CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Parsons Creek
Report Revised April 14, 2006
Report Completed 2000
Assessment Completed 1997

INTRODUCTION

A stream inventory was conducted during the summer of 1997 on Parsons 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 Parsons 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

Parsons Creek is a tributary to the Russian River, located in Mendocino County, California (see Parsons Creek map, page 2). The legal description at the confluence with the Russian River is T14N, R12W, S31. Its location is 39°02'18.2" N. latitude and 123°07'34" W. longitude. Vehicle access exists from Highway 101 near Hopland, via University and East Side Roads.

Parsons Creek and its tributaries drain a basin of approximately 8.4 square miles. Parsons Creek is a second order stream and has approximately 6.7 miles of blue line stream, according to the USGS Elledge Peak, and Purdy Gardens 7.5 minute quadrangles. Elevations range from about 600 feet at the mouth of the creek to 2500 feet in the headwaters. The vegetation throughout the watershed consists primarily of montane hardwood and oak savanna. The Townsend's western big-eared bat (*Corynorhinus townsendii towsendii*) is listed with a federal status of species of concern in the DFG's Natural Diversity Database for the Parsons Creek watershed. Ownership includes the University of California Davis, Hopland Field Extension Research Center (HREC) and four other private holdings. HREC is operated for the purpose of research and experimentation.

Riparian corridors are currently managed either as part of adjacent pastures or for specific research objectives or demonstration projects, such as watershed monitoring or stream restoration demonstrations. Grazing is allowed year-round in most riparian areas, but many pastures that include riparian areas are lightly grazed or not at all. Grazing is excluded on certain sections of the Parson's Creek demonstration project and from Biological Areas.

A lower section of Parson's Creek is severely degraded due to channel alteration. Impacts include channelization in the early 1960's, instream gravel removal until 1992, and annual streambed alterations through 1989. Portions of the creek have actively eroding banks, which contribute high sediment loads.

METHODS

The habitat inventory conducted in Parsons Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The AmeriCorps Volunteers 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 and was supervised by Bob Coey, Russian River Basin Planner (DFG).

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 Parsons 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.

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 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.

3. Temperatures:

Water and air temperatures, and time, are measured by crew members with hand held 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". Parsons 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 unit lengths were measured, additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were completely sampled (length, mean width, mean depth, maximum depth and pool tail crest depth). All measurements were in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Parsons 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). Additionally, a rating of "not suitable" (NS) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, 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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In

Parsons Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were visually estimated using a list of seven size classes.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the California Salmonid Stream Habitat Restoration Manual, 1998. Canopy density relates to the amount of stream shaded from the sun. In Parsons 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 visually into percentages of evergreen or deciduous trees.

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 Parsons Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured unit were selected from 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 Habitat, a dBASE IV 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 tables and appendices:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Shelter by habitat types
- Dominant substrates by habitat types
- Vegetative cover and dominant bank composition
- Fish habitat elements by stream reach

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

- Level II Habitat Types by % Occurrence and % Total Length
- Level IV Habitat Types by % Occurrence
- Pool Habitat Types by % Occurrence
- Maximum Depth in Pools
- Pool Shelter Types by % Area
- Substrate Composition in Low Gradient Riffles
- Percent Cobble Embeddedness by Reach
- Mean Percent Canopy
- Mean Percent Canopy by Reach
- Percent Bank Composition and Bank Vegetation

HISTORICAL STREAM SURVEYS:

No CDFG fish surveys have been conducted in Parsons Creek prior to the 1997 survey. However, numerous studies have been conducted in Parsons Creek Watershed on HREC.

In 1993 the California Department of Fish and Game funded a restoration/demonstration project along this degraded section of Parson's Creek (see Appendix E for project map). The restoration project consisted of twelve treatments as follows:

- no livestock/no deer/planted (4 repetitions),
- no livestock/no deer/not planted (4 repetitions),and
- livestock and deer admitted (control areas) 2 planted and 2 not planted.

All areas of the project that were re-vegetated were planted with

alder, willow, cottonwood, wild grape, Oregon ash, big leaf maple and oaks. Some of the plantings washed out in the high flows of the 1994 and 1995 winters. Vegetation within the exclosures is well established. HREC Principal Superintendent of Agriculture, Bob Keiffer, hopes to maintain the project as a demonstration for community outreach programs for a total of 10 years, or until 2002. Plans for complete re-vegetation of these denuded streambanks should be implemented at the end of the ten year period.

In 1997, this study was completed and published in Restoration Ecology (Resources Management Guidelines 1996). In 1998 Jeff Opperman studied the riparian vegetation in Parsons Creek (Parsons Creek Report 1998).

In 1998, a migration barrier, a concrete ford, was improved by HREC staff through a CDFG funded grant. The project created three weirs with downstream pools, facilitating the migration of juvenile fish. The ford is still difficult for juveniles to cross and often juveniles on the ford are victims of predation by blue herons and other birds (C. Vaughn, B. Keiffer and T. Schott, pers. comm., 1996). The ford could be improved for adult passage with an addition of a concrete ramp and curb poured on the concrete apron.

Recently the HREC received funding from CDFG, SB271 program, to conduct road problem assessment surveys and to prepare plans and designs to restore riparian resources in the Parsons Creek watershed.

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 19 to November 20, 1997 was conducted by Eddie Sanchez, Marc Miller, Todd Parlato, Shamli Tarbell (AmeriCorps) and Jeff Opperman (Extension Center Volunteer). The survey began at the confluence with the Russian River and extended up Parsons to a cascading waterfall. The total length of the stream surveyed was 19,177 feet, with an additional 57 feet of side channel.

A flow of 2-3 cfs was measured August 20, 1997 at habitat unit 12, 146' above survey start with a Marsh-McBirney Model 2000 flowmeter.

The surveyed section of Parsons has three channel types: an F2 from the mouth to 6370 feet; an F4 for the next 9417 feet and a C3 for the upper 3390 feet. Two additional channel types extend above this surveyed section with mostly dry stream channel occurring in some years: an F for 4000 feet and an A for 6000 feet.

F2 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly boulder substrate.

F4 channel types are similar, with a predominantly gravel substrate.

C3 channel types are low gradient (<2%), meandering, point-bar, riffle/pool, alluvial channels with a broad, well defined floodplain and a predominantly cobble substrate.

Water temperatures ranged from 52°F to 69°F. Air temperatures ranged from 55°F to 84°F. In 1996, summer temperatures were also measured using a remote temperature recorder paced in a pool (see Temperature Summary graph at end of report). A remote temperature recorder was placed in Parsons Creek in the summer of 1996. The recorder logged temperatures every 0.5 hours from August 1 to October 31, 1996. The highest temperature recorded was 80°F in August and the lowest temperature was 56°F in September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 33% pool units, 29% flatwater units, 24% riffle units, and 13% dry streambed units. Based on total **length** there were 49% dry streambed units, 23% flatwater units, 17% riffle units, and 11% pool units (Graph 1).

One hundred sixty habitat units were measured and 16% were completely sampled. Twelve Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles at 24%, runs 18%, dry streambed 13% and glides 12% (Graph 2). By percent total **length**, dry streambed made up 49%, runs 17%, low gradient riffles 17%, and glides 6%.

Fifty three pools were identified (Table 3). Scour pools were most often encountered at 87%, and comprised 84% 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. Sixteen of the 53 pools (30%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 3% 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. Pool types had the highest shelter rating at 21.

Riffle had the lowest rating with 0 and flatwater rated 5 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 45, scour pools rated 22, and main channel pools rated 8 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were boulders at 25%, root masses 25%, aquatic vegetation 14%, and undercut banks 11%. Graph 5 describes the pool shelter in Parsons.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 1 of the 4 low gradient riffles measured. Small cobble was dominant in 2 of the low gradient riffles (Graph 6).

No mechanical gravel sampling was conducted in 1997 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 50 pool tail-outs measured, six had a value of 1 (12%); sixteen had a value of 2 (32%); thirteen had a value of 3 (26%); and fifteen had a value of 4 (30%). On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 46%. The mean percentages of deciduous and evergreen trees were 36% and 64%, respectively. Graph 8 describes the canopy for the entire survey.

For the entire stream reach surveyed, the mean percent right bank vegetated was 40% and the mean percent left bank vegetated was 41%. For the habitat units measured, the dominant vegetation types for the stream banks were: 38% evergreen trees, 32% grass, 27% deciduous trees, 2% brush and 2% bare soil. The dominant substrate for the stream banks were: 63% silt/clay, 29% cobble/gravel and 9% bedrock (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

On October 19, 1998 a recent biological inventory was conducted in two sites of Parsons Creek to document fish species composition and distribution. Each site was single pass electrofished using a Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream. The observers were Marc Miller (DFG), Bob Keiffer, and Cory Adams(HREC).

The inventory consisted of spot checking two pools starting 250 feet downstream of the Hopland road ford crossing. This section of the creek was upstream of where the crew ended the habitat typing survey in 1997, however, the inventoried section was observed to be an F4 channel type. In the lower pool, four 0+ and one 1+ steelhead were observed along with 30 roach, 10 Sacramento suckers, and 3 sculpin. In the upper pool, 200 roach, 50 Sacramento suckers, and 10 sculpin were observed. No steelhead were observed in the upper pool.

In spring 1999, Coey (CDFG) observed an adult steelhead migrating back downstream from above the ford, indicating passage has improved at the ford.

In July 1999, four 1+ steelhead and 12 0+ steelhead were moved by CDFG from below the ford crossing downstream to year-round pools. Steelhead (0+) were also observed above the ford indicating successful spawning above the ford.

In August 1999, HREC staff biologist Opperman observed resident steelhead in several pools in Reach 4, well above the concrete ford and the HREC office area.

A summary of recent data collected appears in the table below.

Species Observed in Historical and Recent Surveys

YEARS	SPECIES	SOURCE	Native/Introduced
1998, 1999	Steelhead	DFG	N
1998	Sculpin	DFG	N
1998	Roach	DFG	N
1998	Sacramento Sucker	DFG	N

Steelhead from Parsons Creek were transferred to the Russian River during fish rescue operations in 1949, 1950, 1955, the 1960's, 1970, 1971, 1972 and 1973. In 1972, 433 steelhead were transferred from Parsons Creek into Talmage Pond. Warm Springs Hatchery also stocked 7 pair of adult steelhead into Parsons Creek in 1994 (B. Keiffer, pers. comm., 1998).

Table 2. Summary of fish hatchery - transfers/rescues from Parsons Creek

YEAR	LOCATION	SOURCE	SPECIES	#	SIZE
1949	Russian River	Parsons	SH	ND	FING
1950	Russian River	Parsons	SH	ND	FING
1955	Russian River	Parsons	SH	62	FING
1960's	Russian River	Parsons	SH	ND	ND
1970/71	Russian River	Parsons	SH	2510	FING
1972	Talmage Pond	Parsons	SH	433	FING
1972	Russian River	Parsons	SH	7	YEAR
1973	Russian River	Parsons	SH	125	FING

SH = steelhead
ND = Not Determined

Table 3. Summary of fish hatchery - stocking into Parsons Creek

YEAR	LOCATION	SOURCE	SPECIES	#	SIZE
1994	Parsons	Warm Springs	SH	14	ADULT

SH = steelhead
Warm Springs = Warm Springs Hatchery

ADULT SURVEYS:

A spawning survey was conducted in Parsons Creek on March 2, 1998 beginning at the lower HREC Bridge and extending 500' upstream of the road crossing. No fish or redds were observed.

Another spawning/carcass survey was continued in Parsons Creek on March 10, 1998. This survey started at bridge #1 and extended to habitat unit #069. No fish nor redds were observed.

DISCUSSION

The surveyed section of Parsons has three channel types: F2 (6370 ft.), F4 (9417 ft.) and C3 (3390 ft.).

There are 6370 feet of F2 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F2 channel types are fair for low-stage weirs, single and opposing wing-deflectors and log cover.

There are 9417 feet of F4 channel type in Reach 2. 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. Any work considered in F channel types will require careful design, placement, and construction that must include protection for any unstable banks.

There are 3390 feet of C3 channel type in Reach 3. C3 channel types are excellent for bank-placed boulders and good for low-stage weirs, boulder clusters, single and opposing wing deflectors, log cover, and many biotechnical approaches to decrease erosion and increase riparian growth. They are fair for medium-stage weirs.

Habitat structures are not suitable for A channel types.

The water temperatures recorded on the survey days 08/19/97 to 11/20/97 ranged from 52°F to 69°F. Air temperatures ranged from 55°F to 84°F. The warmer water temperatures were recorded in Reach 1. These temperatures, if sustained, are above the threshold stress level (65°F) for salmonids.

Pools comprised 11% 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 Parsons, the pools are relatively shallow with 30% having a maximum depth of at least 2 feet. However, these pools comprised only 3% of the total length of stream habitat. 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 21. 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 boulders (25%), root masses (25%), aquatic vegetation (14%), and undercut banks (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.

Three of the four low gradient riffles measured (75%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Fifty six 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, Reach 1 had the best ratings and Reaches 2 and 3 had the poorest ratings. Embeddedness increased in an upstream direction.

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 Reach 3 sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was only 46%. This is a very low percentage of canopy, since 80 percent is generally considered desirable. Cooler water temperatures are desirable in Parsons. 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.

SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. Overall, very few fish were observed during the surveys.

In general, The upper Reaches of Parsons Creek are poor for steelhead habitat. In Reach 1 and 3, some sections of the stream occur which may be used as rearing habitat, however, shelter is lacking, stream temperatures are high and sections dry out. Portions of the upper reaches have been downcut, thus stream velocity has increased resulting in streambank erosion and loss of mature riparian. Riffle habitat exists for spawning, but is mostly unsuitable for spawning due to high gravel embeddedness. The unstable banks and effects of aggradation in the lower reaches limits instream habitat improvement alternatives, although some opportunity exists for biotechnical riparian improvement. Any work considered will require careful design, placement, and construction that must include protection for the unstable banks and high stream

velocities.

Biotechnical techniques could be utilized in Reach 1 and 2 to rebuild the floodplain and replant the riparian areas. Decreasing bankfull stream width would increase gravel transport and achieve channel maintenance and stability.

In Reach 3 spawning and rearing habitat quality diminishes due to the effects of eroding stream banks, lack of riparian habitat, and increased temperatures and nutrient runoff from agriculture and livestock. These upstream effects seriously impact resources downstream especially during the warmer months when stream temperature rises, algae blooms occur and demand for oxygen and other resources increases. Sediment transported downstream from Reach 3 in the winter also impacts the source of higher quality spawning gravel in Reaches 1 and 2. Stream bank protection, riparian planting and exclusionary fencing for livestock is recommended, as well as road improvements to improve gravel quality for spawning in all reaches.

GENERAL RECOMMENDATIONS

Parsons 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.

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

1) Identified sites from the road survey should be treated to reduce the amount of fine sediments entering the stream. HREC could serve as an ideal location to quantify the effects and benefits of different road improvement treatments.

2) Reaches 1 and 2 of this stream are being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, will be developed under the CDFG

1999 grant funding and should be explored with the landowner, and implemented.(Proposed)

3) Implement recommendations from the planning grant and increase the canopy on Parsons Creek by planting willow, alder, cottonwoods and oaks along the stream where shade canopy is not at acceptable levels (all reaches are good candidates for revegetation, but Reach 3 in particular only had 32% cover). The reach above the survey section should be assessed 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.

4) Reclaim floodplain bench in Reach 2 utilizing biotechnical vegetative techniques for proper pattern dimension and profile.

5) Woody cover would be desirable along the entire stream. Most of the existing shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover could be accomplished after riparian areas improve (5-10 years away). Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. This could only be done where the banks are stable (Reach 2) or in conjunction with stream bank armor to prevent erosion (Reach 1). Pool enhancement structures to increase the number of pools in the upper reaches, could also be constructed in conjunction with stream bank armor to prevent erosion. Low gradient riffles and step runs can often be converted into pool habitat.

RESTORATION IMPLEMENTED

1) Map sources of upslope (particularly roads) and in-channel erosion, and prioritize them according to present and potential sediment yield. Approximately 42 miles of unpaved roads exist on HREC. A road assessment has been approved for 1999 funding.

PROBLEM SITES AND LANDMARKS-PARSONS 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
1.00	1624	Temp 62 degrees. 973' from RR to bridge(Eastside Rd.). 5' gravel bar above thalweg. LB(1200') no riparian.
4.00	1918	summer wire fence/no blockage.
5.00	1949	erosion RB 10'x20'. Roach
7.00	2026	63 degrees (water)
9.00	2078	road on LB
15.00	2450	road crossing
18.00	2621	road crossing
20.00	2776	see erosion form.
90.00	7382	LB erosion-sheet done.
100.00	8751	Erosion RB
108.00	9641	Wet trib RB.
110.00	9763	Gravel bar RB/Erosion RB
111.00	9779	Erosion/Slide RB.
112.00	9832	Erosion/slide RB.
113.00	10064	Erosion/slide 30' into unit. Dry trib RB 30'into unit.
116.00	10342	Erosion RB.
119.00	10532	3"< Roach/squaw in most 6"+ water. Dry side channel RB.
124.00	10838	Erosion RB (minor).
125.00	13934	Road crossing @ 600'-(200'wide flood prone anomaly). Minor wet road crossing @ 1200'. Dry trib @ 1400' RB. Dry trib @ 1475'LB. Non-floating fence @ 1820'.
127.00	14457	Slip clay erosion LB. Dry trib 175' into unit.
135.00	14990	Dry trib RB (minor).
136.00	15005	Begin RB erosion.

137.00 15435 Wet road crossing @ 135'. 10' high erosion LB x 120' long.

142.00 15787 Wet trib RB.

143.00 16246 Channel change/ channel type

144.00 16269 Many squawfish, some 6".

146.00 16300 Erosion RB. 149.00 16976 Erosion LB. Pieces of cut oak in creek.

150.00 17001 Erosion RB.

151.00 17235 Minor dry trib LB. 153.00 17518 Dry road crossing @ 208'. 1' culvert (20' long). Cabin RB. Pond LB.

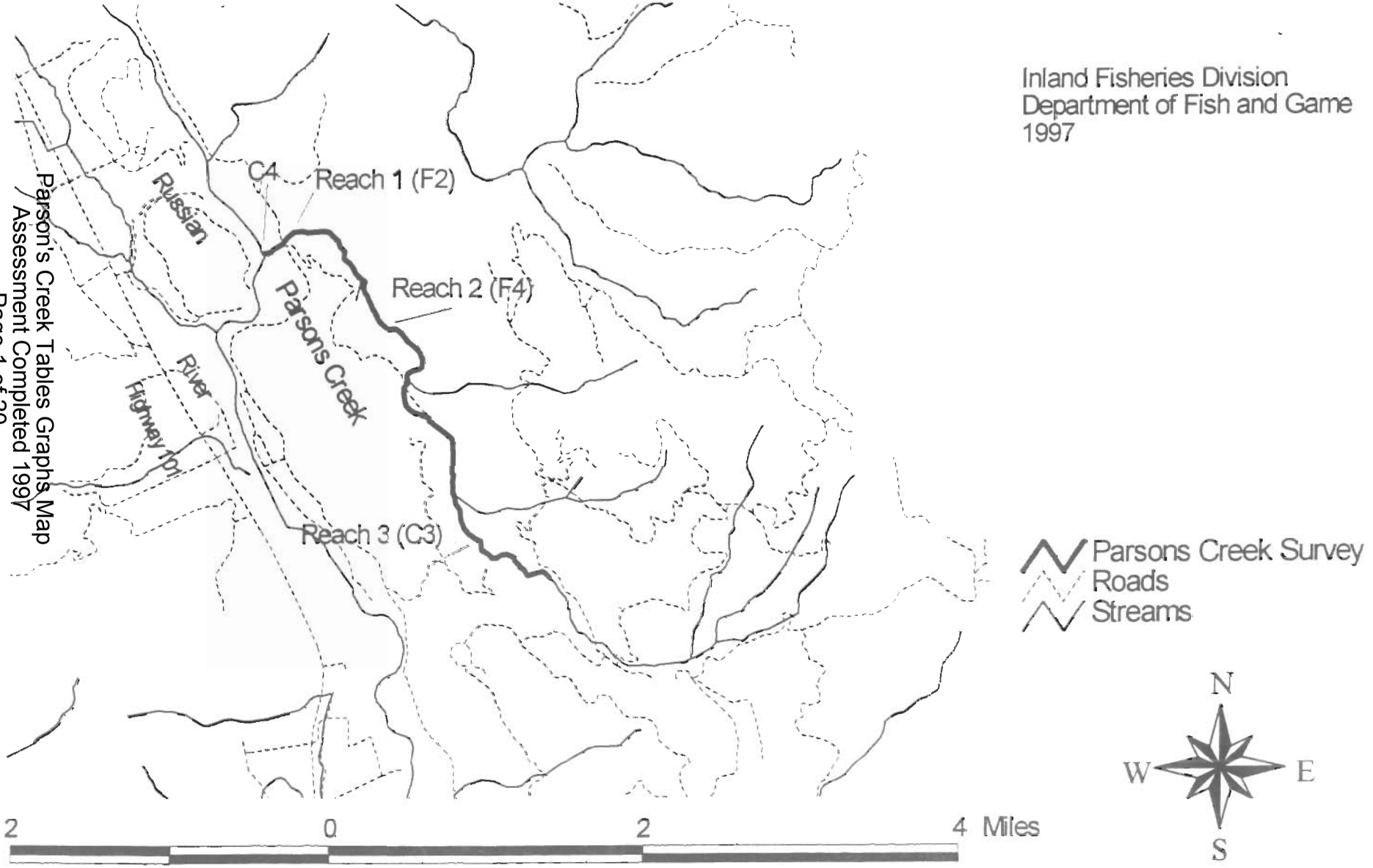
154.00 17542 Erosion RB.

157.00 17984 Erosion LB/RB.

158.00 18056 Tons of algae. Squaw, Roach, Frogs. Erosion LB/RB.

159.00 19177 Erosion both banks. Wet road crossing at 760'. END OF SURVEY***.

Parsons Creek



Inland Fisheries Division
Department of Fish and Game
1997

Parson's Creek Tables Graphs Map
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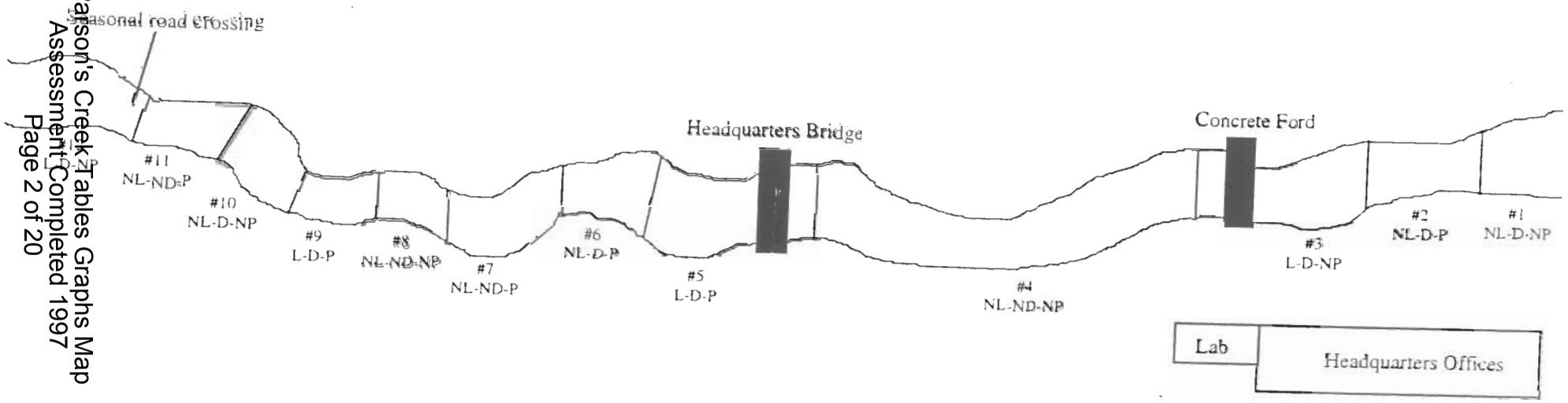
APPENDIX E

PARSON'S CREEK DEMONSTRATION PROJECT



KEY		
L	=	livestock grazing allowed
NL	=	no livestock grazing
D	=	deer browsing allowed
ND	=	no deer allowed
P	=	riparian vegetation planted
NP	=	no riparian vegetation planted

Not to Scale

Parsons Creek Drainage: Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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
39	3	RIFFLE	24	84	3287	17	14.3	0.2	1077	41985	223	8685	0	0
47	4	FLATWATER	29	93	4393	23	8.8	0.6	614	28840	291	13683	0	5
53	18	POOL	33	38	2037	11	12.3	0.8	552	29233	431	22839	364	21
21	0	DRY	13	453	9517	49	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.)
160	25	19234	100059	45207

Parsons Creek Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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 %
39	3	LGR	24	84	3287	17	14	0.2	0.6	1077	41985	223	8685	0	0	40
19	2	GLD	12	57	1090	6	10	0.6	1.6	664	12607	275	5228	0	5	43
28	2	RUN	18	118	3303	17	8	0.6	1.3	564	15785	307	8599	0	5	50
1	0	TRP	1	18	18	0	6	0.7	1.2	108	108	76	76	0	0	100
5	1	MCP	3	48	240	1	26	0.8	3.1	1087	5436	732	3661	400	9	43
1	1	LSL	1	54	54	0	8	0.7	1.7	432	432	302	302	216	5	60
10	3	LSR	6	28	282	1	8	0.8	3.4	237	2370	214	2140	128	55	36
16	5	LSBk	10	42	672	3	9	0.7	2.5	572	9153	394	6311	364	11	48
16	4	LSBo	10	36	569	3	12	0.8	3.0	451	7223	367	5875	319	12	46
3	3	PLP	2	48	143	1	24	0.6	2.5	1170	3509	622	1866	212	20	62
1	1	BPB	1	59	59	0	17	2.6	6.4	1003	1003	2608	2608	1906	45	70
21	0	DRY	13	453	9517	49	0	0.0	0.0	0	0	0	0	0	0	42

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
160	25	19234	99610	45351

Parsons Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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
6	1	MAIN	11	43	258	13	23.0	0.8	924	5544	623	3737	400	8
46	16	SCOUR	87	37	1720	84	10.8	0.7	493	22686	359	16495	305	22
1	1	BACKWATER	2	59	59	3	17.0	2.6	1003	1003	2608	2608	1906	45

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
53	18	2037	29233	22839

Parsons Creek Drainage: Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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	2	0	0	1	100	0	0	0	0	0	0
5	MCP	9	0	0	3	60	1	20	1	20	0	0
1	LSL	2	0	0	1	100	0	0	0	0	0	0
10	LSR	19	0	0	6	60	3	30	1	10	0	0
16	LSBk	30	0	0	12	75	4	25	0	0	0	0
16	LSBo	30	0	0	12	75	3	19	1	6	0	0
3	PLP	6	0	0	2	67	1	33	0	0	0	0
1	BPB	2	0	0	0	0	0	0	0	0	1	100

TOTAL UNITS
53

Parsons Creek

Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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
39	4	LGR	0	0	0	0	0	0	0	0	0
19	2	GLD	100	0	0	0	0	0	0	0	0
28	2	RUN	0	0	0	0	0	0	0	100	0
1	1	TRP	0	0	0	0	0	0	0	0	0
5	5	MCP	13	1	0	2	0	36	0	48	0
1	1	LSL	0	0	100	0	0	0	0	0	0
10	10	LSR	15	16	13	43	3	9	0	1	0
16	15	LSBk	13	4	3	13	3	4	0	8	52
16	16	LSBo	7	3	4	15	0	11	0	61	0
3	3	PLP	7	23	9	43	0	4	0	13	0
1	1	BPB	15	20	20	20	0	25	0	0	0
21	0	DRY	0	0	0	0	0	0	0	0	0
160	60	ALL HABITAT TYPES	14	10	8	23	1	13	0	27	5
53	52	POOLS ONLY	11	10	8	25	1	14	0	25	5

Parsons Creek Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 08/19/97 to 11/20/97

Confluence Location: QUAD: Elledge Peak LEGAL DESCRIPTION: T14NR12WS31 LATITUDE: 39°2'18" LONGITUDE: 123°7'34"

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
39	4	LGR	0	25	25	50	0	0	0
2	2	GLD	0	100	0	0	0	0	0
8	2	RUN	50	50	0	0	0	0	0
1	0	TRP	0	0	0	0	0	0	0
5	2	MCP	100	0	0	0	0	0	0
1	1	LSL	100	0	0	0	0	0	0
0	3	LSR	33	67	0	0	0	0	0
6	5	LSBk	20	60	20	0	0	0	0
5	5	LSBo	0	80	20	0	0	0	0
3	3	PLP	0	67	33	0	0	0	0
1	1	BPB	0	100	0	0	0	0	0
1	1	DRY	0	0	100	0	0	0	0

Parsons 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
46.35	64.38	35.62	39.82	41.15

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	3	2	8.93
Boulder	0	0	0
Cobble/Gravel	6	10	28.57
Silt/clay	19	16	62.50

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	7	11	32.14
Brush	0	1	1.79
Deciduous Trees	8	7	26.79
Evergreen Trees	12	9	37.50
No Vegetation	1	0	1.79

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Parsons Creek
SAMPLE DATES: 08/19/97 to 11/20/97
SURVEY LENGTH:
MAIN CHANNEL: 19177 ft. SIDE CHANNEL: 57 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: Elledge Peak Latitude: 39°2'18"
Legal Description: T14NR12WS31 Longitude: 123°7'34"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-79)

Channel Type: F2	Mean Canopy Density: 48%
Main Channel Length: 6370 ft.	Evergreen Component: 63%
Side Channel Length: 57 ft.	Deciduous Component: 37%
Riffle/Flatwater Mean Width: 7.4 ft.	Pools by Stream Length: 9%
Pool Mean Depth: 0.8 ft.	Pools >=2 ft. Deep: 39%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 6%
Water: 62-69°F Air: 79-84°F	Mean Pool Shelter Rtn: 16
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 57%	Occurrence of LOD: 63%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 1624 ft.

Embeddness Value: 1. 18% 2. 41% 3. 12% 4. 29% 5. 0%

STREAM REACH 2 (Units 80-142)

Channel Type: F4	Mean Canopy Density: 46%
Main Channel Length: 9417 ft.	Evergreen Component: 73%
Side Channel Length: 0 ft.	Deciduous Component: 27%
Riffle/Flatwater Mean Width: 40.0 ft.	Pools by Stream Length: 13%
Pool Mean Depth: 0.7 ft.	Pools >=2 ft. Deep: 19%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 7%
Water: 52-58°F Air: 55-60°F	Mean Pool Shelter Rtn: 17
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 30%	Occurrence of LOD: 25%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 4718 ft.

Embeddness Value: 1. 12% 2. 36% 3. 36% 4. 16% 5. 0%

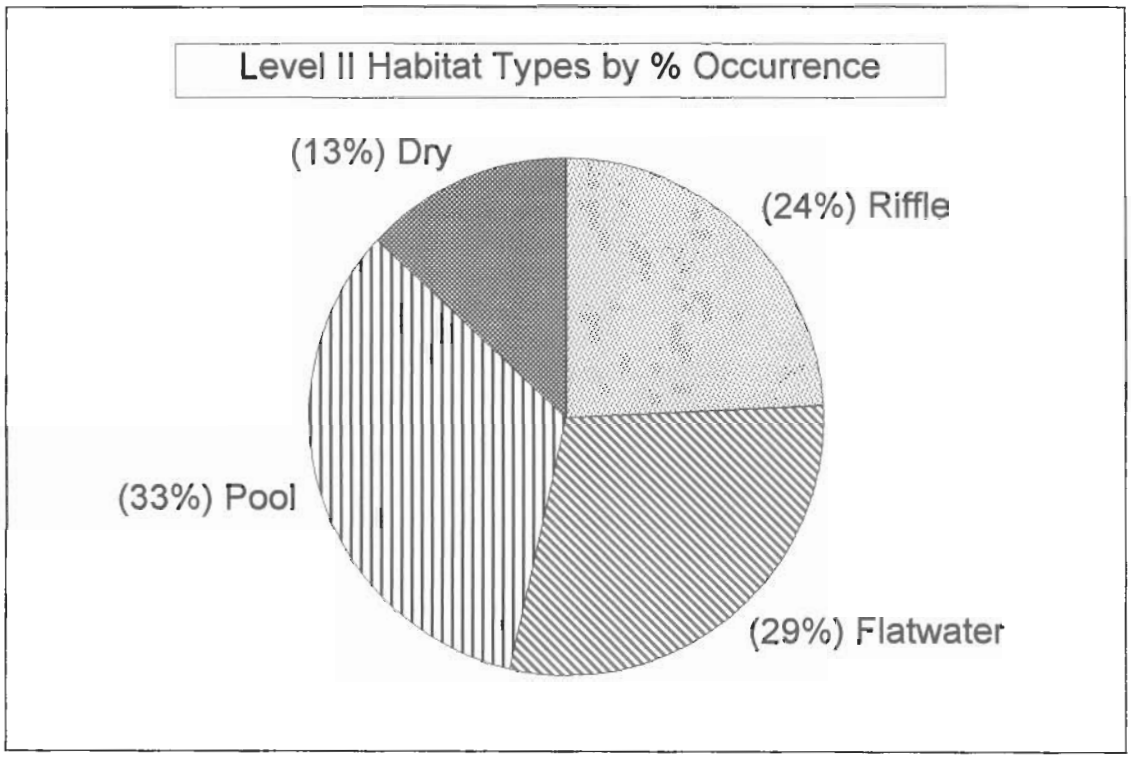
STREAM REACH 3 (Units 143-159)

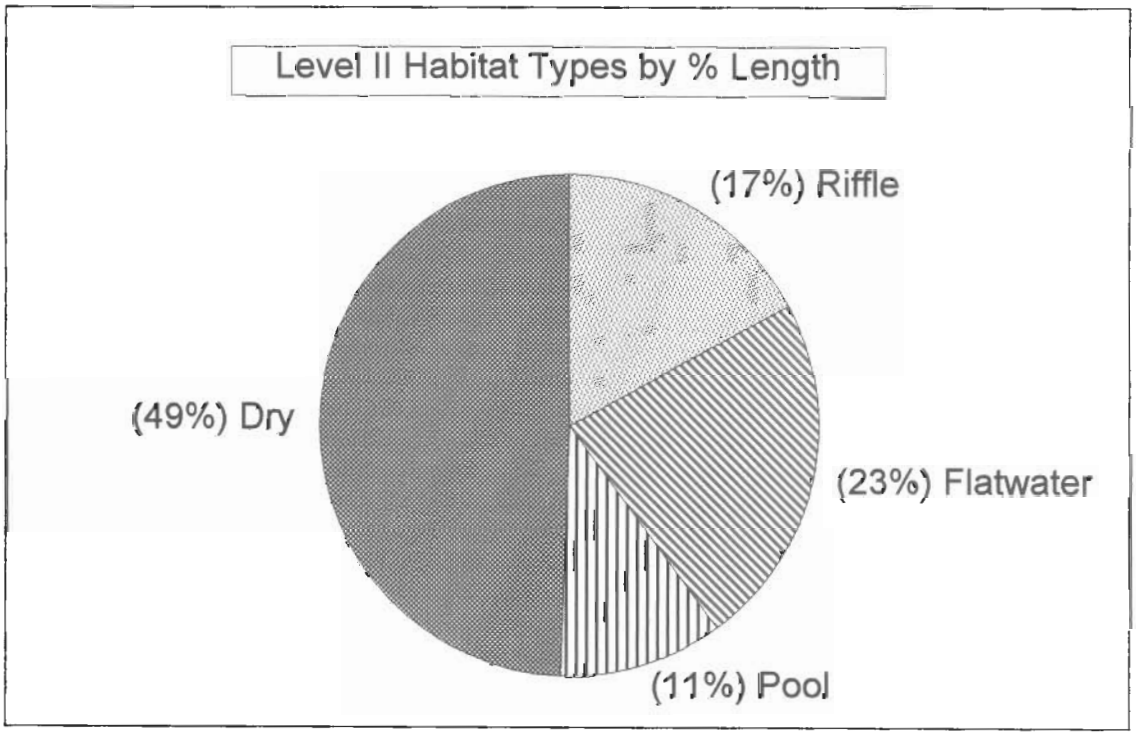
Channel Type: C3	Mean Canopy Density: 32%
Main Channel Length: 3390 ft.	Evergreen Component: 43%
Side Channel Length: 0 ft.	Deciduous Component: 57%
Riffle/Flatwater Mean Width: 0.0 ft.	Pools by Stream Length: 6%
Pool Mean Depth: 0.9 ft.	Pools >=2 ft. Deep: 50%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 13%
Water: 55-57°F Air: 58-59°F	Mean Pool Shelter Rtn: 43
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Bedrock Ledges
Bank Vegetative Cover: 6%	Occurrence of LOD: 15%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 3175 ft.

Embeddness Value: 1. 0% 2. 0% 3. 25% 4. 75% 5. 0%

Parsons Creek

Level II Habitat Types

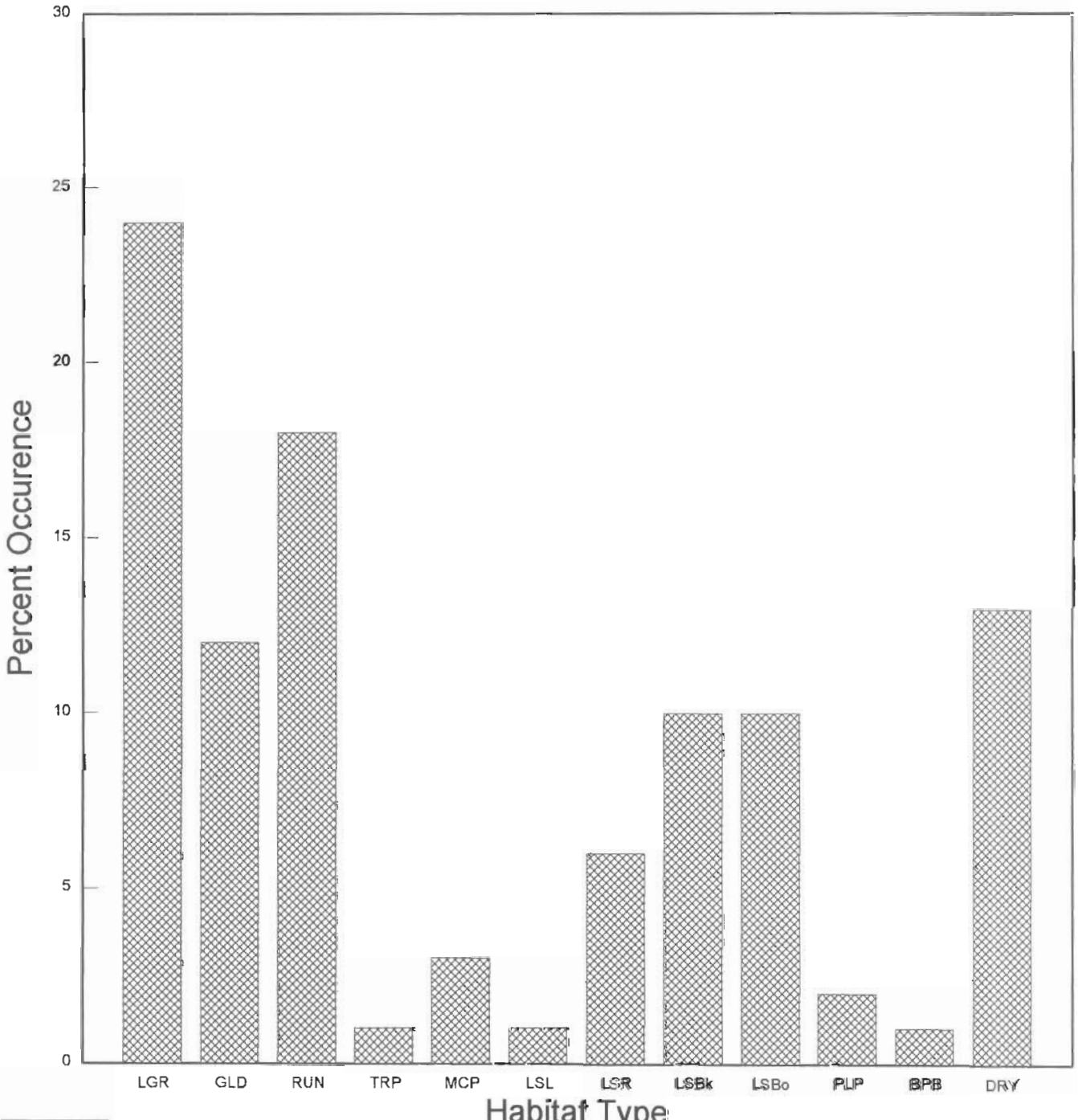




Graph 1

Parsons Creek

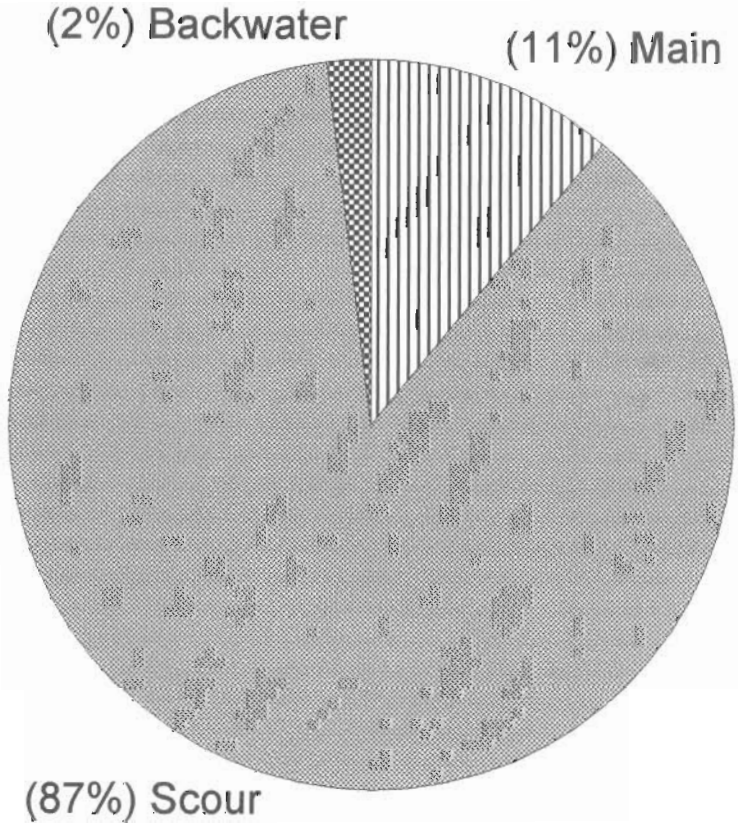
Level IV Habitat Types by % Occurrence



Graph 2

Parsons Creek

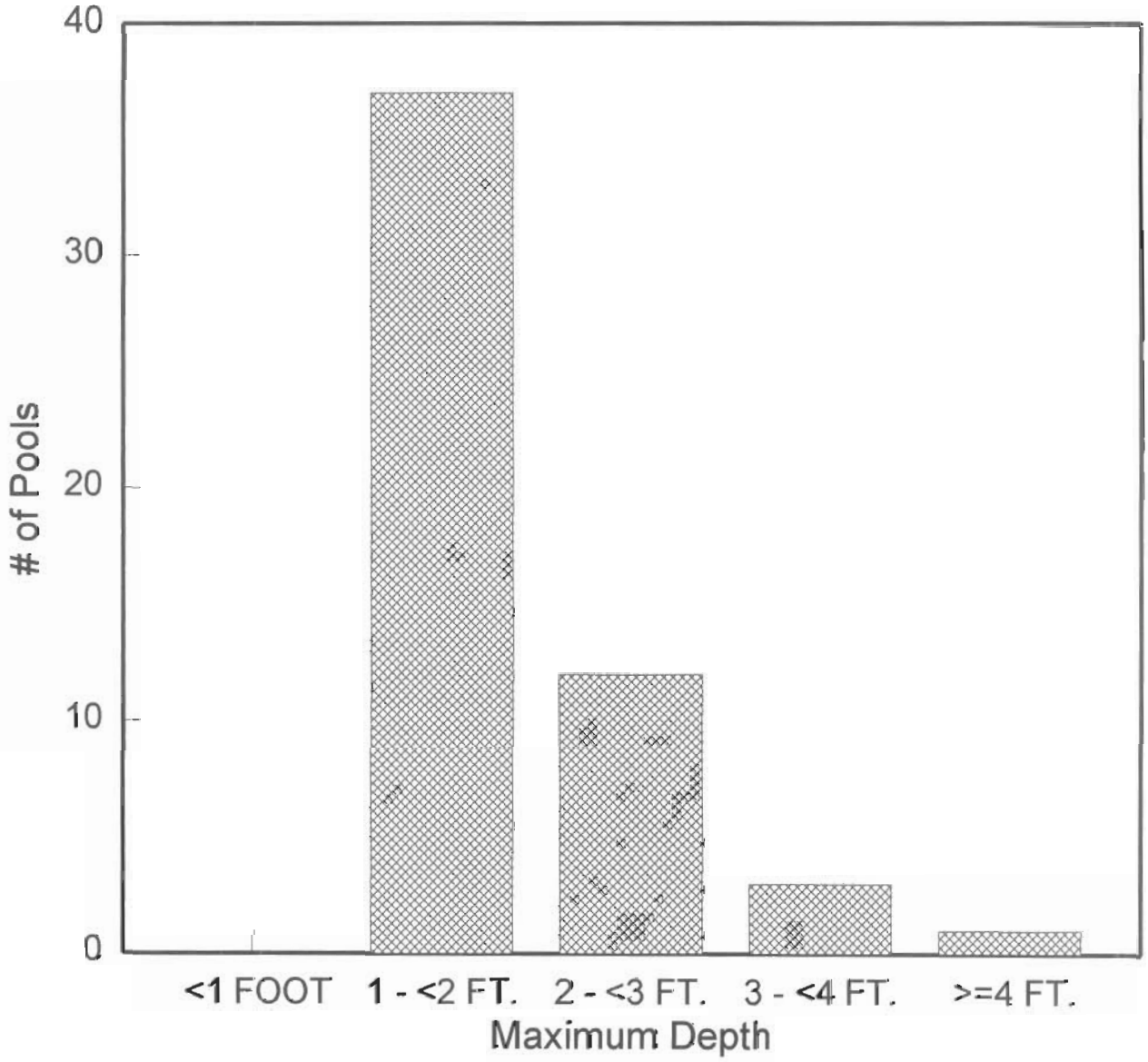
Pool Habitat Types by % Occurrence



Graph 3

Parsons Creek

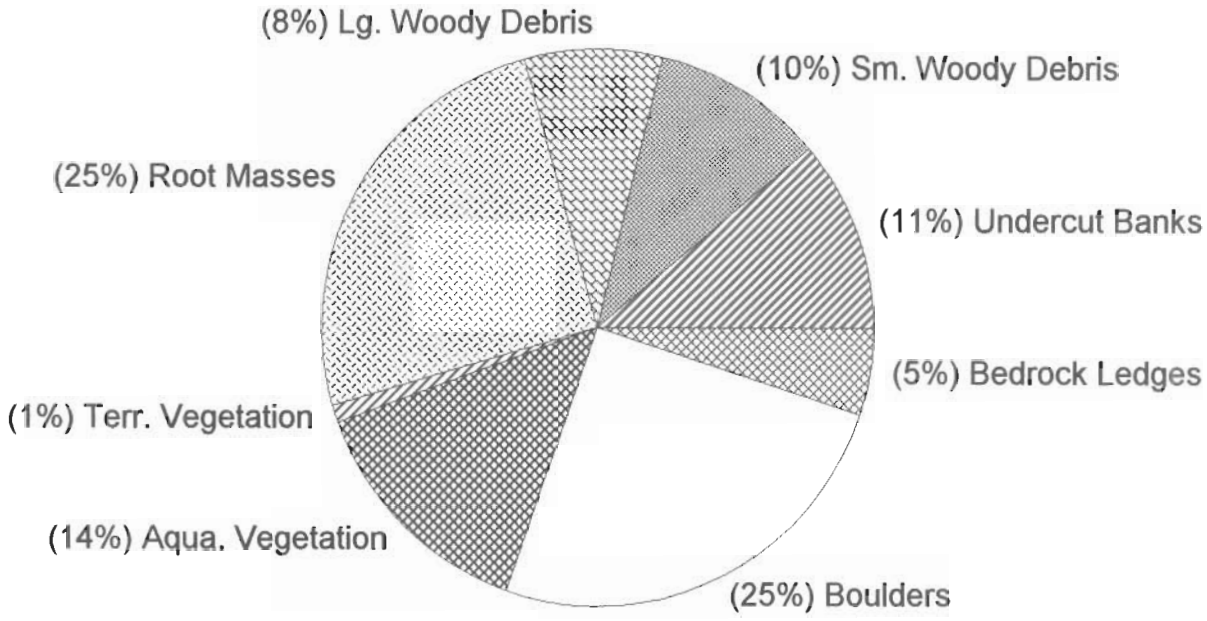
Maximum Depth in Pools



Graph 4

Parsons Creek

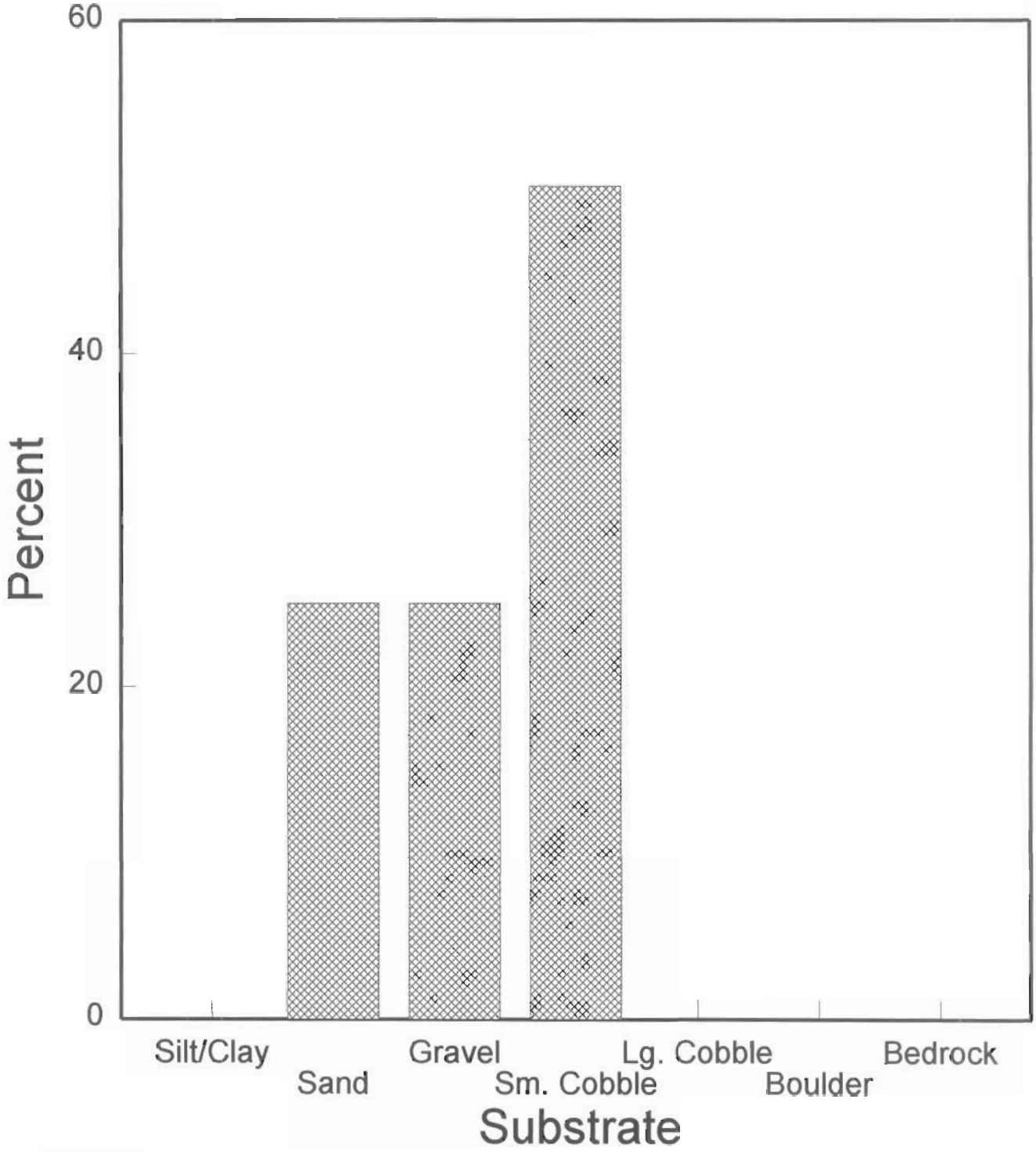
Pool Shelter Types by % Area



Graph 5

Parsons Creek

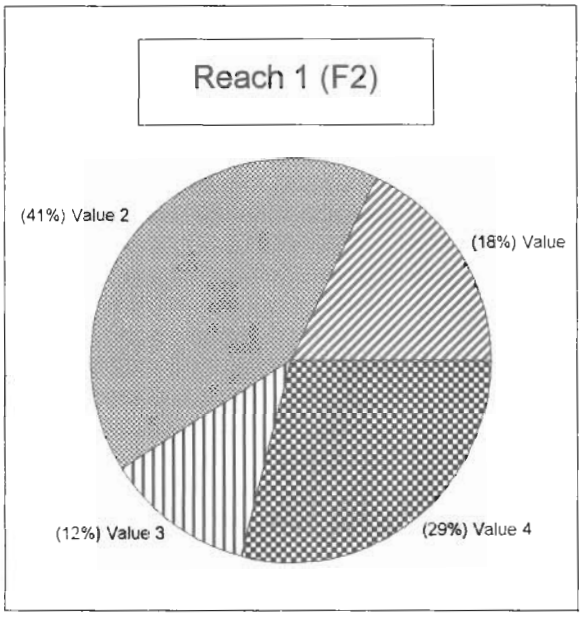
Substrate Composition in Low Gradient Riffles

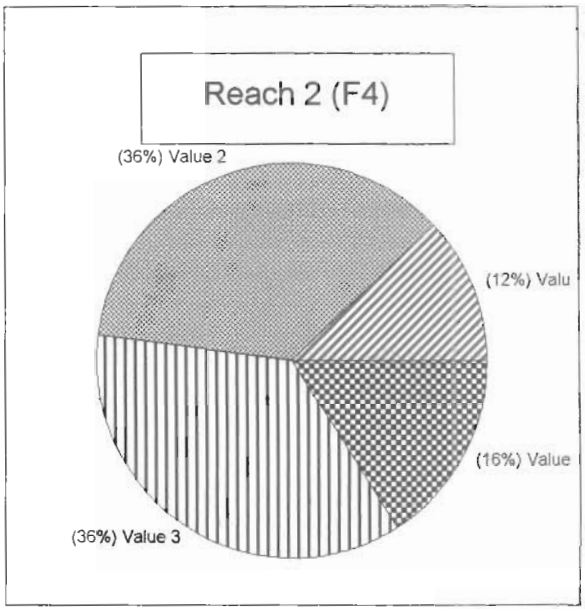


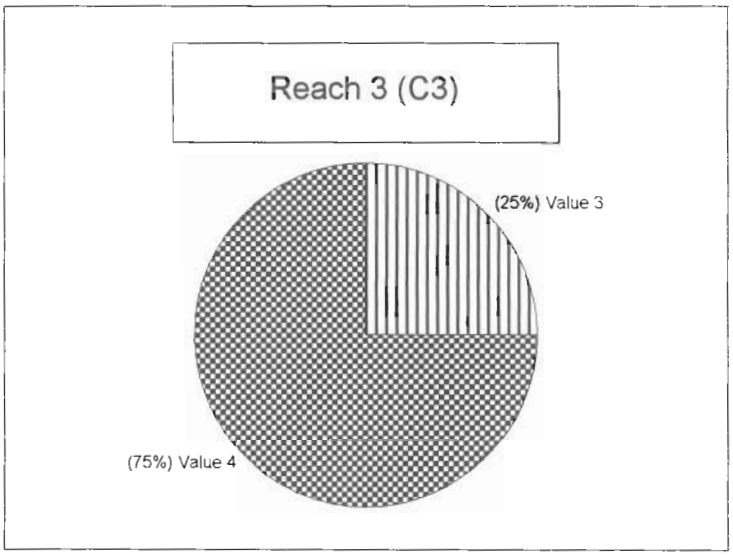
Graph 6

Parsons Creek

Percent Cobble Embeddedness by Reach





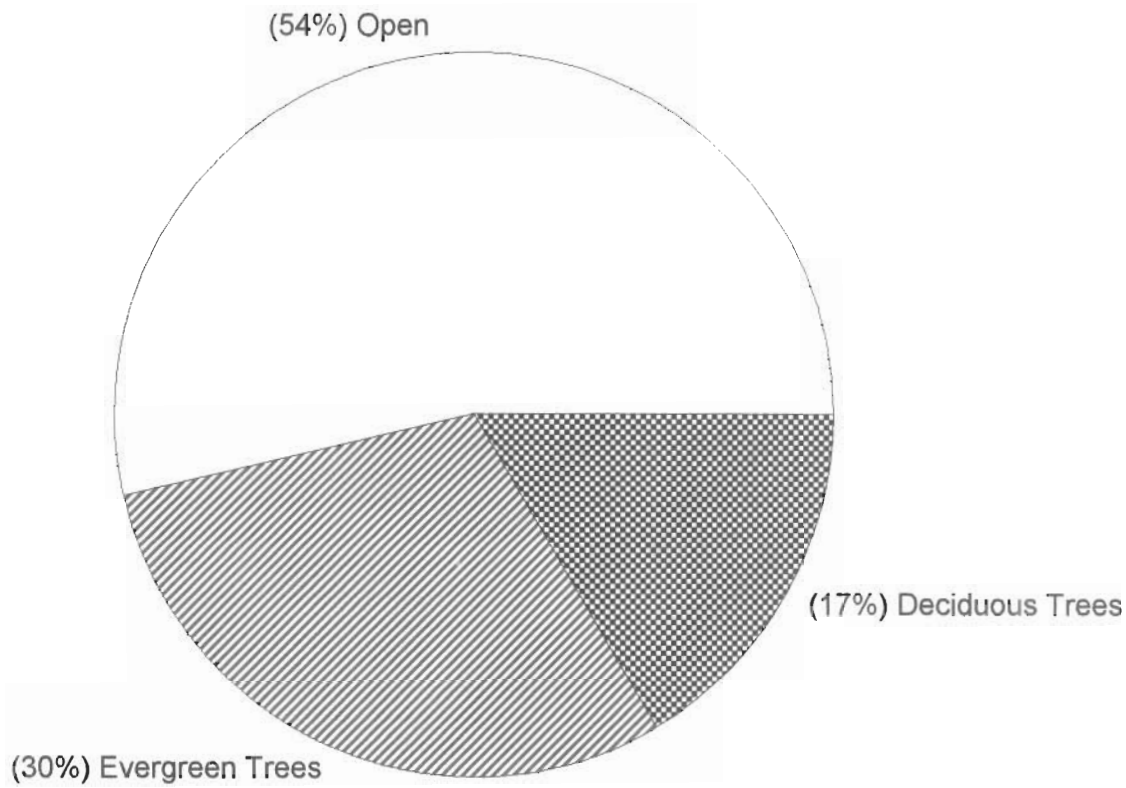


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 7

Parsons Creek

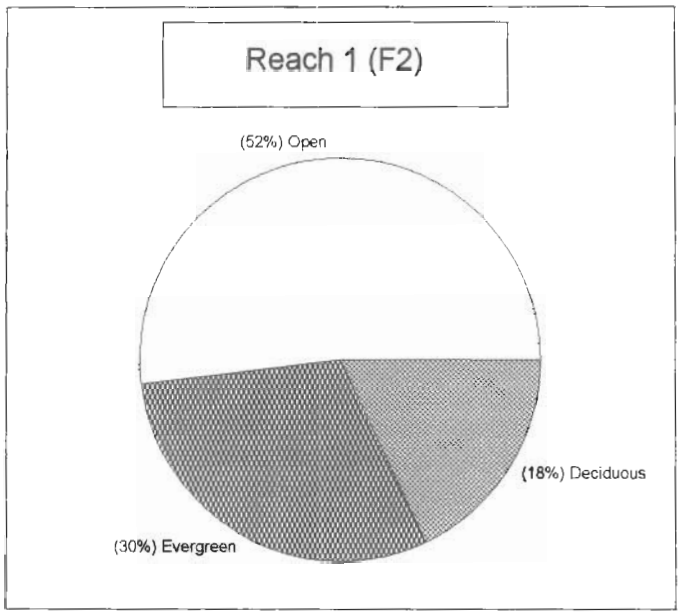
Mean Percent Canopy

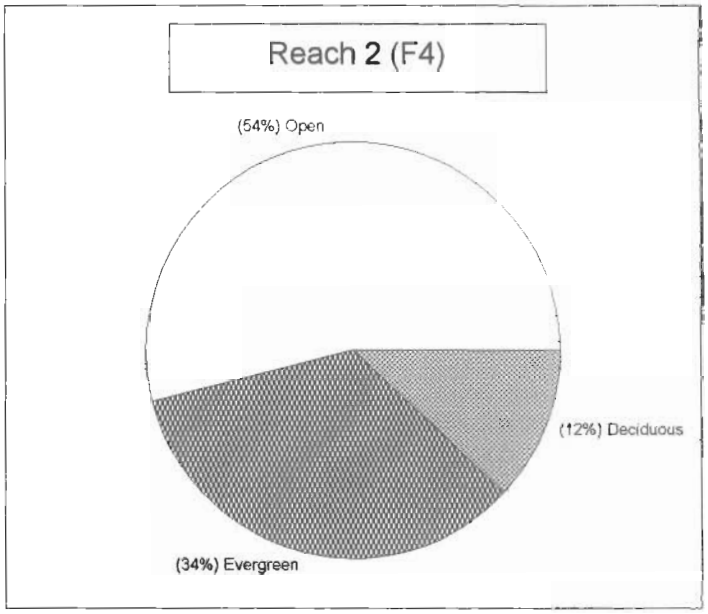


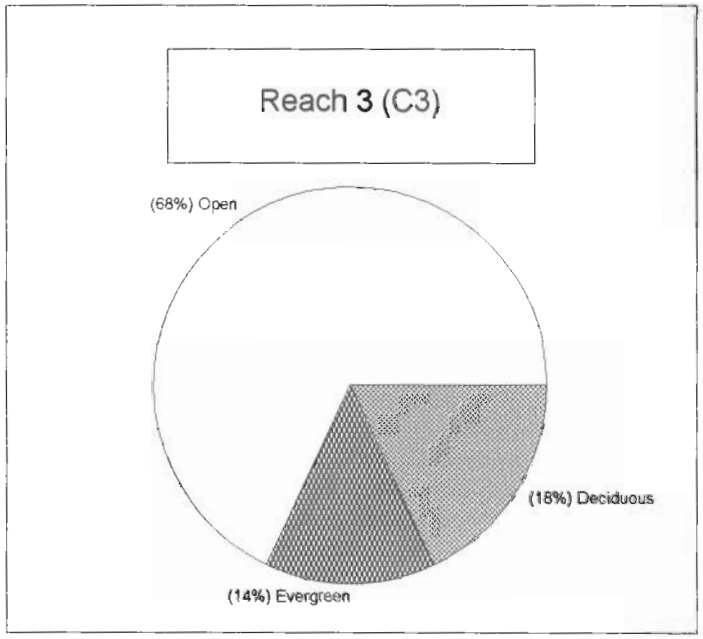
Graph 8

Parsons Creek

Percent Canopy By Reach



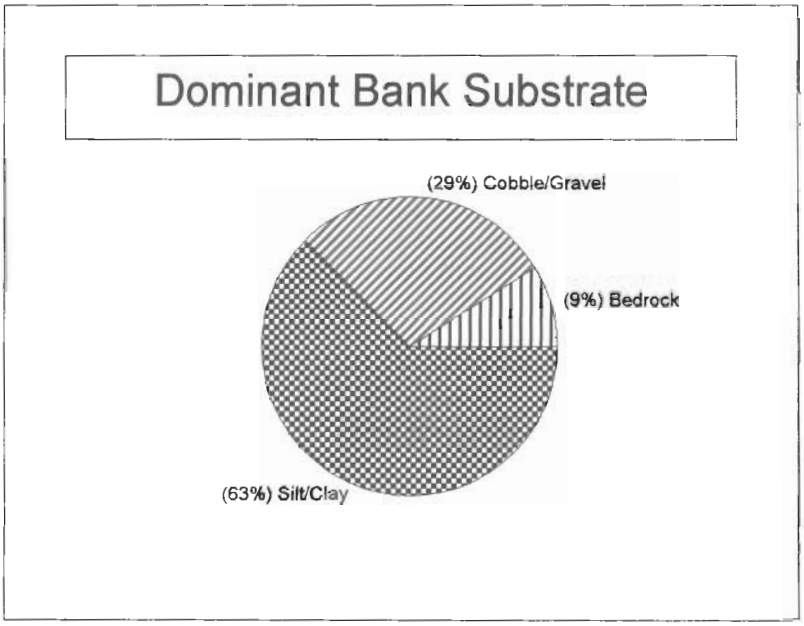


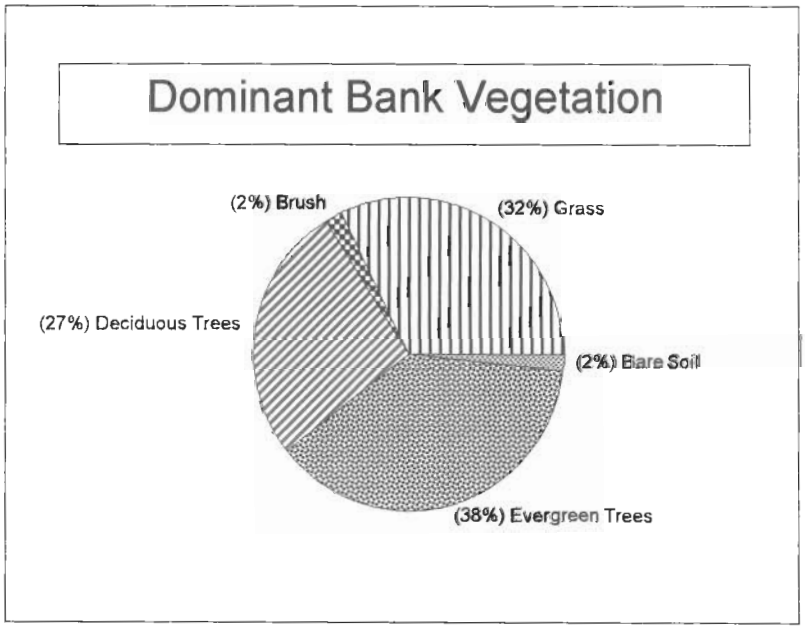


Graph 9

Parsons Creek

Percent Bank Composition





Graph 10