

CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT

Hulbert Creek
Report Revised April 14, 2006
Report Completed 2000
Assessment Completed 1996

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Hulbert 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 Hulbert 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

Hulbert Creek is a tributary of the Russian River, located in Sonoma County, California (see Hulbert Creek map, page 2). The legal description at the confluence with the Russian River is T8N, R10W, S31. Its location is 38°29'38" N. latitude and 123°00'19" W. longitude. Year round vehicle access exists from Highway 101 near Guerneville Park, via Camino Del Arroyo Road.

Hulbert Creek and its tributaries drain a basin of approximately 7.9 square miles. Hulbert Creek is a second order stream and has approximately 5.6 miles of blue line stream, according to the USGS Duncan Mills 7.5 minute quadrangles. Major tributaries include Mission Creek, which is described in a separate stream report. Summer flow was measured as approximately 0.081 cfs on Reach 2 (average depth of 1.5). Elevations range from about 227 feet at the mouth of the creek to 1250 feet in the headwaters. Redwood forest dominates the watershed, along with mixed conifer and Oak Woodland in the upper watershed. The watershed has a range of land uses ranging from timber harvest to urbanization, and includes land in Armstrong Redwoods State Park.

METHODS

The habitat inventory conducted in Hulbert Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1997). 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 Hulbert 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. Temperatures are also recorded using remote Temperature recorders which log temperature every two hours, 24 hours/day.

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". Hulbert 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 Hulbert Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 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 HULBERT 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 ocularly estimated using a list of seven size classes.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual, 1994. Canopy density relates to the amount of stream shaded from the sun. In Hulbert Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of 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 Hulbert 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 Hulbert 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:

This is the first survey of Hulbert Creek.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 22 to August 11, 1997 was conducted by John Campo and Marc Miller (AmeriCorps). The survey began at the confluence with the Russian River and extended up Hulbert to end of the survey. The total length of the stream surveyed was 34837 feet, with no side channels.

A flow of 2-3 cfs was measured 8-20-90 at habitat unit 12, 146' above survey start with a Marsh-McBirney Model 2000 flowmeter. Flow was estimated to be 0.54 cfs during the survey period.

This section of Hulbert has four channel types: from the mouth to 28202 feet an F4; next 2504 feet a G3; next 1678 feet an A3 and the upper 2453 feet a G3.

A3 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly cobble substrate.

F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate.

G3 channel types are characterized as well entrenched "gully" step-pool channels with a low width/depth ratio, a moderate gradient (2-4%) and a predominantly cobble substrate.

Water temperatures on the survey dates ranged from 59°F to 67°F. Air temperatures ranged from 61°F to 93°F. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder in Reach 1 logged temperatures every 2 hours from July 4 - September 3, 1997. The highest temperature recorded was 57°F in July and August, and the lowest was 55°F in July.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 31% pool units, 27% riffle units, 24% flatwater units, and 18% dry streambed units. Based on total **length** there were 64% dry streambed units, 14% riffle units, 12% flatwater units, and 10% pool units (Graph 1).

Two hundred ninety eight habitat units were measured and 20% were completely sampled. Thirteen 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 27%, dry streambed 18%, root wad scour pools 13% and runs 13% (Graph 2). By percent total **length**, dry streambed made up 64%, low gradient riffles 14%, runs 7%, and glides 5%.

Ninety three pools were identified (Table 3). Scour pools were most often encountered at 91%, and comprised 93% 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. Only five of the 93 pools (5%) had a depth of three feet or greater (Graph 4). These deeper pools comprised only 1% 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 19. Riffle had the lowest rating with 1 and flatwater rated 8 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 21 and main channel pools rated 4 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were root masses at 38%, boulders 28%, undercut banks 13%, and large woody debris 12%. Graph 5 describes the pool shelter in Hulbert.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in seven of the 15 low gradient riffles measured. Small cobble was dominant in five of the low gradient riffles (Graph 6).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 91 pool tail-outs measured, 0% had a value of 1; 19 had a value of 2 (21%); 45 had a value of 3 (49%); and 27 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 89%. The mean percentages of deciduous and evergreen trees were 49% and 51%, 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 74% and the mean percent left bank vegetated was 76%. For the habitat units measured, the dominant vegetation types for the stream banks were: 48% evergreen trees, 36% deciduous trees, 15% brush, 1% bare soil and 0% grass. The dominant substrate for the stream banks were: 90% silt/clay/sand, 7% bedrock, 3% boulder and 0% cobble/gravel (Graph 10).

HABITAT INVENTORY RESULTS FOR HULBERT UNNAMED TRIBUTARY (#174)

The habitat inventory of 08/14/97 was conducted by Edward Sanchez and Marc Miller (Americorps). The survey began at the confluence with the Russian River and extended up Hulbert Tributary-#174 to the end of the survey. The total length of the stream surveyed was 2754 feet, with an additional 65 feet of side channel.

Flows of 0.25 cfs. were measured on Hulbert Tributary-#174 on 9/20/97.

This section of Hulbert Tributary-#174 has one channel type: from the mouth to 2754 feet an F4. Water temperatures on the survey dates ranged from 59°F to 61°F. Air temperatures ranged from 65°F to 82°F.

Based on frequency of **occurrence** there were 38% flatwater units, 27% riffle units, 23% pool units, and 12% dry streambed units. Based on total **length** there were 47% flatwater units, 35% riffle units, 14% pool units, and 5% dry streambed units. The most frequent habitat types by percent **occurrence** were runs at 32% and low gradient riffles 27%. By percent total **length**, runs made up 41%, low gradient riffles 35%.

Scour pools were most often encountered at 93%, and comprised 95% of the total length of pools. 14% of pools had a depth of two feet or greater, comprising 1% of the total length of stream habitat. Pool types had the highest shelter rating at 22, with the main channel pools having the highest mean shelter rating at 40, and scour pools at 21. By percent area, the dominant pool shelter types were large woody debris at 67%, root masses 18%, undercut banks 9%, and boulders 3%. Of the 14 pool tail-outs measured, 64% had a value of 1 (64%); 36% had a value of 2; 0% had a value of 3 or 4.

The mean percent canopy density for the stream reach surveyed was 89% (25% deciduous and 75% evergreen). Mean percent right/left bank vegetated was 54%/30%, and dominant vegetation types for the stream banks were: 66% evergreen trees, 24% brush, 3% grass, 3% deciduous trees and 3% bare soil. The dominant substrate for the stream banks were: 67% silt/clay/sand, 20% cobble/gravel and 10% bedrock and 0% boulder.

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

According to *Status of Coho Salmon in California* (L.R. Brown and P.B. Moyle, 1991), DFG personnel rescued 1500 coho salmon juveniles from Hulbert Creek in 1952.

A National Marine Fisheries Service Bioinventory for the Russian

River estimated 41 Steelhead young of the year in two pools sampled on July 22, 1996.

On 10/21/97 a biological inventory was conducted in four sites of Hulbert Creek to document fish species composition and distribution. 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 observers were April Richards, Paul Campo, and Marc Miller (Americorps).

The inventory of Reach 1 started at Bridge #6. No fish were found, site #1 was dry.

The survey was continued starting at habitat unit #87 (downstream of wet road crossing #3) and fished intermittently in 6 pools (distance was not recorded). In riffle and pool habitat types seven 0+, four 1+ and one 2+ steelhead were observed along with eight sculpin.

The survey was continued starting at bridge #6 (confluence pool with un-named trib.) and ending approximately 500 feet upstream. In riffle and pool habitat types five 0+, and two 1+ steelhead were observed along with seven sculpin.

The survey was continued starting 500' upstream from Bridge #6 and ending approximately 428 feet upstream. In riffle and pool habitat types eight 0+, one 1+ and one 2+ steelhead were observed along with four sculpin.

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

Species Observed in Historical and Recent Surveys			
YEARS	SPECIES	SOURCE	Native/Introduced
1996	Steelhead	NMFS	N
1997	Steelhead	DFG	N
1997	Sculpin	DFG	N
1953	Coho	Brown & Moyle	N

ADULT SURVEYS:

A spawning survey was conducted in Hulbert Creek on 3/4/1998, beginning at habitat unit #87 and extending to habitat unit #174. No adult chinook, coho, or steelhead were observed. One juvenile steelhead was observed. Four possible redds were observed, and gravel quality there appeared to be adequate for spawning.

DISCUSSION

Hulbert has three channel types and four reaches: F4 (28202 ft.), G3 (2504 ft.), A3 (1678 ft.) and G3 (2453 ft.).

There are 2802 feet of F4 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, 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. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.

There are 2504 feet of G3 channel type in Reach 2 and 2453 feet in Reach 4. According to the DFG Salmonid Stream Habitat Restoration Manual, G3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover. They are poor for boulder clusters and single wing-deflectors.

There are 1678 feet of A3 channel type in Reach 3. According to the DFG Salmonid Stream Habitat Restoration Manual, A3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover. They are poor for boulder clusters and single wing-deflectors.

The water temperatures recorded on the survey days 07/22/97 to 08/11/97 ranged from 59°F to 67°F. Air temperatures ranged from 61°F to 93°F. These temperatures are within the threshold stress level (65°F) for salmonids. Summer temperatures measured using remote temperature recorders placed in pools ranged from 54° to 56°F for Reach 1. It is unknown if this thermal regime is typical, but our electrofishing samples found steelhead more frequently in the upper, cooler sample sites. 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 conducted.

Pools comprised only 10% of the total **length** of this survey. In third and fourth order streams a primary pool is defined to have a maximum depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In Hulbert, the pools are relatively shallow with 5% having a maximum depth of at least 3 feet. These pools comprised only 1% 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 19. 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 (38%), boulders (28%), undercut banks (13%), and large woody debris (12%). 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.

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

Seventy nine percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4, and 21% rated a 2. 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 3 and 4 had the best ratings and Reaches 1 and 2 had the poorest ratings.

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 Hulbert Reaches 1 and 2, 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 89%. This is an excellent level of canopy since 80 percent is generally considered desirable.

DISCUSSION FOR HULBERT TRIBUTARY #174

The water temperatures recorded on the survey day (08/14/97) ranged from 59°F to 61°F. Air temperatures ranged from 65°F to 82°F. This temperature regime is favorable to salmonids.

*Pools comprised 14% of the total **length** of this survey, but the pools are relatively shallow with 20% having a maximum depth of at least 2 feet, comprising 1% of the total length. The mean shelter rating for pools was 22 (provided primarily by large woody debris (67%), root masses (18%), undercut banks (9%), and boulders (3%). 64% of tailouts had a rating of 1, which is considered good for the needs of salmon and steelhead.*

The mean percent canopy was 89%, which is very good, since 80% is generally considered desirable.

SUMMARY

Overall, very few fish were observed during the 1997 survey. The 1997 spring surveys documented the presence of 0+ fish indicating

successful spawning in the lower and middle reaches of HULBERT Creek. Few 1+ fish were observed indicating poor holding-over conditions in general, however. Overall, habitat conditions for both steelhead and coho have declined over time.

In general, Reach 1 is poor and Reach 2 is marginal for salmon and steelhead habitat. Portions of the lower reaches have been channelized and levied, thus stream velocity has increased resulting in streambank erosion and loss of mature riparian vegetation. Little riffle habitat exists for spawning, and what does exist is unsuitable for spawning due to high gravel embeddedness, especially in Reach 1. Pool habitats in the lower reach are dry due to channel downcutting. The unstable banks and effects of channelization in these reaches limit instream habitat improvement alternatives, although some opportunity exists. Any work considered in the lower reaches will require careful design, placement, and construction that must include protection for the unstable banks and high stream velocities.

All reaches are good for bank-placed boulders and single and opposing wing-deflectors. They are fair for low-stage (low profile) weirs, boulder clusters and channel constrictors. Log cover structures can be used to increase instream shelter.

The best spawning gravel and rearing habitat in the watershed exists within the upper portion of Hulbert Creek, and with unnamed tributary #174. All reaches have low pool percentages and could benefit from pool-building structures with cover.

GENERAL RECOMMENDATIONS

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

The recent winter 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 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.

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

- 1) In Hulbert Creek, active and potential sediment sources

related to the road system need to be mapped, and treated according to their potential for sediment yield to the stream and its tributaries. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.

- 2) Map sources of upslope and in-channel erosion, and prioritize them according to present and potential sediment yield. Biotechnical approaches should be used to create a bench, etc. and near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against urban runoff.
- 3) Spawning gravels on Hulbert Creek and Hulbert Trib 174 are relatively limited in upper reaches. Structures to decrease channel incision and recruit spawning gravel (using gravel retention structures), could be installed to trap, sort and expand redd distribution in the stream.
- 4) 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 in the upper reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion (all reaches). In some areas the material is at hand.
- 5) Where feasible, design and engineer pool enhancement structures to increase the number of pools in the upper reaches. This must only be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

PROBLEM SITES AND LANDMARKS - HULBERT 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	70	See field book, page 66.
5.00	3000	o+?
7.00	3092	o+?
8.00	3136	Small culvert, noted in field book, pg. 69
30.00	4569	Hobo temp. located in pool
31.00	4627	Dry trib., right bank.
40.00	5040	o+?
45.00	5448	Old rusty truck sub-merged by

gravel, left bank.
 47.00 5538 Culvert, left bank, No erosion.
 48.00 5585 Culvert, left bank, No erosion.
 49.00 10209 Mission Creek on right bank. 246'
 upstream of Fern Bridge Way.
 50.00 10282 0+
 52.00 10442 Approx. 75 0+ SHD.
 54.00 10570 Culvert left bank, No erosion
 56.00 10909 0+ SHD
 59.00 20523 Culvert on left bank, eroding part
 of RD.
 62.00 20663 0+ SHD
 67.00 20845 0+ SHD
 72.00 21055 0+ SHD
 78.00 21230 0+ SHD
 81.00 21326 Wet crossing in main road.
 87.00 22652 Road crossing #3 on right bank.
 91.00 22853 Res. fish 8" SHD
 92.00 23051 Wet crossing is dry. Trib. on right
 bank.
 94.00 23183 YOY SHD
 96.00 23269 1+ SHD, YOY, Sculpin, Erosion
 scrap-20'L X 15'H X 7'D
 97.00 23281 Channel type F4
 99.00 23433 Road directly on left bank in unit#
 99 and #100
 102.00 23624 Wet crossing on main road.
 107.00 23979 Bridge crossing
 121.00 24473 Dry trib. left bank.
 122.00 24499 Road crossing, not a main road, not
 used much.
 129.00 24853 Old broken concrete weir no longer
 functioning.
 130.00 24892 Road on right bank spilling silt in
 creek.
 134.00 25087 0+ SHD
 144.00 25647 Trailer on opposite side of road
 (right bank).
 146.00 25749 0+ SHD
 147.00 25780 Road access ND RIP-RAP ON RIGHT
 BANK.
 148.00 25843 Road right bank units #148 through
 #150
 150.00 25959 0+ SHD.
 152.00 26033 Sculpin, 0+ SHD
 156.00 26258 0+ SHD.
 157.00 26286 Wet trib. right bank spilling in
 silt into creek. 0+ SHD.
 164.00 26688 0+ SHD. Erosion right bank. See
 erosion from.
 166.00 26875 0+ SHD
 167.00 26973 Erosion right bank. Road above

still.

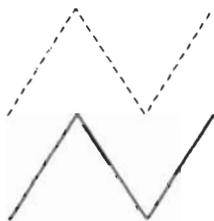
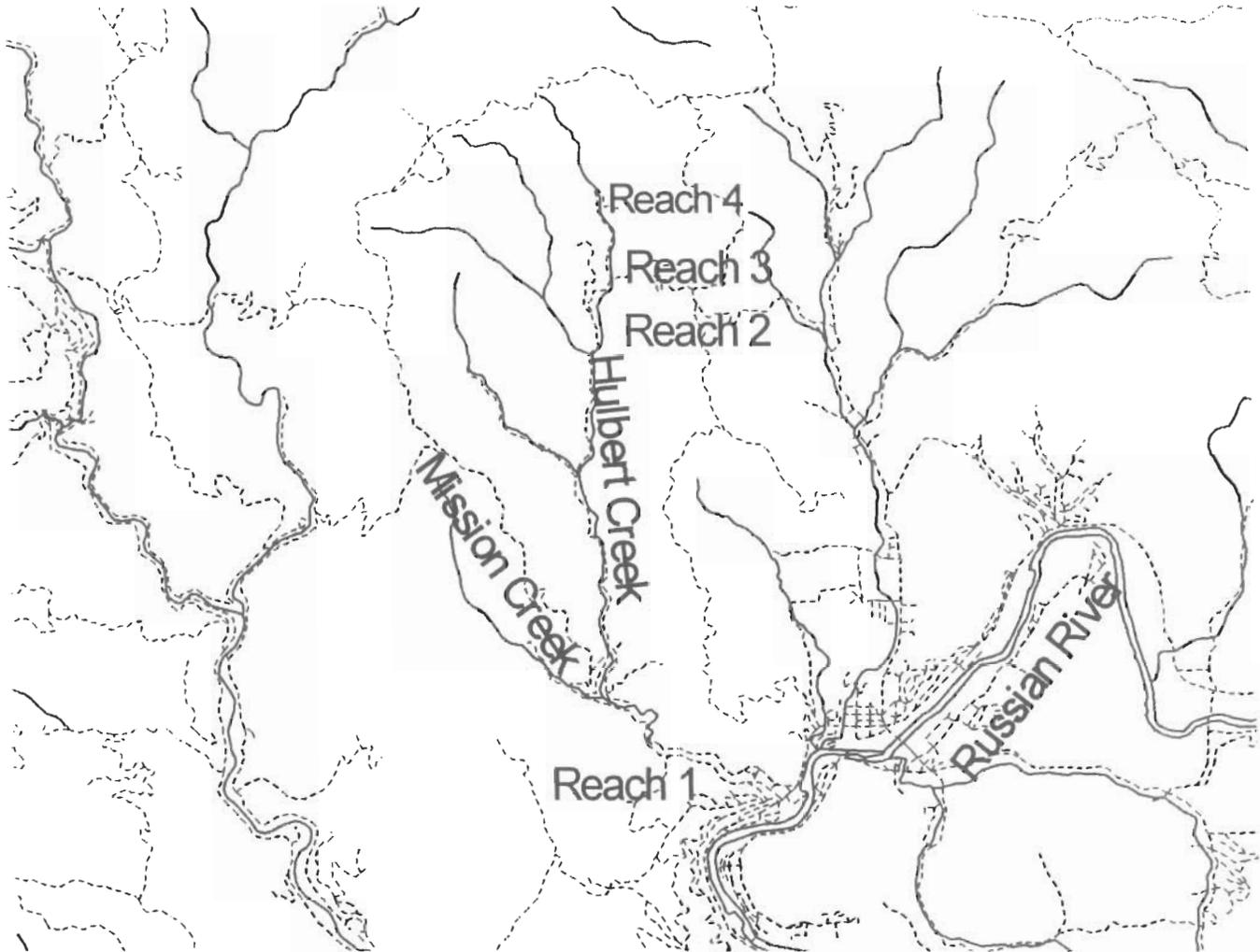
172.00	27108	1+ SHD
174.00	27260	See field book, Wet trib. right bank.
175.00	27287	0+ SHD unit #175 and 176
179.00	27483	Dry trib right bank.
180.00	27545	Dry trib. left bank.
181.00	27661	0+ SHD.
186.00	27828	Wet trib. left bank. 0+ SHD. trib temp.=60 F.
188.00	27996	0 + SHD unit# 188 and #189
190.00	28202	(3) 1+ SHD. (see LWD sheet)
191.00	28252	Start of 100% for reach #2
195.00	28504	0+ SHD
196.00	28549	0+ Shd
197.00	28707	0+ SHD
200.00	28802	0+ SHD
204.00	28996	Erosion right bank.
205.00	29020	0+ SHD. Erosion right bank.
209.00	29179	0+ SHD
211.00	29246	0+ and 1+ SHD, Sculpin.
213.00	29323	0+ SHD
214.00	29334	0+ SHD.
217.00	29526	Dry Trib. right bank.
224.00	29846	1+ and 0+ SHD
226.00	29979	1" PVC water diversion pipe 9' above stream bed.
227.00	30102	"office" house left bank.
230.00	30158	Offill propeerty not flagged.
231.00	30220	0+ SHD
235.00	30458	Road access into creek, right bank.
237.00	30519	Bridge Armstrong Woods. 0+ SHD. Wet trib. left bank.
238.00	30594	Channel change G3
240.00	30679	Erosion scrap, left bank, 30'H X 15'D X 30'W
243.00	30744	Channel type A3
246.00	30857	
247.00	30921	Tree slipped into creek on right bank, erosion.
254.00	31202	Major erosion right bank. Nothing holding it together. Propabley lose road next flood.
256.00	31291	0+ SHD
263.00	31526	0+ SHD.
265.00	31613	0+ SHD.
267.00	31708	0+ SHD
270.00	31868	PGS.
272.00	31983	Dry trib., left bank.
274.00	32065	0+ SHD.
276.00	32183	0+ SHD, sculpin.

277.00	32384	Eroding road on right bank-it's not going to last.
278.00	32462	Channel change (G3) Reach #4, begin 100%.
279.00	32484	0+ SHD.
282.00	32599	Erosion right bank due to run-off from road.
284.00	32645	Large 1+, 0+ SHD.
286.00	32713	0+ SHD
287.00	32840	Small footbridge, 6.5' over creek bed.
288.00	32860	(3) 2+, 0+, sculpin. Beautiful pool/habitat.
291.00	32937	0+ SHD.
293.00	32969	2+ SHD. Erosion left bank.
296.00	33117	Yellow-legged frog.
297.00	33137	Wet trib. left bank. See field book, pg. #76
298.00	34837	end of survey

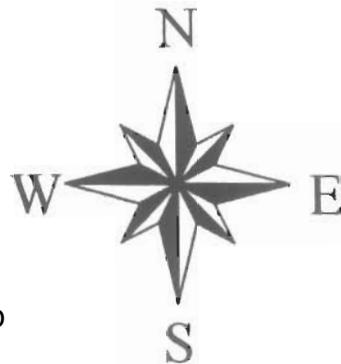
PROBLEM SITES AND LANDMARKS - HULBERT TRIBUTARY #174

<i>HABITAT UNIT #</i>	<i>STREAM LEN. (FT)</i>	<i>COMMENTS</i>
1.00	13	confluence-60 degrees-road through this unit
2.00	36	This creek in general is downcutting
4.00	122	Many 0+
17.00	967	P. Try right bank
19.00	1044	sculpin,0+
26.00	1319	sculpin
29.00	1514	0+
37.00	1896	0+ observed
52.00	2497	2+; huge pool
56.00	2754	End Of Survey

Hulbert Creek

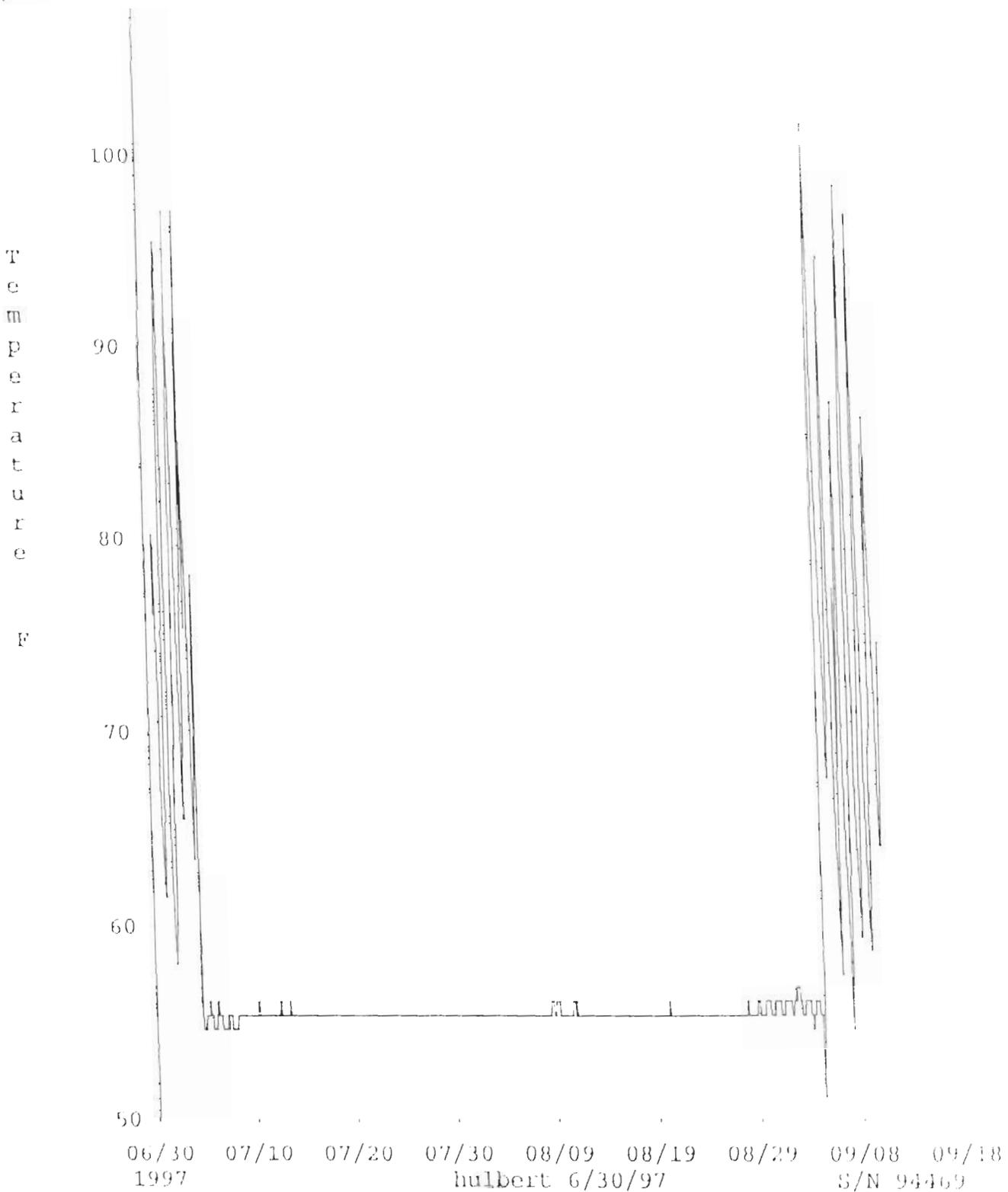


Roads
Streams



DATE: 06/30/97 TIME: 11:28
 TIME: 15:11 TIME: 11:28
 LOCATION: DELTA 5.3 POOL
 CHIEF: [unclear]
 LOCAL: [unclear]
 NAME: ES. M.M.

FILES-11
 Hulbert 1.0TF



Hulbert

Drainage:

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 07/22/97 to 08/11/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	TOTAL PERCENT LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	MEAN ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
80	15 RIFFLE	27	61	4888	14	3.5	0.2	181	14505	43	3440	1
72	12 FLATWATER	24	58	4170	12	6.9	0.4	499	35938	201	14482	8
93	32 POOL	31	36	3352	10	6.7	0.7	254	23636	213	19766	19
53	0 DRY	18	423	22427	64	0.0	0.0	0	0	0	0	0

TOTAL UNITS 59

TOTAL LENGTH (ft.) 34837

TOTAL AREA (sq. ft.) 74079

TOTAL VOL. (cu. ft.) 37688

Hulbert

Drainage:

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/22/97 to 08/11/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS	HABITAT FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	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
8	6	MAIN	9	30	242	7	0.8	219	1750	167	1332	138	4
85	26	SCOUR	91	37	3110	93	0.7	257	21851	216	18387	147	21
TOTAL UNITS	93				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)		
					3352				23601		19720		

Hulbert

Drainage:

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 07/22/97 to 08/11/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		>=4 FEET	
			PERCENT OCCURRENCE	DEPTH OCCURRENCE								
5	MCP	5	0	3	60	2	40	0	0	0	0	0
3	CCP	3	1	33	67	0	0	0	0	0	0	0
6	CRP	6	0	2	33	4	67	0	0	0	0	0
4	LSL	4	1	25	75	0	0	0	0	0	0	0
40	LSR	43	2	5	70	8	20	1	3	1	3	3
16	LSBK	17	0	13	81	3	19	0	0	0	0	0
16	LSBo	17	1	6	69	3	19	1	6	0	0	0
3	PLP	3	0	1	33	0	0	2	67	0	0	0

TOTAL
UNITS
93

Hulbert

Drainage:

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/22/97 to 08/11/97

Confluence Location: GUMD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

MEASURED UNITS	SHELTER TYPE	HABITAT	LEGAL DESCRIPTION:										% TOTAL BEDROCK LEDGES			
			% TOTAL UNDERCUT BANKS	SMD	LMD	% TOTAL ROOT MASS VEGETATION	TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL					
80	16	LGR	0	47	0	53	0	0	0	0	0	0	0	0	0	0
31	8	GLD	100	0	0	0	0	0	0	0	0	0	0	0	0	0
38	5	RUN	26	4	0	0	0	0	0	0	0	0	0	70	0	0
3	1	SRN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	MCP	38	0	0	15	0	0	0	0	0	0	0	46	0	0
3	3	CCP	50	50	0	0	0	0	0	0	0	0	0	0	0	0
6	6	CRP	22	9	4	2	0	0	0	0	0	0	0	64	0	0
4	4	LSL	0	0	100	0	0	0	0	0	0	0	0	0	0	0
40	36	LSR	14	12	9	59	0	0	0	0	0	0	0	6	0	0
16	14	LSBK	51	0	0	0	0	0	0	0	0	0	0	43	6	0
16	16	LSBG	0	3	13	0	0	0	0	0	0	0	0	83	1	0
3	3	PLP	4	14	26	56	0	0	0	0	0	0	0	0	0	0
53	9	DRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
298	126		19	8	10	32	0	0	0	0	0	0	0	30	0	0
93	87	POOLS ONLY	13	9	12	38	0	0	0	0	0	0	0	28	1	0

Drainage:

Hulbert

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 07/22/97 to 08/11/97

TOTAL HABITAT UNITS MEASURED		HABITAT TYPE		LEGAL DESCRIPTION:		QUAD:		LATITUDE: 0°0'0"		LONGITUDE: 0°0'0"							
UNITS	SUBSTRATE	UNITS	TYPE	HABITAT	% TOTAL	SAND	DOMINANT	GRAVEL	% TOTAL	SM COBBLE	% TOTAL	LG COBBLE	% TOTAL	BOULDER	% TOTAL	BEDROCK	DOMINANT
15	LGR	0		20	47	33		0	0	0	0	0	0	0	0	0	0
6	GLD	17		50	33	0		0	0	0	0	0	0	0	0	0	0
5	RUN	0		40	40	20		0	0	0	0	0	0	0	0	0	0
1	SRN	0		0	100	0		0	0	0	0	0	0	0	0	0	0
5	MCP	0		100	0	0		0	0	0	0	0	0	0	0	0	0
3	CCP	33		67	0	0		0	0	0	0	0	0	0	0	0	0
3	CRP	33		33	33	0		0	0	0	0	0	0	0	0	0	0
2	LSL	0		100	0	0		0	0	0	0	0	0	0	0	0	0
8	LSR	38		50	13	0		0	0	0	0	0	0	0	0	0	0
4	LSBK	0		100	0	0		0	0	0	0	0	0	0	0	0	0
6	LSBo	0		83	0	0		0	0	0	0	0	0	0	17	0	0
3	PLP	33		67	0	0		0	0	0	0	0	0	0	0	0	0
10	DRY	0		10	80	10		0	0	0	0	0	0	0	0	0	0

Hulbert

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
88.97	51.38	48.63	73.62	75.84

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	4	6	6.58
Boulder	1	4	3.29
Cobble/Gravel	0	0	0
Silt/clay	71	66	90.13

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	14	9	15.13
Deciduous Trees	23	32	36.18
Evergreen Trees	38	35	48.03
No Vegetation	1	0	0.66

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Hulbert

SAMPLE DATES: 07/22/97 to 08/11/97

SURVEY LENGTH:

MAIN CHANNEL: 34837 ft.

SIDE CHANNEL: 0 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map:

Latitude: 0°0'0"

Legal Description:

Longitude: 0°0'0"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-190)

Channel Type: F4

Main Channel Length: 28202 ft.

Side Channel Length: 0 ft.

Riffle/Flatwater Mean Width: 7.0 ft.

Pool Mean Depth: 0.7 ft.

Base Flow: 0.5 cfs

Water: 59-65°F Air: 61-93°F

Dom. Bank Veg.: Evergreen Trees

Bank Vegetative Cover: 74%

Dom. Bank Substrate: Silt/Clay/Sand

Embeddness Value: 1. 0% 2. 8% 3. 52% 4. 39%

Mean Canopy Density: 88%

Evergreen Component: 44%

Deciduous Component: 56%

Pools by Stream Length: 9%

Pools >=2 ft. Deep: 31%

Pools >=3 ft. Deep: 6%

Mean Pool Shelter Rtn: 17

Dom. Shelter: Boulders

Occurrence of LOD: 58%

Dry Channel: 20066 ft.

STREAM REACH 2 (Units 191-242)

Channel Type: G3

Main Channel Length: 2504 ft.

Side Channel Length: 0 ft.

Riffle/Flatwater Mean Width: 3.7 ft.

Pool Mean Depth: 0.6 ft.

Base Flow: 0.5 cfs

Water: 60-66°F Air: 80-92°F

Dom. Bank Veg.: Evergreen Trees

Bank Vegetative Cover: 70%

Dom. Bank Substrate: Silt/Clay/Sand

Embeddness Value: 1. 0% 2. 23% 3. 62% 4. 15%

Mean Canopy Density: 92%

Evergreen Component: 61%

Deciduous Component: 39%

Pools by Stream Length: 12%

Pools >=2 ft. Deep: 7%

Pools >=3 ft. Deep: 0%

Mean Pool Shelter Rtn: 34

Dom. Shelter: Root masses

Occurrence of LOD: 65%

Dry Channel: 252 ft.

STREAM REACH 3 (Units 243-277)

Channel Type: A3

Main Channel Length: 1678 ft.

Side Channel Length: 0 ft.

Riffle/Flatwater Mean Width: 4.0 ft.

Pool Mean Depth: 0.6 ft.

Base Flow: 0.5 cfs

Water: 62-67°F Air: 85-91°F

Dom. Bank Veg.: Evergreen Trees

Bank Vegetative Cover: 70%

Dom. Bank Substrate: Silt/Clay/Sand

Embeddness Value: 1. 0% 2. 67% 3. 22% 4. 11%

Mean Canopy Density: 86%

Evergreen Component: 50%

Deciduous Component: 50%

Pools by Stream Length: 15%

Pools >=2 ft. Deep: 11%

Pools >=3 ft. Deep: 0%

Mean Pool Shelter Rtn: 13

Dom. Shelter: Root masses

Occurrence of LOD: 0%

Dry Channel: 387 ft.

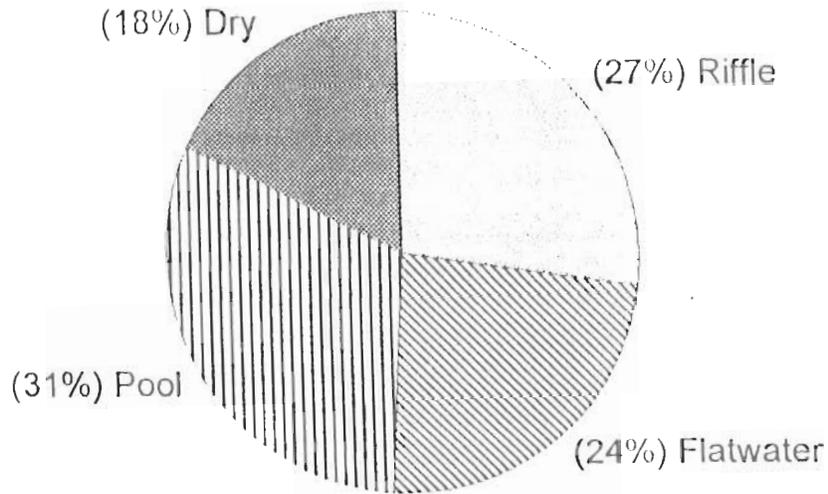
STREAM REACH 4 (Units 278-298)

Channel Type: G3	Mean Canopy Density: 91%
Main Channel Length: 2453 ft.	Evergreen Component: 85%
Side Channel Length: 0 ft.	Deciduous Component: 15%
Riffle/Flatwater Mean Width: 2.6 ft.	Pools by Stream Length: 8%
Pool Mean Depth: 1.0 ft.	Pools >=2 ft. Deep: 50%
Base Flow: 0.5 cfs	Pools >=3 ft. Deep: 13%
Water: 59-59°F Air: 62-64°F	Mean Pool Shelter Rtn: 19
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Undercut Banks
Bank Vegetative Cover: 87%	Occurrence of LOD: 50%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 1722 ft.
Embeddness Value: 1. 0% 2. 63% 3. 38% 4. 0%	

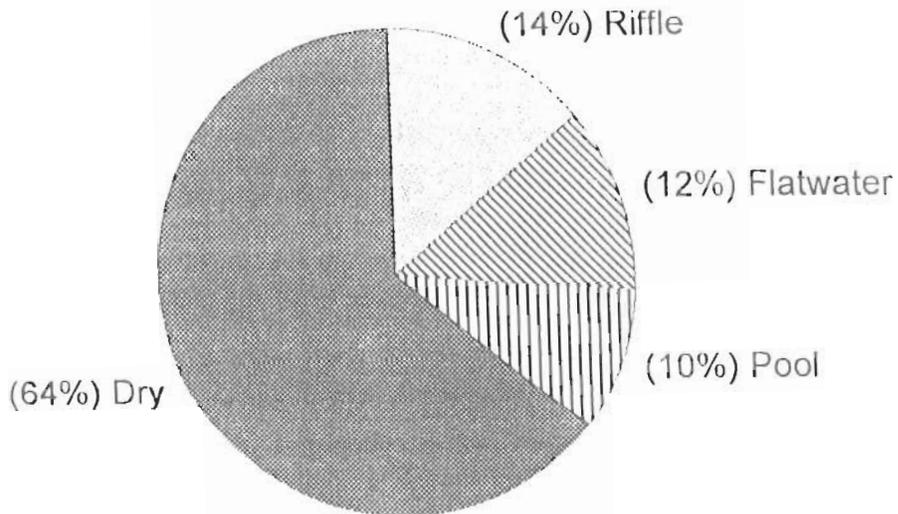
Hulbert Creek

Level II Habitat Types

Level II Habitat Types by % Occurrence



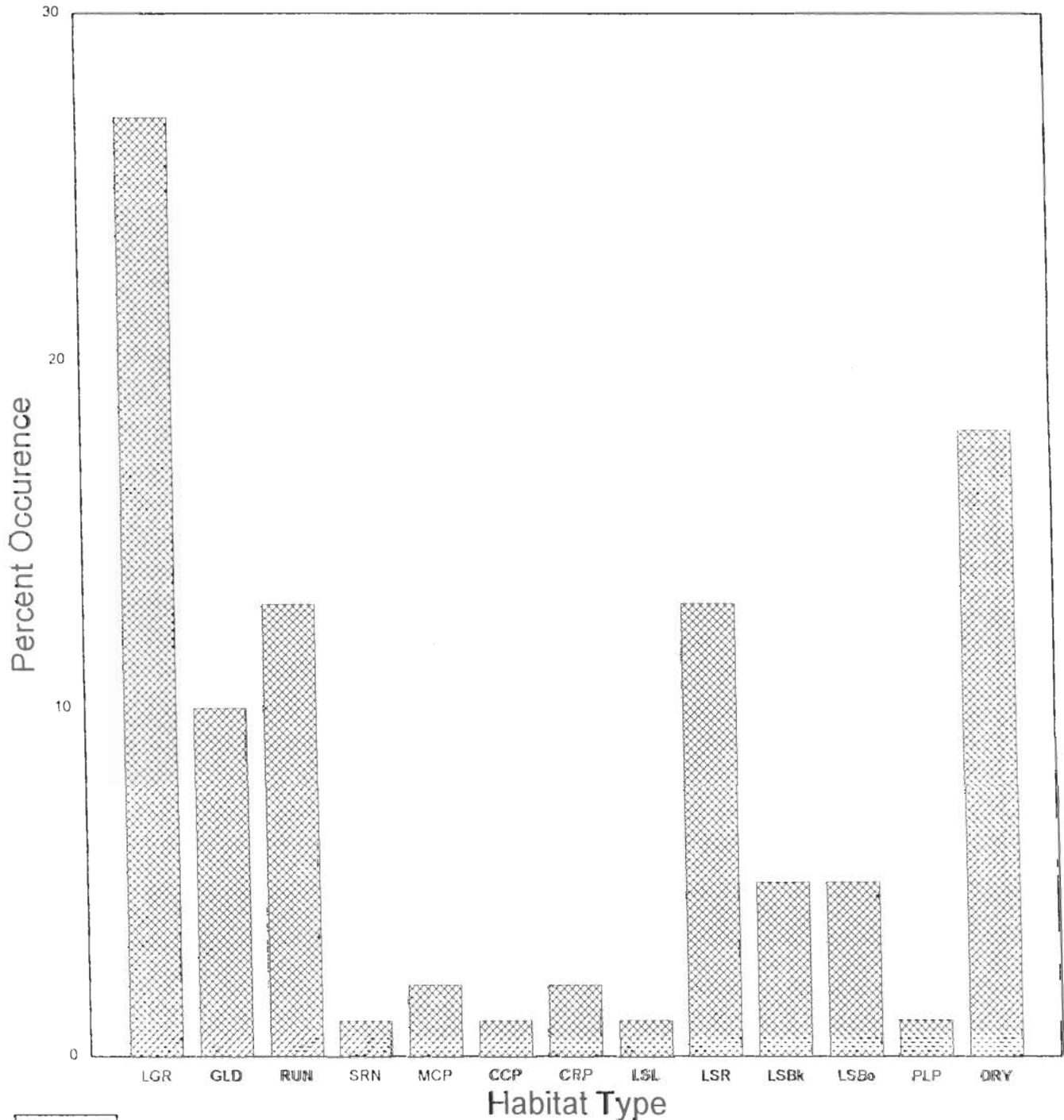
Level II Habitat Types by % Length



Graph 1

Hulbert Creek

Level IV Habitat Types by % Occurrence

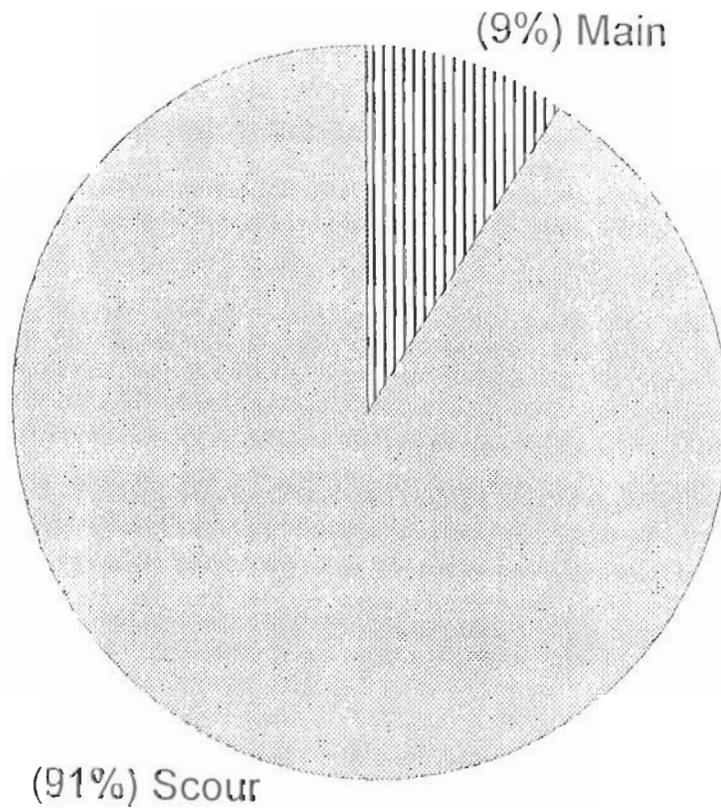


Graph 2

Hulbert Creek Tables Graphs Map
Assessment Completed 1996

Hulbert Creek

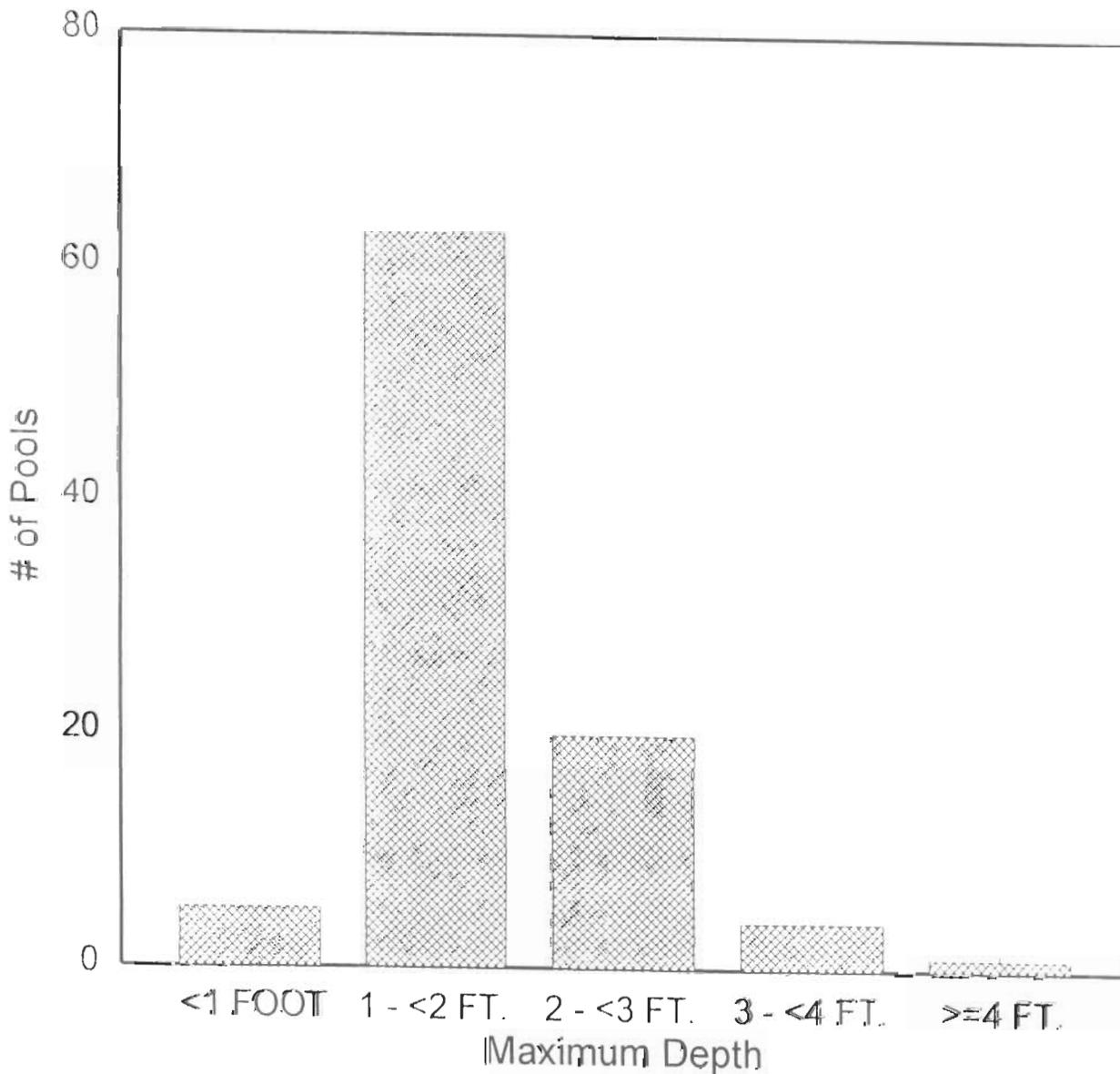
Pool Habitat Types by % Occurrence



Graph 3

Hulbert Creek

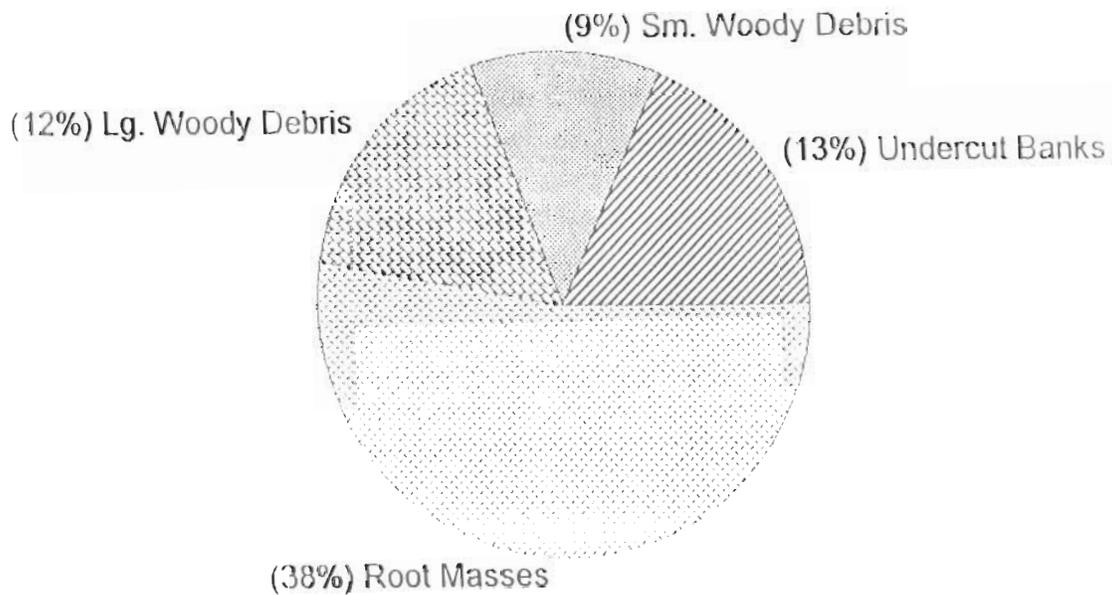
Maximum Depth in Pools



Graph 4

Hulbert Creek

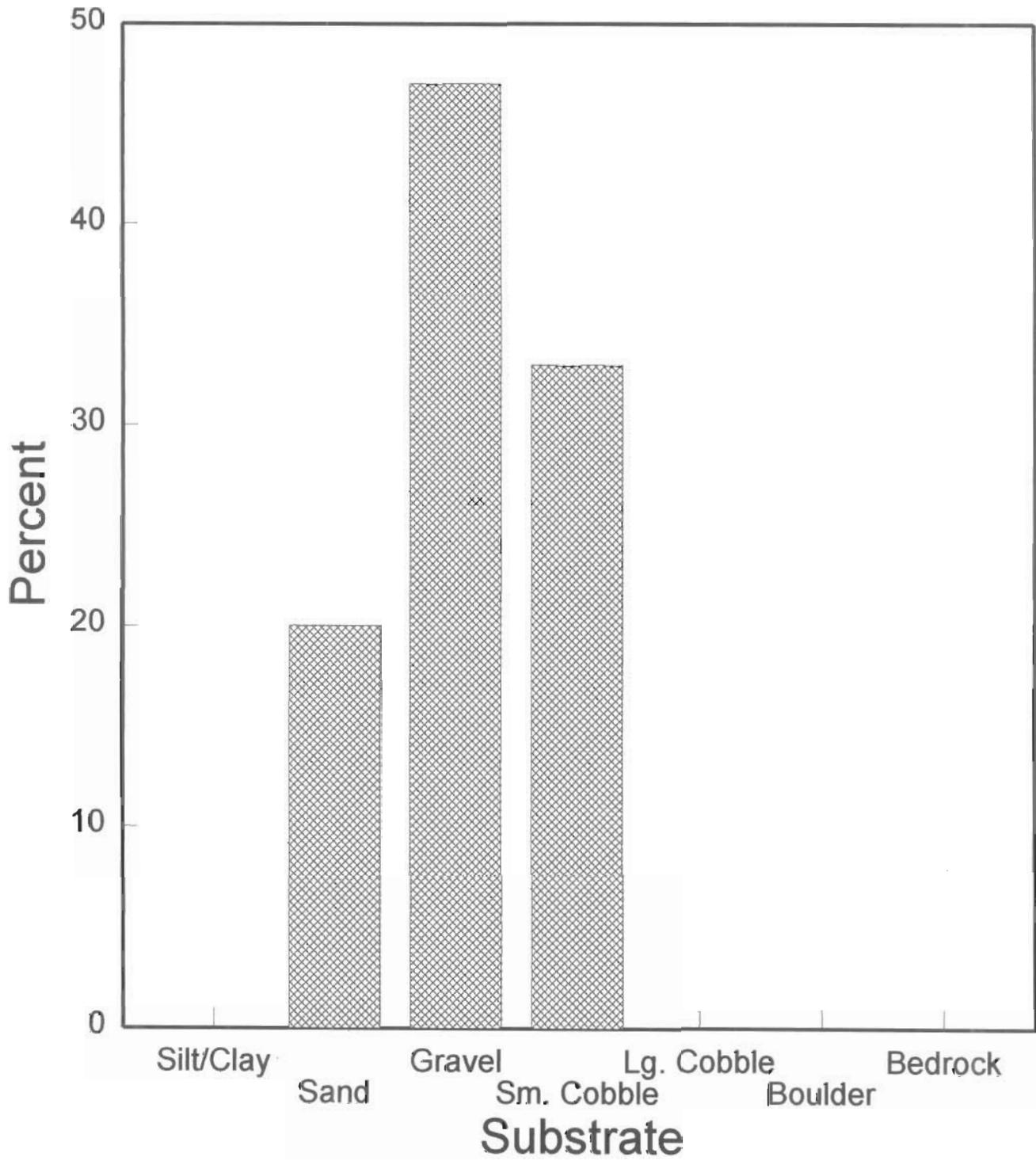
Pool Shelter Types by % Area



Graph 5

Hulbert Creek

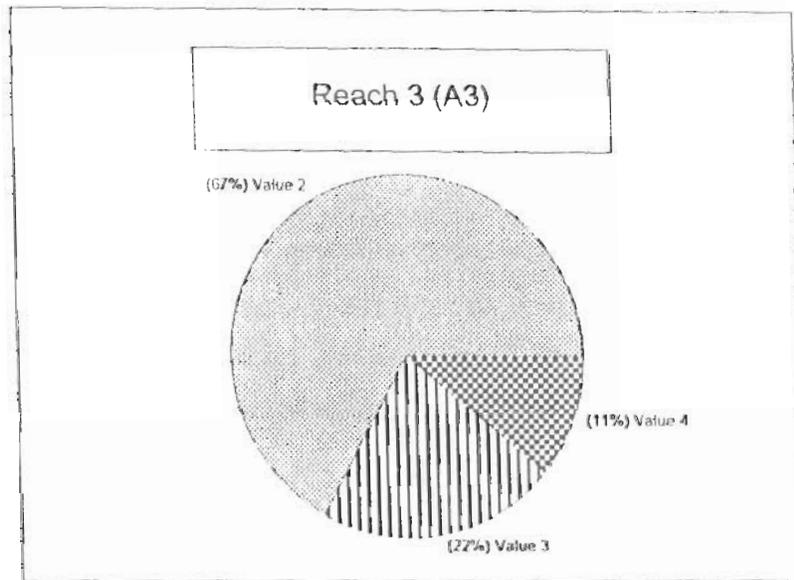
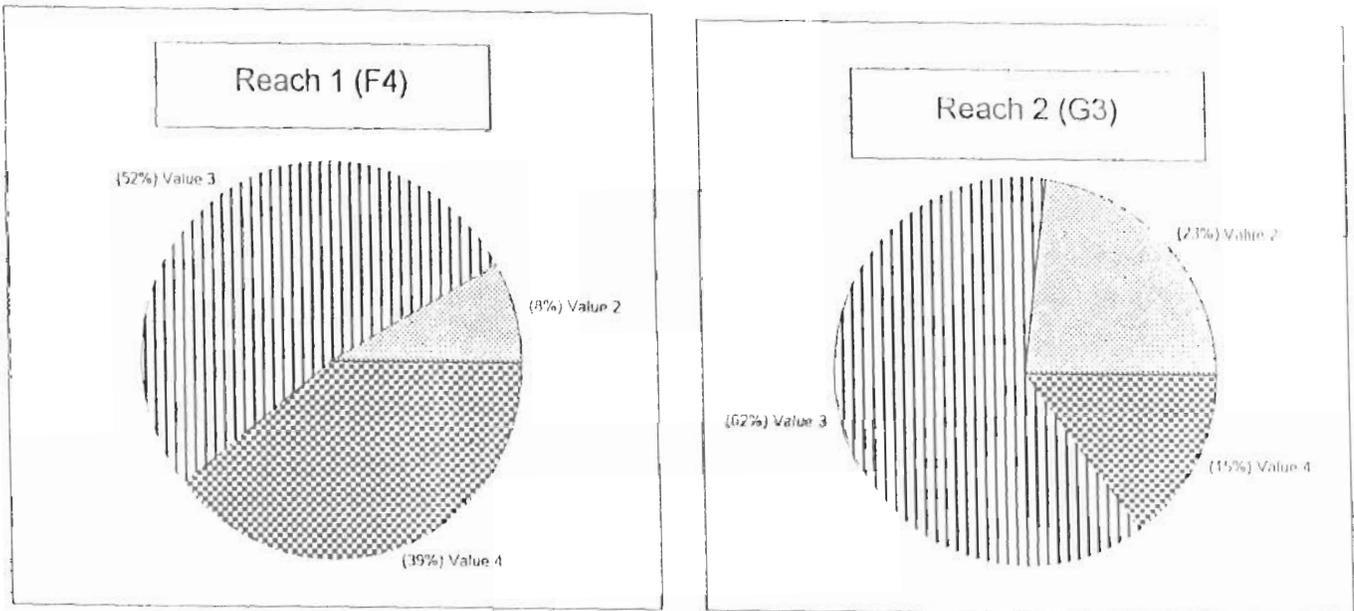
Substrate Composition in Low Gradient Riffles



Graph 6

Hulbert Creek

Percent Cobble Embeddedness by Reach

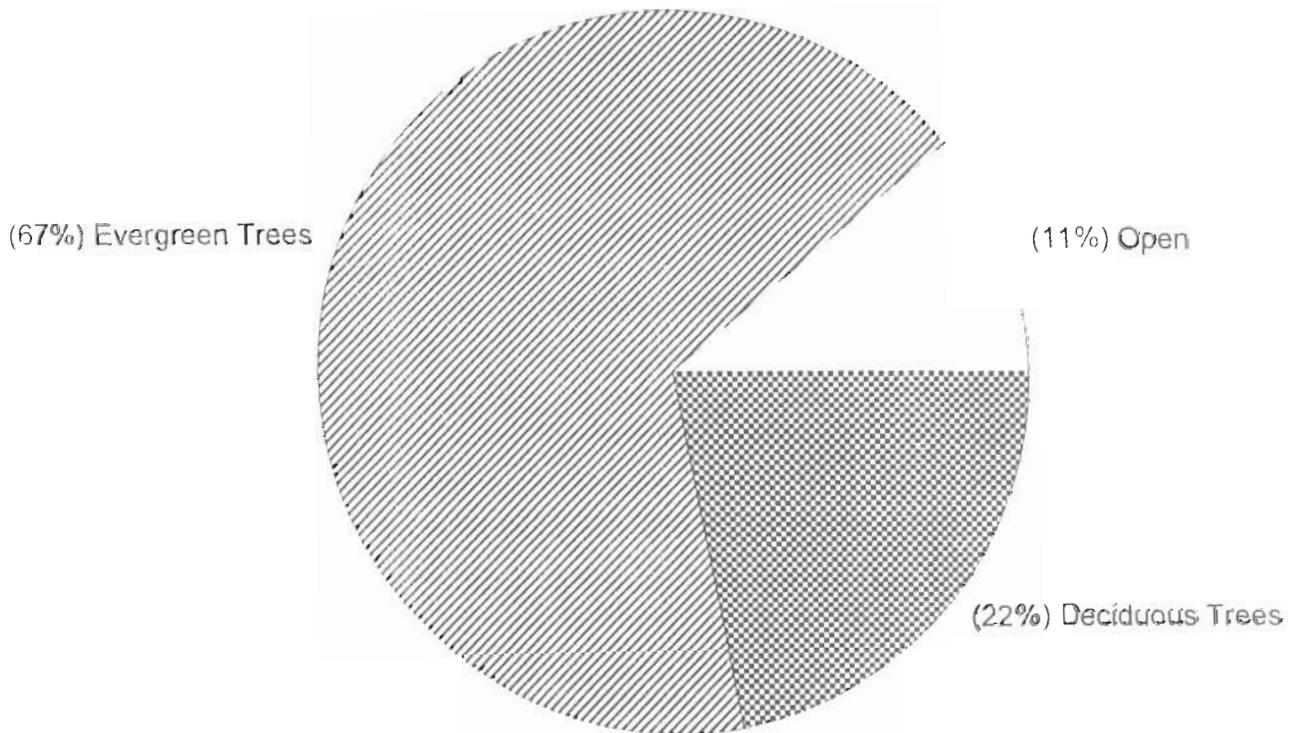


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 7

Hulbert Creek

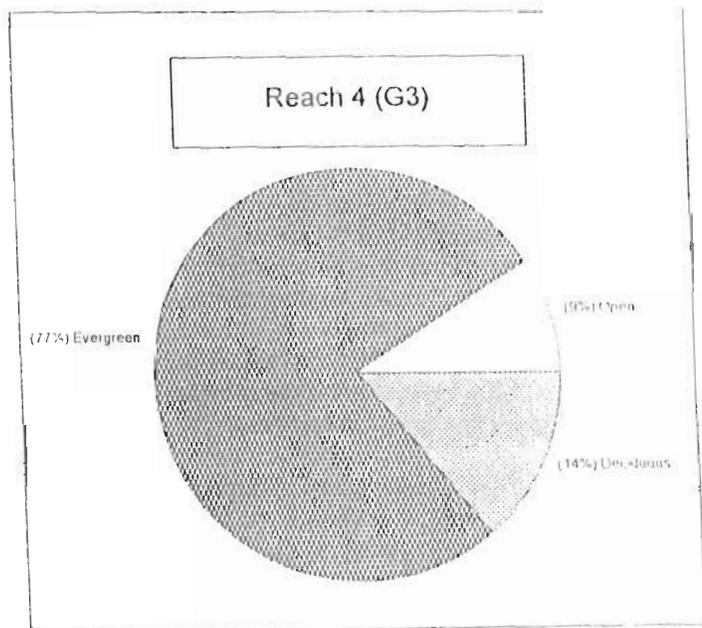
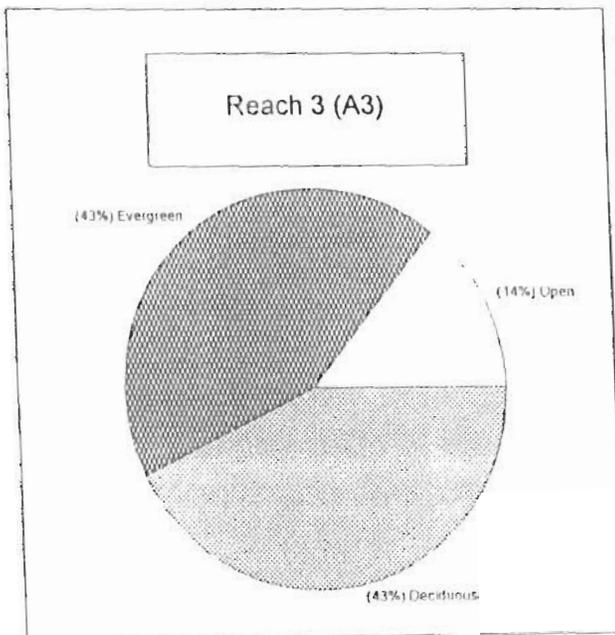
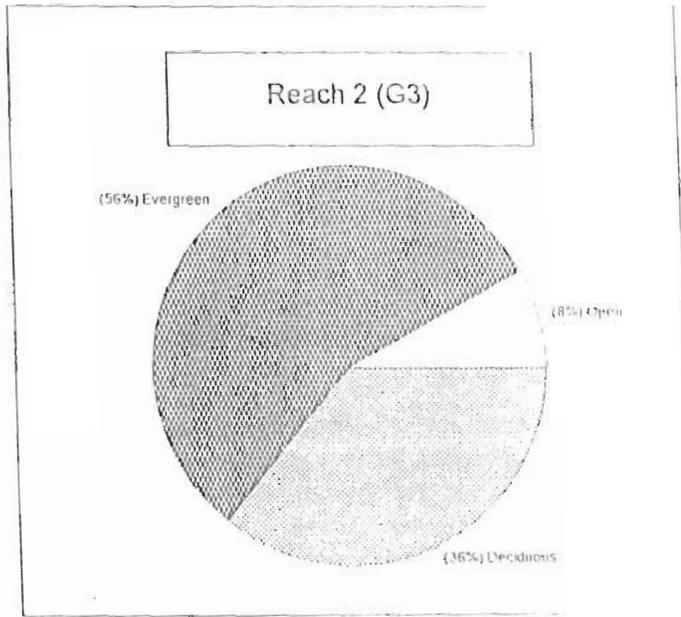
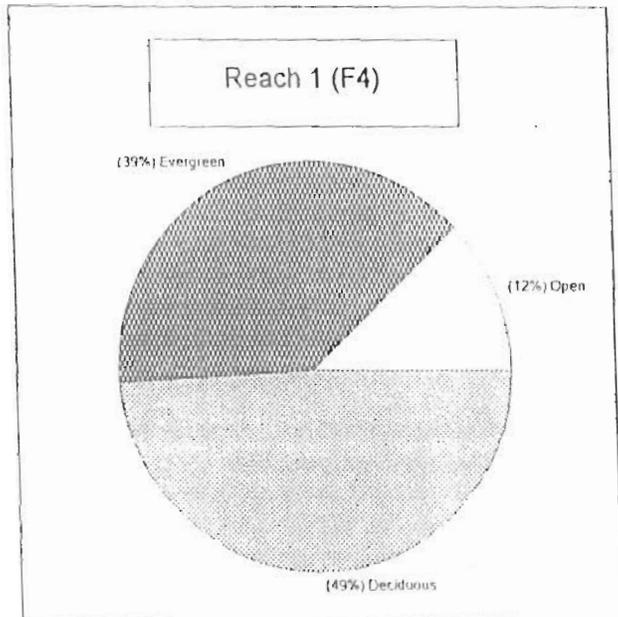
Mean Percent Canopy



Graph 8

Hulbert Creek

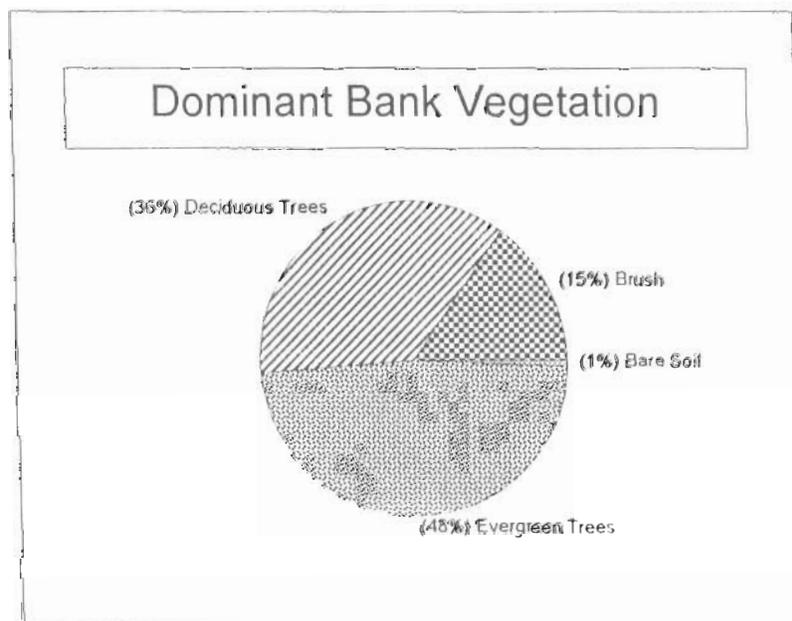
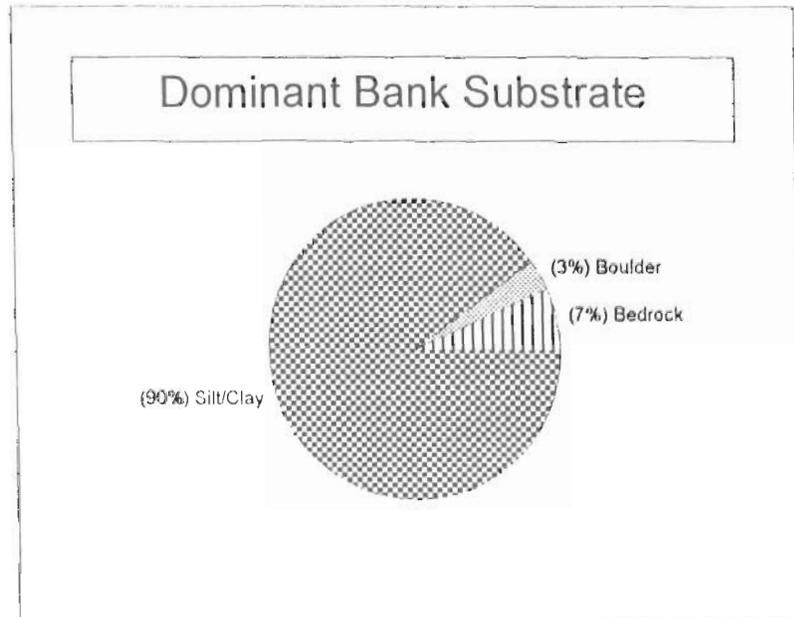
Percent Canopy By Reach



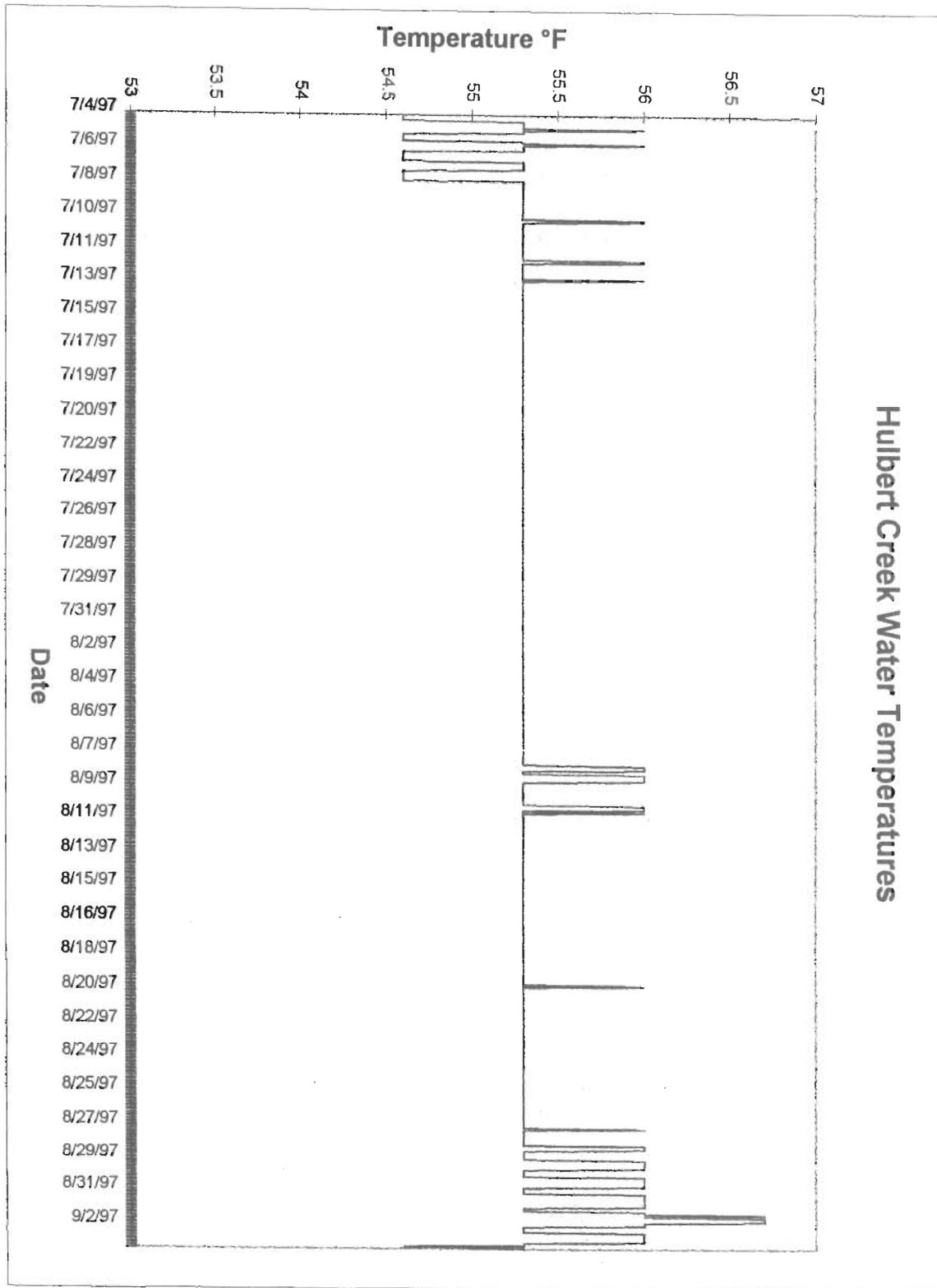
Graph 9

Hulbert Creek

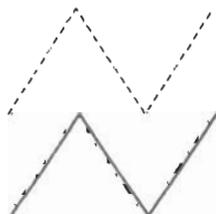
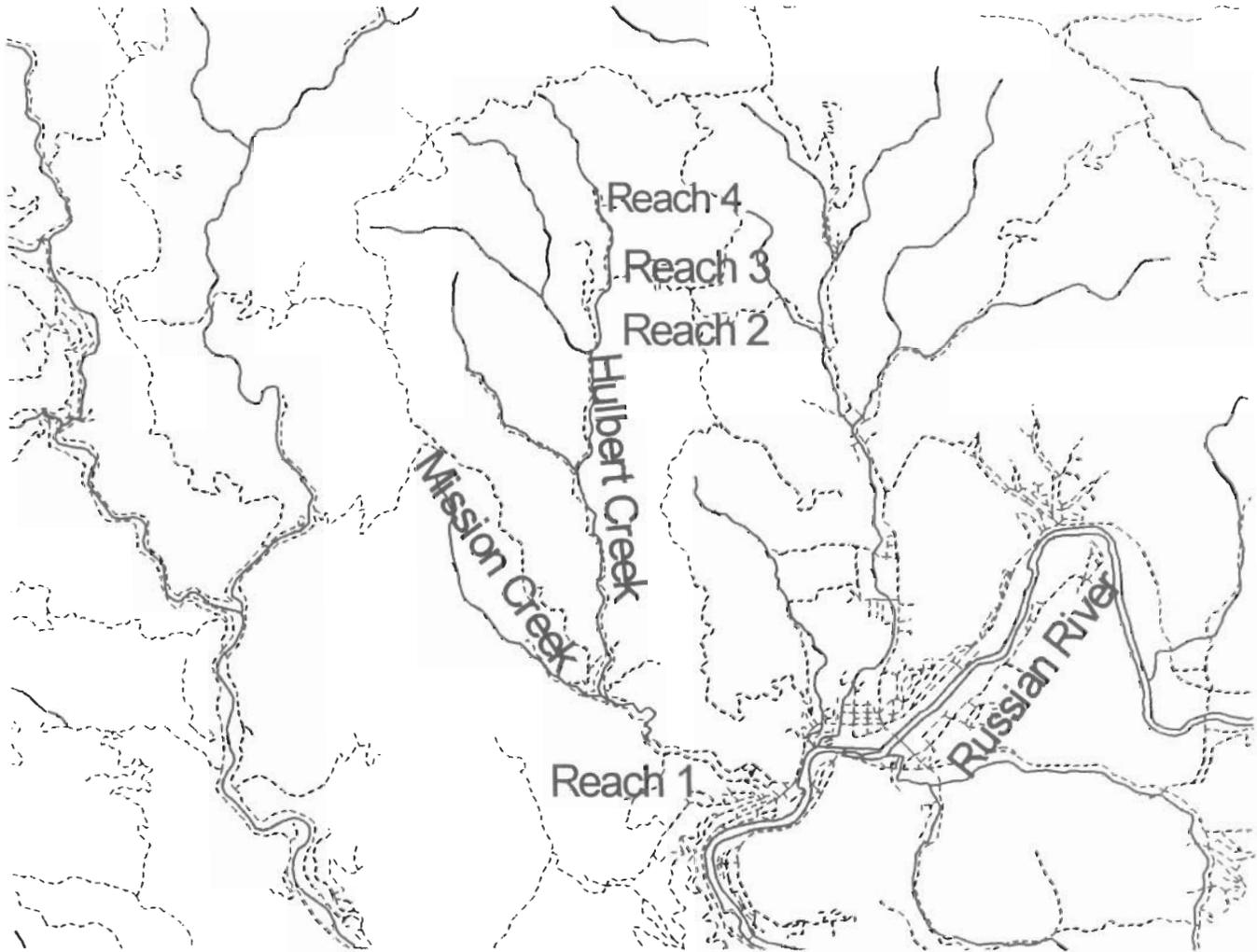
Percent Bank Composition



Graph 10



Hulbert Creek



Roads
Streams



Hulbert Tributary-#174

Drainage: Hulbert Creek

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

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	MEAN ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	WEIR SHELF RATING			
16	0	RIFFLE	27	61	980	35	4.0	0.2	105	1672	26	422	0	0
23	5	FLATWATER	38	57	1317	47	4.5	0.4	197	4539	83	1919	0	1
14	6	POOL	23	27	382	14	6.9	0.8	174	2441	135	1893	107	22
7	0	DRY	12	20	140	5	0.0	0.0	0	0	0	0	0	0
TOTAL UNITS	60				TOTAL LENGTH (ft.)	2819		TOTAL AREA (sq. ft.)	8651	TOTAL VOLUME (cu. ft.)	4234			

Hulbert Tributary-#174

Drainage: Hulbert Creek

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS	HABITAT FULLY MEASURED	HABITAT TYPE	OCCURRENCE	LENGTH	MEAN LENGTH	TOTAL LENGTH	%	WIDTH	MEAN WIDTH	DEPTH	MEAN DEPTH	MAXIMUM DEPTH	AREA	MEAN AREA	TOTAL AREA	VOLUME	MEAN VOLUME	TOTAL VOLUME	RESIDUAL SHELTER	MEAN RESIDUAL SHELTER	CANOPY	MEAN CANOPY	EST. POOL VOL RATING
#			%	ft.	ft.	ft.	%	ft.	ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.
16	0	LGP	27	61	980	35	4	0.2	0.4	105	1672	26	422	0	0	0	0	0	0	0	0	0	85
3	1	GLD	5	43	130	5	5	0.4	0.9	255	765	102	306	0	0	0	0	0	0	0	0	0	93
19	3	RUN	32	60	1148	41	5	0.4	0.9	201	3820	90	1715	0	2	2	89	89	89	89	89	89	89
1	1	SRN	2	39	39	1	4	0.3	0.6	125	125	37	37	0	0	0	85	85	85	85	85	85	85
1	0	MCP	2	19	19	1	8	1.1	3.6	152	152	167	167	0	40	0	0	0	0	0	0	0	0
1	1	CRP	2	29	29	1	5	0.8	1.9	145	145	116	116	87	0	95	95	95	95	95	95	95	95
5	1	LSL	8	27	134	5	6	0.8	1.8	161	804	135	676	114	27	92	92	92	92	92	92	92	92
3	1	LSR	5	32	95	3	7	0.6	1.9	207	622	119	358	126	33	95	95	95	95	95	95	95	95
2	2	LSR	3	30	59	2	5	0.7	1.4	135	271	75	150	88	3	93	93	93	93	93	93	93	93
2	1	PLP	3	23	46	2	12	1.0	2.6	224	448	213	426	67	15	85	85	85	85	85	85	85	85
7	0	DRY	12	20	140	5	0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	88

TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft.)	TOTAL VOLUME (cu.ft.)
60	2819	8923	4374

Hulbert Tributary-#174

Drainage: Hulbert Creek

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN VOLUME EST.	TOTAL VOLUME EST.	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING (cu.ft.)
1	0	MAIN	7	19	19	8.0	1.1	152	152	167	167	0	40
13	6	SCOUR	93	28	363	6.8	0.8	176	2290	133	1726	107	21
TOTAL UNITS	6				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)		
14					382				2442		1893		

Hulbert Tributary-#174

Drainage: Hulbert Creek

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

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

UNITS MAX DPTH MEASURED	HABITAT TYPE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		≥4 FEET	
		PERCENT OCCURRENCE	MAXIMUM DEPTH								
1	MCF	7	0	0	0	0	0	0	1	100	0
1	CRP	7	0	0	1	100	0	0	0	0	0
5	LSL	36	0	0	5	100	0	0	0	0	0
3	LSR	21	0	0	3	100	0	0	0	0	0
2	LSR2	14	0	0	2	100	0	0	0	0	0
2	PLP	14	0	0	1	50	1	50	0	0	0

TOTAL
UNITS
14

Hulbert Tributary-#174

Drainage: Hulbert Creek

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION: LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

UNITS MEASURED	HABITAT TYPE	UNDERCUT BANKS	SWE	LWD	ROOT MASS	TERR. VEGETATION	AQUATIC VEGETATION	WHITE WATER	BOULDERS	BEDROCK LEDGES
		% TOTAL	% TOTAL	% TOTAL	% TOTAL	% TOTAL	% TOTAL	% TOTAL	% TOTAL	% TOTAL
16	0 LGR	0	0	0	0	0	0	0	0	0
3	1 GLD	0	0	0	0	0	0	0	0	0
19	3 RUN	100	0	0	0	0	0	0	0	0
1	1 SRN	0	0	0	0	0	0	0	0	0
1	1 MCP	60	10	30	0	0	0	0	0	0
1	1 CRP	0	0	0	0	0	0	0	0	0
5	5 LSL	9	0	87	0	4	0	0	0	0
3	3 LSR	0	0	33	64	3	0	0	0	0
2	2 LSBk	0	0	0	0	0	0	0	100	0
2	2 PLP	0	0	100	0	0	0	0	0	0
7	0 DFY	0	0	0	0	0	0	0	0	0
60	19	11	1	65	18	2	0	0	3	0
14	14	9	1	67	18	3	0	0	3	0

Hulbert Tributary-#174

Drainage: Hulbert Creek

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 08/14/97

Confluence Location: QUAD: LEGAL DESCRIPTION:

LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

TOTAL HABITAT UNITS	SUBSTRATE MEASURED	HABITAT TYPE	SILT/CLAY		SAND		GRAVEL		SM COBBLE		LG COBBLE		BOULDER		% TOTAL BEDROCK DOMINANT	
			DOMINANT	% TOTAL	DOMINANT	% TOTAL	DOMINANT	% TOTAL	DOMINANT	% TOTAL	DOMINANT	% TOTAL	DOMINANT	% TOTAL	DOMINANT	% TOTAL
2	LGR		50	50	0	0	0	0	0	0	0	0	0	0	0	0
1	GLD		0	0	100	100	0	0	0	0	0	0	0	0	0	0
5	RUN		40	40	0	0	60	60	0	0	0	0	0	0	0	0
1	SRSN		0	0	0	0	0	0	0	0	100	100	0	0	0	0
0	MCP		0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	CRP		0	0	100	100	0	0	0	0	0	0	0	0	0	0
1	LsL		0	0	100	100	0	0	0	0	0	0	0	0	0	0
1	LsR		0	0	100	100	0	0	0	0	0	0	0	0	0	0
2	LsBk		0	0	50	50	50	50	0	0	0	0	0	0	0	0
1	PLP		100	100	0	0	0	0	0	0	0	0	0	0	0	0
0	DRY		0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hulbert Tributary-#174

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
89.11	75.21	24.82	54.00	30.33

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	1	2	10
Boulder	0	0	0
Cobble/Gravel	3	3	20
Silt/clay	10	10	66.67

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	0	1	3.45
Brush	2	5	24.14
Deciduous Trees	1	0	3.45
Evergreen Trees	11	8	65.52
No Vegetation	0	1	3.45

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Hulbert Tributary-#174

SAMPLE DATES:

SURVEY LENGTH:

MAIN CHANNEL: 2754 ft.

SIDE CHANNEL: 65 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map:

Latitude: 0°0'0"

Legal Description:

Longitude: 0°0'0"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-56)

Channel Type: F4

Mean Canopy Density: 89%

Main Channel Length: 2754 ft.

Evergreen Component: 75%

Side Channel Length: 65 ft.

Deciduous Component: 25%

Riffle/Flatwater Mean Width: 4.4 ft.

Pools by Stream Length: 14%

Pool Mean Depth: 0.8 ft.

Pools >=2 ft. Deep: 15%

Base Flow: 0.0 cfs

Pools >=3 ft. Deep: 8%

Water: 59-61°F Air: 65-82°F

Mean Pool Shelter Rtn: 22

Dom. Bank Veg.: Evergreen Trees

Dom. Shelter: Large Woody Debris

Bank Vegetative Cover: 42%

Occurrence of LOD: 68%

Dom. Bank Substrate: Silt/Clay/Sand

Dry Channel: 131 ft.

Embeddness Value: 1. 64% 2. 36% 3. 0% 4. 0%