CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT

Fife Creek

Report Revised April 14, 2006
Report Completed 2000
Assessment Completed 1997

INTRODUCTION

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

Fife Creek is a tributary of the Russian River, located in Sonoma County, California (see Fife Creek map, page 2). The legal description at the confluence with the Russian River is T8N, R10W, S31. Its location is 38°29'59.59" N. latitude and 123°00'9.85" W. longitude. Year round vehicle access exists from Highway 116 near Guerneville, via Armstrong Woods Rd.

Fife Creek and its tributaries drain a basin of approximately 6.7 square miles. Fife Creek is a second order stream and has approximately 4.8 miles of blue line stream, according to the USGS Guerneville, Cazadero, and Duncans Mills 7.5 minute quadrangles. Major tributaries include Redwood Creek, which was not surveyed due to lack of landowner access. Summer flow was measured as approximately 0.09 cfs on July 16 at Unit 157. Elevations range from about 126 feet at the mouth of the creek to 1400 feet in the headwaters. Redwood forest dominates the watershed, but there are zones of grassland and oak-woodland in the upper watershed. Land uses include timber harvesting, hard rock mining, State park areas (Armstrong Woods State Park and Austin Creek State Recreation Area), and urbanization. An abandoned hard rock mine is located on a tributary (Wilson/Redwood Creek). Stream mercury levels in 1980 were above EPA range but not deemed significant to wildlife.

METHODS

The habitat inventory conducted in Fife Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al., 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 Fife 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. 1996). 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". Fife 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 Fife Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). Additionally, a rating of "not suitable" (value 5) 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 Fife Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. Thus, shelter ratings can range from 0-300, and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

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

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the California Salmonid Stream Habitat Restoration Manual, 1997. Canopy density relates to the amount of stream shaded from the sun. In Fife Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated visually into percentages of evergreen or deciduous trees.

9. Bank Composition:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Fife 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 Fife 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
- Percent Bank Composition and Bank Vegetation

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game conducted surveys of Fife Creek in February 1963, from its confluence with Redwood Creek to 400 feet upstream, describing it as good steelhead trout spawning area, but no fish were observed.

HABITAT INVENTORY RESULTS

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

The habitat inventory of 06/18/97 to 07/09/97 was conducted by E. Sanchez and M. Miller (AmeriCorps). The survey began at the confluence with the Russian River and extended up Fife creek to a rock fall. The total length of the stream surveyed was 23932 feet, with an additional 15 feet of side channel.

Flow was measured to be 0.09 cfs during the survey period.

This section of Fife creek has 3 channel types: from the mouth to 20635 feet an F4; next 2958 feet a B2 and the upper 339 feet a B4.

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

B2 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 boulder substrate. B4 channel types are similar and have a predominantly gravel substrate.

Water temperatures ranged from 60°F to 76°F. Air temperatures ranged from 62°F to 87°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 (890 feet from East Ridge Trailhead Bridge, in a shaded pool) logged temperatures every 2 hours from July 2, 1997 - September 27, 1997. The highest temperature recorded was 65°F in August and the lowest was 57°F in September. The mean of the daily highs was 62°F for the month of July, 63°F for August and 61°F for September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 33% pool units, 32% flatwater units, 22% riffle units, and 12% dry streambed units. Based on total **length** there were 41% dry streambed units, 31% flatwater units, 17% riffle units, and 11% pool units (Graph 1).

Two hundred nineteen habitat units were measured and 21% were completely sampled. Eighteen Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were runs at 21%, low gradient riffles 19%, root wad scour pools 19% and dry streambed 12% (Graph 2). By percent total **length**, dry streambed made up 41%, runs 24%, low gradient riffles 15%, and root wad scour pools 6%.

Seventy three pools were identified (Table 3). Scour pools were most often encountered at 81%, and comprised 70% 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. Forty-five of the 73 pools (62%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 7% 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 40. Flatwater had the lowest rating with 11 and riffle rated 13 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 44, backwater pools rated 30, and main channel pools rated 20 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were root masses at 34%, small woody debris 33%, boulders 13%, and large woody debris 12%. Graph 5 describes the pool shelter in Fife creek.

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

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

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 69 pool tail-outs measured, 11 had a value of 1 (16%); 14 had a value of 2 (20%); one had a value of 3 (1%); and 42 had a value of 4 (61%). On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 75%. The mean percentages of deciduous and coniferous trees were 15% and 85%, 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 52% and the mean percent left bank vegetated was 51%. For the habitat units measured, the dominant vegetation types for the stream banks were: 81% evergreen trees, 13% deciduous trees, 4% brush and 2% grass. The dominant substrate for the stream banks were: 89% silt/clay/sand, 6% bedrock and 4% boulder (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

On 10/20/97 a biological inventory was conducted in four sites of Fife 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 #3 and ended approximately 847 feet upstream. In riffle and pool habitat types no steelhead were observed along with four California Roach and seven

stickleback.

The inventory of Reach 1 was continued starting at bridge #13 and ending approximately 1000 feet upstream. No fish were found, as this part of the reach was dry.

The inventory of Reach 1 was continued starting at East Ridge Trail Bridge and ending approximately 333 feet upstream. In riffle and pool habitat types three 0+, one 1+ and one 2+ steelhead were observed.

The inventory of Reach 2 started 364 feet upstream from East Ridge Trail Bridge, ending approximately 2881 feet upstream. In riffle and pool habitat types 13 0+, five 1+ and six 2+ steelhead were observed along with four Pacific Giant Salamanders. The inventory stopped beyond this point because of rock cascades.

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
1997	Steelhead	DFG	N
1997	Roach	DFG	N
1997	Three-Spine Stickleback	DFG	N
1997	Pacific Giant Salamander	DFG	N

ADULT SURVEYS:

A spawning survey was conducted in Fife Creek on 3/4/1998, beginning at bridge #13 and extending to bridge #18 in Reach 1. No fish were observed, however nine redds and six possible redds were observed.

DISCUSSION

Fife creek has three channel types: F4 (20635 ft.) from the mouth to the East Ridge Foot Bridge, B2 (2958 ft.) from the footbridge to the large redwood over the creek and B4 (339 ft.)to Mc Machon Bridge.

There are 20635 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.

There are 2958 feet of B2 channel type in Reach 2. According to the DFG Salmonid Stream Habitat Restoration Manual, B2 channel types are excellent for low and medium-stage plunge weirs, single and opposing wing deflectors and bank cover.

There are 339 feet of B4 channel type in Reach 3. According to the DFG Salmonid Stream Habitat Restoration Manual, B4 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.

Many site specific projects can be designed within these channel types, especially to increase pool volumes and shelter.

The water temperatures recorded on the survey days 06/18/97 to 07/09/97 ranged from 60°F to 76°F. Air temperatures ranged from 62°F to 87°F. The warmer water temperatures were recorded in Reach 1. These warmer temperatures, if sustained, are above the threshold stress level (65°F) for salmonids.

Summer temperatures measured using remote temperature recorders placed in pools ranged from 56° to 64°F for Reach 1. This temperature regime is appropriate for salmonids.

Pools comprised 11% of the total **length** of this survey. In first and second order streams a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In fife creek, the pools are relatively shallow with 62% having a maximum depth of at least 2 feet. These pools comprised 7% of the total length of stream habitat. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 40. However, a pool shelter rating of approximately 80 is desirable. The relatively moderate amount of pool shelter that now exists is being provided primarily by root masses (34%), small woody debris (33%), boulders (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 divide territorial units to reduce density related competition.

Four of the five low gradient riffles measured (80%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Sixty-two percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 16% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In a reach comparison, Reach 3 had the best ratings Reach 1 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.

The mean percent canopy for the survey was 75%. This is good, since 80 percent is generally considered desirable. However, Reach 1 had a lower canopy of 70%. Reach 2 had numerous erosion problems. All reaches had low bank vegetative cover.

SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. Overall, few fish were observed during the 1997 survey. The 1997/1998 spawning surveys found several redds, indicating good spawning utilization in the lower reaches of Fife Creek. However, few 1+ steelhead were observed indicating poor rearing conditions the year before or poor holding-over conditions in general. Coho were not observed although channel characteristics are suitable and coho are likely present in some years. Overall, habitat conditions for both steelhead and coho have declined over time.

In general, Reaches 1-3 of Fife Creek are marginal for salmon and steelhead habitat. In Reach 1, some long, deep sections of the stream occur which may be used as rearing habitat, however, shelter is lacking and stream temperatures are higher. Portions of Reach 1 have been channelized and levied for flood control, thus stream velocity has increased, resulting in streambank erosion and loss of mature riparian. Riffle habitat exists for spawning, but what does exist is unsuitable due to high gravel embeddedness, especially in Reach 1. The unstable banks and effects of channelization in Reach 1 limits instream habitat improvement alternatives, although some opportunity exists. Any work considered in Reach 1 will require careful design, placement, and construction that must include protection for the unstable banks and high stream velocities. Reaches 2 and 3 have stable profiles and gradients suitable for enhancement, although banks are unconsolidated and the streambed is severely aggraded with gravel.

GENERAL RECOMMENDATIONS

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

Recent storms brought down many large trees and other woody debris into the stream, which increased the number and quality of pools since the drought years. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Many signs of recent and historic tree and log removal were evident in the active channel during our survey. Efforts to increase flood protection or improve fish access in the short run, have led to long term problems in the system. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

1) Increase the canopy on Fife Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reach 1).

2) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from root masses and small woody debris. 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 should be done where the banks are stable (Reach 1) or in conjunction with stream bank armor to prevent erosion (Reaches 2 and 3). In some areas the material is at hand.

3) Evaluate boulder in Reach 2, Unit 183 for the potential of being and adult migration barrier.

4) Monitor response of juvenile recruitment and retention of flows in the restoration area. Transport of gravel should be monitored above and below the restoration area.

RESTORATION IMPLEMENTED

1) Road problem assessment has been completed, and data analysis with site improvements and prioritization level are currently being funded. 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 urban runoff.

2) Pools on Fife Creek are limited to relatively few reaches due to severe aggradation of the channel. Many of the concrete weirs in Reaches 2 and 3 should be removed (#1-4,6-8,10,11,14,15.5,17-19,21,23-28,30.5,31,31.5-33) where current weir locations are backflooding each other with gravel. Where grade stabilization is needed, concrete weirs should be replaced (#5,9.5,12,15,13,16,22) with redwood scour logs, vortex weirs, and boulder defectors to increase pool formation and encourage scour. Opportunities also exist to modify some existing weirs (#7,9,20,29,30) where erosion is prevalent to achieve fisheries enhancement objectives. A hydrological survey is encouraged to verify recommendations for removal, replacement and modification of specific weir locations to improve sediment transport and to provide proper height and design. Boulder structures to decrease channel incision and sort and recruit spawning gravels should be installed to expand redd and pool distribution in Reach 1.

3) The Park's Riparian Restoration Program and confined trail policy should be continued. This will increase bank vegetation and lead to more stable banks in the long term. The reach above the survey section should be assessed for planting and treated as well, since water

temperatures throughout are effected from upstream.

PROBLEM SITES AND LANDMARKS - FIFE CREEK SURVEY COMMENTS

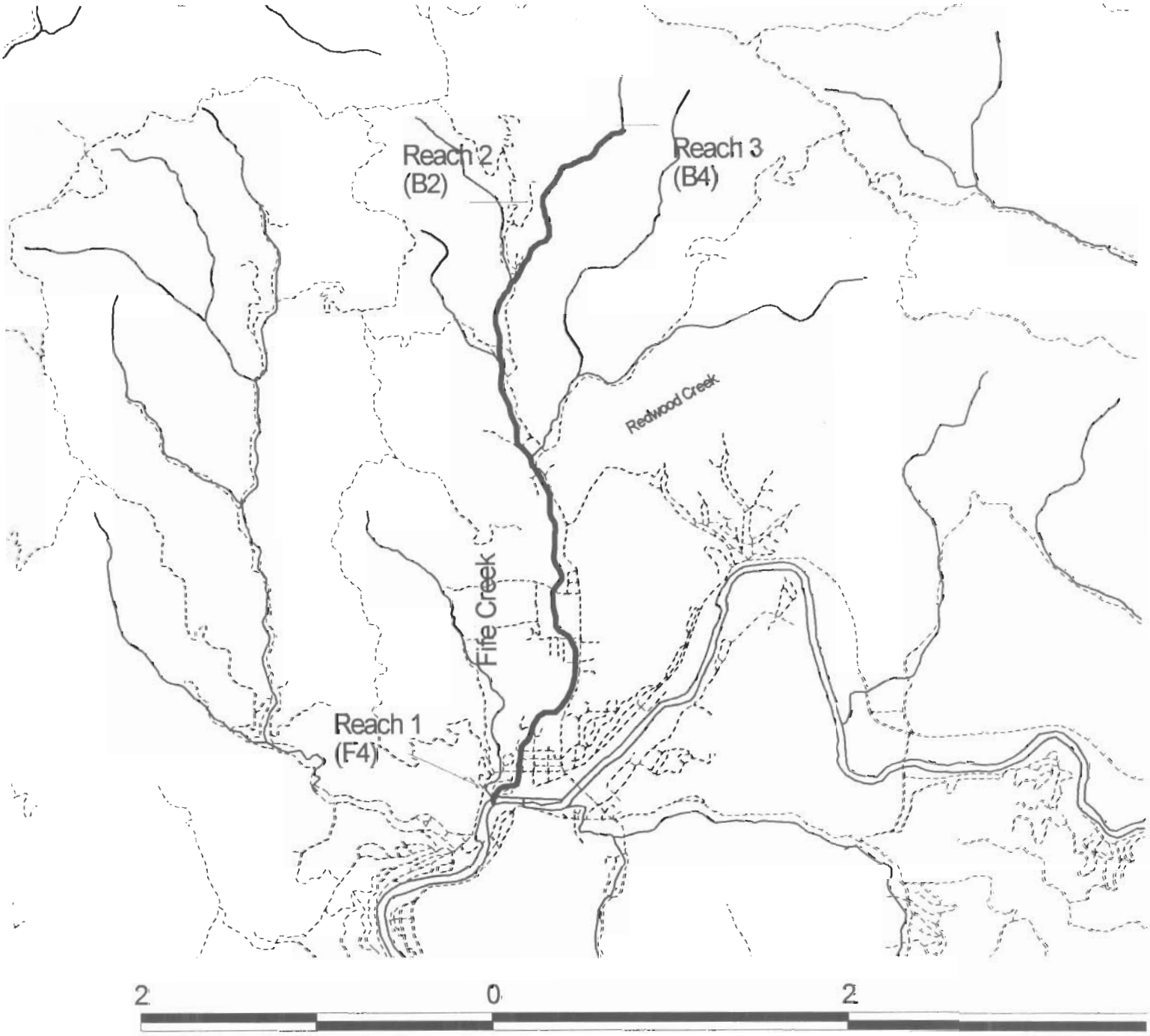
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

HABITAT UNIT#	STREAM LEN.(FT.)	COMMENTS
001.00	14.5	Mouth filled with Russian River water extending up for 150' Banks very erosive
	111	Blackberries taking over majority of banks
	150	Dry streambed
	294	No canopy to 396'
	468	Left Bank slide
	697	Culvert
	761	Left bank erosion
	1232	Rip Rap Left Bank (50' long,15' high)
	1388	River Road Bridge Culvert LB
	1458	Culvert LB
002.00	1464	Water present
010.00	2090	Water pipe runs bank to bank to pump from resort to resort
028.00	3469	Culvert on LB; 1 ft filled w/gravel
054.00	5551	Cement wall (broken) LT bank w/ broken culverts
139.00	13,800	Cement sand-bagged banks that straighten out sinuosity (100' length X 7' height)
140.00	14,185	Cement sand bags continue
141.00	14,239	Dry unit, Diversion; creek bed cemented
	14,429	Dry tributary RB
	14,510	Erosive bank, Bridge
	15,079	Cement check dam
	15,189	Footbridge; house over creek
	15,316	Riprap RT bank
	15,496	Cement weir; retaining gravel
	15,716	Cement weir, retaining gravel
	15,826	Cement weir
	15,956	Cement weir
	16,066	Cement weir
	16,176	Weir; sandbagged RB
	16,676	Sandbagged RB above cement weir
	16,361	Cement weir
	16,421	Cement sand bags deflector right bank: cemented boulders 10' into creek

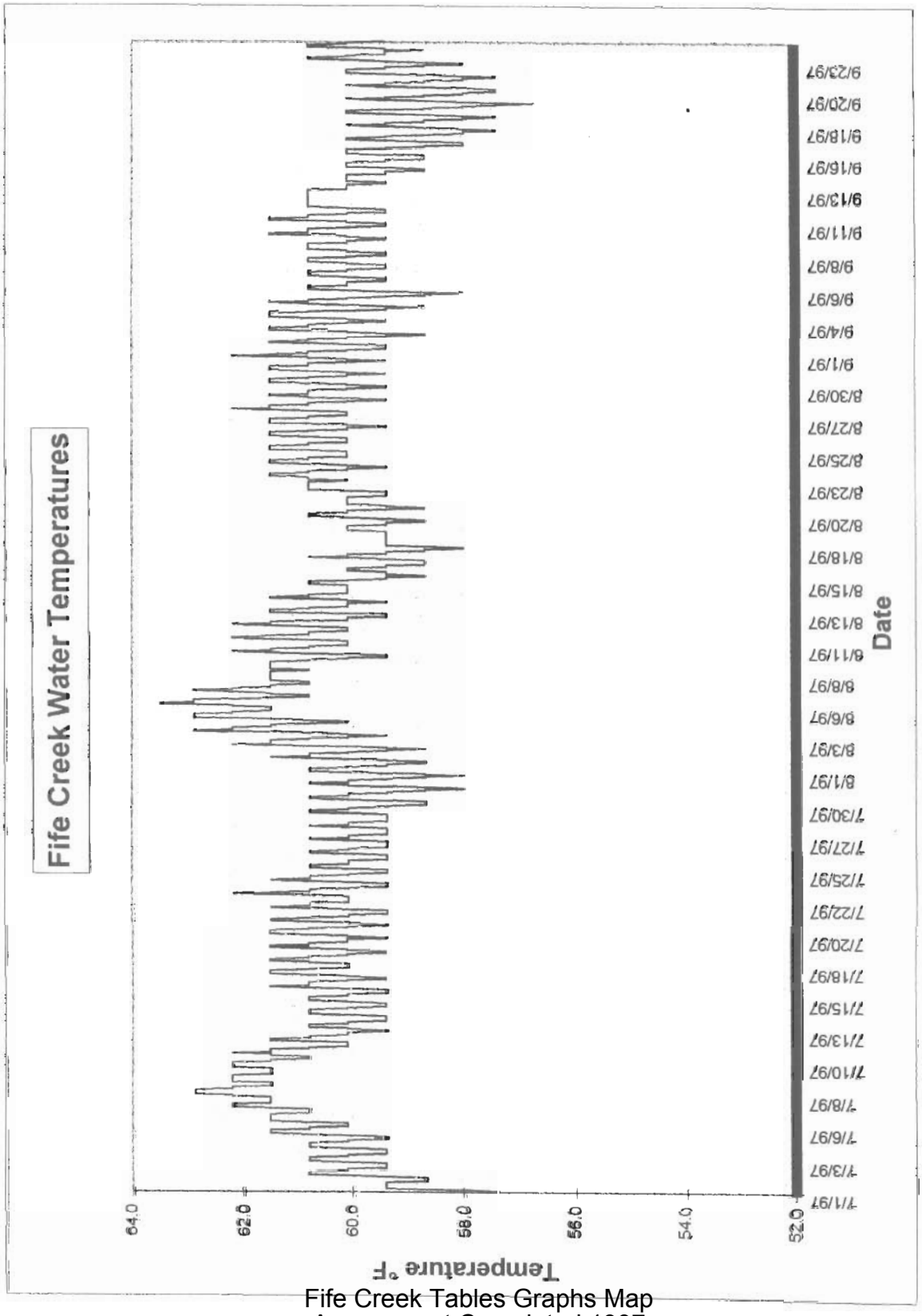
	16,810	Broken cement weir, Cement sand bags
	17,866	Dry tributary RB
	17,911	Cement weir; cement sandbags RB Log wall LB
	17,007	Cement weir; RB sand bags
	17,096	Cement weir; dry west fork convergence RB
	17,450	Cement weir
	17,496	Bridge
	17,662	Cement weir
	17,876	Cement weir
	17,956	Cement weir
	18,248	Cement weir
	18,316	Cement weir
	18,346	Footbridge
	18,442	Weir
	18,592	Buried weir
	18,711	Cement weir
	18,797	Cement weir
	19,091	Cement weir
	19,146	Cement weir
	19,298	Cement weir
	19,346	Dry tributary
	19,603	Cement weir
	19,588	Cement deflector
	19,646	Cement weir
	19,776	Dry tributary RB, Bridge
	19,901	Cement weir
	19,486	Cement weir
	19,846	Bridge
	19,946	Cement weir submerged by gravel
	20,036	Cement weir partially submerged under gravel; culvert RB
	20,181	Pedestrian Bridge
	20,376	Pedestrian Bridge, Culvert under bridge to dry tributary
	20,390	Boulder and cement weir
	20,476	Cement weir
	20,548	Cement weir
149.00	20,635	Erosion
150.00	20,687	Resident dam; bedrock pool
152.00	21,096	Highly erosive banks due to downcutting
153.00	21,116	Erosive RB
157.00	21,398	Dry tributary RB; Flashboard
159.00	21,529	Log/redwood jam
165.00	21,841	Landslide; back up gravel
169.00	21,913	Resident fish; hobotemp; 2 PGS
171.00	22,034	Resident fish

173.00	22,100	Pool because of old growth redwood in creek
175.00	22,145	Dry tributary RB
178.00	22,235	Lots of 8 foot logs
181.00	22,375	Dry tributary LB
183.00	22,501	25 foot boulder in center of creek
187.00	22,682	Residential fish; 2 plus mountain trout
189.00	22,812	Dry tributary LB and RB
191.00	22,982	Old growth growing in creekbed
197.00	23,339	Erosion RB
198.00	23,375	Residential fish
202.00	23,443	Entrenched and eroding bank
203.00	23,493	Residential fish
209.00	23,509	Steelhead
210.00	23,593	Large redwood over creek
213.00	23,699	Residential fish
215.00	23,786	Bridge
216.00	23,873	Residential fish
218.00	23,932	Mc Mahon Bridge
	End of Survey	

Fife Creek



Inland Fisheries Division
Department of Fish and Game
1997


Fife Creek Water Temperatures
Temperature °F
64.0
62.0
60.0
58.0
56.0
54.0
52.0
Date
7/1/97
7/3/97
7/6/97
7/8/97
7/10/97
7/13/97
7/15/97
7/18/97
7/20/97
7/22/97
7/25/97
7/27/97
7/30/97
8/1/97
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8/15/97
8/18/97
8/20/97
8/23/97
8/25/97
8/27/97
8/30/97
9/1/97
9/4/97
9/6/97
9/8/97
9/11/97
9/13/97
9/16/97
9/18/97
9/20/97
9/23/97

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: fife creek
SAMPLE DATES: 06/18/97 to 07/09/97
SURVEY LENGTH:
MAIN CHANNEL: 23932 ft. SIDE CHANNEL: 15 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: GUERNEVILE Latitude: 38°29'60"
Legal Description: T8NR10WS31 Longitude: 123°0'10"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-149)

Channel Type: F4	Mean Canopy Density: 70%
Main Channel Length: 20635 ft.	Evergreen Component: 82%
Side Channel Length: 15 ft.	Deciduous Component: 18%
Riffle/Flatwater Mean Width: 8.6 ft.	Pools by Stream Length: 9%
Pool Mean Depth: 1.0 ft.	Pools >=2 ft. Deep: 65%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 14%
Water: 000-76°F Air: 62-89°F	Mean Pool Shelter Rtn: 41
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 66%	Occurrence of LOD: 43%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 9761 ft.

Embeddness Value: 1. 0% 2. 14% 3. 2% 4. 84%

STREAM REACH 2 (Units 150-210)

Channel Type: B2	Mean Canopy Density: 83%
Main Channel Length: 2958 ft.	Evergreen Component: 88%
Side Channel Length: 0 ft.	Deciduous Component: 12%
Riffle/Flatwater Mean Width: 5.5 ft.	Pools by Stream Length: 24%
Pool Mean Depth: 1.1 ft.	Pools >=2 ft. Deep: 48%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 10%
Water: 000-63°F Air: 78-88°F	Mean Pool Shelter Rtn: 35
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 40%	Occurrence of LOD: 32%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 36 ft.

Embeddness Value: 1. 56% 2. 44% 3. 0% 4. 0%

STREAM REACH 3 (Units 211-218)

Channel Type: B4	Mean Canopy Density: 89%
Main Channel Length: 339 ft.	Evergreen Component: 96%
Side Channel Length: 0 ft.	Deciduous Component: 4%
Riffle/Flatwater Mean Width: 4.8 ft.	Pools by Stream Length: 11%
Pool Mean Depth: 1.5 ft.	Pools >=2 ft. Deep: 100%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 0%
Water: 61-61°F Air: 79-81°F	Mean Pool Shelter Rtn: 70
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Undercut Banks
Bank Vegetative Cover: 32%	Occurrence of LOD: 40%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 100% 2. 0% 3. 0% 4. 0%

FIFE CREEK — Drainage: RUSSIAN RIVER

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31 LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	ESTIMATED TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
49	9	RIFFLE	22	81	3980	17	5.1	0.3	201	9839	82	3997	0	13
71	13	FLATWATER	32	105	7475	31	7.1	0.5	298	21188	142	10076	0	11
73	24	POOL	33	37	2695	11	8.6	1.0	309	22540	360	26285	335	40
26	1	DRY	12	377	9797	41	7.0	0.6	329	8554	197	5132	0	10

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
219	47	23947	62120	45491

FIFE CREEK

Drainage: RUSSIAN RIVER

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31

LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

HABITAT UNITS #	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH ft.	TOTAL LENGTH ft.	TOTAL LENGTH %	MEAN WIDTH ft.	MEAN DEPTH ft.	MAXIMUM DEPTH ft.	MEAN AREA sq.ft.	TOTAL AREA EST. sq.ft.	MEAN VOLUME cu.ft.	TOTAL VOLUME EST. cu.ft.	MEAN RESIDUAL POOL VOL cu.ft.	MEAN SHELTER RATING	MEAN CANOPY %
42	5	LGR	19	86	3594	15	5	0.2	0.5	199	8375	46	1911	0	1	74
2	1	HGR	1	59	117	0	9	0.6	1.7	233	465	140	279	0	40	88
3	2	CAS	1	78	234	1	6	0.6	1.4	282	847	182	547	0	60	65
2	1	BRS	1	18	35	0	1	0.2	0.2	13	26	3	5	0	0	85
1	1	POW	0	37	37	0	6	0.6	1.2	144	144	87	87	0	20	95
11	3	GLD	5	61	671	3	11	0.4	1.4	433	4762	159	1750	0	7	66
46	5	RUN	21	126	5799	24	6	0.5	1.5	269	12387	125	5737	0	9	73
13	4	SRN	6	74	968	4	6	0.5	1.7	264	3426	164	2137	0	15	84
7	2	MCP	3	47	330	1	9	1.4	4.2	504	3531	1017	7121	902	17	68
2	2	CCP	1	47	94	0	9	0.9	2.0	452	904	436	872	391	18	73
4	2	STP	2	92	368	2	6	0.8	1.9	390	1559	301	1203	196	30	87
3	2	CRP	1	45	136	1	6	1.0	2.2	269	806	257	770	213	25	55
41	7	LSR	19	35	1416	6	9	1.0	3.5	325	13315	343	14082	324	52	75
4	2	LSBk	2	18	71	0	7	1.1	2.1	123	492	139	555	104	18	78
9	4	LSBo	4	27	241	1	8	0.9	2.9	209	1878	167	1500	123	23	82
2	2	PLP	1	12	24	0	11	1.7	3.6	131	263	278	556	255	50	85
1	1	BPR	0	15	15	0	10	1.1	2.0	150	150	165	165	135	30	70
26	1	DRY	12	377	9797	41	7	0.6	1.0	329	8554	197	5132	0	10	74

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
219	47	23947	61884	44409

FIFE CREEK

Drainage: RUSSIAN RIVER

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31 LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
13	6	MAIN	18	61	792	29	8.1	1.2	471	6123	758	9851	710	20
59	17	SCOUR	81	32	1888	70	8.7	1.0	284	16754	296	17463	262	44
1	1	BACKWATER	1	15	15	1	10.0	1.1	150	150	165	165	135	30

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
73	24	2695	23027	27478

FIFE CREEK Drainage: RUSSIAN RIVER

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31 LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH	>=4 FEET PERCENT OCCURRENCE
7	MCP	10	0	0	4	57	0	0	2	29	1	14
2	CCP	3	0	0	1	50	1	50	0	0	0	0
2	STP	3	0	0	2	100	0	0	0	0	0	0
3	CRP	4	0	0	1	33	2	67	0	0	0	0
41	LSR	56	0	0	12	29	24	59	5	12	0	0
4	LSBk	5	0	0	1	25	3	75	0	0	0	0
9	LSBo	12	0	0	4	44	5	56	0	0	0	0
2	PLP	3	0	0	1	50	0	0	1	50	0	0
1	RPR	1	0	0	0	0	1	100	0	0	0	0

TOTAL UNITS
71

FIFE CREEK

Drainage: RUSSIAN RIVER

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31 LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SWD	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
42	5	LGR	50	0	0	0	0	0	0	50	0
2	1	HGR	30	0	0	0	0	0	0	0	70
3	1	CAS	0	10	20	0	0	0	0	70	0
2	1	BRS	0	0	0	0	0	0	0	0	0
1	1	POW	0	0	0	0	0	0	0	100	0
11	3	GLD	0	0	0	0	0	100	0	0	0
46	7	RUN	34	23	0	0	0	0	0	44	0
13	4	SRN	8	14	5	42	0	0	0	32	0
7	6	MCP	22	61	0	3	0	14	0	0	0
2	2	CCP	0	3	3	0	0	0	0	93	0
4	2	STP	9	0	4	59	0	0	0	28	0
3	3	CRP	0	89	0	0	0	0	0	11	0
41	39	LSR	2	33	16	42	0	4	0	4	0
4	4	LSBk	20	10	0	20	0	0	5	45	0
9	9	LSBo	0	0	4	1	0	0	0	95	0
2	2	PLP	28	3	0	28	0	0	0	41	0
1	1	BPR	0	0	0	100	0	0	0	0	0
26	1	DRY	0	0	0	0	0	0	0	100	0
ALL 219 HABITAT TYPES	92		5	30	11	31	0	6	0	16	1
POOLS ONLY 73	68		4	33	12	34	0	4	0	13	0

FIFE CREEK Drainage: RUSSIAN RIVER

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 06/18/97 to 07/09/97

Confluence Location: QUAD: GUERNEVILE LEGAL DESCRIPTION: T8NR10WS31 LATITUDE: 38°29'60" LONGITUDE: 123°0'10"

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
42	5	LGR	20	0	80	0	0	0	0
2	1	HGR	0	0	0	0	0	100	0
3	2	CAS	0	0	0	0	0	50	50
2	1	BRS	0	0	0	0	0	0	100
1	1	POW	0	0	0	0	0	100	0
1	4	GLD	50	25	25	0	0	0	0
46	8	RUN	13	38	38	0	13	0	0
3	4	SRN	0	25	0	25	0	25	25
7	5	MCP	80	40	0	0	0	0	0
2	2	CCP	50	50	0	0	0	0	0
4	2	STP	0	50	0	0	0	50	0
3	2	CRP	0	100	0	0	0	0	0
1	14	LSR	50	29	14	7	0	0	0
4	2	LSBk	0	0	100	0	0	0	0
9	4	LSBo	25	25	25	0	0	25	0
2	2	PLP	0	50	50	0	0	0	0
1	1	BPR	0	100	0	0	0	0	0
26	2	DRY	0	0	100	0	0	0	0

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
74.96	84.92	15.08	51.52	50.71

APPENDIX B.

Mean Percentage of Dominant Substrate

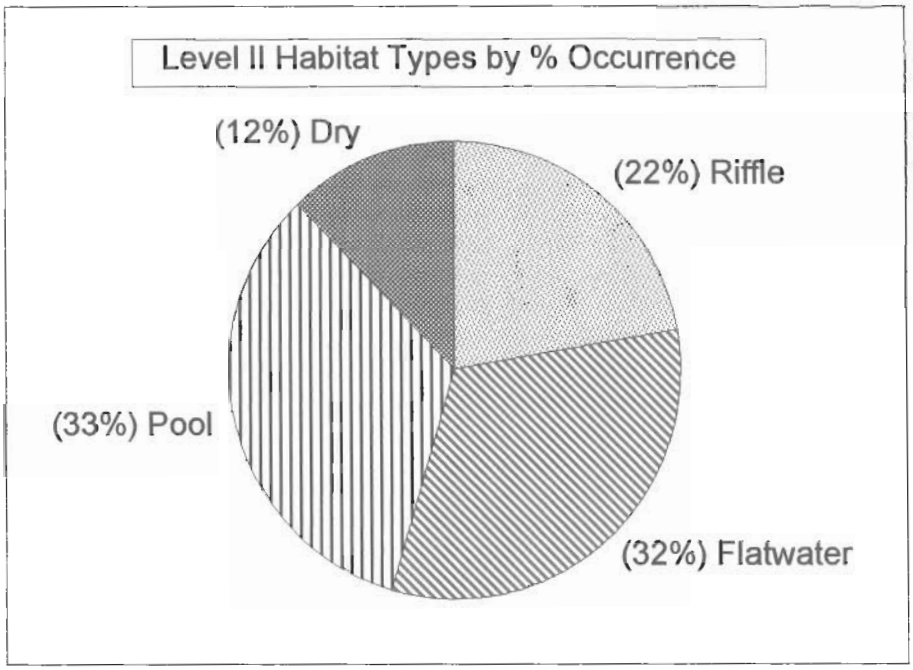
Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	1	6	6.25
Boulder	4	1	4.46
Cobble/Gravel	0	0	0
Silt/clay	51	49	89.29

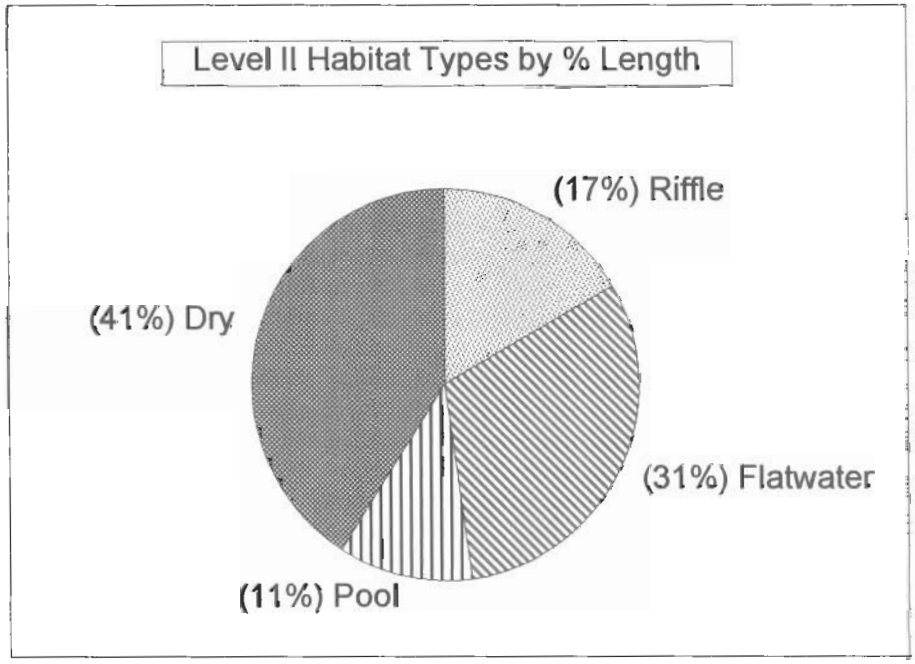
Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	1	1	1.79
Brush	4	1	4.46
Deciduous Trees	8	6	12.50
Evergreen Trees	43	48	81.25
No Vegetation	0	0	0

Fife Creek

Level II Habitat Types

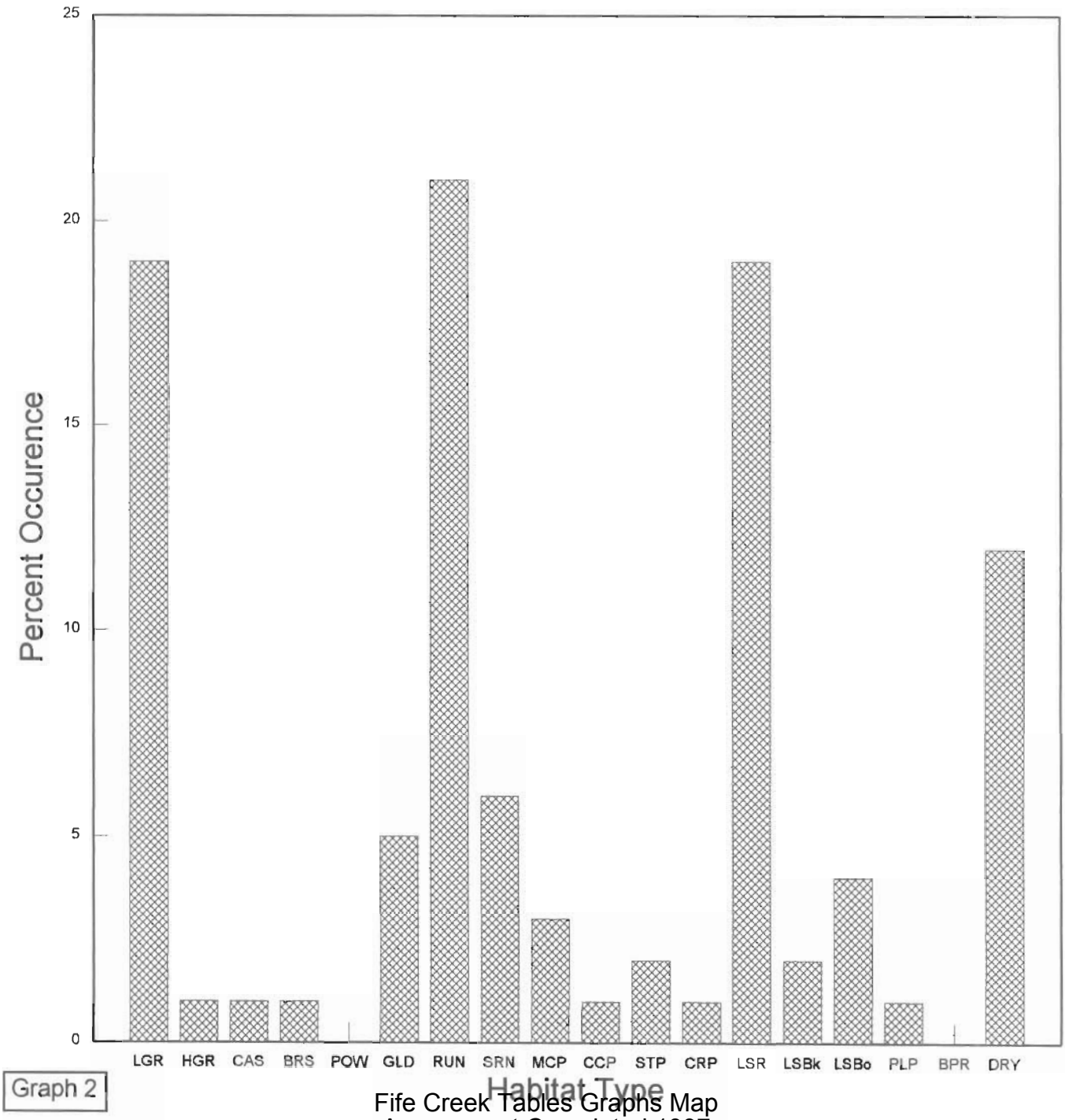




Graph 1

Fife Creek

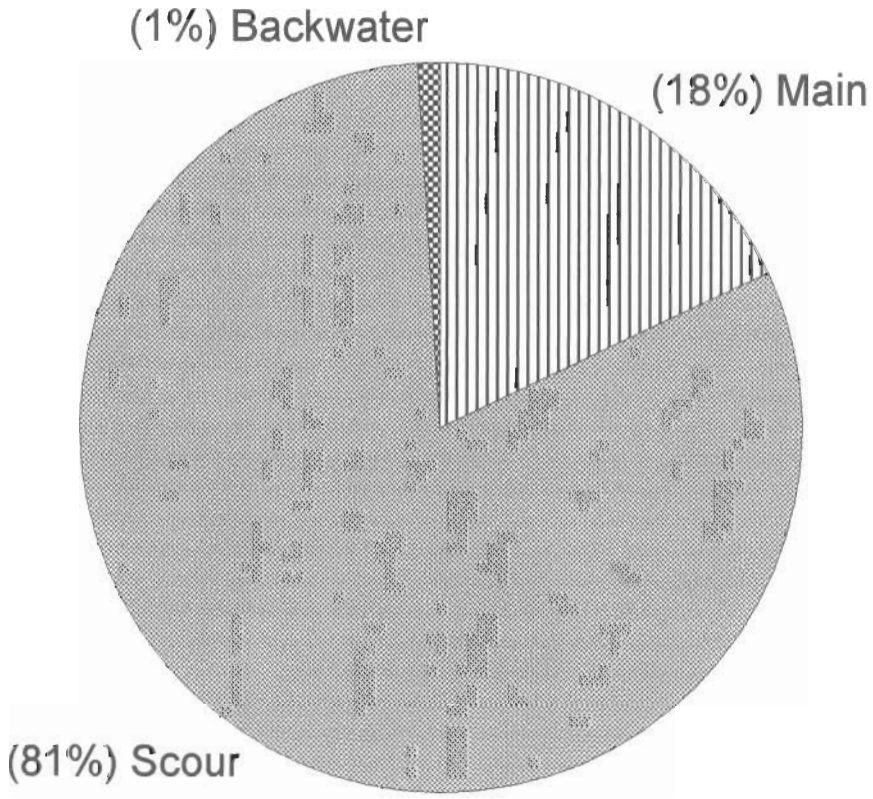
Level IV Habitat Types by % Occurrence



Graph 2

Fife Creek

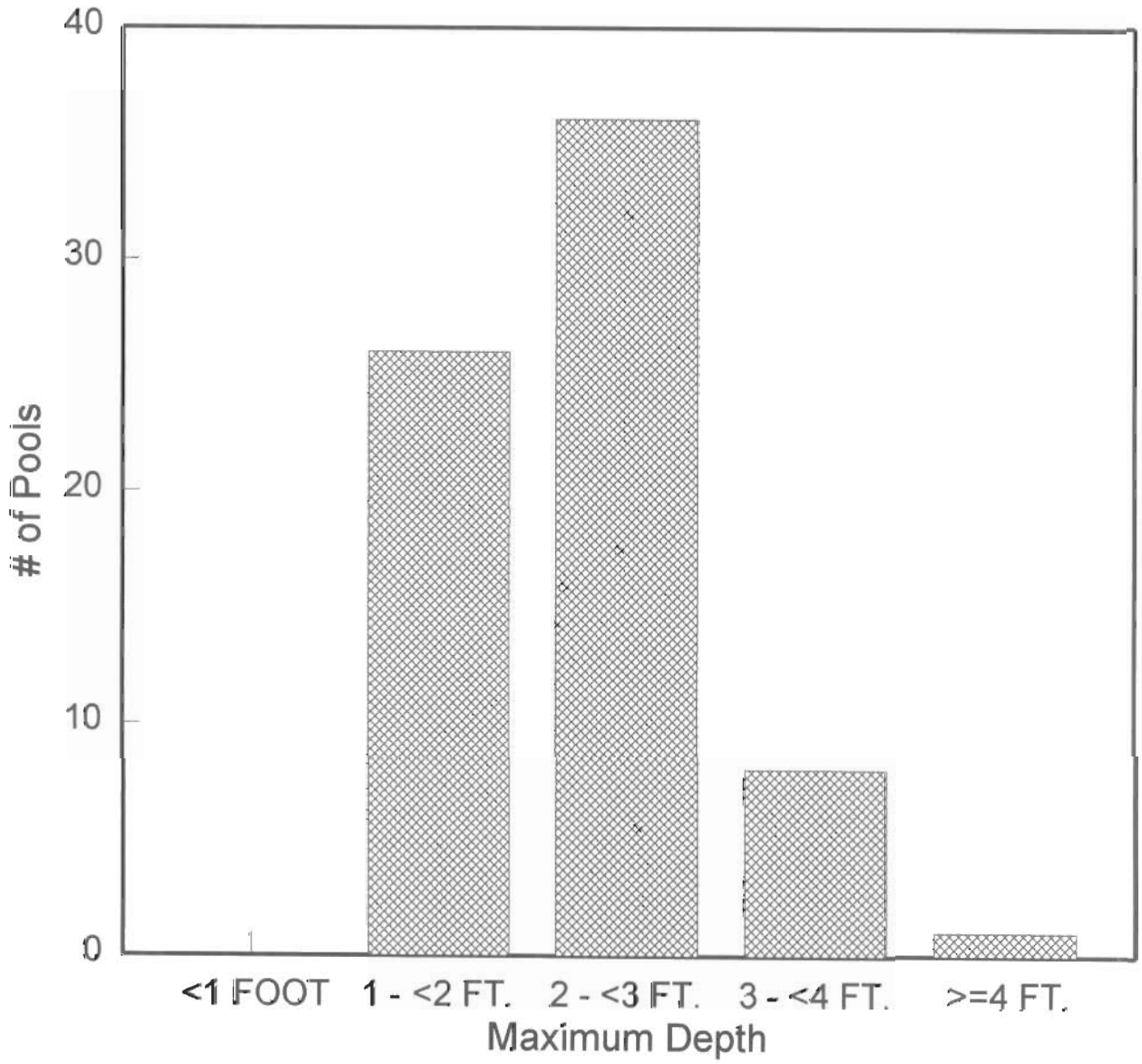
Pool Habitat Types by % Occurrence



Graph 3

Fife Creek

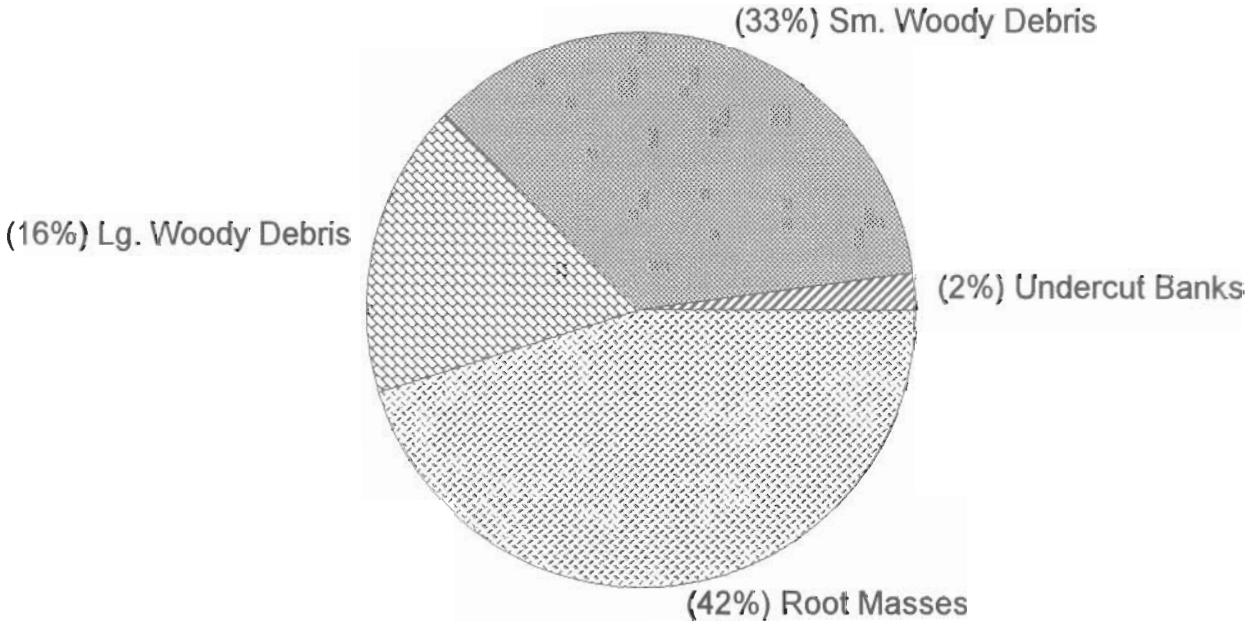
Maximum Depth in Pools



Graph 4

Fife Creek

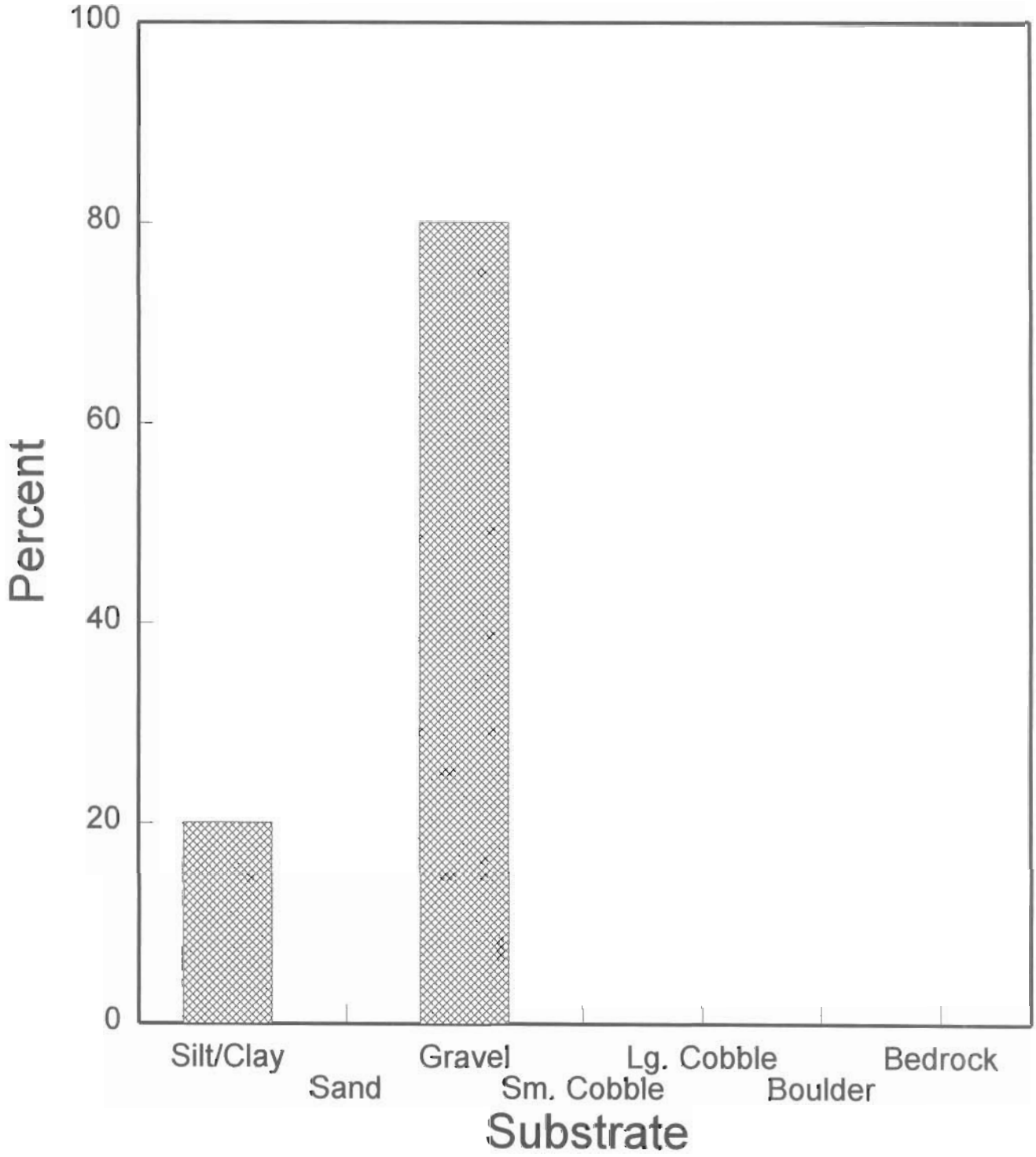
Pool Shelter Types by % Area



Graph 5

Fife Creek

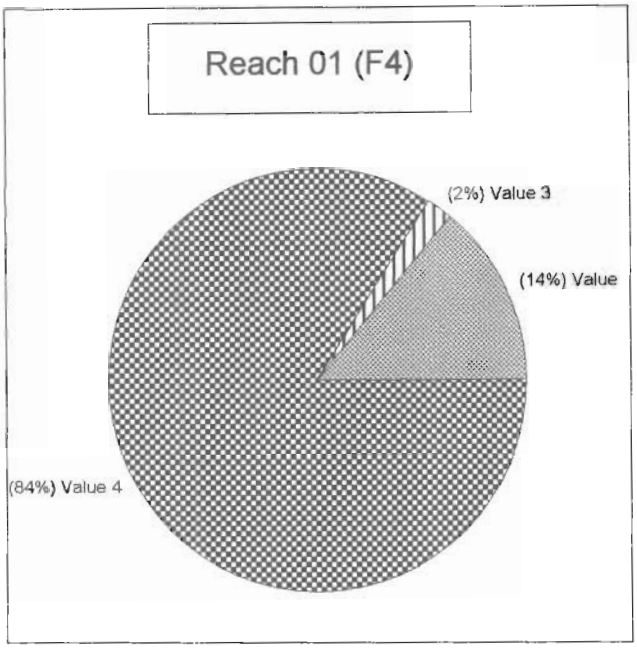
Substrate Composition in Low Gradient Riffles

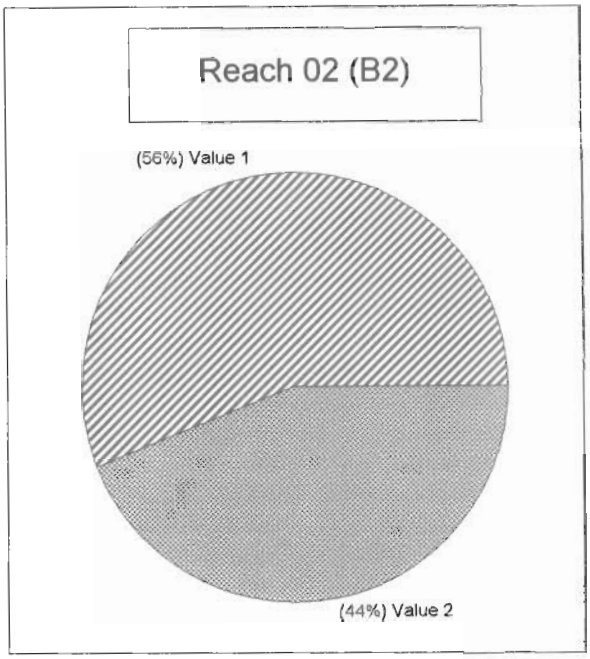


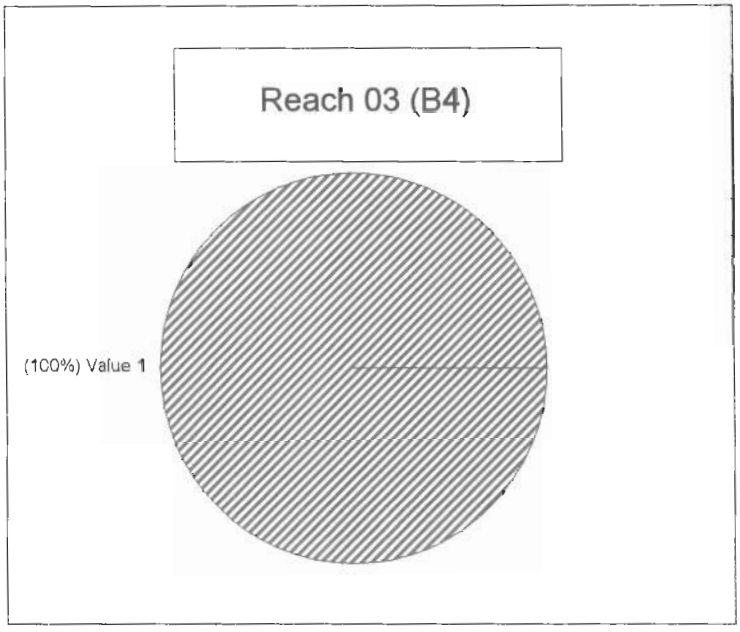
Graph 6

Fife Creek

Percent Cobble Embeddedness by Reach





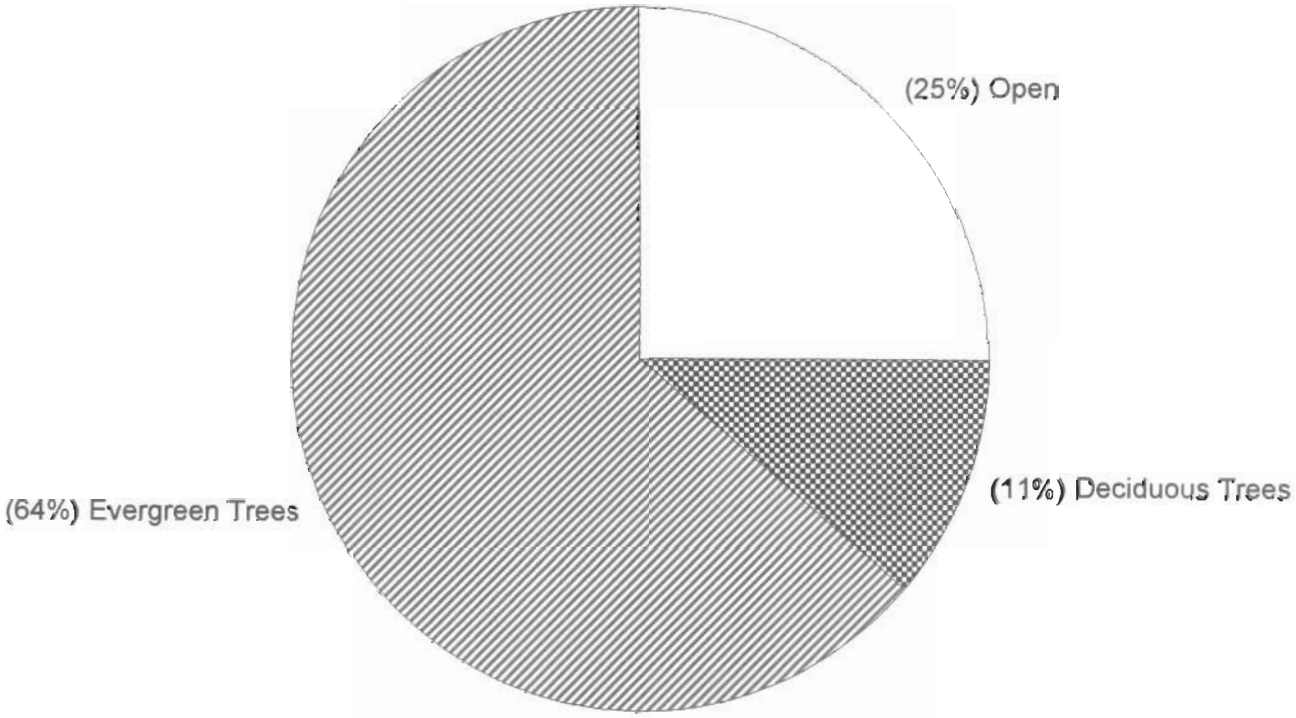


Value **1** = <25% Value 2 = 25-50% Value 3 = 51-75% Value **4** = >76%

Graph **7**

Fife Creek

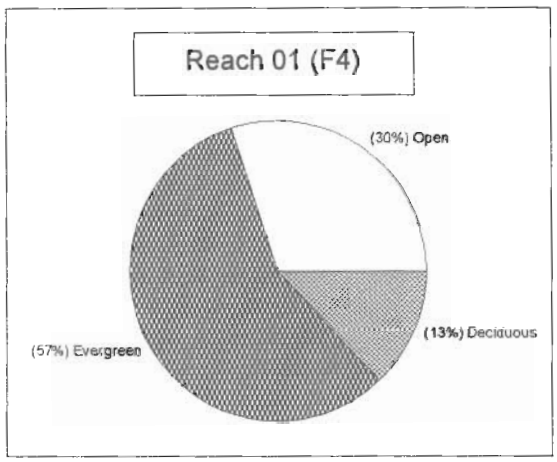
Mean Percent Canopy

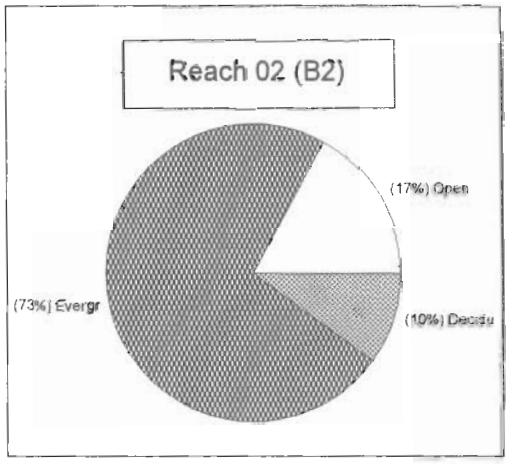


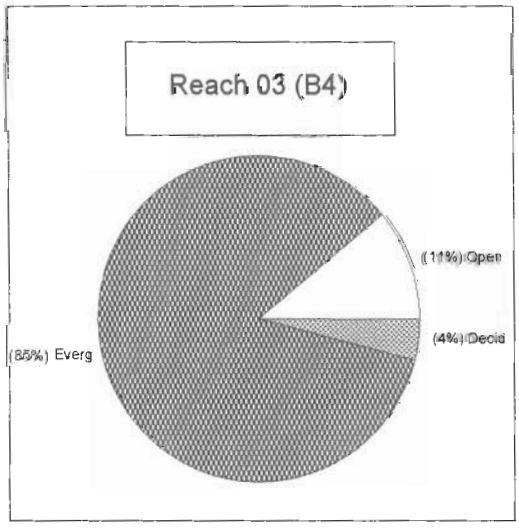
Graph 8

Fife Creek

Percent Canopy By Reach



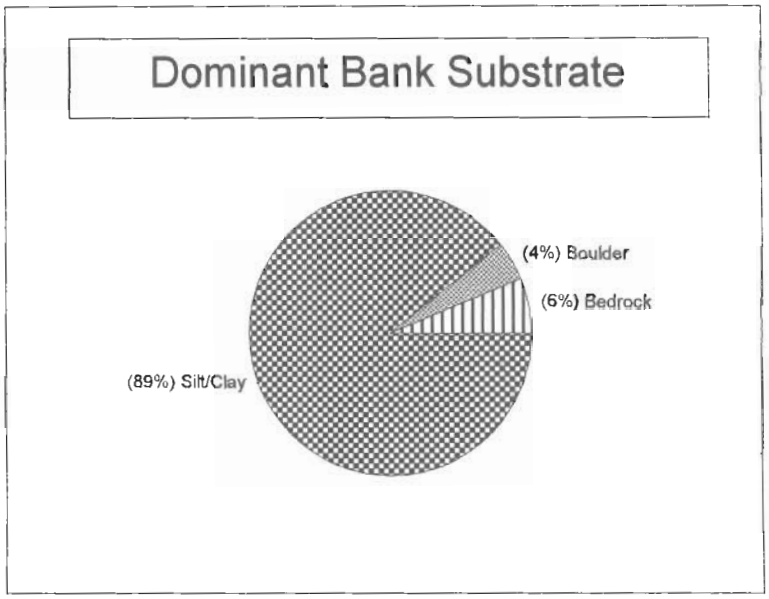


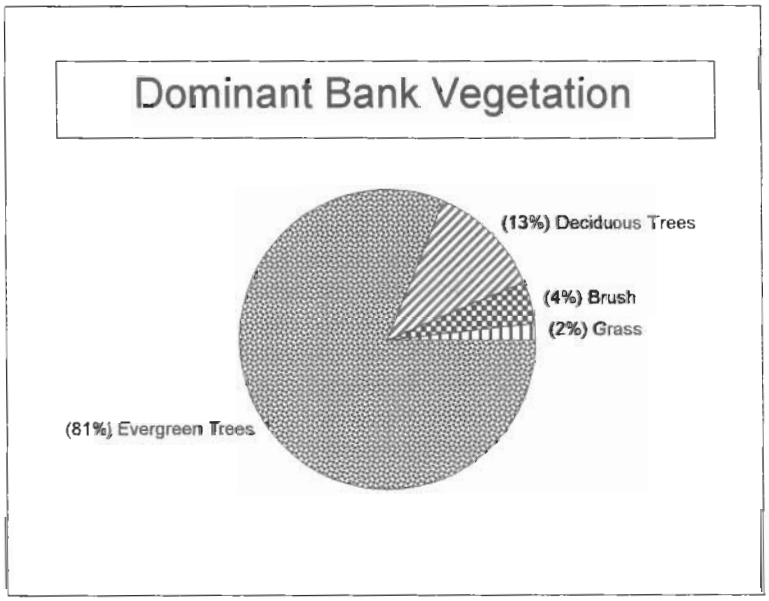


Graph 9

Fife Creek

Percent Bank Composition





Graph 10