**CALIFORNIA DEPARTMENT OF FISH AND GAME**
**STREAM INVENTORY REPORT**
Robinson Creek
Assessment Completed 1995
Report Completed 2000
Report Revised April 14, 2006

## INTRODUCTION

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

## WATERSHED OVERVIEW:

Robinson Creek is a tributary to the Russian River located in Mendocino County, California (see Robinson Creek map, page 2). The legal description at the confluence with the Russian River is T14N,R12W. Its location is 39°6'6" N. latitude and 123°10'53" W. longitude. Year round vehicle access exists from Robinson Creek Road (private), via State Highway 253, via U.S. Highway 101.

Robinson Creek and its tributaries drain a basin of approximately 25.3 square miles with varying terrain, flowing through a U-shaped canyon. Robinson Creek is a fourth order stream and has approximately 9.8 miles of blue line stream, according to the USGS Elledge and Boonville 7.5 minute quadrangles. A first order unnamed tributary ('Mercer Creek') was also surveyed and is included in this report. Elevations range from about 550 feet at the mouth to 2200 feet in the headwaters. The watershed is entirely privately owned. Major landuses in the watershed include grazing and timber harvest cultivation.

The Mendocino Bush Mallow (*Malacothamnus mendocinensis*) was listed in DFG's Natural Diversity Database as occurring in Robinson Creek Watershed.

## STREAM SURVEYS:

Stream surveys were conducted in July of 1954, August of 1956,

August of 1962 and July of 1973 on Robinson Creek to assess habitat conditions for anadromous salmonids. The 1954 survey described a site 2 miles upstream from the gorge. In reach 6 the stream was nearly dry with scattered, isolated pools and above reach 7 where gradient increases, the flow was less than 0.5 cfs. Water temperatures in the shaded areas were 70°F. It was estimated that flows in reach 6 would not allow adequate holding/shelter pools.

A partial survey of Robinson Creek was conducted on August 21, 1956 on a 100' section, 50 yards downstream from the second bridge crossing above U.S. Highway 101. A small 6" cobblestone dam was observed across the creek midway in the surveyed site. The flow at this point was estimated at 0.5 cfs, afternoon water temperatures were 82°F, and air temperatures were 88°F.

In August of 1962, the entire length of Robinson Creek was surveyed from the headwaters to the mouth. The width of the creek through the middle and lower sections was estimated as averaging 25', and overall 0'- 80'. The average depth was 1', and ranged from 0'-9', with deeper pools found in the lower middle section. The stream flows were intermittent, and rapid to slow throughout the creek ranging from 30 GPM on the south branch, to 1 cfs on the lower and middle section. All water temperatures taken during the survey were in the 60's.

The pools found in the creek were located in the lower middle and lower sections, and described as averaging 0'-12' long, 0'-8' wide, and 0'-9' deep. Some of the pools observed measured 35' long, 12' wide, and 9' deep. Fish shelter in this area of undercut banks, large rocks, and boulder formed pools, was described as good to very good.

One diversion and poor spring development were observed, but no pollution was noted anywhere. An earth filled dam,(40' wide, 15' long, 4' tall) was found 1/4 mile downstream from the mouth of the south branch of Robinson Creek, but it did not appear to obstruct upstream migration. Another earth filled dam (45' wide, 12' tall, 20' long) was observed 1 ½ miles upstream of the mouth of Robinson Creek. Both dams were believed to be removed with the first rains. It was estimated that the entire stream in general provided some very good spawning habitat, but provided little nursery habitat because of the low flows.

A partial stream survey from the mouth to the gorge, which at the time was a barrier, at 5 miles, was conducted in July of 1973. The overall survey reach width was described as ranging from 4'-15' and averaging 5', depth ranging from ½"-4' and averaging 6". The flows

measured ranged from .1 cfs above the gorge to 2.2 cfs in the gorge, and 1.8 cfs in the lower section. Water temperatures were 74°F throughout the creek except for the lower section where the temperature was 82 degrees.

Available spawning habitat area was estimated to be 70% in the upper section of Robinson Creek, 10% through the gorge, 25% below the gorge and 20% in the lower section. The stream above the gorge was dry. Through the gorge consisted of 75% deep pools of 6' or greater, the middle section had 30% pools of 4' or greater, and the lower section had 10% pools of 1.5' or greater. The fish shelter consisted of undercut banks and boulders. There was one diversion observed, a 4" pipe with fish screen, at a location 100' below Boonville Road bridge. Above the gorge a 4' high dam was observed but did not present an obstacle to fish movement during higher flows. Pollution observed on the survey was a result of livestock grazing. The survey found that Robinson Creek had about 1 mile of excellent summer nursery habitat for steelhead.

## METHODS

The habitat inventory conducted in Robinson Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1994). The AmeriCorps members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG) under the supervision of DFG's Russian River Basin Planner, Robert Coey in June, 1995. This inventory was conducted by a two person team.

## HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the California Salmonid Stream Habitat Restoration Manual. This form was used in Robinson Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows were also measured or estimated at major tributary confluences.

2. Channel Type:

Channel typing is conducted according to the classification system developed by David Rosgen (1985). This methodology is described in the California Salmonid Stream Habitat Restoration Manual. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are four measured parameters used to determine channel type: 1) water slope gradient, 2) channel confinement, 3) width/depth ratio, 4) substrate composition.

3. Temperatures:

Water and air temperatures, and time taken, are measured by crew members with 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 Ryan Tempmentors 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". Robinson Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. Channel dimensions were measured using hip chains, range finders, tape measures, and stadia rods. Unit measurements included mean length, mean width, mean depth, and maximum depth. Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were taken in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Robinson 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).

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow

separation of territorial units to reduce density related competition. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Robinson Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300, and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

8. Canopy:

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

9. Bank Composition:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Robinson Creek, the dominant composition type in both the right and left banks was selected from a list of eight options on the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

## BIOLOGICAL INVENTORY

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

## DATA ANALYSIS

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

The Habitat Runtime program produces the following tables:

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

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

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

## HABITAT INVENTORY RESULTS

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

The habitat inventory of October 25 - December 6, 1995 was conducted by Ann Huber, John Fort and Ken Mogan (AmeriCorps). The survey began at the confluence with the Russian River and extended up Robinson Creek to the end of landowner access in the north fork. However, landowners indicate little habitat exists upstream. The south fork was not surveyed due to uncooperative ownership. The total length of the stream surveyed was 28,299 feet, with an additional 331 feet of side channel. Also, 3,308 feet of an unnamed tributary was surveyed.

This section of Robinson Creek has 7 channel types: from the mouth to 11,441 feet an F4; the next 5,508 feet a B3; the next 1,971 feet a B1; the next 3,661 feet a B2; the next 1,420 feet a G2; the next

2,940 feet a C4; and the upper 1,359 feet an F3.

F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate. F3 types are similar to F4 types but with a cobble substrate.

B3 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly cobble substrate. B1 and B2 channel types are similar to B3 types but with bedrock and boulder substrates, respectively.

G2 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 boulder substrate.

C4 channel types are low gradient (<2%), meandering, point-bar, riffle/pool, alluvial channels with a broad, well defined floodplain and a predominantly gravel substrate.

Water temperatures during late summer ranged from 49°F to 60°F. Air temperatures ranged from 56°F to 72°F. Summer temperatures were also measured using Ryan Tempmentors placed in pools (see Tempmentor Summary graph at end of report). A Tempmentor in Reach 5 ( Gorge, unit #220) recorded every 2 hours from August 10 - October 6, 1995. The highest temperature recorded was 76.6°F in August and the lowest was 52.9°F also in August. The mean of the daily highs was 71.5°F for August, 68.3°F for September and 64.3°F for October. Another Tempmentor, in Reach 6 (Stipp's Ranch), recorded temperatures from August 11 - October 10, 1995. The highest temperature recorded was 62.8°F in August and the lowest was 49.6°F in October. The mean of the daily highs was 60.1°F for August, 57.6°F for September and 53.3°F for October.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, flatwater made up 35%, pools 35%, riffles 23% and dry streambed 7% (Graph 1). Dry streambed made up 33% of the total survey **length**, flatwater 30%, pools 21%, and riffles 16%.

Twenty-one Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were glides, 19%; low gradient riffles, 18%; runs, 14%; and mid-channel pools, 13% (Graph 2). By percent total **length**, dry streambed made up 33%, glides 16%, low gradient riffles 13%, and

runs 12%.

One-hundred, eleven pools were identified (Table 3). Scour pools were most often encountered at 46%, and comprised 48% of the total length of pools (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Fifteen of the 111 pools (14%) had a depth of three feet or greater (Graph 4).

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Riffle types had the highest shelter rating at 56. Flatwater had the lowest rating with 19 and pools rated 42 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 86, scour pools rated 39, and main channel pools 34 (Table 3).

Table 5 summarizes shelter by habitat type. Boulders are the dominant cover type for pools. Terr. vegetation and bedrock ledges are the next most common pool cover types. Graph 6 describes the pool cover in Robinson Creek.

Nearly 57% of Robinson Creek lacked shade canopy. Nine percent of the stream had a canopy consisting of coniferous trees and 34% had a canopy of deciduous trees (Graph 8). Graph 11 describes the canopy by reach.

For the stream reach surveyed, the mean percent right bank vegetated was 47% and the mean percent left bank vegetated was 52%. For the habitat units measured, the dominant vegetation types for the stream banks were: 54% deciduous trees, 16% grass, 14% coniferous trees, 10% brush and 7% bare soil. The dominant substrate for the stream banks were: 29% silt/clay/sand, 27% bedrock, 23% cobble/gravel and 22% boulder (Graph 9).

## *HABITAT INVENTORY RESULTS FOR UNNAMED CREEK (Mercer Creek)*

*The habitat inventory of November 20, 1995 was conducted by Ken Mogan and Kurt Gregory (AmeriCorps). The survey began at the confluence with Robinson Creek and extended to the end of survey. The total length of the stream surveyed was 3,308 feet.*

*This section of the unnamed creek has 2 channel types: from the mouth to 2,080 feet an F4 and the upper 1,228 feet a C3. F4 types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a gravel substrate. C3*

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

*Water temperatures ranged from 34°F to 38°F. Air temperatures ranged from 42°F to 49°F.*

*By percent **occurrence**, riffles made up 53%, pool types 41%, flatwater 3% and dry streambed 3%. Riffle habitat types made up 48% of the total survey **length**, pools 8%, flatwater 1% and dry streambed 44%.*

*Nine Level IV habitat types were identified. The most frequent habitat types by percent **occurrence** were high gradient riffles, 31%; plunge pools, 22%; low gradient riffles, 13%; and mid-channel pools, 13%. By percent total **length**, dry streambed made up 44%, high gradient riffles 31%, low gradient riffles 13%, and cascades 3%.*

*Thirteen pools were identified. Scour pools were most often encountered at 54%, and comprised 41% of the total length of pools. Eleven of the 13 pools (85%) had a depth of two feet or greater.*

*Pool types had a mean shelter rating of 121. Of the pool types, the scour pools had a shelter rating of 128 and main channel pools rated 112. There were no backwater pools. Bedrock ledges are the dominant cover type for pools. Boulders and white water are the next most common pool cover types.*

*Small cobble was the dominant substrate observed in the 1 low gradient riffle measured for substrate. Of the 13 pool tail-outs measured for cobble embeddedness, 0 had a value of 1 (0%); 1 had a value of 2 (8%); 7 had a value of 3 (54%); and 5 had a value of 4 (38%).*

*Approximately 55% of the unnamed creek lacked shade canopy. 21% of the stream had a canopy consisting of coniferous trees and 24% had a canopy of deciduous trees.*

*For the stream reach surveyed, the mean percent right bank vegetated was 56% and the mean percent left bank vegetated was 58%. For the habitat units measured, the dominant vegetation types for the stream banks were: 41% deciduous trees, 32% coniferous trees, 14% grass, 9% bare soil and 5% brush. The dominant substrate for the stream banks were: 50% cobble/gravel, 27% bedrock and 23% boulder.*

## SUBSTRATE SAMPLING

The August 1962 survey of Robinson Creek described the streambed substrate as predominantly bedrock, boulder, rubble and gravel. In the lower 2 miles salmonid spawning habitat was good to very good, consisting of 70% spawning gravel and 30% large rock and rubble. On the south fork, the spawning areas were described as fair to good, but consisted of less than 40% area of the stream. From the south branch of Robinson Creek downstream approximately 1 ½ miles, the spawning habitat was observed as good to very good, making up 60% - 70% of the section.

The July 1973 survey very generally described the streambed near the headwaters as consisting of large rocks and silt, changing to gravel and sand in the lower section.

In the recent 1995 habitat inventory, substrate composition and cobble embeddedness were measured. Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 7 of the 12 low gradient riffles (58%) measured for substrate. Gravel was the next most frequently observed dominant substrate type, and occurred in 25% of the low gradient riffles (Graph 7).

The depth of cobble embeddedness was estimated at pool tail-outs for Robinson Creek. Of the 111 pool tail-outs measured, 16 had a value of 1 (14%); 19 had a value of 2 (17%); 24 had a value of 3 (22%); and 52 had a value of 4 (47%). On this scale, a value of one is best for fisheries. Graph 5 describes percent embeddedness by reach.

## BIOLOGICAL INVENTORY

### JUVENILE SURVEYS:

In the July 1954 survey, there were abundant rainbow trout and steelhead observed, along with a few young suckers, in the canyon area. No Sacramento squawfish were observed. The August 1956 survey, in a 100' section, yielded 223 young steelhead and 3 small suckers, but no other fish species. The sample site was 50 yards downstream from the second bridge crossing above Highway 101.

In the August 1962 survey, very few Steelhead were observed except in the upper middle section of stream, where numbers of 0+ range from 5-10 per pool. Some roach were also observed in the lower middle and lower sections of stream, along with unidentified snakes

and frogs.

The July 1973 survey observed steelhead 0+ at 25 per 100' above the gorge, 100 per 100' in the gorge and no salmonids observed in the lower section. Roach and suckers were observed throughout the creek and were especially abundant in the lower section, along with unidentified snakes and frogs.

On November 21, 1995 a biological inventory was conducted in Robinson Creek to document the fish species composition and distribution at several locations. 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 air temperature was 49°F and the water temperature was 39°F. The observers were Ken Mogan, John Fort, Kurt Gregory and Ann Huber (AmeriCorps).

The inventory of Reach 1 was conducted in habitat units 36-44. In pool, run and riffle habitat types 27 0+ and 4 1+ steelhead were observed along with 228 Sacramento Squawfish, 214 Western Roach and 12 Sacramento Suckers.

The inventory of Reach 4 was conducted 200 yards downstream from a tributary on the left bank starting at habitat unit 164. In pool, riffle and run habitat types 131 0+, 32 1+ and 3 2+ steelhead were observed along with 195 squawfish, 64 roach, 20 suckers, 4 sculpin, 11 Pacific Giant Salamanders and 7 unidentified frogs.

A Biological inventory was taken on November 21, 1995 on the unnamed tributary (Mercer Creek). Single pass electrofishing was the method used. The air temperature was 44°F and the water temperature was 39°F. The observers were Ken Mogan and Kurt Gregory.

The inventory of reach one was conducted in habitat units 3-8. In riffle, glide and pool habitat types, 119 0+, and 7 1+ steelhead were observed along with 2 unidentified frogs, 20 Pacific Giant Salamanders and 26 newts (Taricha sp.).

The inventory of reach two was conducted in habitat units 10-32. In riffle and pool habitat types 143 0+, 25 1+ and 22 2+ steelhead were observed along with 3 newts.

The table below summarizes historical and recent surveys.

| Summary of Species observed in DFG Juvenile Surveys | |
|---|---|
| **YEAR** | **SPECIES** |
| 1954,1973 | Steelhead |
| 1954,1962 | Rainbow Trout |
| 1954,1973,1995 | Sac. Suckers |
| 1962,1973,1995 | Western Roach |
| 1995 | Sac. Squawfish |
| 1995 | Sculpin(Cottus) |

Historical records reflect steelhead fingerlings and yearlings were stocked in Robinson Creek from 1938-1975. The following table summarizes fish hatchery-stocking, transfers and rescues:

| Summary of fish hatchery-stocking/transfers/rescues | | | | |
|---|---|---|---|---|
| **YEAR** | **SPECIES** | **SOURCE** | **NUMBER** | **SIZE** |
| 1938 | SH | PRAIRIE CK HATCHERY | 15.2 (LBS) | YEARLING |
| 1958 | SH | CRAWFORD CK | 3060 | FINGERLING |
| 1958 | SH | DOOLEY CK | 720 | FINGERLING |
| 1958 | SH | FELIZ CK | 7440 | FINGERLING |
| 1958 | SH | JOHNSON CK | 660 | FINGERLING |
| 1958 | SH | MCNAB CK | 6668 | FINGERLING |
| 1958 | SH | ROBINSON CK | 1714 | FINGERLING |
| 1959 | SH | MCNAB CK | 1920 | FINGERLING |
| 1960 | SH | ROBINSON CK | 10449 | FINGERLING |
| 1961 | SH | ROBINSON CK | 6304 | FINGERLING |
| 1962 | SH | ROBINSON CK | 4652 | FINGERLING |
| 1963 | SH | ROBINSON CK | 2336 | FINGERLING |
| 1966 | SH | ROBINSON CK | 408 | FINGERLING |

| Summary of fish hatchery-stocking/transfers/rescues | | | | |
|---|---|---|---|---|
| **YEAR** | **SPECIES** | **SOURCE** | **NUMBER** | **SIZE** |
| 1966 | SH | ROBINSON CK (SOUTH FK) | 2112 | FINGERLING |
| 1972 | SH | TALMAGE HATCHERY | 2502 | YEARLING |
| 1975 | SH | TALMAGE HATCHERY | 7931 | YEARLING |

SH = steelhead

## DISCUSSION

Robinson Creek has 7 channel types: F4, B3, B1, B2, G2, C4 and F3. There are 11,441 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. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and shelter.

There are 5508 feet of B3 channel type in Reach 2. B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs. 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 1971 feet of B1 channel type in Reach 3. B1 channel types are excellent for bank-placed boulders and bank cover and also good for log cover.

There are 3661 feet of B2 channel type in Reach 4. B2 channel types are excellent for low and medium-stage plunge weirs, single and opposing wing deflectors and bank cover.

There are 1420 feet of G2 channel type in Reach 5. G2 channel types are fair for log cover.

There are 2940 feet of C4 channel type in Reach 6. C4 channel

types are good for bank-placed boulders and log cover. They are fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. Any work considered will require careful design, placement, and construction that must include protection for the unstable banks.

There are 1359 feet of F3 channel type in Reach 7. F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover.

The water temperatures recorded on the survey days October 25 - December 6, 1995 ranged from 49°F to 60°F. Air temperatures ranged from 56°F to 72°F. This temperature regime is favorable to salmonids. However, these temperatures were recorded during the cooler months of fall. Summer temperatures measured using Ryan Tempmentors placed in pools ranged from 53°F to 77°F for Reach 5 and 50°F to 63°F for Reach 6. The warmer temperatures in Reach 5, if sustained, are above the threshold stress level (65°F) for salmonids. It is unknown if this thermal regime is typical, but observed steelhead more frequently in the upper, cooler reach.

Pools comprised 21% of the total length of this survey. The pools were relatively shallow with only 14% having a maximum depth greater than 3 feet. 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 coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat.

The mean shelter rating for pools was 42. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool cover that now exists is being provided primarily by boulders. Terr. vegetation and bedrock ledges are the next most common pool cover types. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

83% of the low gradient riffles measured had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Seventy-nine percent of the pool tail-outs measure had embeddedness ratings of either 3 or 4. Only 14% 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. Poor embeddedness ratings are found throughout all reaches in Robinson Creek. 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.

The mean percent canopy for the survey reach was only 43%. This is a very low percentage of canopy, since 80 percent is generally considered desirable. In general, canopy decreases in an upstream direction. Elevated water temperatures could be reduced by increasing stream canopy. Cooler water temperatures are desirable in Robinson Creek. The large trees required to contribute shade to the wide channel typical of this reach would also eventually provide increased bank stability and a long term source of large woody debris needed for instream structure.

*DISCUSSION FOR UNNAMED CREEK (Mercer Creek)*

*The unnamed creek has 2 channel types: F4 and C3. F4 types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. C3 types are excellent for bank-placed boulders and good for low-stage weirs, boulder clusters, single and opposing wing deflectors and log cover.*

*The water temperatures recorded on the survey day November 20, 1995 ranged from 34°F to 38°F. Air temperatures ranged from 42°F to 49°F. Temperatures would need to be monitored during the critical summer months to make any conclusions.*

*Pools comprised only 8% of the total length of this survey. The few existing pools are relatively deep with 85% of the pools having a maximum depth greater than 2 feet.*

*The mean shelter rating for pools was 121. This is a good pool shelter rating since a rating of at least 100 is desirable. Bedrock ledges are the dominant cover type for pools. Boulders and white water are the next most common pool cover types.*

*The 1 low gradient riffle measured had small cobble as the dominant substrate. This is generally considered good for spawning salmonids.*

*92% of the pool tail-outs measured had embeddedness ratings of either 3 or 4. None had a rating of 1.*

The mean percent canopy for the survey reach was only 45%. This is a very low percentage of canopy, since 80 percent is generally considered desirable.

## SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. The 1995 fall surveys documented many 0+ fish in Reach 4 of Robinson Creek and in the unnamed tributary indicating successful spawning. However, few 0+ or 1+ fish were found in Reach 1. Coho were not observed in the 1995 surveys. Squawfish and roach were numerous throughout Robinson Creek indicating warmer water temperatures, as the typical regime.

In general, Robinson Creek is poor for steelhead habitat. Canopy density is very low and stream temperatures are high (especially in Reach 5). Although riffle habitat exists, much of it is highly embedded with fine sediment, making it unsuitable for spawning salmonids. There are few pools with adequate depth and shelter, making rearing and holding over conditions poor. Any work considered in these reaches will require careful design, placement, and construction that must include protection for any unstable banks and high stream velocities. Riparian planting and/or deer exclusionary fencing is recommended to increase canopy, bank stability and to provide long term woody debris for instream shelter and pool development.

In the unnamed tributary, conditions are similar with low canopy density, and high cobble embeddedness. Although existing pool shelter ratings and depths are good, there is a lack of backwater pools needed for juvenile habitat.

## GENERAL RECOMMENDATIONS

Robinson and Mercer Creeks should be managed as an anadromous, natural production stream.

The winter of 1995/96 storms brought down many large trees and other woody debris into the stream, which increased the number and quality of pools since the drought years. This woody debris, if left undisturbed, will provide fish cover and rearing habitat, and offset channel incision. Many signs of recent and historic tree and log removal were evident in the

active channel during our survey. Past efforts to increase flood protection or improve fish access in the short run, have led to long term problems in the system. Landowners should be educated about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

1) Increase the canopy throughout Robinson Creek and Mercer Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (especially Reaches 4-7). 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.

2) In Robinson 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.

3) Map sources of upslope and in-channel erosion in Reach 1, and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.

4) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing cover is from boulders and terrestrial vegetation. Adding high quality complexity with large 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. In some areas the material is at hand.

5) Where feasible, design and engineer pool enhancement structures to increase the number; depth and length of pools in all reaches, of both creeks. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

6) Encourage landowner outreach, especially unsurveyed areas upstream where active erosion and sedimentation are occurring, and impacting downstream resources. Cooperative alternatives to control erosion should be explored with these landowners by a local agency. Survey S. Branch Robinson Creek and above surveyed section from 1995 survey.

RESTORATION IMPLEMENTED

1) Deer exclusionary fencing already in place in Reach 6 should be continued upstream of bridge #8.

PROBLEM SITES AND LANDMARKS - ROBINSON CREEK SURVEY COMMENTS

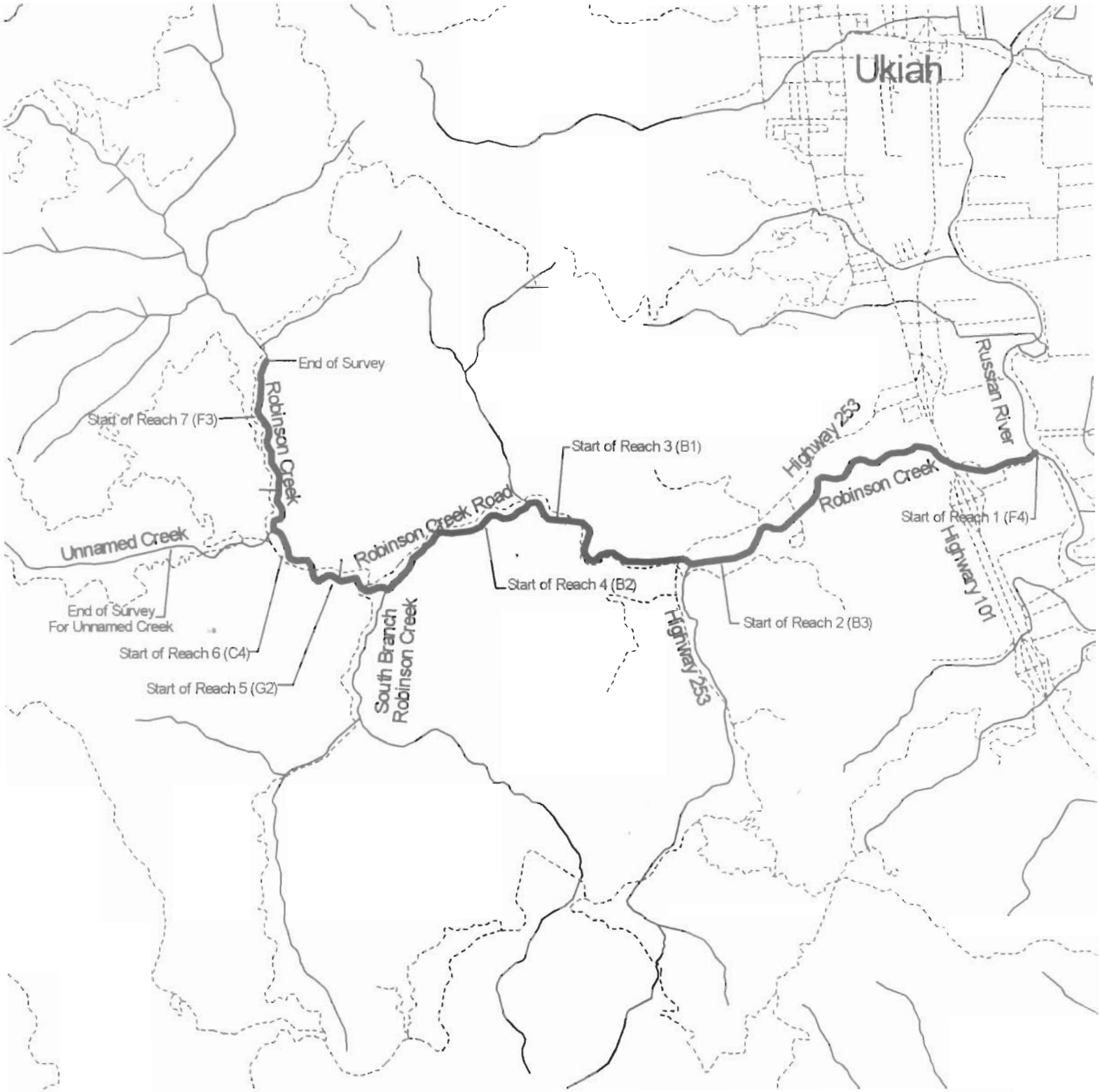
| HABITAT UNIT # | STREAM LEN (FT) | COMMENTS |
|---|---|---|
| 1.00 | 255 | DRY FROM CONFLUENCE; DIRT CROSSING 281 FT FROM CONFLUENCE LF BK |
| 5.00 | 4426 | BRIDGE (R.R.) #2 SUMMER CROSSING 200 FT UP FROM BRIDGE #1 |
| 14.00 | 5006 | JUVENILE BULLFROGS ABUNDANT ALONG ENTIRE CREEK |
| 18.00 | 5742 | SMALL FRY ABUNDANT |
| 22.00 | 5945 | 1-3" FISH ABUNDANT |
| 28.00 | 6292 | CREEKBED ALTERED BY TRACTOR, HEAVY RT BK ALTERATION 2212 FT |
| 66.00 | 11442 | BRIDGE #4 (FLAT CAR) 25'H X 110'W X 10'L |
| 75.00 | 11947 | ERODING LF BK |
| 79.00 | 12371 | DRY TRIB RT BK |
| 83.00 | 12634 | BRIDGE #5 BOONEVILLE RT |
| 146.00 | 17937 | BRIDGE #6 |
| 165.00 | 19312 | MANY 3-4" FISH |
| 188.00 | 20610 | AQUATIC VEG=ALGAE |
| 261.00 | 24531 | OLD DAM SILL 10'L X 30'W |
| 275.00 | 25215 | SUMMER CROSSING |
| 279.00 | 25475 | SUMMER CROSSING |
| 285.00 | 26120 | CONFLUENCE WITH S. FORK ROBINSON (DRY) CREEK BED BULLDOZED BY TRACTOR |

| | | |
|---|---|---|
| 287.00 | 26184 | BANK STABILIZATION RESTORATION SITE |
| 288.00 | 26227 | BRIDGE #6; ERODING BANKS ON LF BK; CULVERT RT BK ABOUT 1000 FT FROM BRIDGE #8; CULVERT LF BK; UNNAMED CR. RT BK 1441 FT; CULVERT RT BK 2400 FT; CULVERT RT BK 3494 FT; LIVESTOCK FENCE 7' HIGH ACROSS CREEK 3579 FT |
| 295.00 | 26475 | DRY TRIB LF BK |
| 307.00 | 27154 | DRY TRIB LF BK |
| 311.00 | 27673 | DRY TRIB RT BK |

PROBLEM SITES AND LANDMARKS - UNNAMED CREEK SURVEY COMMENTS

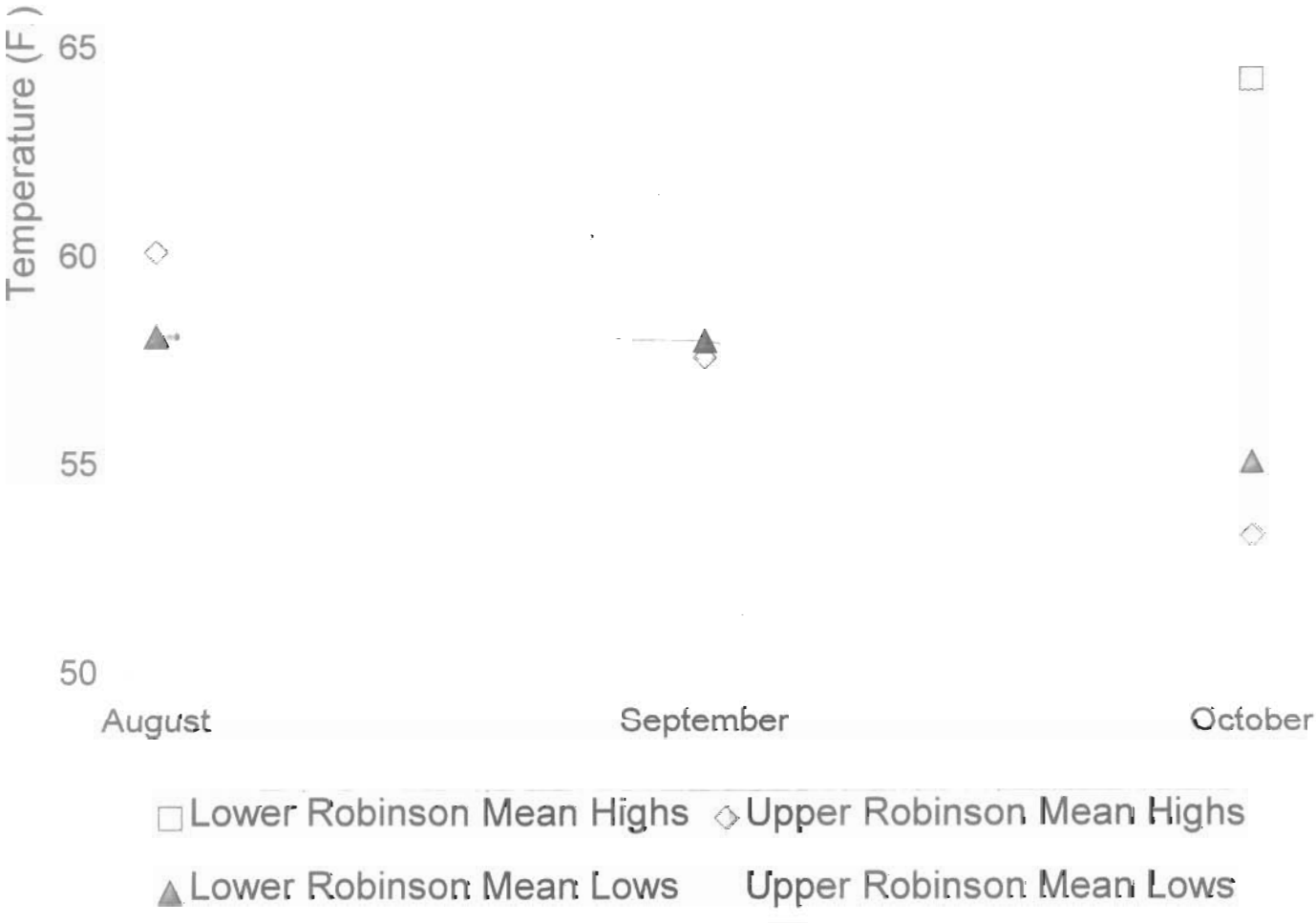
| HABITAT UNIT # | STREAM LEN (FT) | COMMENTS |
|---|---|---|
| 1.00 | 1452 | BRIDGE #1 AT 345' LF BK DRY TRIB. 1162' |
| 17.00 | 2374 | 9' WATERFALL |
| 20.00 | 2460 | FISH IN POOL |
| 22.00 | 2540 | DRY TRIB RT BK |
| 23.00 | 2576 | BRIDGE #2 |
| 25.00 | 2929 | 2+ FISH IN SMALL POOL |
| 26.00 | 2945 | DRY TRIB LF BK 2+ FISH IN POOL |
| 27.00 | 3051 | DRY TRIB RT BK |
| 29.00 | 3193 | 0+ FISH; SPRING RT BK |
| 30.00 | 3202 | 2+ FISH |
| 32.00 | 3308 | END SURVEY; |

# Robinson Creek

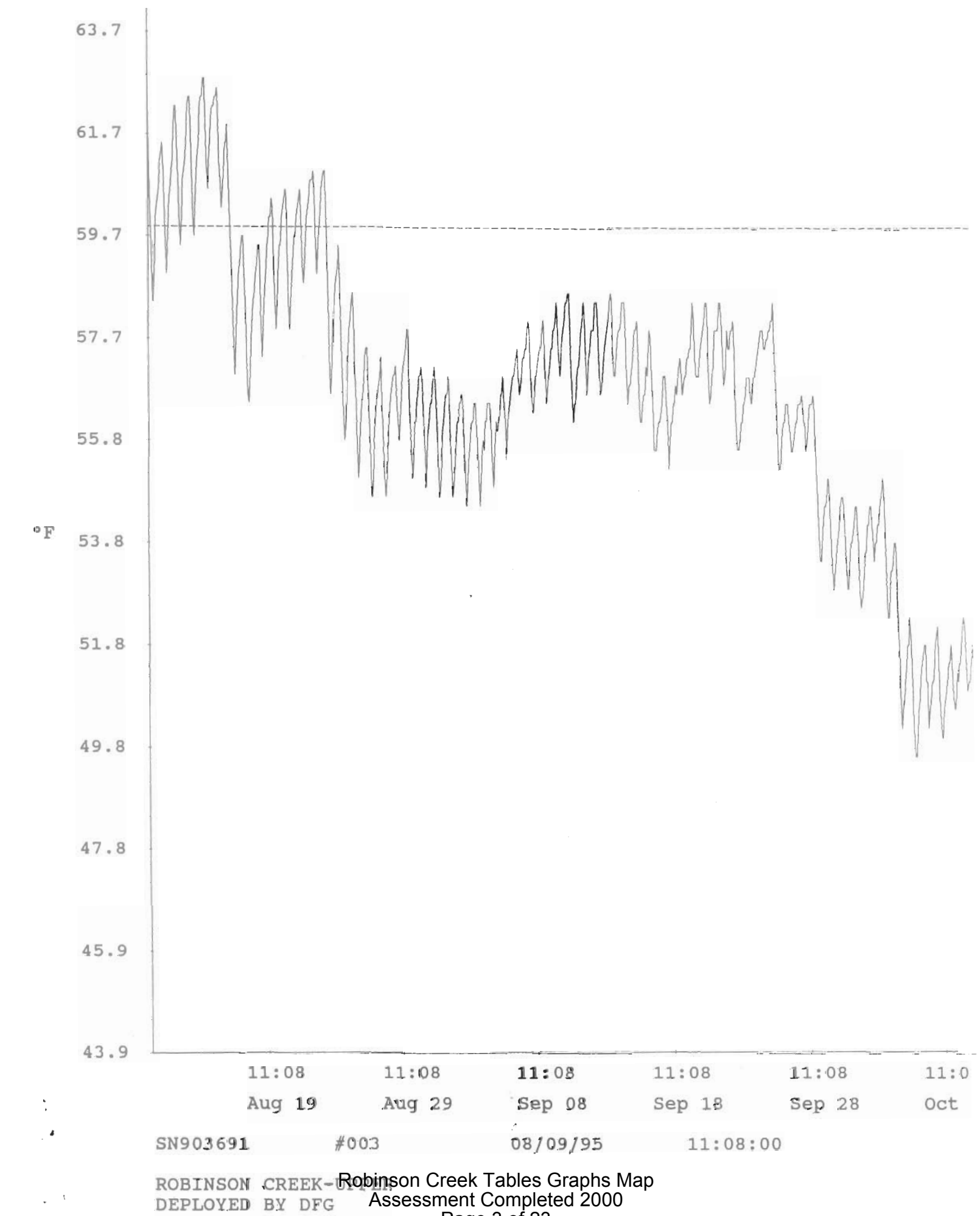


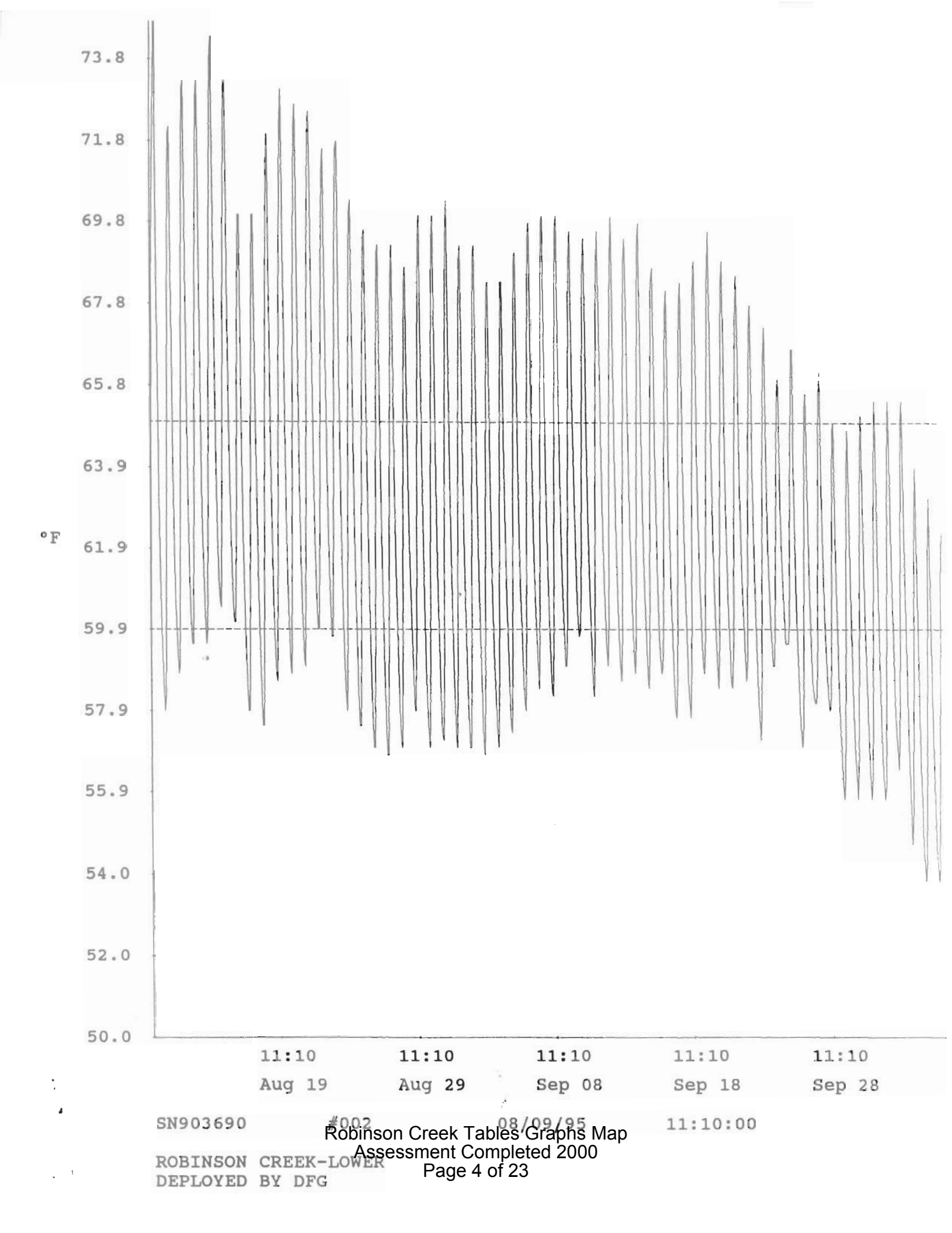
# Tempmentor Summary

## Robinson Creek Mean Highs and Lows by Month




Lower Robinson Location: Roscoe's Gorge, below house; Sample Period: August 10 - Oct. 6
Upper Robinson Location: Stipp's Ranch; Sample Period: August 11 - Oct. 10


63.7
61.7
59.7
57.7
55.8
°F
53.8
51.8
49.8
47.8
45.9
43.9
11:08
Aug 19
11:08
Aug 29
11:08
Sep 08
11:08
Sep 18
11:08
Sep 28
11:0
Oct
SN903691
#003
08/09/95
11:08:00
ROBINSON CREEK-UPPER
DEPLOYED BY DFG


73.8
71.8
69.8
67.8
65.8
63.9
°F
61.9
59.9
57.9
55.9
54.0
52.0
50.0
11:10
Aug 19
11:10
Aug 29
11:10
Sep 08
11:10
Sep 18
11:10
Sep 28
SN903690
#002
08/09/95
11:10:00
ROBINSON CREEK-LOWER
DEPLOYED BY DFG

Robinson Creek

Drainage: Russian River

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

Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 LATITUDE: 39°6'6" LONGITUDE: 123°11'4"

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | 16 | RIFFLE | 23 | 62 | 4679 | 16 | 12.7 | 0.4 | 727 | 54508 | 298 | 22320 | 0 | 56 |
| 111 | 19 | FLATWATER | 35 | 77 | 8504 | 30 | 10.9 | 0.6 | 615 | 68288 | 399 | 44240 | 398 | 19 |
| 111 | 36 | POOL | 35 | 55 | 6127 | 21 | 13.3 | 1.2 | 777 | 86252 | 1022 | 113423 | 868 | 42 |
| 23 | 0 | DRY | 7 | 405 | 9320 | 33 | 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.) |
|---|---|---|---|---|
| 320 | 71 | 28630 | 209047 | 179983 |

Robinson Creek

Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 LATITUDE: 39°6'6" LONGITUDE: 123°11'4"

| 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 % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | 10 | LGR | 18 | 63 | 3590 | 13 | 12 | 0.3 | 3.0 | 922 | 52564 | 350 | 19929 | 0 | 48 | 41 |
| 10 | 2 | HGR | 3 | 82 | 821 | 3 | 19 | 0.6 | 1.3 | 423 | 4232 | 98 | 984 | 0 | 73 | 27 |
| 5 | 2 | CAS | 2 | 39 | 196 | 1 | 13 | 0.8 | 2.7 | 488 | 2438 | 376 | 1882 | 0 | 100 | 12 |
| 3 | 2 | BRS | 1 | 24 | 72 | 0 | 6 | 0.7 | 6.0 | 151 | 454 | 106 | 318 | 0 | 25 | 12 |
| 61 | 10 | GLD | 19 | 76 | 4647 | 16 | 13 | 0.7 | 2.0 | 719 | 43853 | 479 | 29197 | 398 | 5 | 54 |
| 44 | 7 | RUN | 14 | 76 | 3357 | 12 | 9 | 0.5 | 1.5 | 479 | 21054 | 282 | 12399 | 0 | 29 | 45 |
| 6 | 2 | SRN | 2 | 83 | 500 | 2 | 9 | 0.6 | 2.0 | 656 | 3936 | 467 | 2805 | 0 | 40 | 54 |
| 42 | 10 | MCP | 13 | 54 | 2249 | 8 | 15 | 1.3 | 4.0 | 805 | 33826 | 1086 | 45632 | 894 | 28 | 53 |
| 1 | 1 | CCP | 0 | 100 | 100 | 0 | 9 | 1.4 | 2.7 | 855 | 855 | 1197 | 1197 | 1026 | 30 | 65 |
| 3 | 1 | STP | 1 | 70 | 210 | 1 | 17 | 1.3 | 3.6 | 1100 | 3300 | 1469 | 4407 | 1287 | 118 | 40 |
| 8 | 4 | CRP | 3 | 52 | 418 | 1 | 11 | 1.1 | 2.8 | 490 | 3917 | 580 | 4640 | 1340 | 13 | 36 |
| 2 | 0 | LSL | 1 | 64 | 128 | 0 | 13 | 1.0 | 1.6 | 760 | 1520 | 768 | 1536 | 432 | 105 | 10 |
| 13 | 4 | LSR | 4 | 59 | 764 | 3 | 12 | 1.2 | 3.5 | 778 | 10117 | 1094 | 14216 | 733 | 49 | 38 |
| 10 | 5 | LSBk | 3 | 68 | 676 | 2 | 12 | 1.3 | 4.5 | 900 | 9001 | 1382 | 13816 | 1599 | 21 | 33 |
| 16 | 4 | LSBo | 5 | 55 | 875 | 3 | 15 | 1.3 | 5.0 | 803 | 12849 | 1002 | 16033 | 934 | 49 | 43 |
| 2 | 1 | PLP | 1 | 39 | 77 | 0 | 18 | 1.1 | 2.8 | 693 | 1386 | 881 | 1762 | 634 | 30 | 50 |
| 4 | 2 | SCP | 1 | 39 | 158 | 1 | 7 | 1.0 | 2.0 | 293 | 1171 | 331 | 1323 | 35 | 123 | 69 |
| 8 | 3 | BPB | 3 | 30 | 237 | 1 | 8 | 0.7 | 3.0 | 220 | 1760 | 164 | 1312 | 119 | 81 | 33 |
| 1 | 1 | BPR | 0 | 68 | 68 | 0 | 12 | 0.7 | 2.6 | 812 | 812 | 569 | 569 | 325 | 10 | 24 |
| 1 | 0 | DPL | 0 | 167 | 167 | 1 | 25 | 1.1 | 2.4 | 4175 | 4175 | 4593 | 4593 | . | . | 30 |
| 23 | 0 | DRY | 7 | 405 | 9320 | 33 | 0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | . | . | 23 |

| TOTAL UNITS | TOTAL UNITS | LENGTH (ft.) | AREA (sq.ft) | TOTAL VOL. (cu.ft) |
|---|---|---|---|---|
| 320 | 71 | 28630 | 213221 | 178548 |

Robinson Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 LATITUDE: 39°6'6" LONGITUDE: 123°11'4"

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 12 | MAIN | 41 | 56 | 2559 | 42 | 14.7 | 1.3 | 826 | 38002 | 1114 | 51264 | 927 | 34 |
| 51 | 18 | SCOUR | 46 | 58 | 2938 | 48 | 13.0 | 1.2 | 771 | 39321 | 1038 | 52956 | 982 | 39 |
| 14 | 6 | BACKWATER | 13 | 45 | 630 | 10 | 9.3 | 0.8 | 617 | 8640 | 608 | 8518 | 134 | 86 |

| TOTAL UNITS | TOTAL UNITS | TOTAL LENGTH (ft.) | TOTAL AREA (sq.ft.) | TOTAL VOL. (cu.ft.) |
|---|---|---|---|---|
| 111 | 36 | 6127 | 85963 | 112738 |

Robinson Creek

Drainage: Russian River

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

Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 LATITUDE: 39°6'6" LONGITUDE: 123°11'4"

| UNITS MEASURED | HABITAT TYPE | HABITAT PERCENT OCCURRENCE | <1 FOOT MAXIMUM DEPTH | <1 FOOT PERCENT OCCURRENCE | 1-<2 FT. MAXIMUM DEPTH | 1-<2 FOOT PERCENT OCCURRENCE | 2-<3 FT. MAXIMUM DEPTH | 2-<3 FOOT PERCENT OCCURRENCE | 3-<4 FT. MAXIMUM DEPTH | 3-<4 FOOT PERCENT OCCURRENCE | >=4 FEET MAXIMUM DEPTH | >=4 FEET PERCENT OCCURRENCE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | MCP | 38 | 3 | 7 | 14 | 33 | 20 | 48 | 3 | | | |
| 1 | CCP | 1 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 |
| 3 | STP | 3 | 0 | 0 | 0 | 0 | 2 | 67 | 1 | 33 | 0 | 0 |
| 8 | CRP | 7 | 3 | 38 | 3 | 38 | 2 | 25 | 0 | 0 | 0 | 0 |
| 2 | LSL | 2 | 0 | 0 | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | LSR | 12 | 1 | 8 | 3 | 23 | 7 | 54 | 2 | 15 | 0 | 0 |
| 10 | LSBk | 9 | 1 | 10 | 1 | 10 | 5 | 50 | 2 | 20 | 1 | 10 |
| 16 | LSBo | 14 | 0 | 0 | 5 | 31 | 8 | 50 | 2 | 13 | 1 | 6 |
| 2 | PLP | 2 | 0 | 0 | 1 | 50 | 1 | 50 | 0 | 0 | 0 | 0 |
| 4 | SCP | 4 | 3 | 75 | 0 | 0 | 1 | 25 | 0 | 0 | 0 | 0 |
| 8 | BPB | 7 | 4 | 50 | 3 | 38 | 0 | 0 | 1 | 13 | 0 | 0 |
| 1 | BPR | 1 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 |
| 1 | DPL | 1 | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 |

TOTAL UNITS
111

Robinson Creek | Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type | Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 | LATITUDE: 39°6'6" | LONGITUDE: 123°11'4"

| | UNITS MEASURED | UNITS SHELTER MEASURED | HABITAT TYPE | SQ. FT. UNDERCUT BANKS | SQ. FT. SWD | SQ. FT. LWD | SQ. FT. ROOT MASS | SQ. FT. TERR. VEGETATION | SQ. FT. AQUATIC VEGETATION | SQ. FT. WHITE WATER | SQ. FT. BOULDERS | SQ. FT. BEDROCK LEDGES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 57 | 12 | LGR | 0 | 0 | 0 | 0 | 2716 | 1220 | 0 | 1934 | 0 |
| | 10 | 3 | HGR | 0 | 37 | 0 | 0 | 148 | 0 | 37 | 678 | 0 |
| | 5 | 2 | CAS | 0 | 0 | 0 | 0 | 0 | 0 | 106 | 354 | 106 |
| | 3 | 2 | BRS | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 30 | 0 |
| | 61 | 11 | GLD | 0 | 0 | 0 | 0 | 248 | 0 | 0 | 108 | 8 |
| | 44 | 10 | RUN | 0 | 0 | 0 | 0 | 0 | 537 | 41 | 619 | 39 |
| | 6 | 3 | SRN | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 349 | 118 |
| | 42 | 41 | MCP | 122 | 80 | 8 | 146 | 820 | 481 | 302 | 2957 | 1085 |
| | 1 | 1 | CCP | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 115 | 0 |
| | 3 | 3 | STP | 86 | 0 | 0 | 0 | 86 | 0 | 221 | 1655 | 274 |
| | 8 | 8 | CRP | 54 | 0 | 0 | 0 | 109 | 45 | 0 | 0 | 0 |
| | 2 | 2 | LSL | 0 | 9 | 45 | 90 | 676 | 0 | 0 | 0 | 0 |
| | 13 | 13 | LSR | 185 | 415 | 67 | 726 | 586 | 344 | 0 | 47 | 83 |
| | 10 | 10 | LSBk | 0 | 0 | 0 | 57 | 457 | 134 | 0 | 205 | 96 |
| | 16 | 16 | LSBo | 0 | 6 | 0 | 77 | 352 | 527 | 0 | 2262 | 211 |
| | 2 | 2 | PLP | 0 | 0 | 0 | 0 | 0 | 111 | 0 | 40 | 136 |
| | 4 | 3 | SCP | [illegible] | [illegible] | 0 | 100 | 259 | 40 | 0 | 11 | 33 |
| | 8 | 7 | BPB | [illegible] | 27 | 0 | 0 | 259 | 128 | 0 | 111 | 208 |
| | 1 | 1 | BPR | [illegible] | [illegible] | 0 | 41 | [illegible] | 0 | 0 | 0 | 0 |
| | 1 | 1 | DPL | [illegible] | [illegible] | [illegible] | 0 | [illegible] | 0 | 0 | 0 | 0 |
| | 23 | 0 | DRY | [illegible] | [illegible] | [illegible] | 0 | [illegible] | 0 | 0 | 0 | 0 |
| TOTAL | 320 | 151 | | 467 | 578 | 120 | 1237 | 6724 | 3574 | 707 | 11475 | 2397 |
| | | | | 2% | 2% | 0% | 5% | 25% | 13% | 3% | 42% | 9% |
| TOTAL FOR POOLS | 111 | 108 | | 467 | 541 | 120 | 1237 | 3604 | 1810 | 523 | 7403 | 2126 |
| | | | | 3% | 3% | 1% | 7% | 20% | 10% | 3% | 42% | 12% |

Robinson Creek

Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 10/25/95 to 12/06/95

Confluence Location: QUAD: ELLED/BOON LEGAL DESCRIPTION: T14NR12WS4 LATITUDE: 39°6'6" LONGITUDE: 123°11'4"

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 57 | 12 | LGR | 0 | 0 | 25 | 58 | 17 | 0 | 0 |
| 10 | 3 | HGR | 0 | 0 | 0 | 0 | 67 | 33 | 0 |
| 5 | 2 | CAS | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 3 | 2 | BRS | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 61 | 10 | GLD | 0 | 20 | 40 | 20 | 0 | 0 | 20 |
| 44 | 10 | RUN | 0 | 10 | 0 | 20 | 30 | 10 | 30 |
| 6 | 2 | SRN | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 42 | 16 | MCP | 0 | 25 | 19 | 0 | 6 | 13 | 38 |
| 1 | 1 | CCP | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 3 | 2 | STP | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 8 | 5 | CRP | 0 | 20 | 40 | 20 | 0 | 0 | 20 |
| 2 | 0 | LSL | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 4 | LSR | 0 | 0 | 75 | 0 | 0 | 0 | 25 |
| 10 | 6 | LSBk | 0 | 33 | 67 | 0 | 0 | 0 | 0 |
| 16 | 6 | LSBo | 0 | 17 | 33 | 0 | 17 | 0 | 33 |
| 2 | 1 | PLP | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 4 | 2 | SCP | 50 | 0 | 50 | 0 | 0 | 0 | 0 |
| 8 | 4 | BPB | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 1 | 1 | BPR | | 0 | 100 | 0 | 0 | 0 | |
| 1 | 0 | DPL | | 0 | 0 | | 0 | 0 | |
| 23 | 1 | DRY | | | 100 | | | 0 | |

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

| Mean Percent Canopy | Mean Percent Evergreen | Mean Percent Decidous | Mean Right bank % Cover | Mean Left Bank % Cover |
|---|---|---|---|---|
| 42.75 | 20.40 | 79.60 | 47.47 | 51.61 |

APPENDIX B.

Mean Percentage of Dominant Substrate

| Dominant Class of Substrate | Number Units Right Bank | Number Units Left Bank | Total Mean Percent |
|---|---|---|---|
| Bedrock | 16 | 28 | 26.51 |
| Boulder | 23 | 13 | 21.69 |
| Cobble/Gravel | 22 | 16 | 22.89 |
| Silt/clay | 22 | 26 | 28.92 |

Mean Percentage of Dominant Vegetation

| Dominant Class of Vegetation | Number Units Right Bank | Number Units Left Bank | Total Mean Percent |
|---|---|---|---|
| Grass | 17 | 9 | 15.66 |
| Brush | 9 | 7 | 9.64 |
| Deciduous Trees | 44 | 46 | 54.22 |
| Evergreen Trees | 9 | 14 | 13.86 |
| No Vegetation | 4 | 7 | 6.63 |

## APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Robinson Creek
SAMPLE DATES: 10/25/95 to 12/06/95
STREAM LENGTH: 28299 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: ELLED/BOON — Latitude: 39°6'6"
Legal Description: T14NR12WS4 — Longitude: 123°11'4"

## SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1

| | |
|---|---|
| Channel Type: F4 | Canopy Density: 54% |
| Channel Length: 11441 ft. | Evergreen Component: 2% |
| Riffle/Flatwater Mean Width: 10 ft. | Deciduous Component: 98% |
| Total Pool Mean Depth: 1.0 ft. | Pools by Stream Length: 12% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 0% |
| Water: 52 - 60 °F Air: 58 - 72 °F | Mean Pool Shelter Rtn: 41 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Terrestrial Veg. |
| Vegetative Cover: 75% | Occurrence of LOD: 25% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 8373 ft. |

Embeddedness Value: 1. 21% 2. 17% 3. 4% 4. 58%

STREAM REACH 2

| | |
|---|---|
| Channel Type: B3 | Canopy Density: 49% |
| Channel Length: 5508 ft. | Evergreen Component: 3% |
| Riffle/Flatwater Mean Width: 13 ft. | Deciduous Component: 97% |
| Total Pool Mean Depth: 1.4 ft. | Pools by Stream Length: 27% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 19% |
| Water: 51 - 53 °F Air: 62 - 70 °F | Mean Pool Shelter Rtn: 24 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Terrestrial Veg. |
| Vegetative Cover: 61% | Occurrence of LOD: 8% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 0 ft. |

Embeddedness Value: 1. 19% 2. 13% 3. 38% 4. 31%

STREAM REACH 3

| | |
|---|---|
| Channel Type: B1 | Canopy Density: 47% |
| Channel Length: 1971 ft. | Evergreen Component: 12% |
| Riffle/Flatwater Mean Width: 11 ft. | Deciduous Component: 89% |
| Total Pool Mean Depth: 1.4 ft. | Pools by Stream Length: 32% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 18% |
| Water: 52 - 58 °F Air: 64 - 72 °F | Mean Pool Shelter Rtn: 45 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Bedrock Ledges |
| Vegetative Cover: 47% | Occurrence of LOD: 0% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 0 ft. |

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

STREAM REACH 4

| | |
|---|---|
| Channel Type: B2 | Canopy Density: 37% |
| Channel Length: 3661 ft. | Evergreen Component: 47% |
| Riffle/Flatwater Mean Width: 13 ft. | Deciduous Component: 53% |
| Total Pool Mean Depth: 1.1 ft. | Pools by Stream Length: 32% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 15% |
| Water: 49 - 58 °F Air: 57 - 71 °F | Mean Pool Shelter Rtn: 62 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Boulders |
| Vegetative Cover: 51% | Occurrence of LOD: 5% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 0 ft. |

Embeddedness Value: 1. 12% 2. 23% 3. 23% 4. 42%

STREAM REACH 5

| | |
|---|---|
| Channel Type: G2 | Canopy Density: 36% |
| Channel Length: 1420 ft. | Evergreen Component: 51% |
| Riffle/Flatwater Mean Width: 16 ft. | Deciduous Component: 49% |
| Total Pool Mean Depth: 1.4 ft. | Pools by Stream Length: 31% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 33% |
| Water: 52 - 52 °F Air: 56 - 62 °F | Mean Pool Shelter Rtn: 37 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Boulders |
| Vegetative Cover: 29% | Occurrence of LOD: 0% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 0 ft. |
| Embeddness Value: 1. 25% 2. 25% 3. 8% 4. 42% | |

STREAM REACH 6

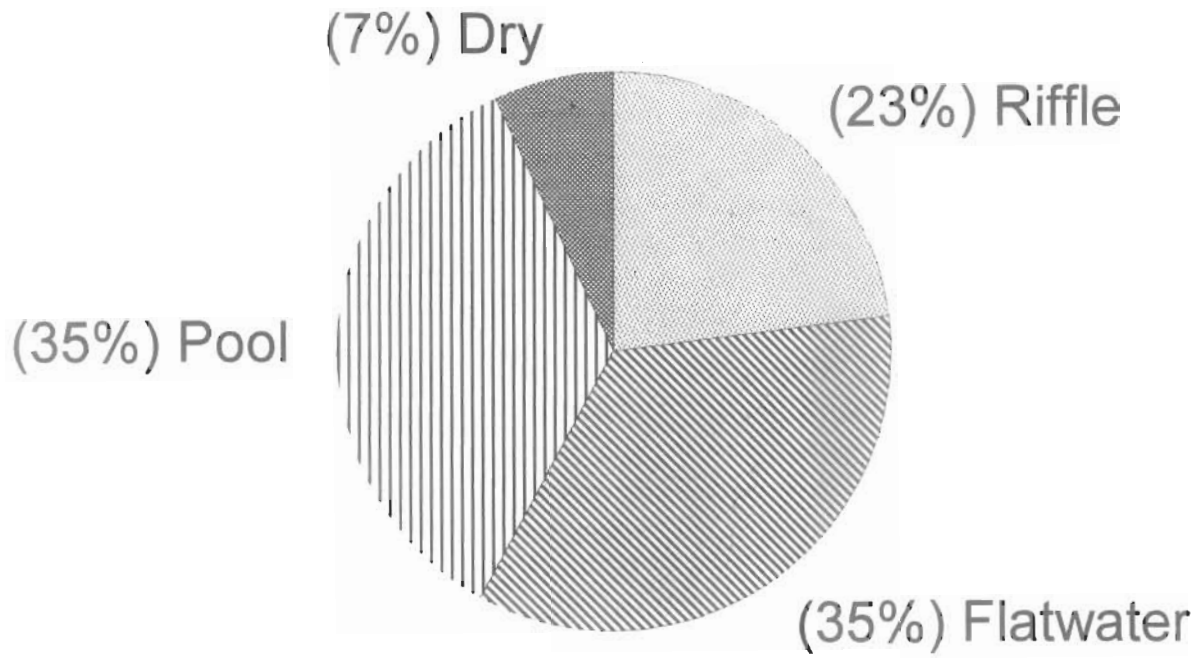
| | |
|---|---|
| Channel Type: C4 | Canopy Density: 37% |
| Channel Length: 2940 ft. | Evergreen Component: 48% |
| Riffle/Flatwater Mean Width: 9 ft. | Deciduous Component: 52% |
| Total Pool Mean Depth: 1.1 ft. | Pools by Stream Length: 28% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 0% |
| Water: 52 - 57 °F Air: 58 - 65 °F | Mean Pool Shelter Rtn: 41 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Boulders |
| Vegetative Cover: 44% | Occurrence of LOD: 0% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 557 ft. |
| Embeddness Value: 1. 11% 2. 17% 3. 22% 4. 50% | |

STREAM REACH 7

| | |
|---|---|
| Channel Type: F3 | Canopy Density: 19% |
| Channel Length: 1359 ft. | Evergreen Component: 65% |
| Riffle/Flatwater Mean Width: 0. ft. | Deciduous Component: 35% |
| Total Pool Mean Depth: 1.0 ft. | Pools by Stream Length: 12% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 50% |
| Water: 53 - 58 °F Air: 63 - 65 °F | Mean Pool Shelter Rtn: 3 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Boulders |
| Vegetative Cover: 71% | Occurrence of LOD: 0% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 390 ft. |
| Embeddness Value: 1. 0% 2. 25% 3. 50% 4. 25% | |

# Robinson Creek

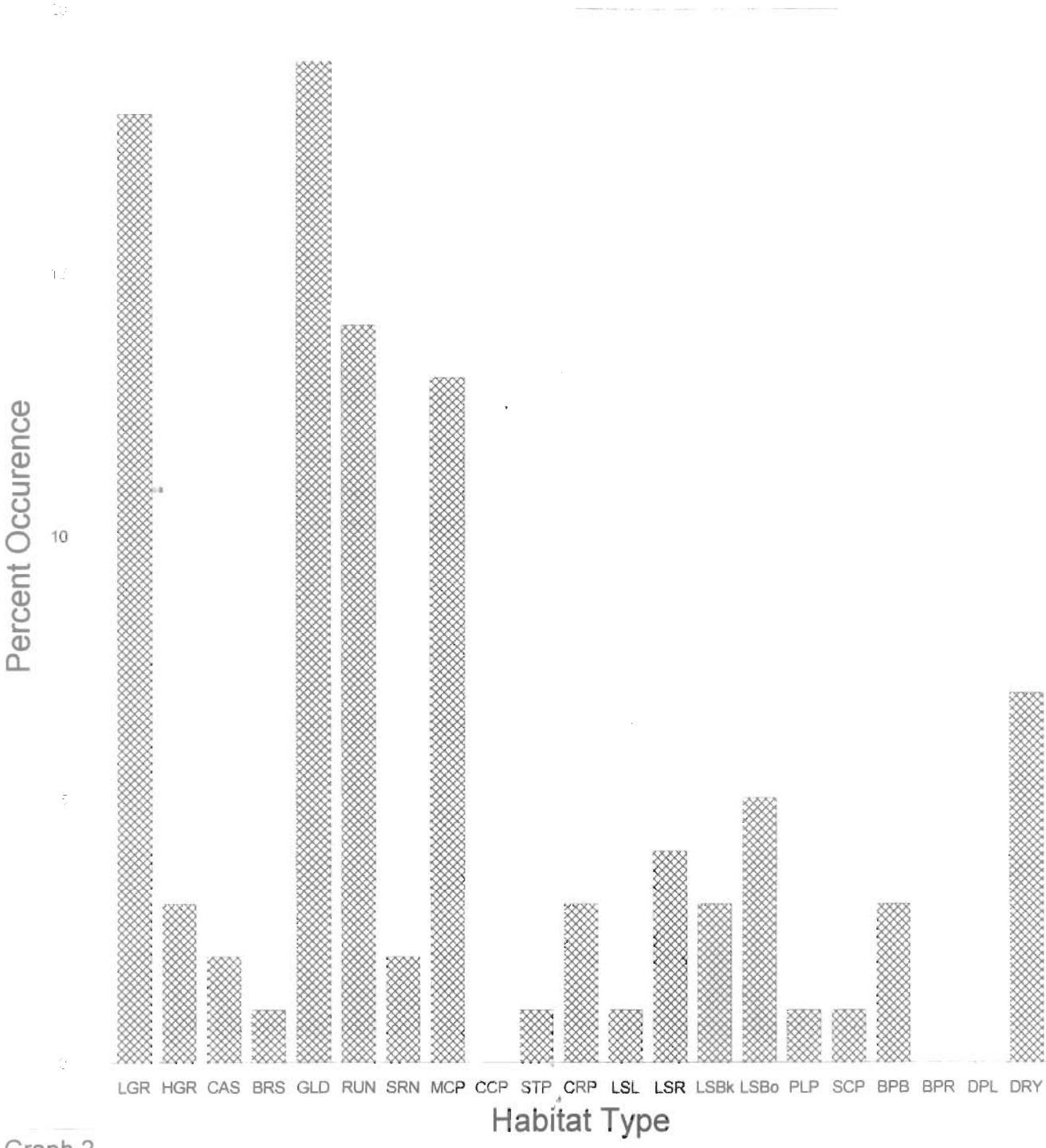
## Level II Habitat Types by % Occurrence




Graph 1

# Robinson Creek

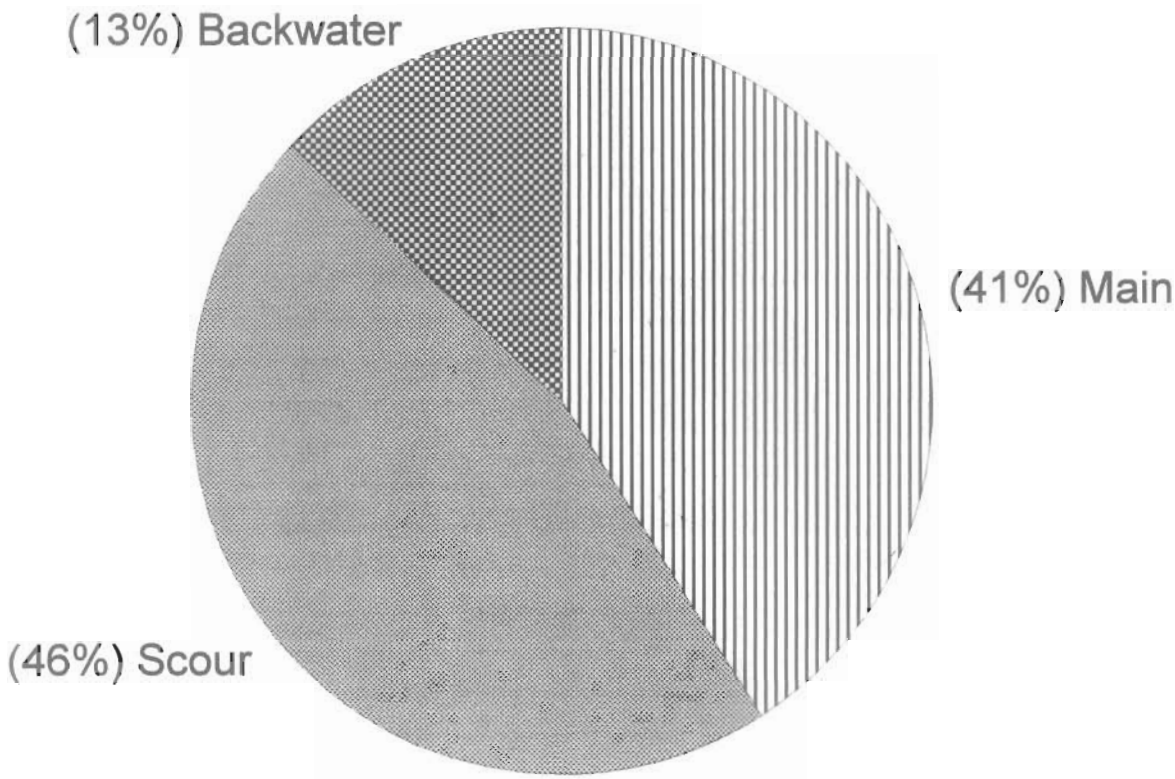
## Level IV Habitat Types by Percent Occurrence




Graph 2

# Robinson Creek

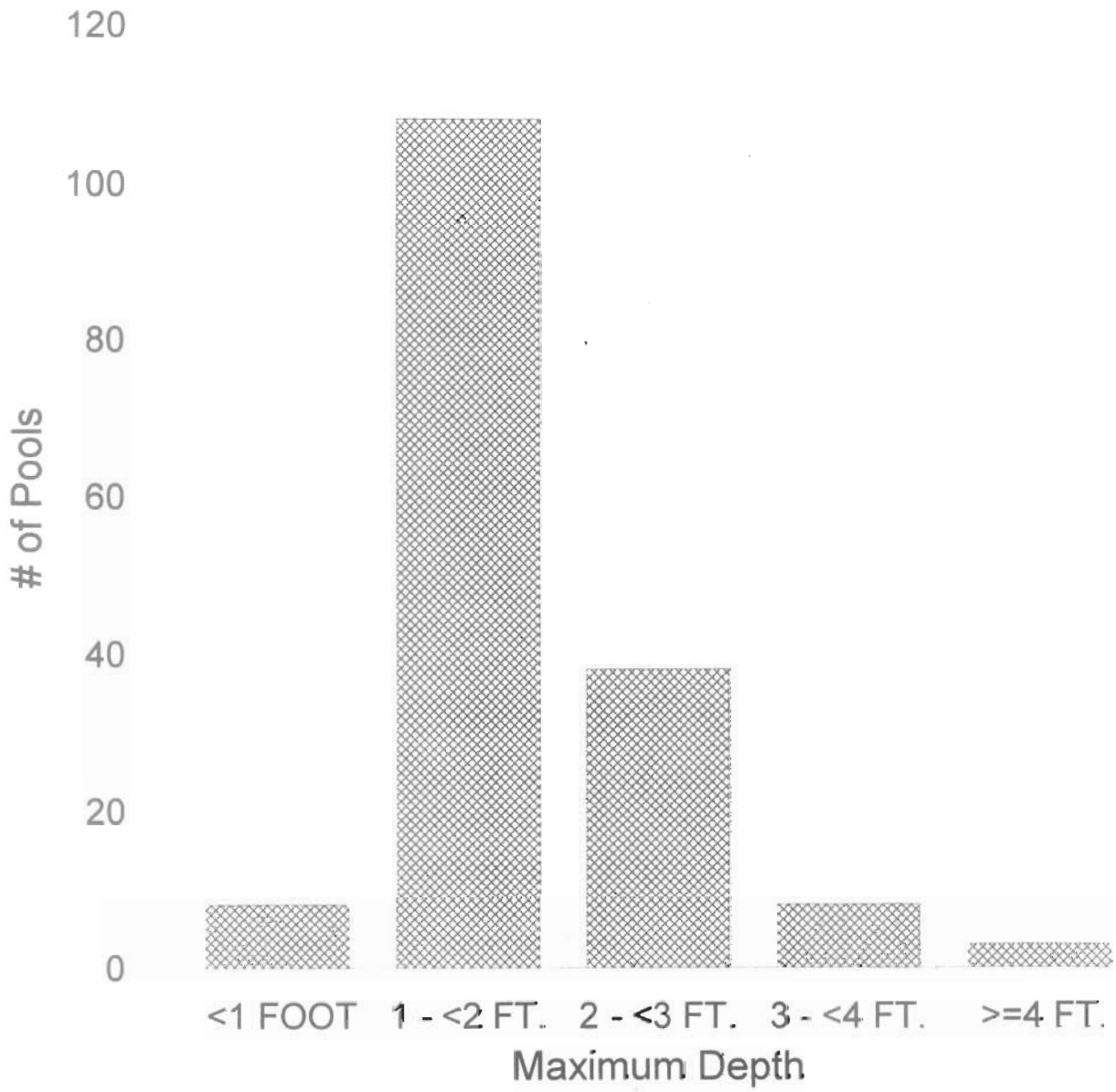
## Pool Habitat Types by % Occurrence




Graph 3

# Robinson Creek

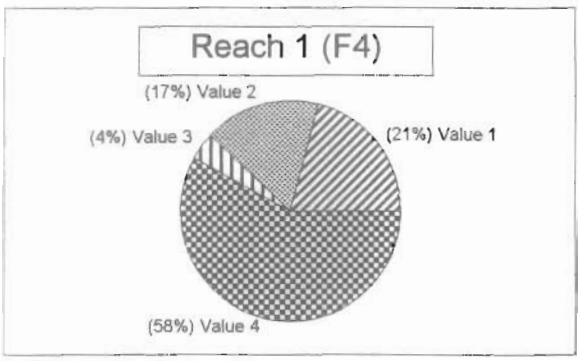
## Maximum Depth in Pools

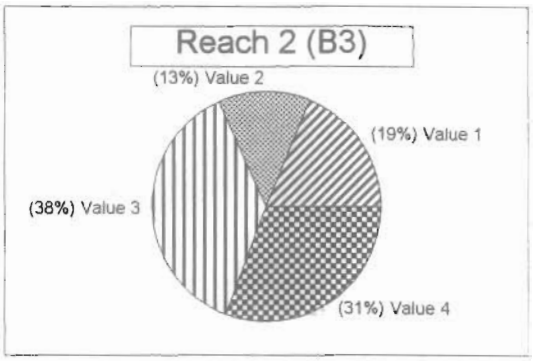


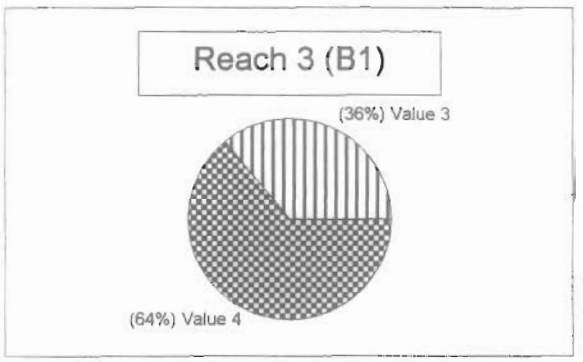

Graph 4

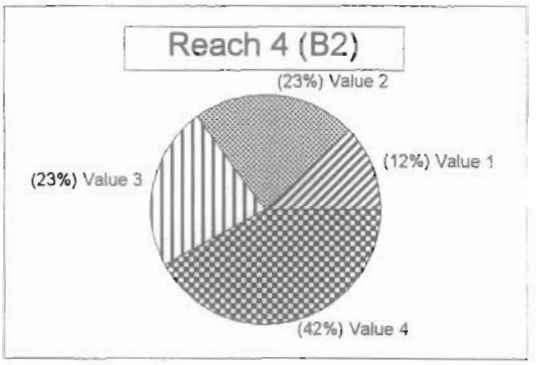
# Robinson Creek

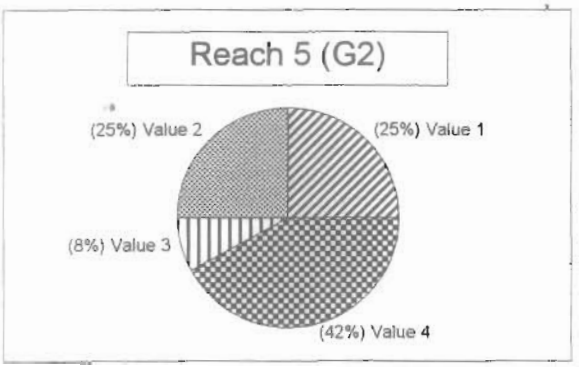
## Percent Embeddedness by Reach

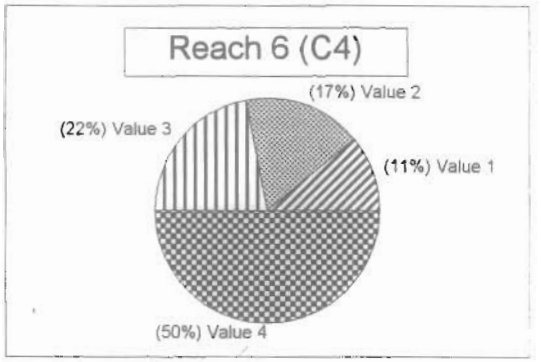


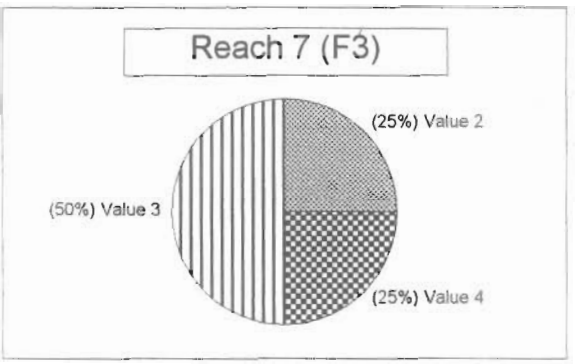



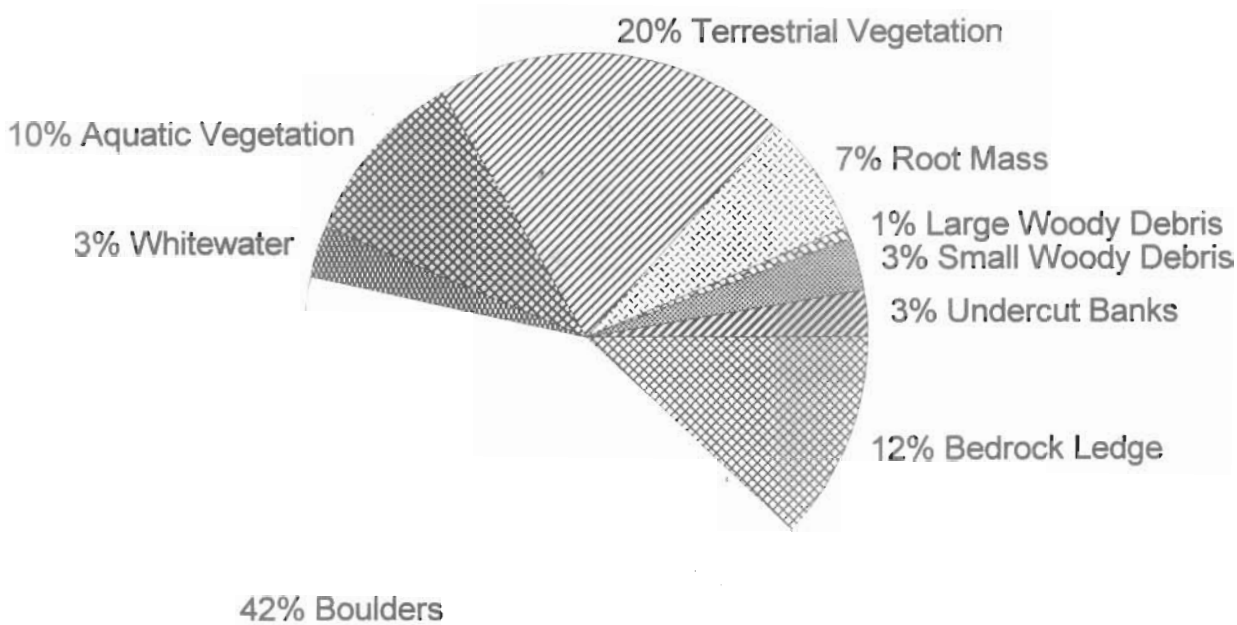




Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 5

# Robinson Creek

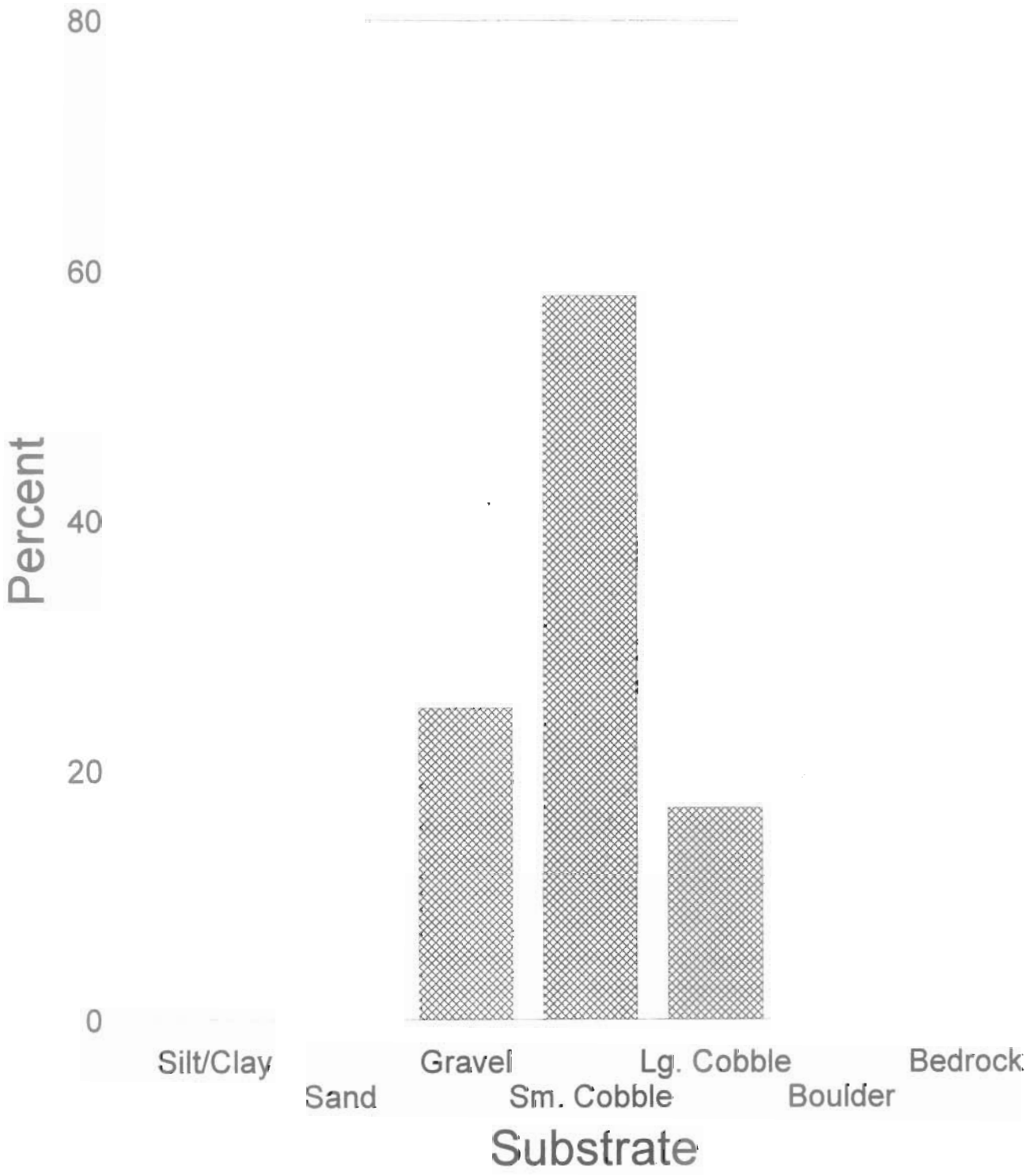
## Percent Cover Types in Pools




Graph 6

# Robinson Creek

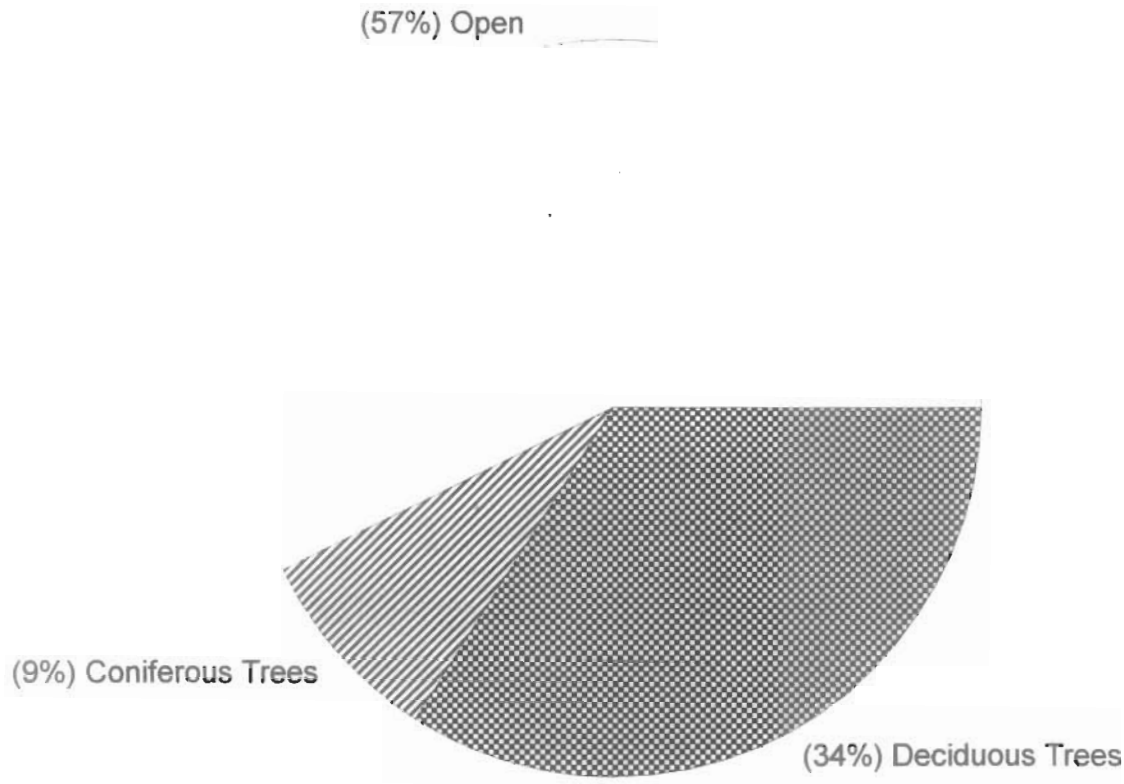
## Substrate Composition in Low Gradient Riffles




Graph 7

# Robinson Creek

## Mean Percent Canopy

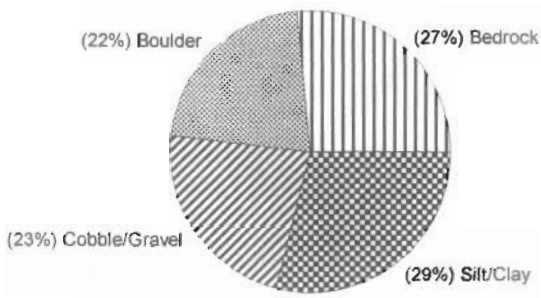



Graph 8

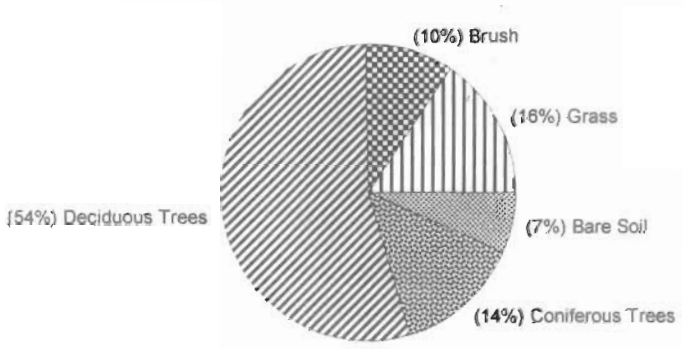
# Robinson Creek

## Percent Bank Composition

### Dominant Bank Substrate



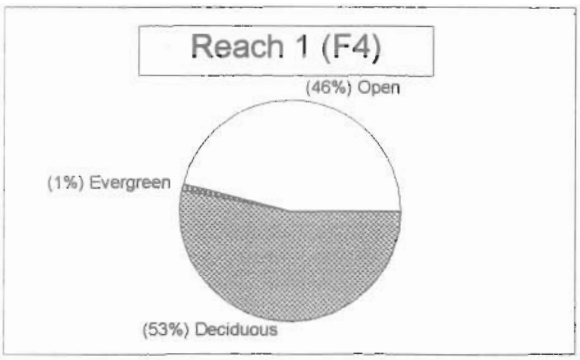

### Dominant Bank Vegetation

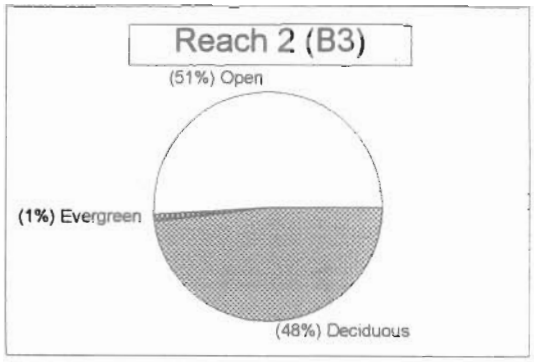


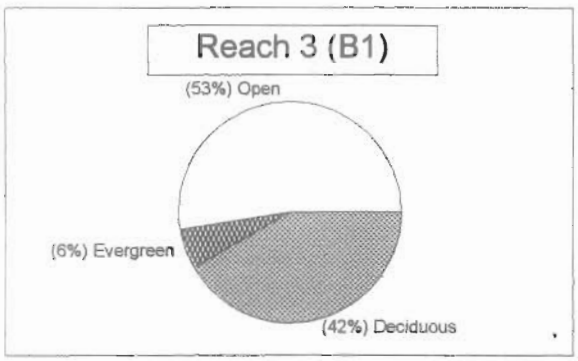

Graph 9

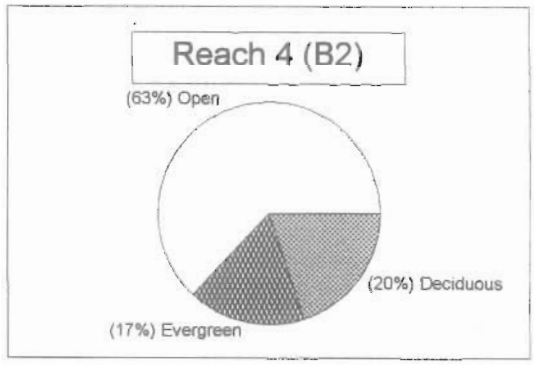
# Robinson Creek

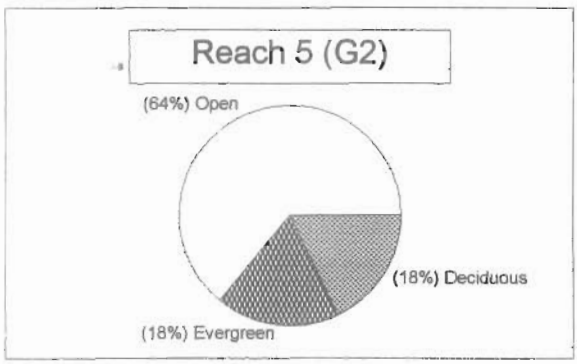
## Percent Canopy by Reach

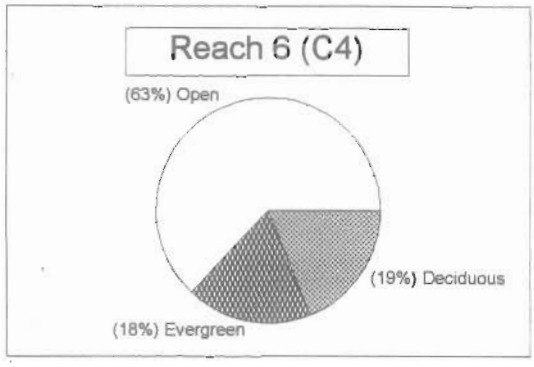


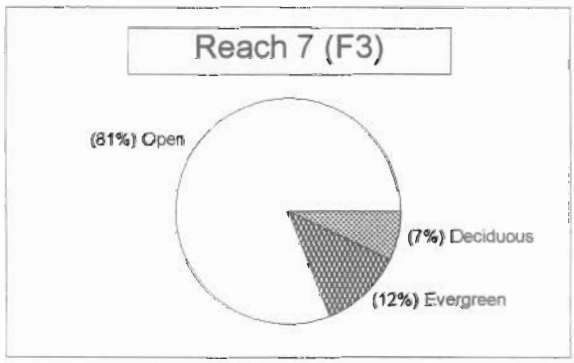




Graph 11