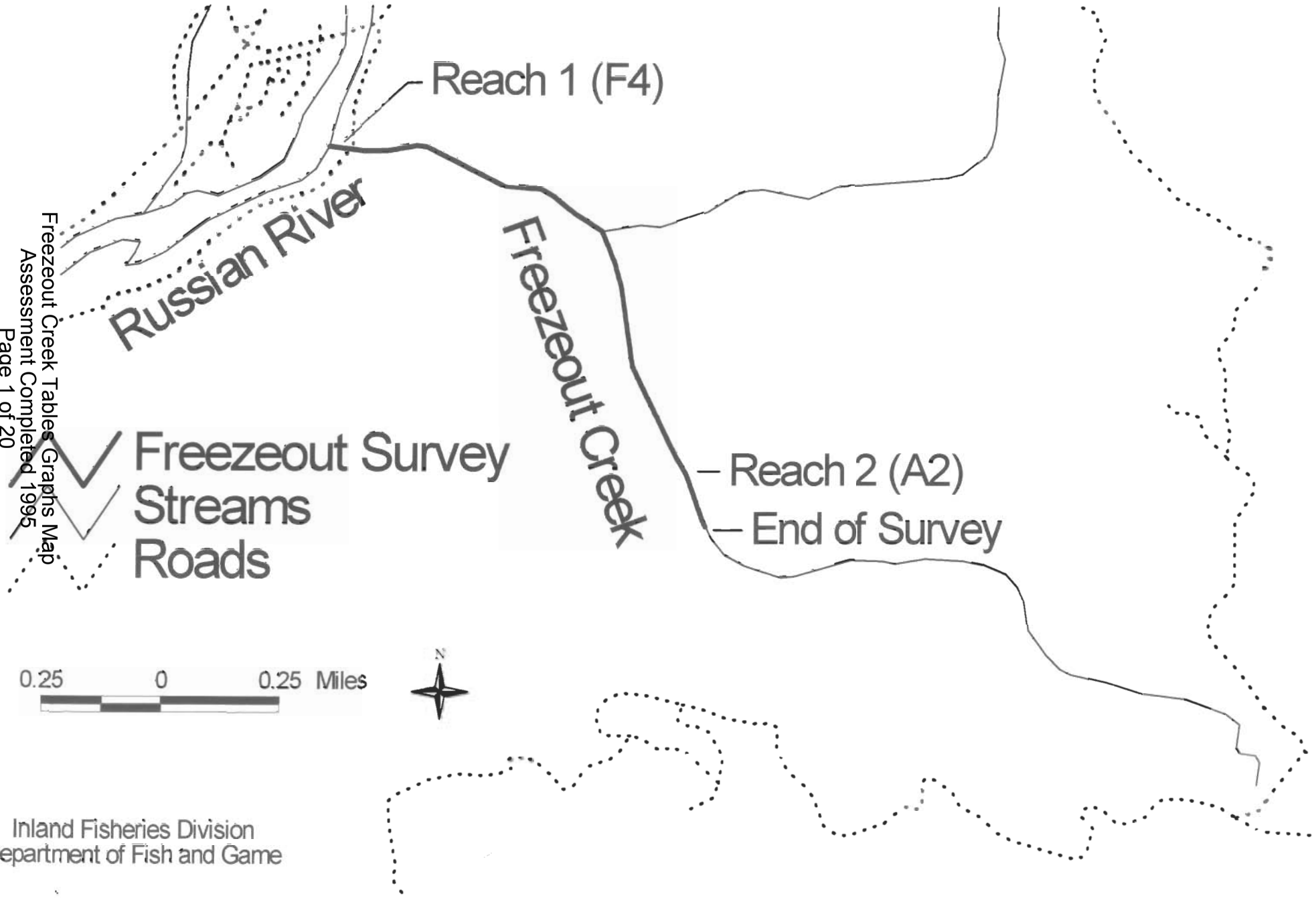
5) Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.

6) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing cover is from root wads and undercut banks. Adding high quality complexity with large woody cover is desirable. Combination cover/scour logs would be effective in many flatwater and pool locations in Reach 1. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

PROBLEM SITES AND LANDMARKS - FREEZEOUT CREEK SURVEY COMMENTS

STREAM LENGTH	COMMENTS	HABITAT UNIT #
176	LARGE WOODY DEBRIS IN CREEKBED, SOME UNDERCUT BANK	
225	FISH OBSERVED	
451	OLD WOODEN BRIDGE WITH GATE STRUCTURE ACROSS CREEK (NOT IN CREEK)	
605	BRIDGE #1; DRY LEFT BANK; CATTLE CROSSING	UNIT 9
1479	STEELHEAD 0+/1+	
1562	1+ STEELHEAD	
2618	1+ FISH	UNIT 43
5243	RT BANK DRY TRIBUTARY	
5432	DRY TRIBUTARY RT BANK	UNIT 135
5763	ROAD CROSSING	
6283	ROAD CROSSING BRIDGE (7'H X 35'W X 15'L)	
6353	TRIBUTARY RT BANK (56°F); SHALLOW 2'-3' WIDE 50 YDS, THEN STEEP; SOME FISH FRY 20 YDS UP	UNIT 157
6868	VERY STEEP, LARGE BOULDERS, NO FISH OBSERVED; SHALLOW POOLS	

Freezeout Creek



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Inland Fisheries Division
Department of Fish and Game

Freezeout Creek

Drainage: Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS

LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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
53	6	RIFFLE	32	37	1963	29	7.1	0.2	207	10982	42	2219	0	0
39	5	FLATWATER	23	60	2327	34	6.2	0.4	228	8897	86	3349	59	33
71	13	POOL	43	30	2156	31	8.5	0.8	264	18755	235	16681	183	26
3	0	DRY	2	138	413	6	0.0	0.0	0	0	0	0	0	0

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
166	24	6859	38635	22248

Freezeout Creek

Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS

LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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 %
50	5	LGR	30	33	1665	24	8	0.1	1.0	219	10928	41	2060	0	0	81
2	1	HGR	1	49	98	1	4	0.3	0.6	151	301	45	90	0	0	80
1	0	CAS	1	200	200	3	0	0.0	0.0	0	0	0	0	0	0	0
17	3	GLD	10	37	631	9	8	0.4	0.9	259	4410	108	1840	59	33	79
22	2	RUN	13	77	1696	25	4	0.3	1.2	166	3642	41	905	0	30	87
3	1	MCP	2	23	69	1	9	1.2	3.6	179	537	216	648	171	53	88
1	0	STP	1	78	78	1	11	0.9	2.3	858	858	772	772	686	10	0
13	3	CRP	8	34	443	6	6	0.8	2.2	197	2557	165	2140	123	16	75
4	1	LSL	2	18	74	1	8	0.8	2.0	142	569	110	441	79	7	73
40	4	LSR	24	32	1298	19	9	0.8	3.7	310	12390	274	10976	212	26	81
6	2	PLP	4	17	102	1	12	0.9	2.6	193	1161	171	1023	136	40	62
1	1	BPR	1	8	8	0	5	0.7	1.5	40	40	28	28	20	10	85
3	1	DPL	2	28	85	1	7	0.9	2.4	214	643	218	653	193	35	75
3	0	DRY	2	138	413	6	0	0.0	0.0	0	0	0	0	0	0	93

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
166	24	6859	38036	21576

Freezeout Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS

LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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
4	1	MAIN	6	37	147	7	9.3	1.1	349	1395	355	1421	300	43
63	10	SCOUR	89	30	1916	89	8.6	0.8	265	16677	231	14580	178	24
4	2	BACKWATER	6	23	93	4	6.6	0.9	171	683	170	681	150	27

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
71	13	2156	18755	16681

Freezeout Creek

Drainage: Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS

LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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
3	MCP	4	0	0	2	67	0	0	1	33	0	0
1	STP	1	0	0	0	0	1	100	0	0	0	0
13	CRP	18	0	0	11	85	2	15	0	0	0	0
4	LSL	6	0	0	3	75	1	25	0	0	0	0
40	LSR	56	0	0	27	68	9	23	4	10	0	0
6	PLP	8	0	0	3	50	3	50	0	0	0	0
1	BPR	1	0	0	1	100	0	0	0	0	0	0
3	DPL	4	0	0	2	67	1	33	0	0	0	0

TOTAL UNITS
71

Freezeout Creek | Drainage: Russian River

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE | Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS | LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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
50	5	LGR	0	0	0	0	0	0	0	0	0
2	1	HGR	0	0	0	0	0	0	0	0	0
1	0	CAS	0	0	0	0	0	0	0	0	0
17	3	GLD	33	20	0	0	47	0	0	0	0
22	2	RUN	0	0	0	0	0	0	0	0	0
3	1	MCP	3	10	13	13	27	0	0	33	0
1	0	STP	0	0	0	0	0	0	0	100	0
13	3	CRP	44	24	0	12	20	0	0	0	0
4	1	LSL	0	33	67	0	0	0	0	0	0
40	4	LSR	20	7	5	66	2	0	0	0	0
6	2	PLP	3	28	30	0	7	0	0	32	0
1	1	BPR	45	0	0	55	0	0	0	0	0
3	1	DPL	5	10	5	80	0	0	0	0	0
3	0	DRY	0	0	0	0	0	0	0	0	0

Freezeout Creek | Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE | Survey Dates: 09/11/95 to 09/13/95

Confluence Location: QUAD: DUNCAN MIL LEGAL DESCRIPTION: T7NR11WS | LATITUDE: 38°27'1" LONGITUDE: 123°2'2"

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
10	5	LGR	0	0	80	20	0	0	0
2	1	HGR	0	0	0	100	0	0	0
1	0	CAS	0	0	0	0	0	0	0
7	3	GLD	0	75	25	0	0	0	0
2	2	RUN	0	0	100	0	0	0	0
3	1	MCP	0	100	0	0	0	0	0
1	0	STP	0	0	0	0	100	0	0
3	3	CRP	33	33	33	0	0	0	0
1	1	LSL	0	100	0	0	0	0	0
0	4	LSR	0	25	50	25	0	0	0
6	2	PLP	0	50	50	0	0	0	0
1	1	BPR	0	0	100	0	0	0	0
3	1	DPL	0	0	100	0	0	0	0
3	0	DRY	0	100	0	0	0	0	0

Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Decidous	Mean Right bank % Cover	Mean Left Bank % Cover
80.53	35.58	64.42	80.37	88.15

FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Freezeout Creek
SAMPLE DATES: 09/11/95 to 09/13/95
STREAM LENGTH: 6859 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: DUNCAN MIL — Latitude: 38°27'1"
Legal Description: T7NR11WS — Longitude: 123°2'2"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

Channel Type: F4	Canopy Density: 80%
Channel Length: 6250 ft.	Coniferous Component: 33%
Flowing Water Mean Width: 7 ft.	Deciduous Component: 67%
Flowing Water Mean Depth: 0.3 ft.	Pools by Stream Length: 32%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 8%
Water: 57 - 64 °F Air: 58 - 70 °F	Mean Pool Shelter Rtn: 27
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Vegetative Cover: 84%	Occurrence of LOD: 40%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 413 ft.
Embeddness Value: 1. 9% 2. 33% 3. 38% 4. 20%	

STREAM REACH 2

Channel Type: A2	Canopy Density: 86%
Channel Length: 609 ft.	Coniferous Component: 66%
Flowing Water Mean Width: 6 ft.	Deciduous Component: 34%
Flowing Water Mean Depth: 0.3 ft.	Pools by Stream Length: 27%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 0%
Water: 57 - 57 °F Air: 59 - 69 °F	Mean Pool Shelter Rtn: 13
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Vegetative Cover: 86%	Occurrence of LOD: 10%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 0% 3. 0% 4. 100%	

Mean Percentage of Dominant Substrate

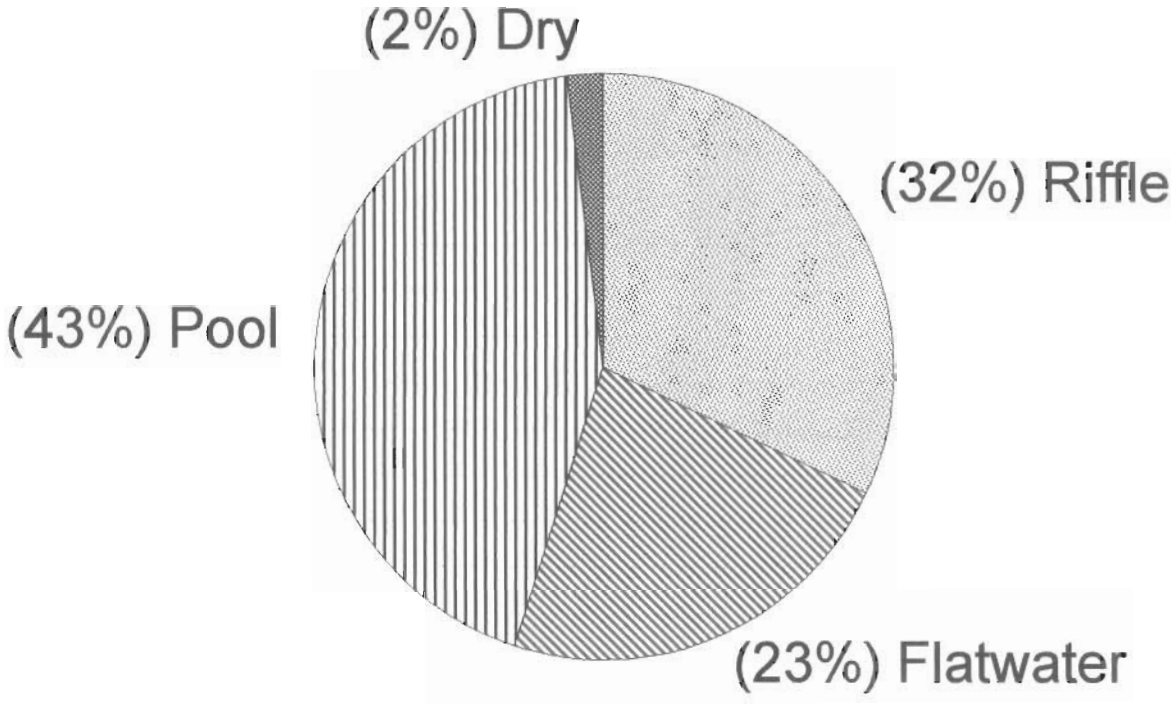
Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Bedrock	0	1	1.85
Boulder	1	1	3.70
Cobble/Gravel	0	0	0
Silt/clay	26	25	94.44

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Grass	0	0	0
Brush	4	2	11.11
Decid. Trees	16	18	62.96
Conif. Trees	7	7	25.93
No Vegetation	0	0	0

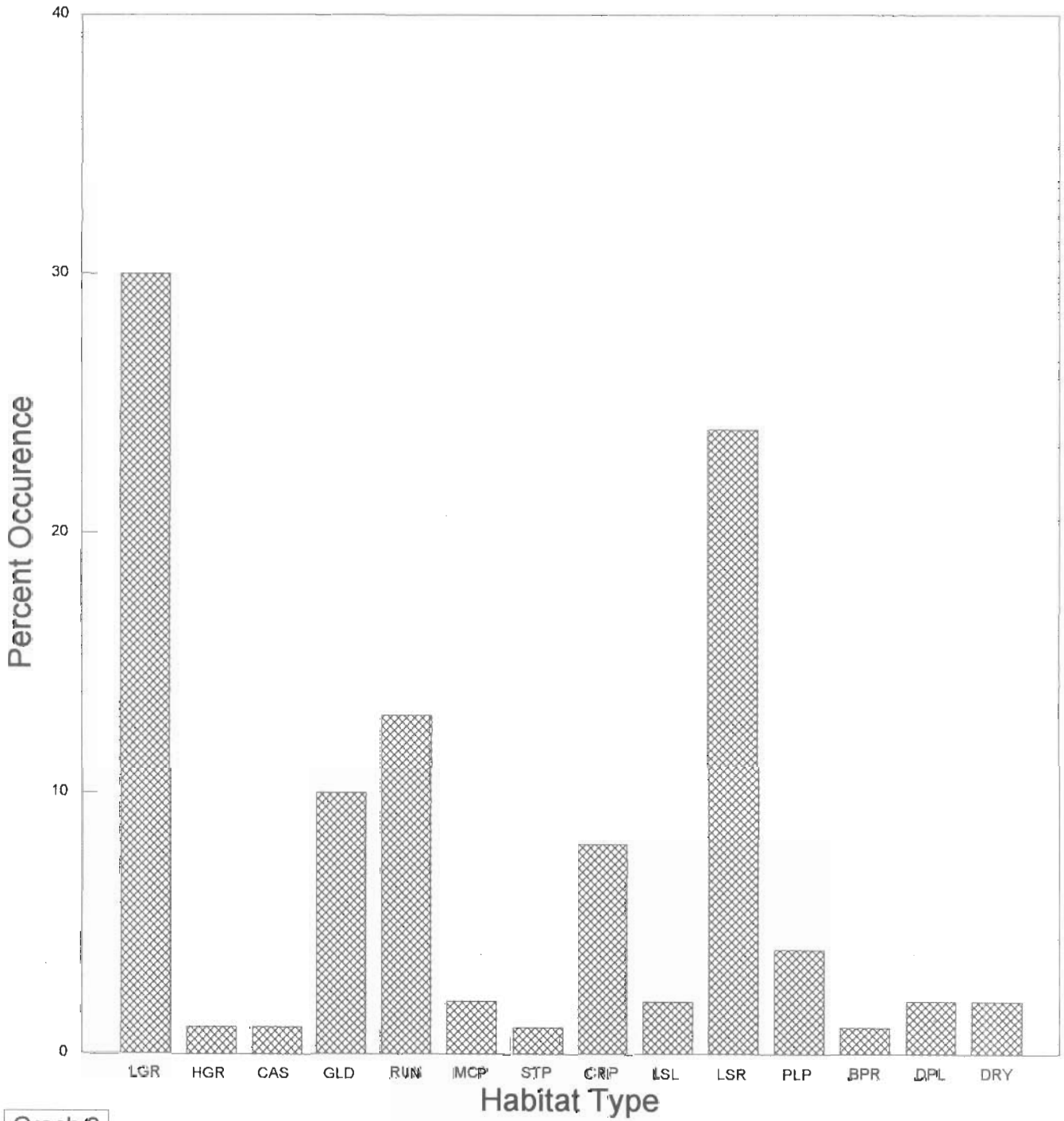
Freezeout Creek

Level II Habitat Types by % Occurrence



Graph 1

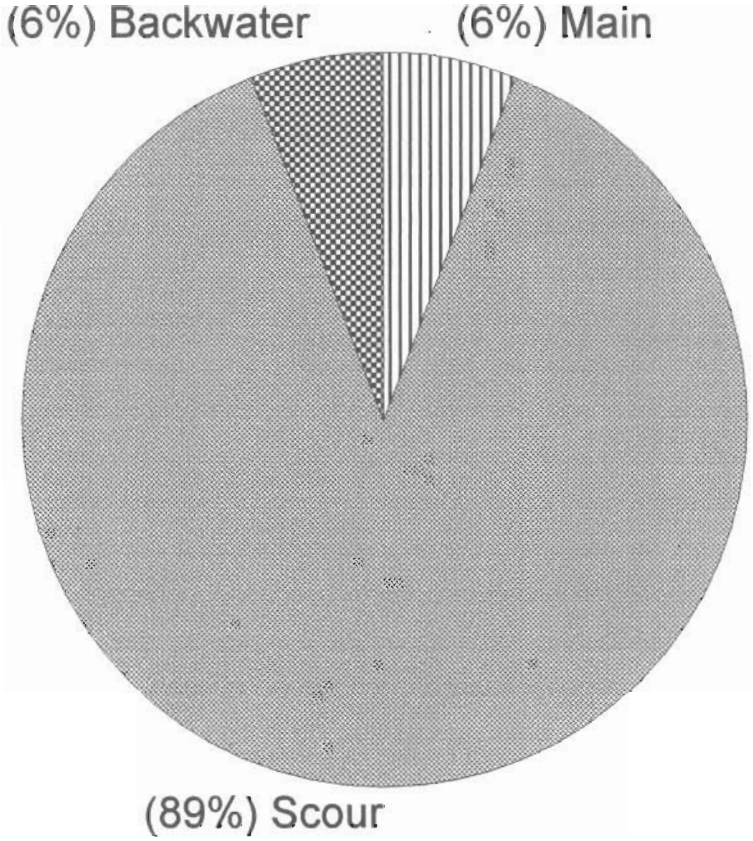
Freezeout Creek
Level IV Habitat Types by Percent Occurrence



Graph 2

Freezeout Creek

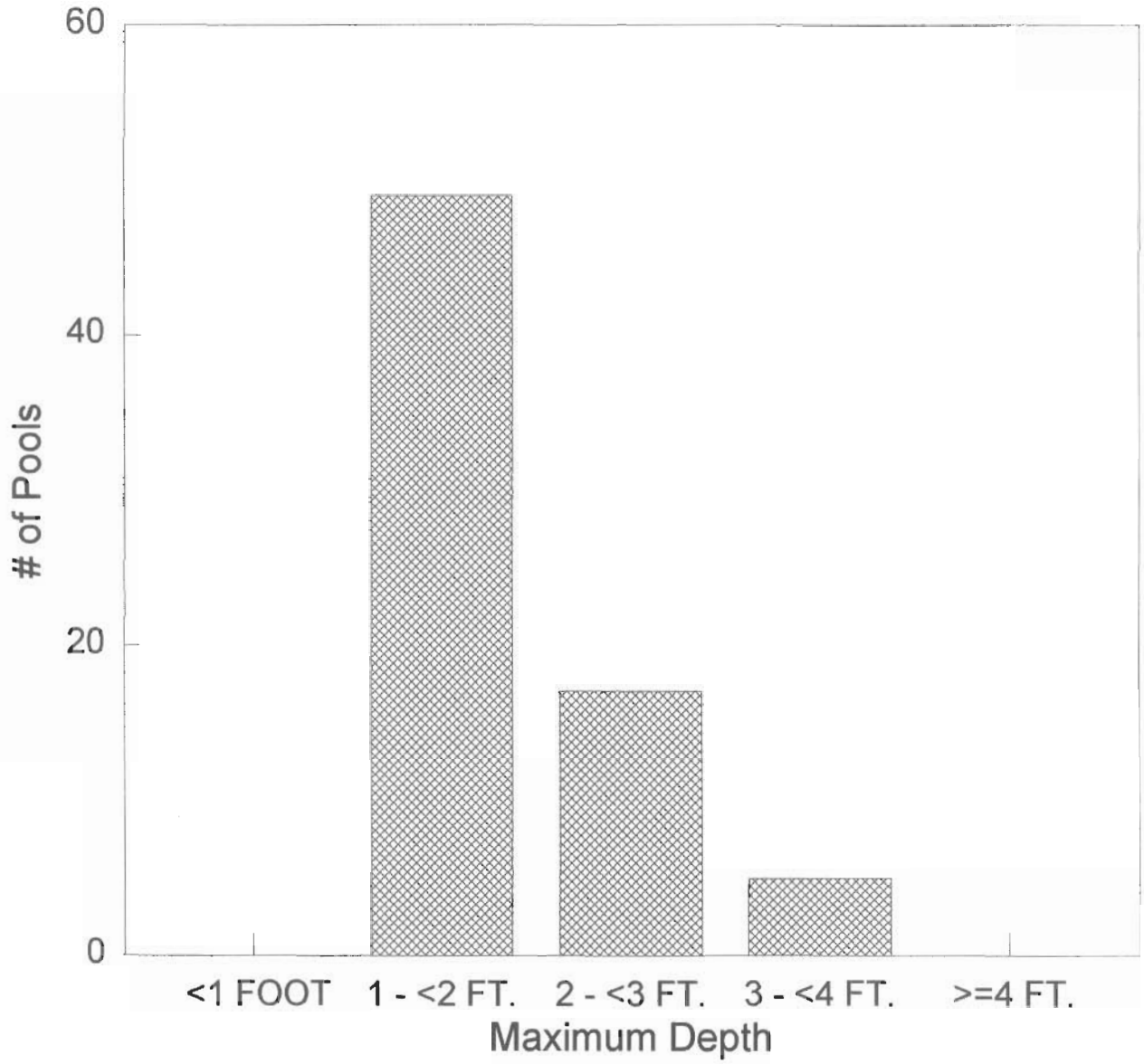
Pool Habitat Types by % Occurrence



Graph 3

Freezeout Creek

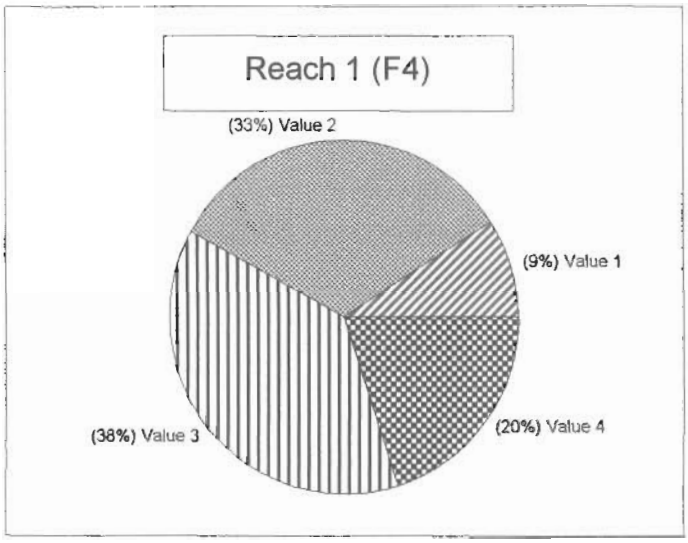
Maximum Depth in Pools

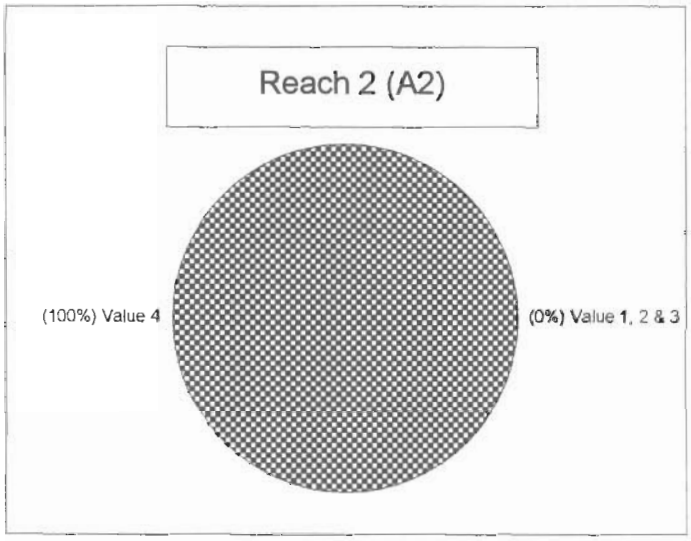


Graph 4

Freezeout Creek

Percent Embeddedness by Reach



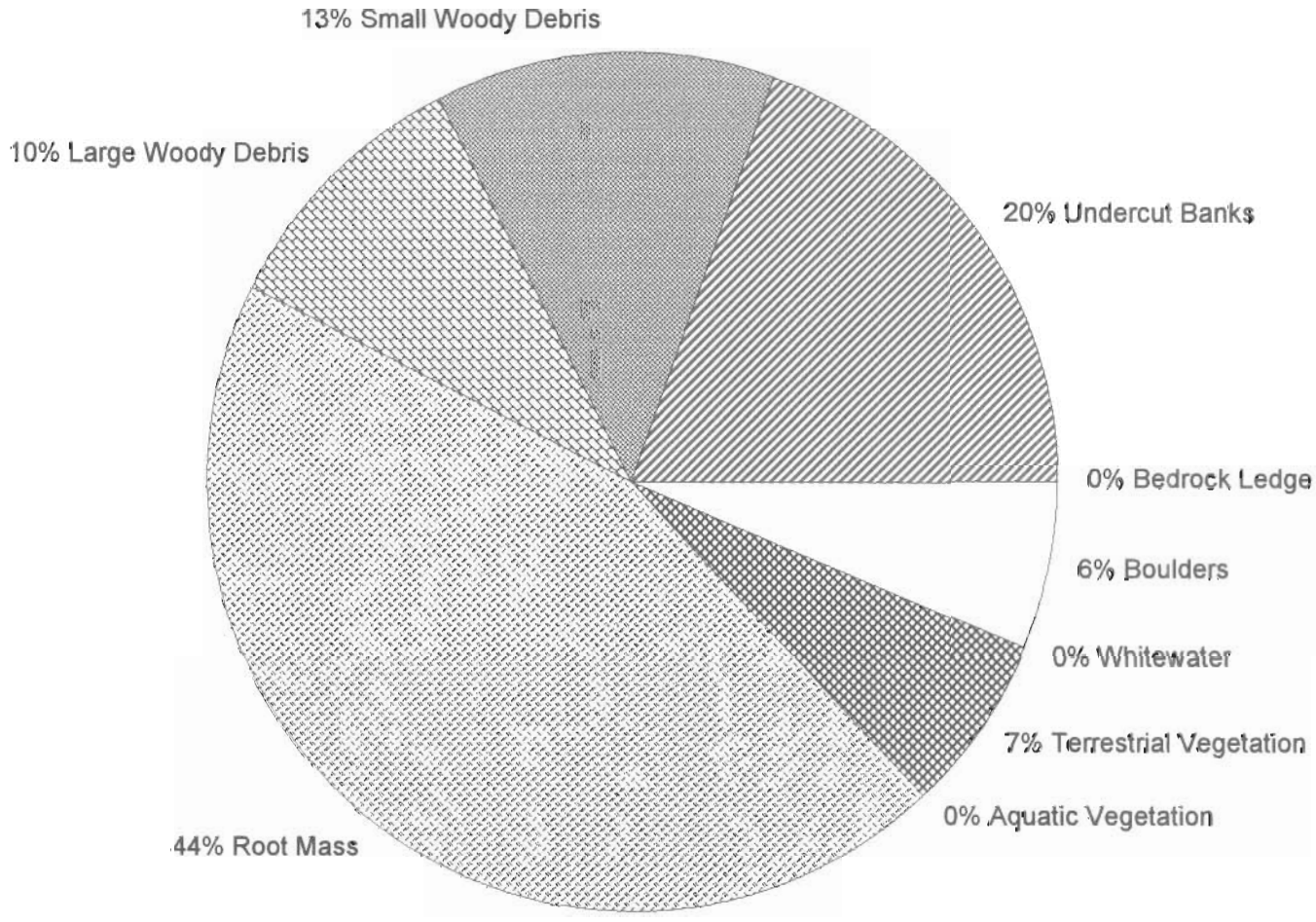


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 5

Freezeout Creek

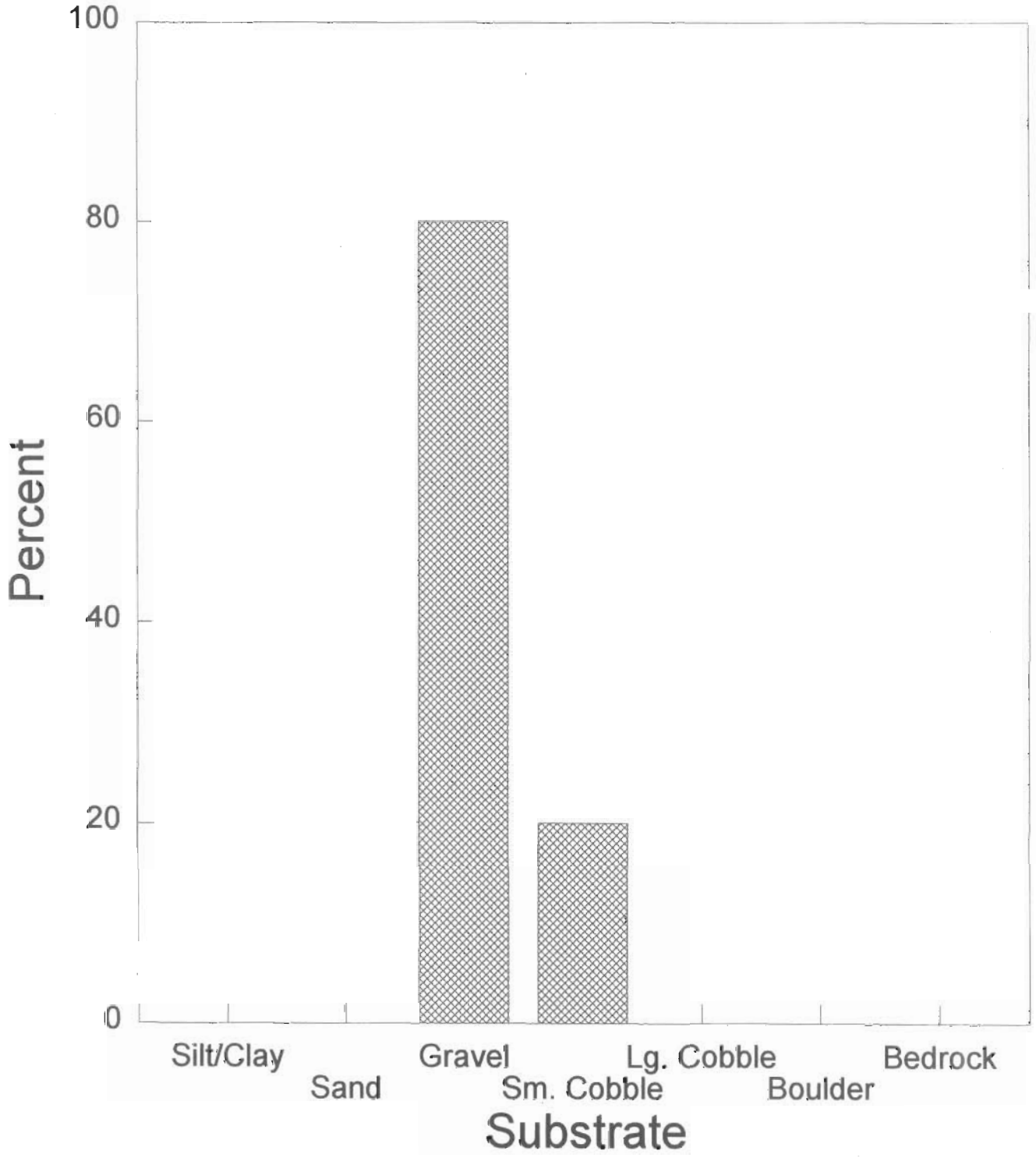
Percent Cover Types in Pools



Graph 6

Freezeout Creek

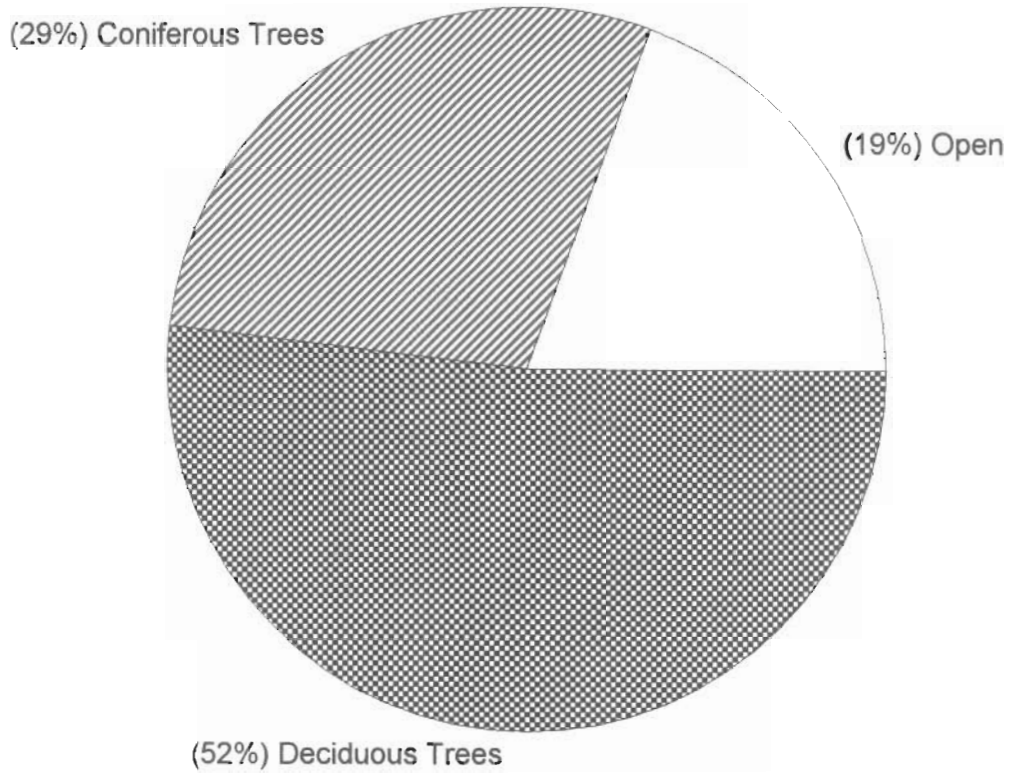
Substrate Composition in Low Gradient Riffles



Graph 7

Freezeout Creek

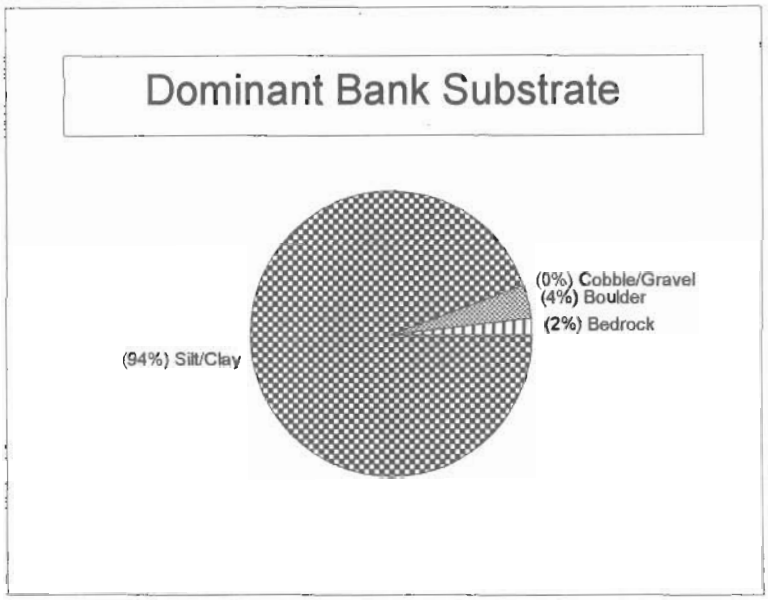
Mean Percent Canopy

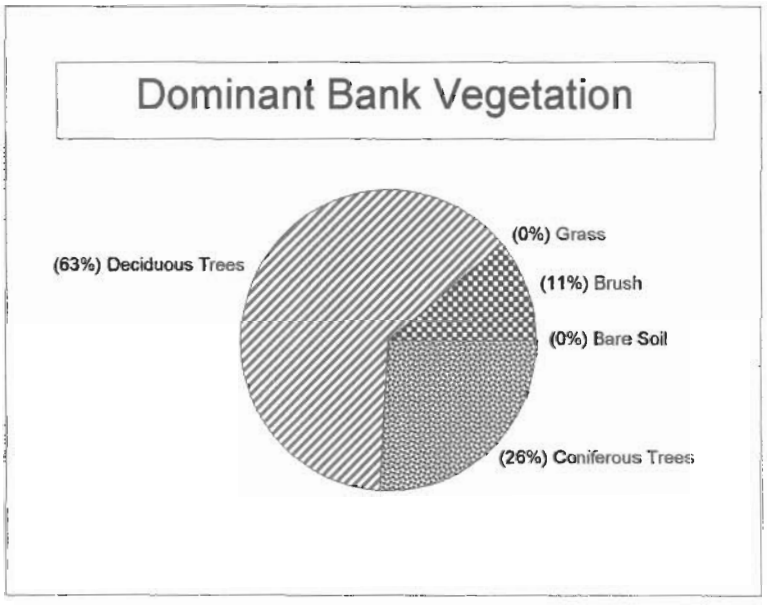


Graph 8

Freezeout Creek

Percent Bank Composition

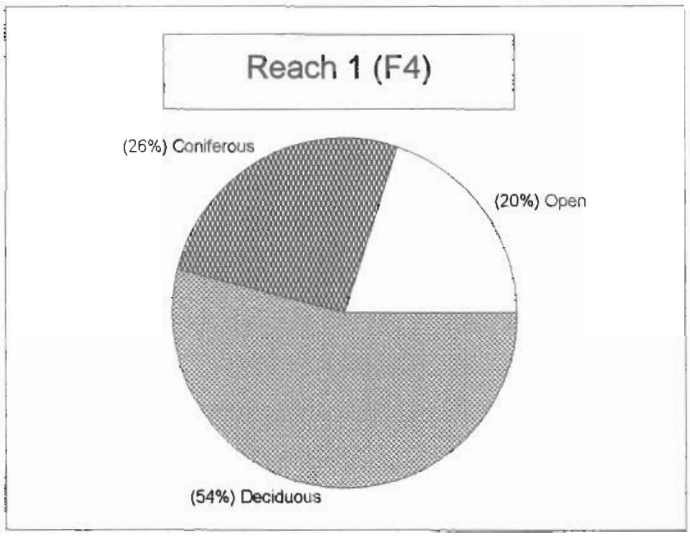


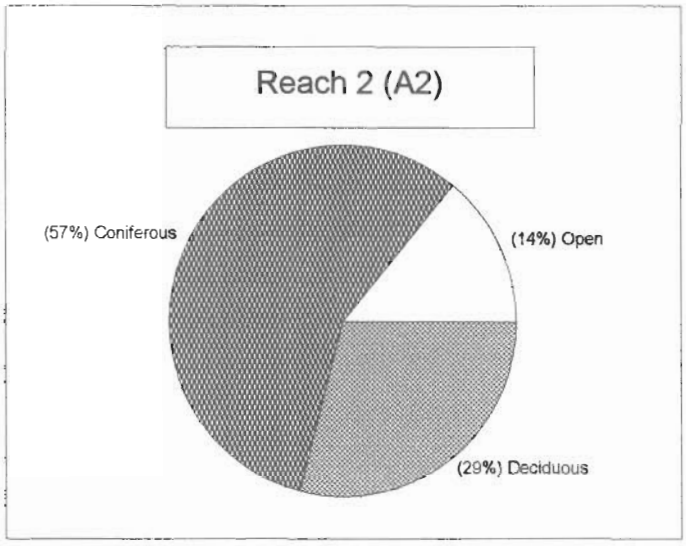


Graph 9

Freezeout Creek

Percent Canopy by Reach





Graph 11