CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Porter Creek
Report Revised April 14, 2006
Report Completed 2000
Assessment Completed 1996

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Porter Creek. 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 Porter Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

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 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

Porter Creek is a tributary to Mark West Creek, a tributary of the Russian River, located in Sonoma County, California (see Porter Creek map, page 2). The legal description at the confluence with Mark West Creek is T8N, R8W, S12. Its location is 38°32'52" N. latitude and 122°42'10" W. longitude.

Porter Creek and its tributaries drain a basin of approximately 10 square miles. Porter Creek is a second order stream and has approximately 8 miles of blue line stream, according to the USGS Mark West, and Calistoga 7.5 minute quadrangles. Elevations range from about 40 feet at the mouth of the creek to 1200 feet in the headwaters. Porter Creek flows through redwoods, maple, Oregon ash, tan oak and willows, draining approximately 10 square miles.

The stream flows through a narrow V-shaped canyon except for the last 1 1/4 mile to the mouth which opens up into a wide, flat valley of pasture land and grape fields. The watershed is primarily privately owned.

METHODS

The habitat inventory conducted in Porter Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi, et al. 1998). The Sonoma county Water Agency personnel 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 with technical oversight by Bob Coey, Russian River Basin Planner (DFG).

Historical Stream Surveys

The 1974 survey reported the average water temperature at 66°F, the maximum being 74°F and the minimum being 61°F. The substrate consisted of 5% boulder, 70% rubble, 10% gravel, 10% sand, 5% detritus. There was an estimated 50% spawning area near the mouth of the stream. The remaining part of the stream had approximately 20% spawning area. Near the headwaters, the ratio of pools to riffles was 25% pools to 75% riffle with the pools averaging 3 feet wide, 4-6 feet long and 1.0-2.5 feet deep. About 3 miles above the mouth the pools became more abundant, averaging 75% pools to 25% riffle with the pools about 4-7 feet wide, 8-10 feet long and 2-3 feet deep. No barriers exist on the main stem of Porter Creek, although two tributaries about 0.5 miles downstream from the headwaters had barriers. One was a 15 ft. high log jam and the other was a 20 ft. high rock wall, located about 50 yards upstream of the tributaries confluence with Porter creek. Four diversions were noted at the time, three along Sharpe Road and one on Mark West Creek.

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 Porter Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition. See Mark West Creek report for discussion of specific methods used.

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 Habitat, a dBASE IV data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. Refer to Mark West Creek report for discussion of methods.

HABITAT INVENTORY RESULTS

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

The habitat inventory of June 27 - August 1, 1996 was conducted by Sean White and Pam Higgins, Sonoma County Water Agency personnel. The survey began at the confluence with Mark West Creek and extended up Porter Creek to the end of landowner access permission. The total length of the stream surveyed was 24,155 feet, with an additional 586 feet of side channel. Flow was estimated to be 1.36 cfs during the survey period.

This section of Porter Creek has 7 channel types: from the mouth to 3,752 feet an F5; next 766 feet a B3; next 906 feet an F4; next 1,288 feet an F2; next 8,634 feet an F3; next 3,863 feet a B1 and the upper 4,946 feet an F3. F5 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly sand substrate. F4, F3 and F2 channel types are similar except with gravel, cobble and boulder substrates, respectively.

B3 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly cobble substrate. B1 channels are similar, but with a bedrock substrate.

Water temperatures ranged from 58°F to 74°F and air temperatures ranged from 66°F to 84°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 34% flatwater units, 34% pool units, 28% riffle units, and 5% dry streambed units. Based on total length there were 41% flatwater units, 31% pool units, 21% riffle units, and 7% dry streambed

units (Graph 1).

Four hundred, eighteen habitat units were measured and 9% were completely sampled. Twenty-one Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent occurrence were glides at 22%, low gradient riffles 21%, root wad scour pools 13% and runs 8% (Graph 2). By percent total length, glides made up 22%, low gradient riffles 15%, step runs 12%, and root wad scour pools 12%.

One hundred forty one pools were identified (Table 3). Scour pools were most often encountered at 70%, and comprised 63% of the total length of pools (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Sixty-three of the 141 pools (45%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 17% of the total length of stream habitat.

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. Shelter measurements are for 1+ salmonids. Pool habitat types in general had a mean shelter rating of 36 (Table 1). The backwater pools rated 49, scour pools rated 39, and main channel pools rated 28 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were root masses at 32%, boulders 21%, undercut banks 14%, and terr. vegetation 11%. Graph 5 describes the pool shelter in Porter Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 5 of the 9 low gradient riffles measured. Small cobble was dominant in 4 of the low gradient riffles (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 128 pool tail-outs measured, 15 had a value of 1 (12%); 37 had a value of 2 (29%); 55 had a value of 3 (43%); and 21 had a value of 4 (16%). On this scale, a value of one is best for fisheries. Graph 7 describes percent embeddedness by reach.

The mean percent canopy density for the stream reach surveyed was 67%. The mean percentages of deciduous and evergreen trees were 64% and 35%, respectively. Graph 8 describes the canopy for the entire survey and graph 9 describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 82% and the mean percent left bank vegetated was 84%. For the habitat units measured, the dominant vegetation types for the stream banks were: 65% deciduous trees, 30% evergreen trees, and 5% brush. The dominant substrate for the stream banks were: 58% silt/clay/sand, 25% cobble/gravel, 14% bedrock and 4% boulder(Graph 10).

During the summer of 1997, summer water temperatures were measured using a remote temperature recorder placed in a pool (see Temperature Summary graph at end of report). The recorder was placed in Reach 5 and logged temperatures every two hours from May 15 to September 9, 1997. The highest temperature recorded was 71°F in July and the lowest temperature recorded was 54°F in May.

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In the 1974 survey, juvenile steelhead were present from the mouth to the headwaters and California Roach were present from the mouth to the junction of Franz Valley Rd. and Porter Creek Rd. It was noted that steelhead production was limited due to the intermittent nature of the stream during the summer months.

In the 1974 survey, young of the year and 1+ steelhead were estimated at a rate of 20/100ft,in the middle section juvenile steelhead were estimated at a rate of 150/100 ft., roach at 50/100 ft., and adult green sunfish were observed at a rate of 8/100 ft. In the lower section, juvenile steelhead were observed at a rate of 50/100 ft. and roach were observed at a rate of 200/100ft. Other vertebrates observed were tadpoles, unidentified frogs, garter snakes, California newts, and red bellied newts.

Biological surveys were not conducted in Porter Creek in 1996 or 1997 due to inadequate staffing levels.

DISCUSSION

Porter Creek has seven channel types: F5, B3, F4, F2, F3, B1 and F3. There are 3,752 feet of F5 channel type in Reach 1.

According to the DFG Salmonid Stream Habitat Restoration Manual, F5 channel types are good for bank-placed boulders and fair for

low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

There are 906 feet of F4 channel type in Reach 3. F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

There are 13,580 feet of F3 channel type in Reaches 5 and 7. F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover.

There are 1,288 feet of F2 channel type in Reach 4. F2 channel types are fair for low-stage weirs, single and opposing wing-deflectors and log cover.

There are 766 feet of B3 channel type in Reach 2. B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs.

There are 3,863 feet of B1 channel type in Reach 6. B1 channel types are excellent for bank-placed boulders and bank cover and good for log cover.

The water temperatures recorded on the survey days June 27 - August 1, 1996 ranged from 58°F to 74°F. Air temperatures ranged from 66°F to 84°F. These warmer temperatures are above the threshold stress level (65°F) for salmonids.

Pools comprised 31% of the total length of this survey. 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. In Porter Creek, the pools are relatively shallow with 45% having a maximum depth of at least 2 feet. These pools comprised 17% of the total length of stream habitat. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 36. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by root masses (32%), boulders (21%), undercut banks (14%), and terr. vegetation (11%). Log and root wad

cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

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

Fifty-nine percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 12% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In a reach comparison, Reaches 1-5 had very poor embeddedness ratings, while reaches 6 and 7 had fair ratings with more than half of the pool tail-outs having either a 1 or 2.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Reaches 1-5 of Porter Creek, salmonid spawning is likely inhibited by high sediment levels.

The mean percent canopy for the survey was 67%. This is a slightly low percentage of canopy, since 80 percent is generally considered desirable. Cooler water temperatures are desirable in Porter Creek. Elevated water temperatures could be reduced by increasing stream canopy. The large trees required for adequate stream canopy would also eventually provide a long term source of large woody debris needed for instream structure and bank stability.

GENERAL RECOMMENDATIONS

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

Recent 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 shelter and rearing habitat, and offset channel incision. Many signs of recent and historic tree and log removal were evident in the active channel during our survey. 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 encouraged not to remove woody debris from the stream, except under

extreme buildup and only under guidance by a fishery professional.

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

1) Increase the canopy on Porter Creek by planting willow, alder, redwood, and douglas fir along the stream where shade canopy is not at acceptable levels. The reach above the survey section should be assesses for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

2) For sources of upslope and in-channel erosion, utilize biotechnical approaches. 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 run-off. Biotechnical approaches should be utilized in reach 5.

3) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations. This must be in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

4) Where feasible, design and engineer pool enhancement structures to increase the number and quality of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion. Many glide habitats could be converted to pools with the addition of large woody debris.

PROBLEM SITES AND LANDMARKS - PORTER CREEK SURVEY COMMENTS

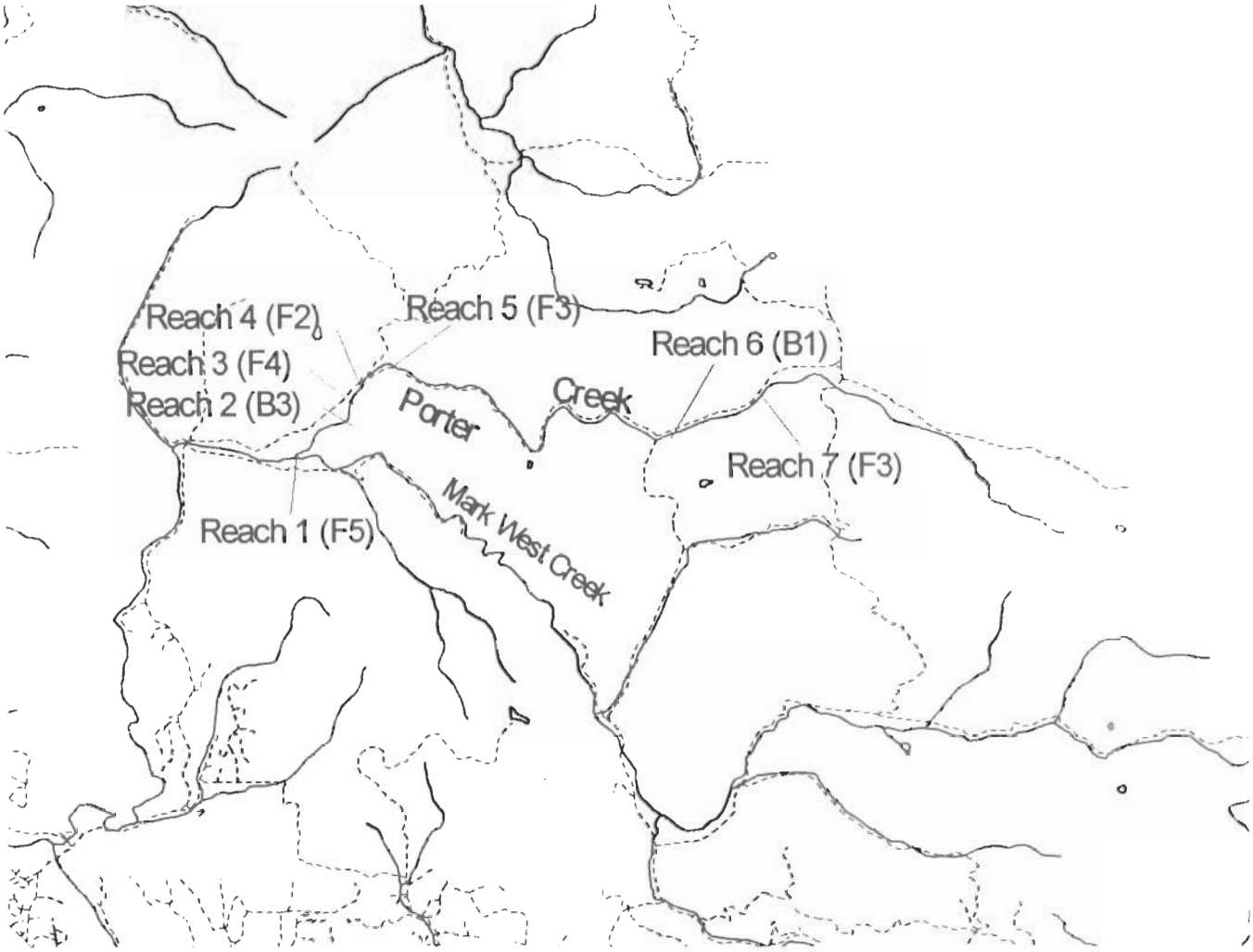
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

HABITAT UNIT #	STREAM LEN (FT.)	COMMENTS
7.00	330	OBSERVED RED-LEGGED FROG
9.00	402	70% DECIDUOUS BAY

20.00	861	200 YDS DOWNSTREAM OF HOUSE
22.00	1048	DIRT RD. CROSSING
46.00	2470	BRIDGE #1 CEMENT CUL. (SUMMER DAM-EARTH ROCK)
52.00	2831	DRY TRIB R/B
62.00	3414	SM. MOUTH BASS/ROACH/SH/BLUE GILL/SUCKERS
65.00	3816	CHANNEL CHANGE BEGIN
77.00	4635	CHANNEL CHANGED BACK TO DOWNSTREAM SECTION.
84.00	5269	LOTS OF WARMWATER FISH SPECIES: BRN BULLHEAD/GSUN/SM M BASS. INTERMIT. TRIBS R/B
86.00	5426	WOODEN DRIVEWAY BRIDGE (#2) 23' * SEVERAL DEAD JUVENILE SH (UNIT #076-UPSTREAM)
87.00	5452	CHANNEL CHANGE BEGIN (BEDROCK)
88.00	5534	WOODEN DRIVEWAY BRIDGE #2 23' OBSERVED SEVERAL DEAD JUVENILE SH (UNIT #76-UPSTREAM)
96.00	6275	BRIDGE #3 CEMENT 43'L
99.00	6422	BIG CRAWDAD, ALL SPECIES POOL BRIDGE #4 WOODEN/CEMENT 20'L 42'W
103.00	6713	@ HOUSE UPSTREAM OF FV RD BRIDGE
104.00	6735	CHANNEL CHANGE TO LG. BOULDRS
108.00	7216	R/B RD. INTO CREEK
113.00	7369	END OF PROP. ACCESS OK
114.00	7421	BEGIN AGAIN @ULMAN PROPERTY. BRIDGE #5 (DOWNSTREAM)
118.00	7698	EROSION R/B ALDER DOWN IN CREEK
127.00	8247	EROSION/ROCKSLIDE
128.00	8298	SPRING R/B
147.00	9173	END @ PUMPHOUSE
148.00	9240	BEGIN @ BRIDGE #6 SWIGCAMP PROPERTY DOUBLE BOX CEMENT CULVERT 8'H/24'W/124'L
159.00	9811	TRIB L/B WITH CEMENT CULVERT 3' DIA
168.00	10349	CEMENT CHECK DAM
171.00	10654	END AT PROP. LINE 100' DOWNSTREAM OF BRIDGE #7
182.00	11322	THIS UNIT OF QUARRY ENTRANCE

186.00	13122	EROSION R/B JUST ABOVE QUARRY
194.00	13463	3'DIA CULVERT R/B WATER/TRIB
196.00	13576	CORRAGATED METAL RETAINING WALL R/B
199.00	13746	CULVERT R/B 2'DIA
216.00	14643	x 100' downstream of bridge #8 (pet. for. rd.)
218.00	14730	x 2.5'
220.00	14768	METAL & CONCRETE FISH LADDER
221.00	14889	THRU CONCRETE BRIDGE #8 CULVERT (DOUBLE BOX) 11'H / 24' *LOW F10 CHANNEL 120'LONG
224.00	15023	EROSION L/B & R/B
225.00	15057	EROSION L/B & R/B
226.00	15091	LWD JAM 4' HIGH EROSION R/B & L/B
232.00	15277	EROSION L/B
237.00	15404	CHANNEL CHANGE
240.00	15497	EROSION R/B
272.00	17035	DRY TRIB R/B SM. DRY TRIB L/B
308.00	18893	EROSION R/B
310.00	19000	ACROSS FROM PETRIFIED FOREST ENTRANCE
314.00	19100	CEMENT DAM ABANDONED
317.00	19248	CHANNEL CHANGE TO BEDROCK
320.00	19407	EROSION L/B
343.00	20761	EROSION L/B
347.00	21113	DRT RD. XNG
366.00	21892	ACCESS PERM. ENDS HERE
367.00	21944	BEGIN BELOW BRIDGE #9
380.00	22530	HOUSE RT BOTTOM MADRID?
386.00	23149	BRIDGE #10 RD. TO SHARP RD. 7' H/ 29.06/21.5W
394.00	23851	END @ PROP. LINE BELOW HOUSE ON KROHN PROP.
395.00	23911	BEGIN @URGUHART PROP. @ WOODEN FOOT BRIDGE
405.00	24244	EROSION RB
406.00	24272	EROSION RB
409.00	24482	EROSION RB
410.00	24492	END OF SURVEY

Porter Creek



2 0 2 4 Miles

Roads

Streams

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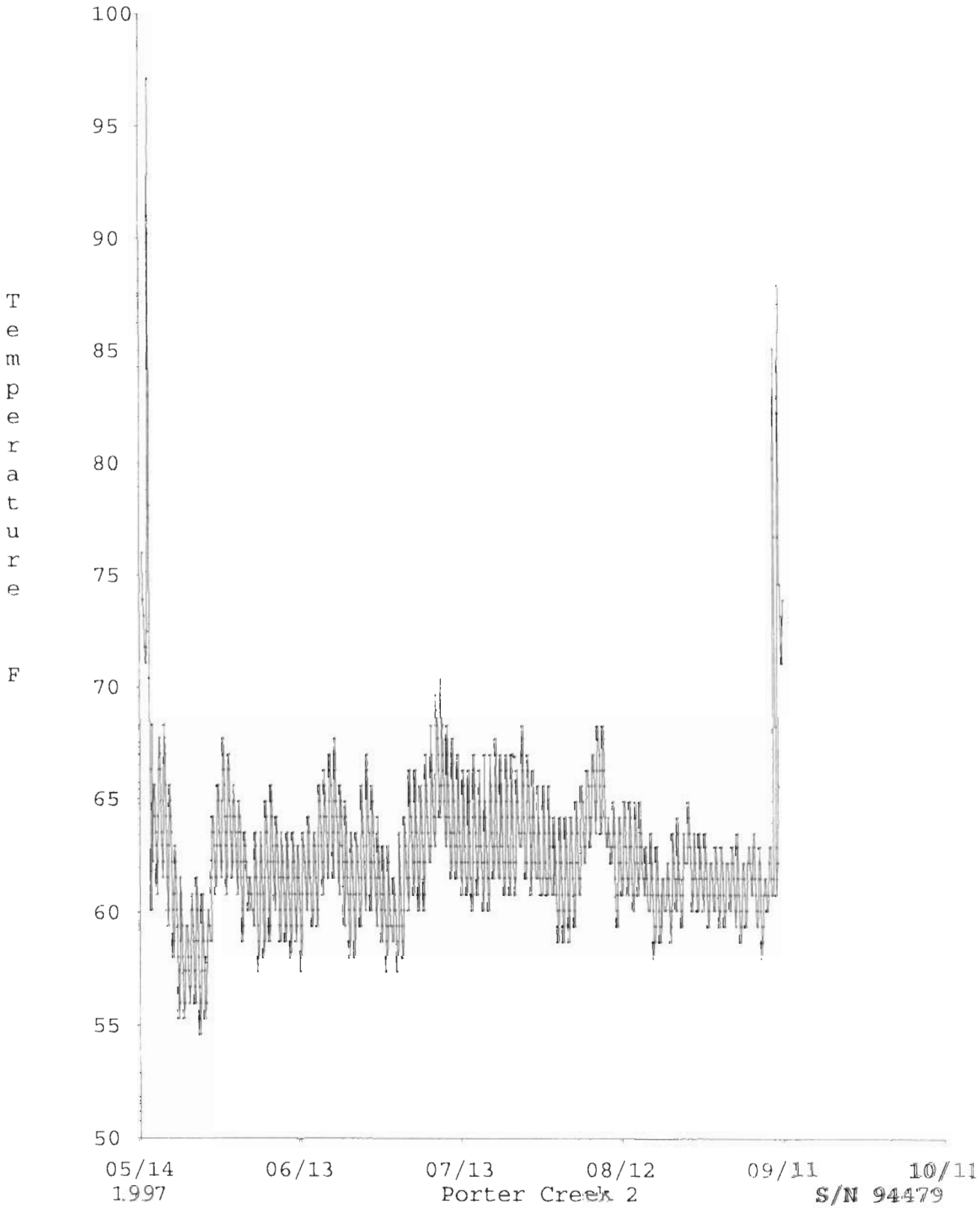
Inland Fisheries Division
Department of Fish and Game
1997


100
95
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Temperature F
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10/11
Porter Creek 2
S/N 94479

PORTER CREEK

Drainage: Mark West Creek, Russian River

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

Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T8NR8WS12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

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
116	8	RIFFLE	27	45	5266	21	6.7	0.3	301	34917	93	10749	0	0
144	9	FLATWATER	34	72	10380	41	8.8	0.4	595	85679	321	46218	0	8
144	20	POOL	34	53	7642	30	11.0	1.3	593	85354	875	126018	751	38
20	1	DRY	5	89	1777	7	18.1	0.0	1573	31460	0	0	0	0

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
424	38	25065	237410	182985

PORTER CREEK

Drainage: Mark West Creek, Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T8NR8WS12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

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 %
87	6	LGR	21	44	3827	15	7	0.2	1.2	313	27273	88	7638	0	0	62
24	1	HGR	6	50	1205	5	6	0.3	1.2	262	6295	84	2025	0	0	81
1	0	CAS	0	24	24	0	3	0.2	0.2	61	61	12	12	0	0	0
4	1	BRS	1	52	209	1	6	0.8	2.8	325	1301	267	1069	0	0	48
91	6	GLD	21	61	5523	22	10	0.5	2.4	670	60936	396	36059	0	13	70
35	2	RUN	8	52	1836	7	7	0.3	1.3	414	14482	140	4905	0	0	68
18	1	SRN	4	168	3021	12	6	0.4	1.2	568	10229	290	5224	0	0	50
1	1	TRP	0	87	87	0	7	0.8	1.4	618	618	494	494	432	10	50
29	3	MCP	7	53	1540	6	11	1.4	4.1	596	17274	880	25519	771	31	68
1	1	CCP	0	62	62	0	26	1.4	2.4	1581	1581	2213	2213	1897	30	20
8	1	STP	2	115	920	4	8	1.0	3.1	936	7484	983	7865	2076	23	85
1	1	CRP	0	77	77	0	13	1.6	2.2	1027	1027	1643	1643	1438	10	85
7	2	LSL	2	44	306	1	11	1.2	2.6	504	3531	682	4775	567	89	67
57	6	LSR	13	52	2940	12	11	1.3	4.6	581	33104	883	50326	731	41	75
12	2	LSBk	3	60	715	3	10	1.4	3.8	604	7245	1010	12121	870	23	80
10	1	LSBo	2	33	330	1	9	1.0	3.1	339	3389	494	4936	443	21	80
13	0	PLP	3	35	458	2	14	1.3	3.3	446	5794	687	8930	565	47	74
1	1	BPR	0	48	48	0	8	0.4	1.2	389	389	156	156	117	20	80
1	0	BPL	0	19	19	0	5	1.0	1.1	87	87	87	87	79	0	0
3	1	DPL	1	47	141	1	25	1.7	3.6	1277	3830	2255	6764	2074	58	50
20	1	DRY	5	89	1777	7	18	0.0	0.0	1573	31460	0	0	0	0	57

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
424	38	25065	237390	182762

PORTER CREEK

Drainage: Mark West Creek, Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T8NR8WS12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

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
39	6	MAIN	27	67	2609	34	10.5	1.3	691	26957	925	36091	841	29
100	12	SCOUR	69	48	4825	63	10.9	1.3	541	54090	829	82874	694	41
5	2	BACKWATER	3	42	208	3	17.2	1.3	861	4307	1401	7007	1283	49

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
144	20	7642	85354	125971

PORTER CREEK

Drainage: Mark West Creek, Russian River

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

Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T8NR8WS12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

UNITS MAX DPTH 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
1	TRP	1	0	0	1	100	0	0	0	0	0	0
29	MCP	20	0	0	15	52	11	38	2	7	1	3
1	CCP	1	0	0	0	0	1	100	0	0	0	0
8	STP	6	0	0	4	50	3	38	1	13	0	0
1	CRP	1	0	0	0	0	1	100	0	0	0	0
7	LSL	5	0	0	3	43	4	57	0	0	0	0
57	LSR	40	0	0	30	53	17	30	7	12	3	5
12	LSBk	8	0	0	6	50	4	33	2	17	0	0
10	LSBo	7	0	0	8	80	1	10	1	10	0	0
13	PLP	9	0	0	9	69	3	23	1	8	0	0
1	BPR	1	0	0	1	100	0	0	0	0	0	0
1	BPL	1	0	0	1	100	0	0	0	0	0	0
3	DPL	2	0	0	1	33	1	33	1	33	0	0

TOTAL UNITS
144

PORTER CREEK

Drainage: Mark West Creek, Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T6NR8W12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
87	8	LGR	0	0	0	0	0	0	0	0	0
24	3	HGR	0	0	0	0	0	0	0	0	0
1	0	CAS	0	0	0	0	0	0	0	0	0
4	2	BRS	0	0	0	0	0	0	0	0	0
91	12	GLD	0	4	3	15	56	4	0	10	8
35	3	RUN	0	0	0	0	0	0	0	0	0
18	3	SRN	0	0	0	0	0	0	0	0	0
1	1	TRP	0	0	0	0	0	0	0	0	0
29	26	MCP	9	2	1	32	14	0	0	28	15
1	1	CCP	0	0	0	15	85	0	0	0	0
8	6	STP	0	0	0	0	0	0	1	99	0
1	1	CRP	0	0	0	0	100	0	0	0	0
7	7	LSL	10	24	37	19	6	0	0	2	3
57	55	LSR	20	9	4	48	12	0	0	6	1
12	12	LSBk	20	6	0	18	7	0	0	23	26
10	7	LSBo	0	1	0	9	1	0	0	90	0
13	11	PLP	8	11	8	10	4	0	0	20	40
1	1	BPR	0	0	0	100	0	0	0	0	0
1	0	BPL	0	0	0	0	0	0	0	0	0
3	3	DPL	20	30	12	3	0	0	0	35	0
20	1	DRY	0	0	0	0	0	0	0	0	0
ALL 424 HABITAT TYPES	163		13	8	5	31	14	0	0	20	8
POOLS 144 ONLY	131		14	8	6	32	11	0	0	20	8

PORTER CREEK — Drainage: Mark West Creek, Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE — Survey Dates: 06/27/96 to 08/01/96

Confluence Location: QUAD: MARK WEST LEGAL DESCRIPTION: T6NR8WS12 LATITUDE: 38°32'52" LONGITUDE: 122°42'10"

TOTAL HABITAT UNITS	UNITS SUBSTRATE 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
87	9	LGR	0	0	56	44	0	0	0
1	1	HGR	0	0	100	0	0	0	0
1	0	CAS	0	0	0	0	0	0	0
4	2	BRS	0	0	0	0	0	0	100
8	8	GLD	0	25	75	0	0	0	0
5	2	RUN	0	0	100	0	0	0	0
3	3	SRN	0	0	33	0	67	0	0
1	1	TRP	0	0	100	0	0	0	0
5	5	MCP	0	40	20	20	0	0	20
1	1	CCP	0	100	0	0	0	0	0
2	2	STP	0	0	0	50	50	0	0
1	1	CRP	0	100	0	0	0	0	0
2	2	LSL	0	50	50	0	0	0	0
7	7	LSR	0	43	29	14	14	0	0
2	2	LSBk	0	50	50	0	0	0	0
1	1	LSBo	0	0	100	0	0	0	0
13	0	PLP	0	0	0	0	0	0	0
1	1	BPR	0	0	0	100	0	0	0
1	0	BPL	0	0	0	0	0	0	0
3	1	DPL	0	0	100	0	0	0	0
20	1	DRY	0	0	0	100	0	0	0

PORTER CREEK

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
67.53	35.28	63.93	82.00	84.40

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	6	8	13.73
Boulder	2	2	3.92
Cobble/Gravel	10	15	24.51
Silt/clay	33	26	57.84

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	0	0	0
Brush	2	3	5
Deciduous Trees	30	35	65
Evergreen Trees	18	12	30
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: PORTER CREEK
SAMPLE DATES: 06/27/96 to 08/01/96
SURVEY LENGTH:
MAIN CHANNEL: 24479 ft. SIDE CHANNEL: 586 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: MARK WEST Latitude: 38°32'52"
Legal Description: T8NR8WS12 Longitude: 122°42'10"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-64)

Channel Type: F5
Main Channel Length: 3752 ft.
Side Channel Length: 231 ft.
Riffle/Flatwater Mean Width: 11.9 ft.
Pool Mean Depth: 1.7 ft.
Base Flow: 1.4 cfs
Water: -68°F Air: -78°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 82%
Dom. Bank Substrate: Silt/Clay/Sand
Mean Canopy Density: 60%
Evergreen Component: 22%
Deciduous Component: 78%
Pools by Stream Length: 28%
Pools >=2 ft. Deep: 88%
Pools >=3 ft. Deep: 38%
Mean Pool Shelter Rtn: 33
Dom. Shelter: Root masses
Occurrence of LOD: 10%
Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 0% 3. 62% 4. 38% 5. 0%

STREAM REACH 2 (Units 65-76)

Channel Type: B3
Main Channel Length: 766 ft.
Side Channel Length: 0 ft.
Riffle/Flatwater Mean Width: 11.5 ft.
Pool Mean Depth: 1.1 ft.
Base Flow: 1.4 cfs
Water: 68-74°F Air: 78-80°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 71%
Dom. Bank Substrate: Silt/Clay/Sand
Mean Canopy Density: 72%
Evergreen Component: 35%
Deciduous Component: 65%
Pools by Stream Length: 11%
Pools >=2 ft. Deep: 50%
Pools >=3 ft. Deep: 0%
Mean Pool Shelter Rtn: 8
Dom. Shelter: Boulders
Occurrence of LOD: 0%
Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 0% 3. 100% 4. 0% 5. 0%

STREAM REACH 3 (Units 77-86)

Channel Type: F4
Main Channel Length: 906 ft.
Side Channel Length: 66 ft.
Riffle/Flatwater Mean Width: 14.7 ft.
Pool Mean Depth: 1.3 ft.
Mean Canopy Density: 18%
Evergreen Component: 20%
Deciduous Component: 80%
Pools by Stream Length: 14%
Pools >=2 ft. Deep: 100%

Base Flow: 1.4 cfs
Water: 74-74°F Air: 78-84°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 70%
Dom. Bank Substrate: Silt/Clay/Sand
Embeddness Value: 1. 0% 2. 0% 3. 67% 4. 33% 5. 0%

Pools >=3 ft. Deep: 0%
Mean Pool Shelter Rtn: 40
Dom. Shelter: Terrestrial Veg.
Occurrence of LOD: 0%
Dry Channel: 0 ft.

STREAM REACH 4 (Units 87-103)

Channel Type: F2
Main Channel Length: 1288 ft.
Side Channel Length: 0 ft.
Riffle/Flatwater Mean Width: 10.0 ft.
Pool Mean Depth: 1.0 ft.
Base Flow: 1.4 cfs
Water: 64-74°F Air: 66-84°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 96%
Dom. Bank Substrate: Silt/Clay/Sand
Embeddness Value: 1. 0% 2. 20% 3. 60% 4. 20% 5. 0%

Mean Canopy Density: 46%
Evergreen Component: 15%
Deciduous Component: 85%
Pools by Stream Length: 36%
Pools >=2 ft. Deep: 14%
Pools >=3 ft. Deep: 14%
Mean Pool Shelter Rtn: 22
Dom. Shelter: Terrestrial Veg.
Occurrence of LOD: 0%
Dry Channel: 0 ft.

STREAM REACH 5 (Units 104-236)

Channel Type: F3
Main Channel Length: 8634 ft.
Side Channel Length: 289 ft.
Riffle/Flatwater Mean Width: 6.6 ft.
Pool Mean Depth: 1.3 ft.
Base Flow: 1.4 cfs
Water: 58-70°F Air: 66-80°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 83%
Dom. Bank Substrate: Silt/Clay/Sand
Embeddness Value: 1. 2% 2. 31% 3. 55% 4. 13% 5. 0%

Mean Canopy Density: 77%
Evergreen Component: 40%
Deciduous Component: 60%
Pools by Stream Length: 39%
Pools >=2 ft. Deep: 47%
Pools >=3 ft. Deep: 12%
Mean Pool Shelter Rtn: 38
Dom. Shelter: Boulders
Occurrence of LOD: 33%
Dry Channel: 21 ft.

STREAM REACH 6 (Units 237-316)

Channel Type: B1
Main Channel Length: 3863 ft.
Side Channel Length: 0 ft.
Riffle/Flatwater Mean Width: 6.5 ft.
Pool Mean Depth: 1.3 ft.
Base Flow: 1.4 cfs
Water: 64-68°F Air: 76-78°F
Dom. Bank Veg.: Deciduous Trees
Bank Vegetative Cover: 87%
Dom. Bank Substrate: Silt/Clay/Sand
Embeddness Value: 1. 38% 2. 33% 3. 29% 4. 0% 5. 0%

Mean Canopy Density: 78%
Evergreen Component: 36%
Deciduous Component: 64%
Pools by Stream Length: 28%
Pools >=2 ft. Deep: 42%
Pools >=3 ft. Deep: 8%
Mean Pool Shelter Rtn: 46
Dom. Shelter: Root masses
Occurrence of LOD: 29%
Dry Channel: 222 ft.

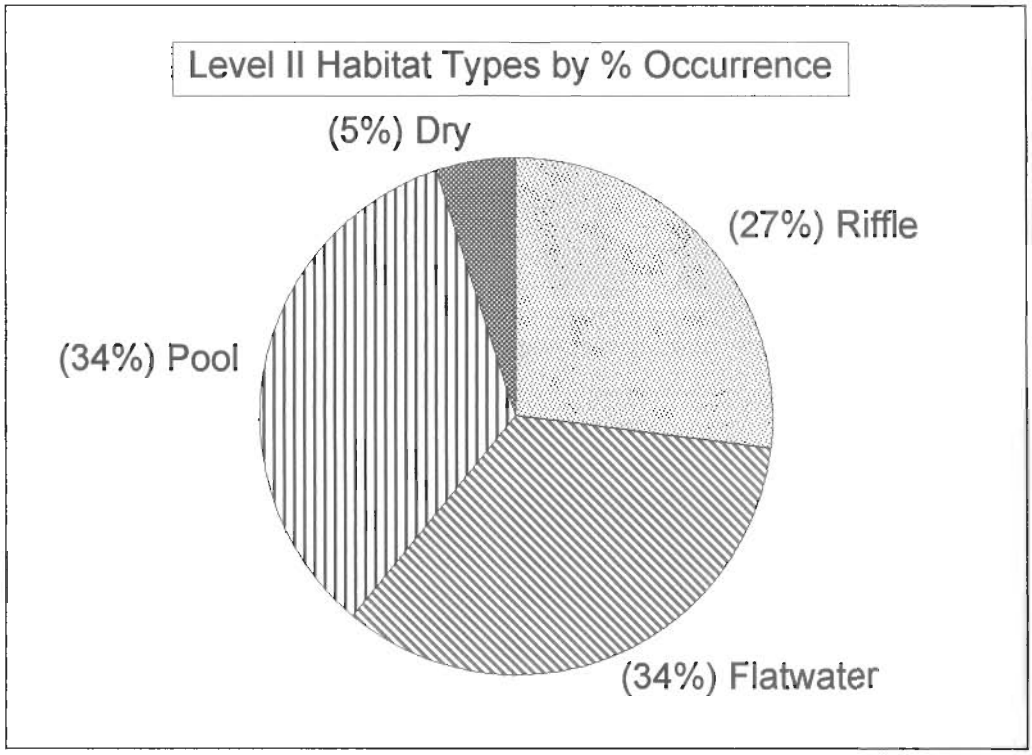
STREAM REACH 7 (Units 317-410)

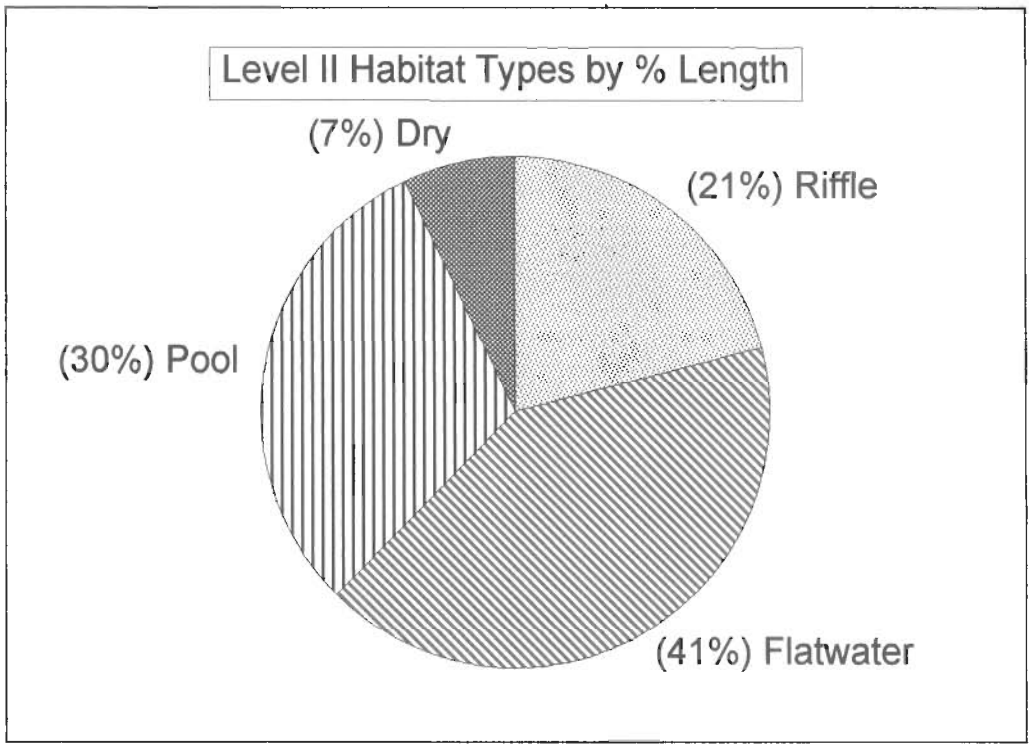
Channel Type: F3	Mean Canopy Density: 60%
Main Channel Length: 5269 ft.	Evergreen Component: 48%
Side Channel Length: 0 ft.	Deciduous Component: 49%
Riffle/Flatwater Mean Width: 5.1 ft.	Pools by Stream Length: 26%
Pool Mean Depth: 1.1 ft.	Pools >=2 ft. Deep: 29%
Base Flow: 1.4 cfs	Pools >=3 ft. Deep: 10%
Water: 66-66°F Air: 78-78°F	Mean Pool Shelter Rtn: 41
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 91%	Occurrence of LOD: 30%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 1535 ft.

Embeddness Value: 1. 17% 2. 45% 3. 10% 4. 28% 5. 0%

Porter Creek

Level II Habitat Types

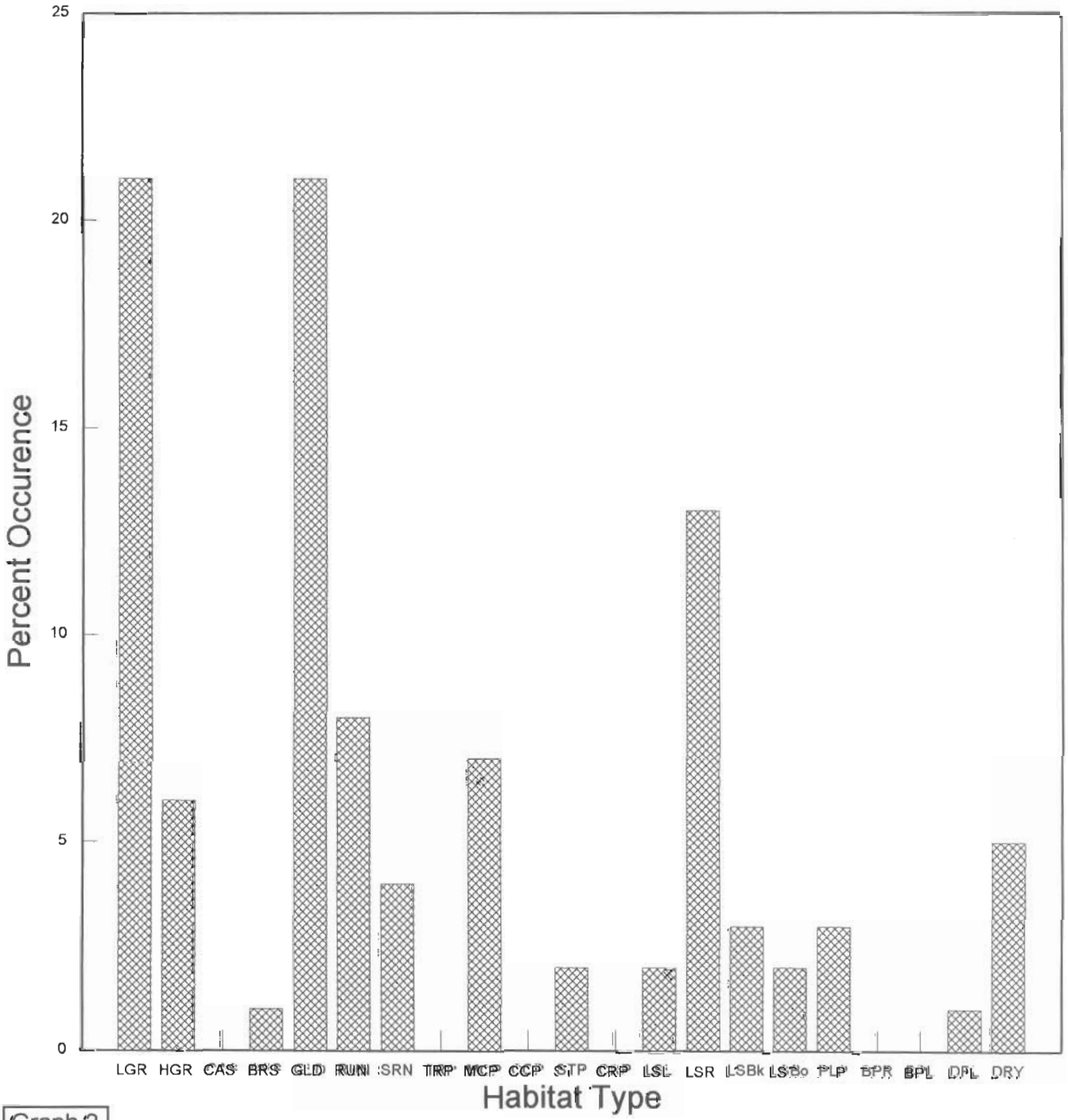




Graph 1

Porter Creek

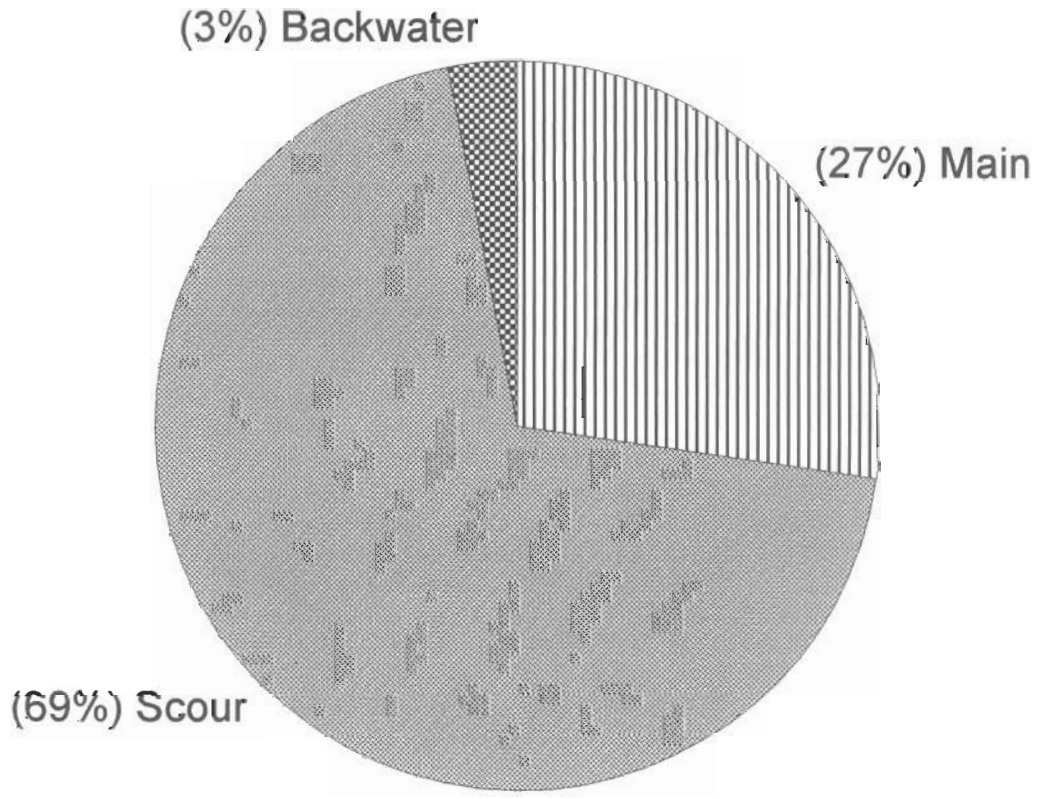
Level IV Habitat Types by % Occurrence



Graph 2

Porter Creek

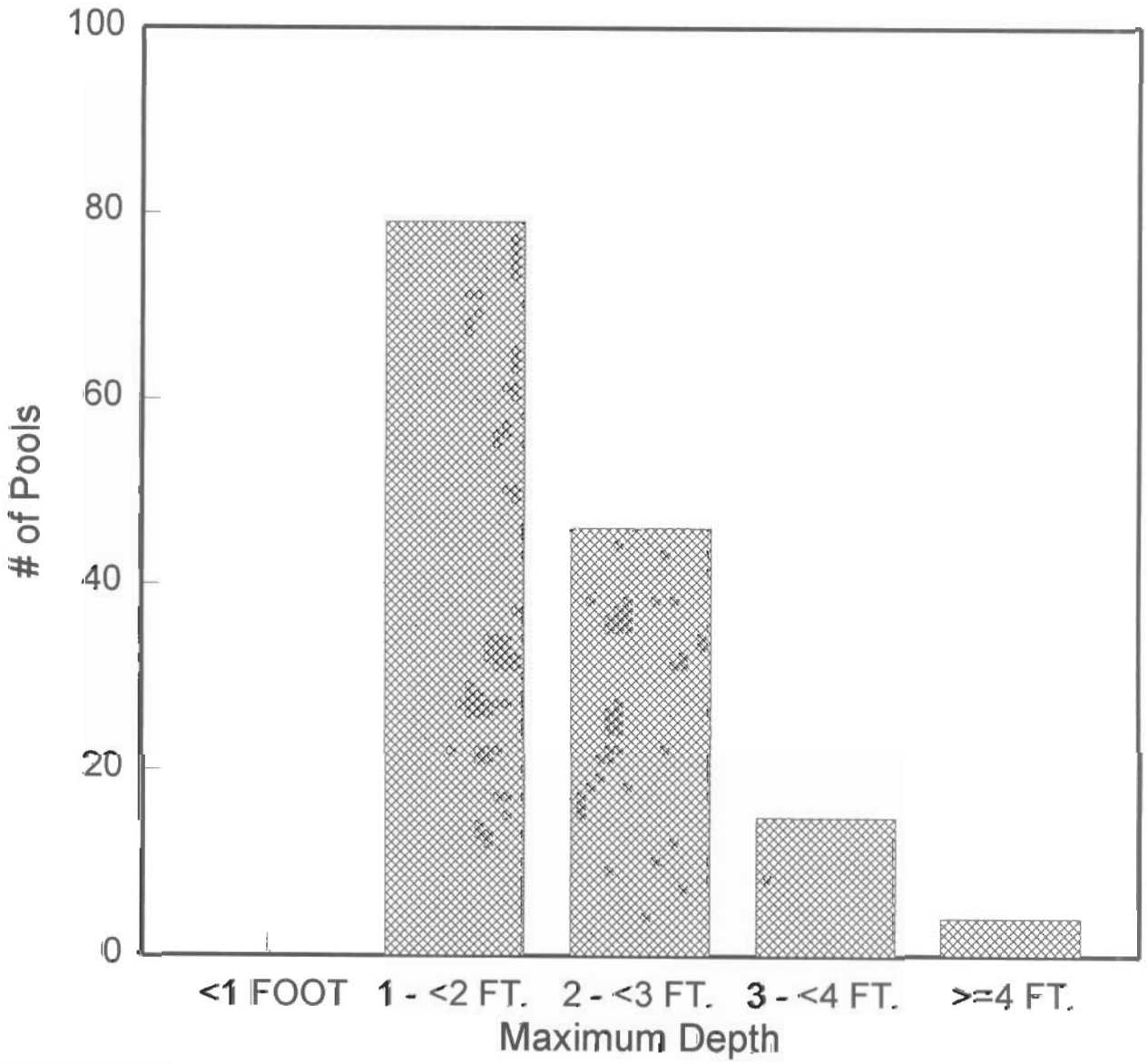
Pool Habitat Types by % Occurrence



Graph 3

Porter Creek

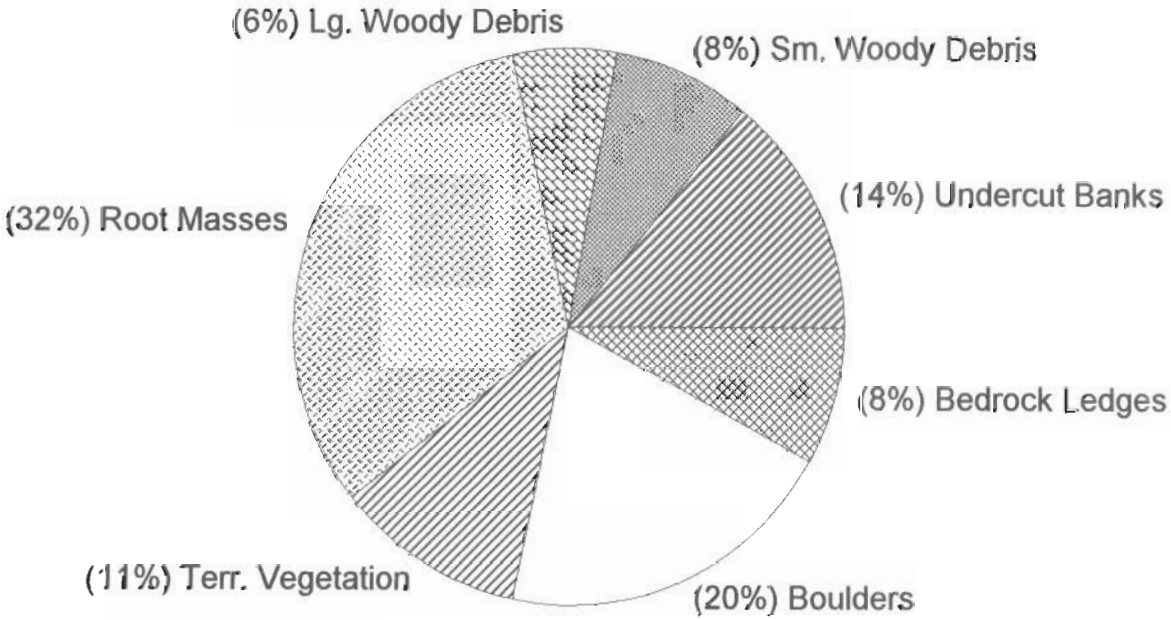
Maximum Depth in Pools



Graph 4

Porter Creek

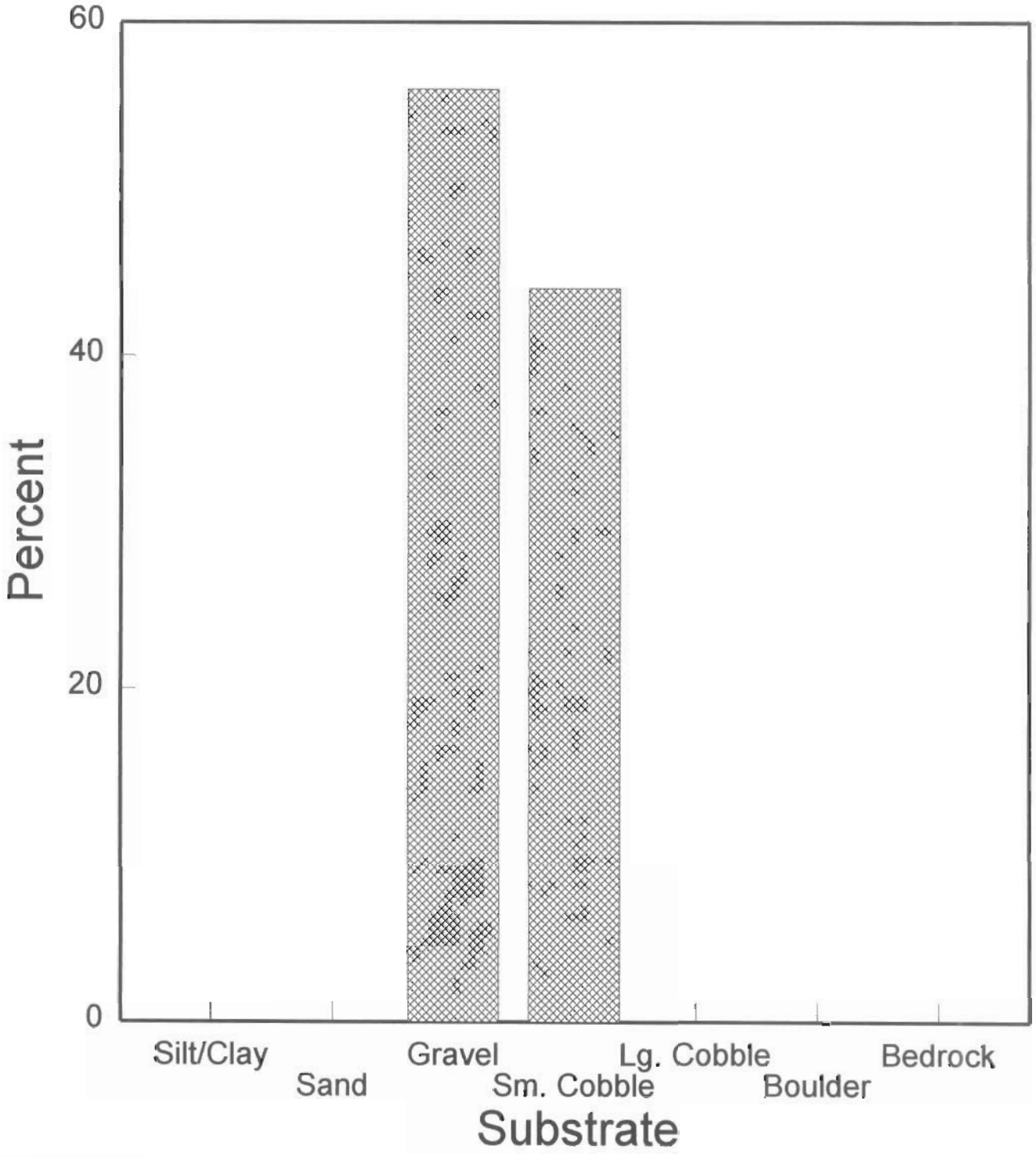
Pool Shelter Types by % Area



Graph 5

Porter Creek

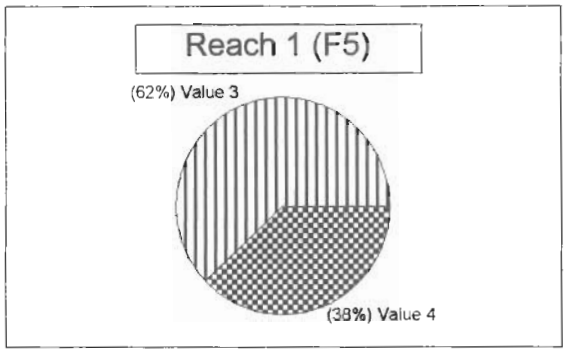
Substrate Composition in Low Gradient Riffles

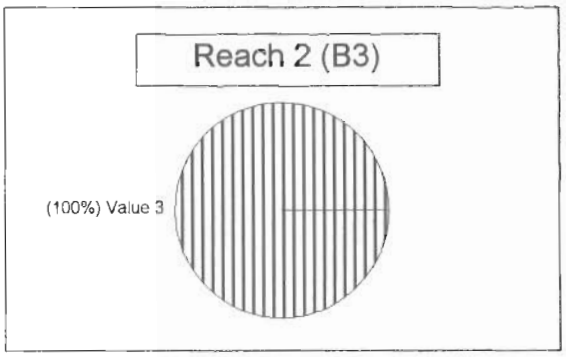


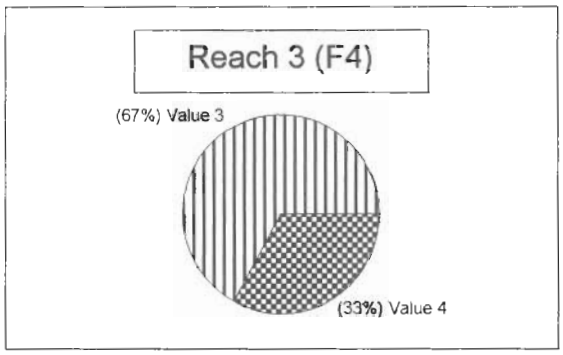
Graph 6

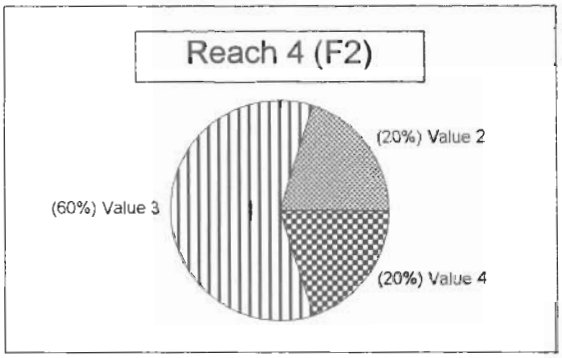
PORTER CREEK

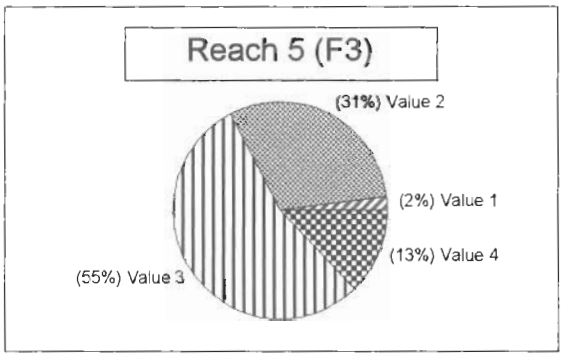
Percent Cobble Embeddedness by Reach

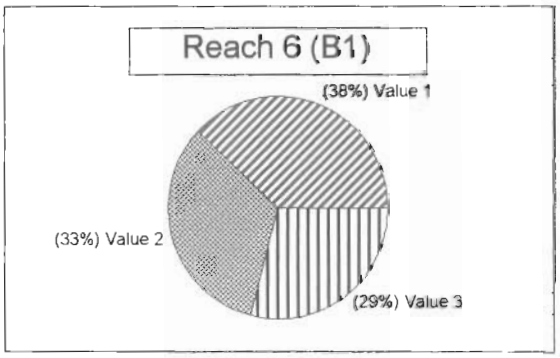


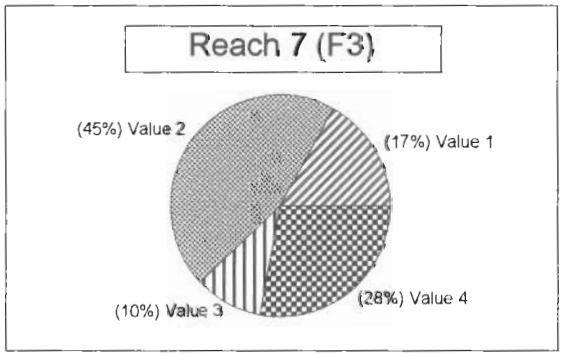










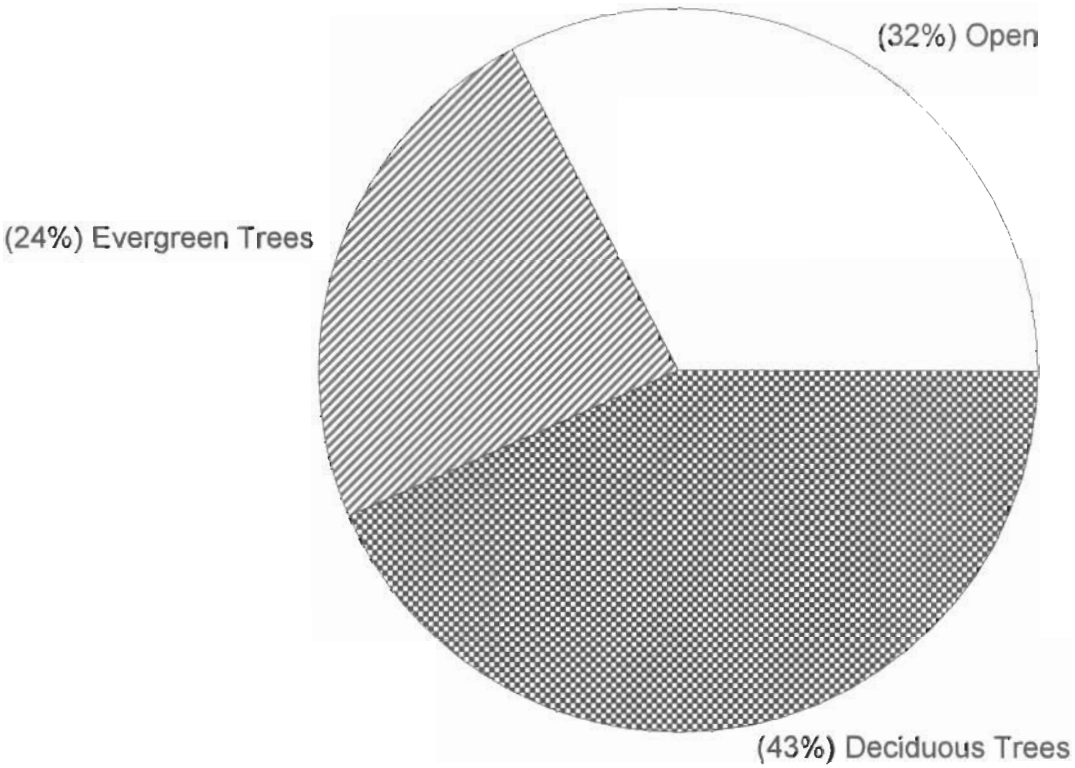


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 7

Porter Creek

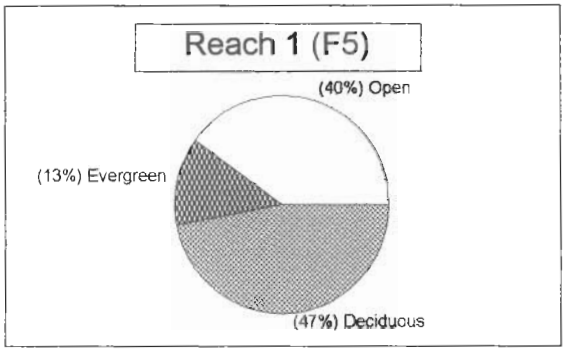
Mean Percent Canopy

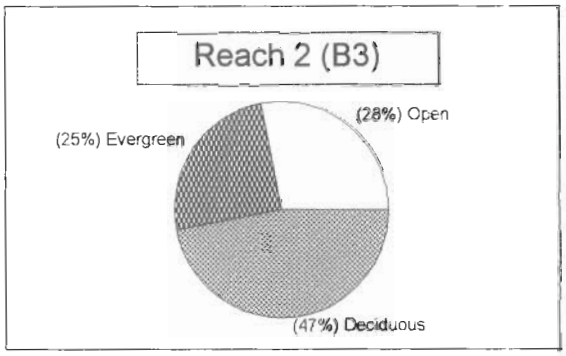


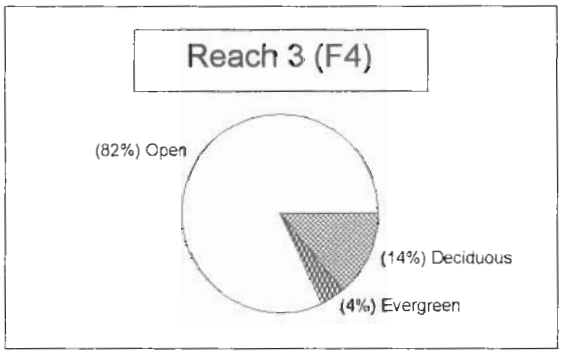
Graph 8

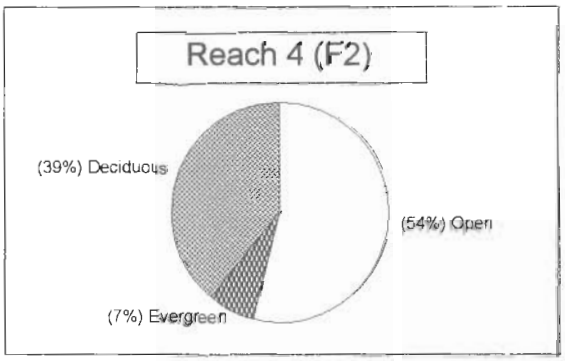
PORTER CREEK

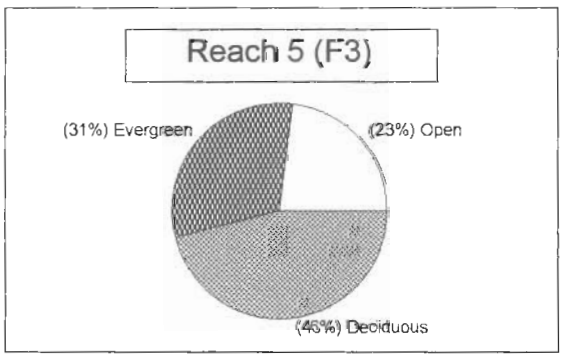
Percent Canopy By Reach

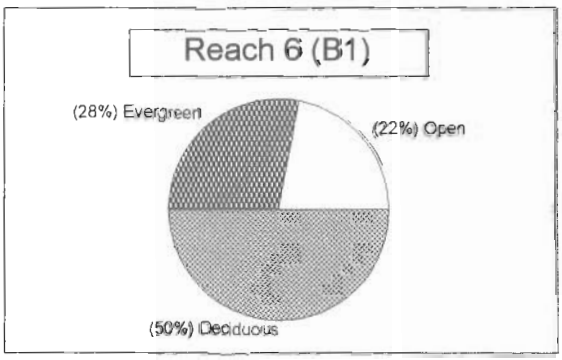


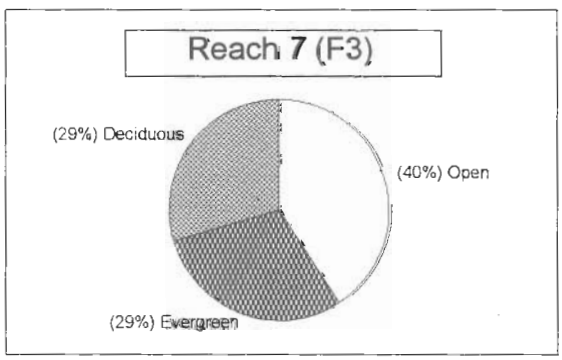








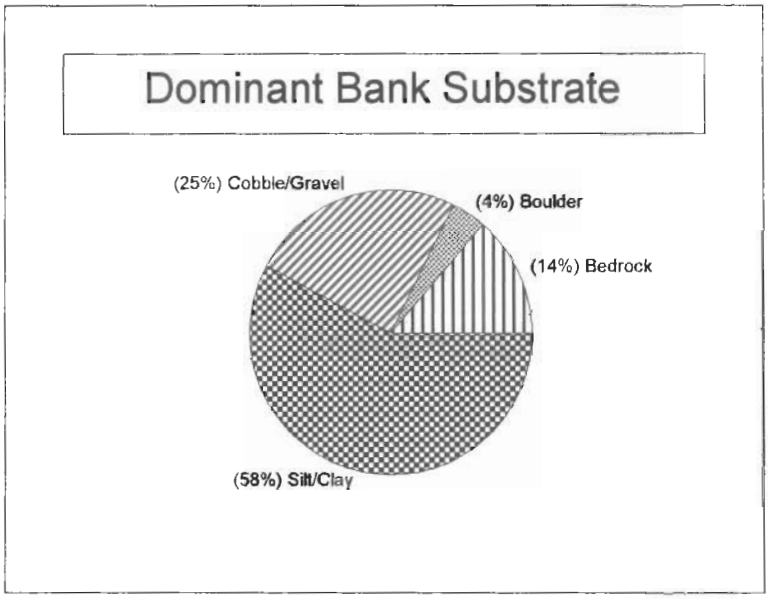


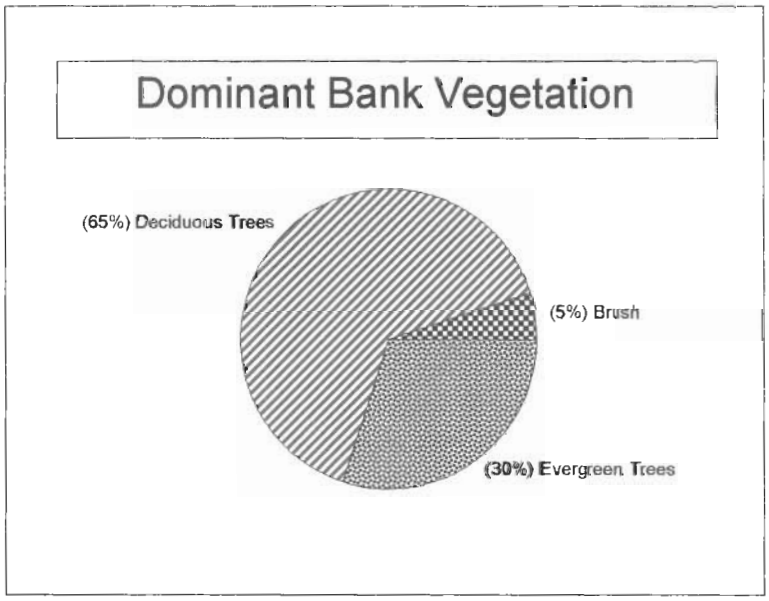


Graph 9

Porter Creek

Percent Bank Composition





Graph 10