CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Franz Creek
Report Revised April 14, 2006
Report Completed 1998
Assessment Completed 1997

INTRODUCTION

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

Franz Creek is a tributary to Maacama Creek which flows to the Russian River, located in Sonoma County, California (see Franz Creek map, page 2). The legal description at the confluence with Maacama Creek is T9N, R8W, S20. Its location is 38°36'45" N. latitude and 122°46'17" W. longitude. Year round vehicle access exists from HWY 128 to Chalk Hill Rd, and HWY 128 to Franz Valley Road.

Franz Creek and its tributaries drain a basin of approximately 18.9 square miles. Franz Creek is a third order stream and has approximately 17.7 miles of blue line stream, according to the USGS Healdsburg and Mark West Springs 7.5 minute quadrangles. Major tributaries include the Thorton Branch which is described in a separate stream report. Summer flow was measured as approximately 0.046 cfs at Bridge #2. Elevations range from about 365 feet at the mouth of the creek to 1180 feet in the headwaters. With the exception of the first mile, which is a flat valley, the creek flows through a low gradient U-shaped canyon. Vineyards and other agriculture dominate the watershed, but there are zones of grassland and oak-woodland in the upper watershed. The predominant vegetation throughout the area is second growth redwood, oak, alder, bay, manzanita, pine, madrone, and Douglas fir. The watershed is entirely privately owned.

METHODS

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

1. Flow:

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

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the California Salmonid Stream Habitat Restoration Manual. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity.

3. Temperatures:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in Fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures are also recorded using remote Temperature recorders which log temperature every two hours, 24 hours/day.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "DRY". Franz 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 Franz Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). Additionally, a rating of "not suitable" (NS) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Franz 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 Franz 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 Franz 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 Franz Creek include:

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

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game conducted a survey of Franz Creek on August 13 and 14, 1973. This survey was a complete survey that started at the mouth and ended at the headwaters. At the time of the survey, the creek was intermittent throughout. About one-half of the entire stream length was dry. The flow was estimated to be less than 0.5 cfs in flowing sections. The water temperatures ranged from 63°F to 75°F and the air temperatures ranged from 76°F to 84°F.

The substrate consisted of 45% cobble/gravel, 25% silt, and 30% sand throughout the stream. Some boulders were observed in the middle section of the stream. From the mouth to one mile above the mouth, 25% of the streambed was estimated to be suitable for spawning, only 10% on the above upper stream reach. Stagnant pools were present throughout the entire length fed by underground seepage. A small amount of shelter was provided by undercut banks and rocks.

In the upper reaches, two log jams and a six-foot high falls, all passable to adult steelhead during high water, were noted. Two diversions were also observed 1/4 mile above Chalk Hill Road bridge. Both utilized 6-inch pipes with fish screens and pumps. A third diversion was noted 1/2 mile above the bridge which was removing underground water. Turbid water was noted, possibly due to livestock pollution and naturally occurring minerals.

HABITAT INVENTORY RESULTS

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

The habitat inventory of Franz Creek was conducted from 09/10/97 to 11/09/97 by S. Nossaman, S. Carey, M. Miller and S. Tarbell (AmeriCorps). The survey began at the mouth and extended up Franz

Creek to the end of landowner access permission. The total length of the stream surveyed was 53,904 feet, with an additional 1,523 feet of side channel.

Flow was estimated to be 0.046 cfs during the survey period.

This section of Franz Creek has nine channel types: from the mouth to 16155 feet an F4; next 1954 feet an F2; next 5136 feet an F3; next 3900 feet a D3; next 12655 feet an F3; next 5605 feet a B3; next 786 feet a G2; next 2378 feet a B3 and the upper 5336 feet a G1.

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

F2 channel types are similar with a predominately boulder substrate.

F3 channel types are similar with a predominantly cobble substrate.

D3 channel types are multiple channels with longitudinal and transverse bars. They have a very wide low gradient (<2%) channel with eroding banks and a predominantly 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.

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.

G1 channel types are similar with a predominantly bedrock substrate.

Water temperatures during the field inventory ranged from 45°F to 71°F. Air temperatures ranged from 44°F to 79°F. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder at the Franz Valley Road Bridge (Bridge #3) logged temperatures from July 1 - September 20, 1997. The highest temperature recorded was 68°F in July and the lowest was 58°F in September. Another recorder near Franz Valley School Road Bridge (Bridge #6) logged temperatures every 2 hours from July 1 - September 20, 1997. The highest temperature recorded was 65°F in

July and the lowest was 57°F in September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 42% pool units, 38% flatwater units, 10% riffle units, and 10% dry streambed units. Based on total **length** there were 46% flatwater units, 28% pool units, 21% dry streambed units, and 5% riffle units (Graph 1).

Five hundred thirty three habitat units were measured and 23% were completely sampled. Seventeen Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were runs at 25%, mid-channel pools 14%, step runs 11% and root wad scour pools 11% (Graph 2). By percent total **length**, runs made up 31%, dry streambed 21%, step runs 13%, and mid-channel pools 10%.

Two hundred twenty six pools were identified (Table 3). Scour pools were most often encountered at 62%, and comprised 62% 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. Seventy five of the 226 pools (33%) had a depth of three feet or greater (Graph 4). These deeper pools comprised 12% 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 22. Riffle had the lowest rating with 4 and flatwater rated 12 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 23, main channel pools rated 21, and backwater pools rated 10 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were root masses at 28%, small woody debris 18%, boulders 15%, and terr. vegetation 14%. Graph 5 describes the pool shelter in Franz Creek.

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

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

The depth of cobble embeddedness was estimated at pool tail-outs.

Of the 223 pool tail-outs measured, fifteen had a value of 1 (7%); 73 had a value of 2 (33%); 68 had a value of 3 (30%); and 67 had a value of 4 (30%). On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 71%. The mean percentages of deciduous and evergreen trees were 63% and 37%, respectively. Graph 8 describes the canopy for the entire survey.

For the entire stream reach surveyed, the mean percent right bank vegetated was 54% and the mean percent left bank vegetated was 58%. For the habitat units measured, the dominant vegetation types for the stream banks were: 56% deciduous trees, 24% evergreen trees, 10% grass, 9% brush and 1% bare soil. The dominant substrate for the stream banks were: 70% silt/clay/sand, 14% bedrock, 12% cobble/gravel and 4% boulder (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In the August 1973 survey, juvenile Sacramento squawfish were observed at a rate of 100/100' from the mouth to 7.75 miles upstream. Roach were observed at a rate of 25/100' and juvenile suckers were observed at a rate of 10/100'. Bluegills were observed from the mouth to approximately 5.75 miles upstream at a rate of 50/100'. Three juvenile salmonids were also observed in the upper reaches of the creek. Unidentified frogs and salamanders were also observed during the survey.

On 10/22/1997 and 10/31/1997 a recent biological inventory was conducted in four sites of Franz 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 air temperature ranged from 64°-70°F and the water temperature from 52°F. to 60°F. The observers were Marc Miller, Paul Campo, April Richards, Stephanie Carey, Todd Parlato (AmeriCorps), and Bob Coey (DFG).

The inventory of Reach 3 was conducted at GPS location 32 (38° 36' 848":122° 43' 057") and continued for approximately 627 feet. In pool, backwater pool, glide, run, low gradient and high gradient riffle habitat types two 0+ steelhead were observed along with more than 60 Chappal, two sculpin, more than 60 Sacramento sucker, 2 Yellow legged frogs, and 3 stickleback.

The inventory of Reach 5 started at the confluence with Bidwell

Creek and ended approximately at habitat unit #237. In riffle and pool habitat types nine 0+, and one 1+ steelhead were observed along with eight sculpin, 26 California Roach, one bluegill, and 80 juvenile squawfish.

The inventory of Reach 6 started in habitat unit #387 and continued for approximately 566 feet upstream. In riffle and pool habitat types four 0+,and twenty 1+ steelhead were observed along with 25 Sacramento squawfish, 28 sculpin, two California roach, three Sacramento sucker, and 20 freshwater shrimp.

The inventory of Reach 7 started in habitat unit # 398 and continued for approximately 460 feet upstream. In riffle and pool habitat types ten 0+, and fifteen 1+ steelhead were observed along with 22 Chappal, 22 sculpin, and 1 Sacramento Sucker.

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**
1973,1997	Steelhead	DFG	N
1973,1997	Sacramento Squawfish	DFG	N
1997	Sculpin	DFG	N
1997	Roach	DFG	N
1973,1997	Sacramento Sucker	DFG	N
1997	Three-spine Stickleback	DFG	N
1973,1997	Bluegill	DFG	I
1997	CA Freshwater Shrimp	DFG	N
1997	Crayfish	DFG	N
1997	California Newt	DFG	N
1997	Yellow-legged Frog	DFG	N

Historical records reflect that fish rescue/transfer operations occurred in 1959, 1960, 1961, 1962, 1963, 1964, 1966, 1967, 1968, 1969, 1970, and 1971.

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

YEAR	LOCATION	SOURCE	SPECIES	#	SIZE
1959	Big Sulphur Cr	Franz Cr	SH	3,060	FING
1959	Sausal Cr	Franz Cr	SH	22,069	FING
1960	Sausal Cr	Franz Cr	SH	4,529	FING
1961	Little Sulphur Cr	Franz Cr	SH	5,251	FING
1962	Big Sulphur Cr	Franz Cr	SH	4,380	FING
1963	Russian River	Franz Cr	SH	2,740	FING
1964	Little Sulphur Cr	Franz Cr	SH	2,108	FING
1964	Russian River	Franz Cr	SH	9,026	FING
1966	Russian River	Franz Cr	SH	4,120	FING
1967	Russian River	Franz Cr	SH	1,460	FING
1968	Russian River	Franz Cr	SH	11,072	FING
1969	Russian River	Franz Cr	SH	3,906	FING
1970	Russian River	Franz Cr	SH	5,125	FING
1971	Russian River	Franz Cr	SH	3,722	FING

SH = steelhead

ADULT SURVEYS:

A spawning survey was conducted in Franz Creek on 3/3/1998, beginning at Knights Valley Creek crossing and extending 2,340' upstream to the confluence with Bidwell. No fish or redds were observed.

The survey was continued in Franz Creek, 403' downstream of unit #461 and extended 200' upstream of unit #472. One 1+ steelhead was observed however, no redds or adult fish were observed.

Another spawning/carcass survey was continued in Franz Creek on 3/10/1998. This survey began at the Franz Valley School Road Bridge and continued to the confluence with Thorton Creek. One 18"

steelhead carcass was observed, (sex unidentifiable). One redd and one possible redd were observed near the carcass.

DISCUSSION

Franz Creek has nine channel types: F4 (16155 ft.), F2 (1954 ft.), F3 (5136 ft.), D3 (3900 ft.), F3 (12655 ft.), B3 (5605 ft.), G2 (786 ft.), B3 (2378 ft.) and G1 (5336 ft.).

There are 16,155 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 1954 feet of F2 channel type in Reach #2. According to the DFG Salmonid Stream Habitat Restoration Manual, F2 channel types are fair for low-stage weirs, single and opposing wing-deflectors and log cover.

There are 17791 feet of F3 channel type in Reach #3 and #5. According to the DFG Salmonid Stream Habitat Restoration Manual, 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. Many site specific projects can be designed within these channel types, especially to increase pool frequency, volume and shelter.

There are 3900 feet of D3 channel type in Reach #4. According to the DFG Salmonid Stream Habitat Restoration Manual, D3 channel types are fair for bank-placed boulders, single and opposing wing-deflectors and channel constrictors. They are poor for low and medium-stage weirs, boulder clusters and log cover.

There are 7983 feet of B3 channel type in Reach #6 and #8. According to the DFG Salmonid Stream Habitat Restoration Manual, 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 6122 feet of G1/2 channel type in Reach #7 and #9. According to the DFG Salmonid Stream Habitat Restoration Manual, G1/2 channel types are fair for log cover. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

The water temperatures recorded on the survey days 09/10/97 to 11/09/97 ranged from 45°F to 71°F. Air temperatures ranged from 44°F to 79°F. The warmer water temperatures were recorded in Reach 1. These 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 58° to 68°F near bridge #3 and 57° to 65°F at bridge #6. The Temperature Summary graph shows that for part of the summer (July) the lower watershed exhibited temperatures above the optimal for salmonids.

It is unknown if this thermal regime is typical, but our electrofishing samples found steelhead more frequently in the upper, cooler sample sites. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months, and more extensive biological sampling conducted.

Pools comprised 28% of the total **length** of this survey. In third and fourth order streams a primary pool is defined to have a maximum depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In Franz Creek, the pools are relatively shallow with 33% having a maximum depth of at least 3 feet. These pools comprised 12% of the total length of stream habitat. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 22. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by root masses (28%), small woody debris (18%), boulders (15%), and terr. vegetation (14%). Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Ten of the fourteen low gradient riffles measured (71%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Sixty one percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 7% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In a reach

comparison, Reaches 8 and 9 had the best ratings and Reaches 1 through 7 had the poorest ratings.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. In Franz Creek Reaches 1 through 7 sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 71% and ranged from 53% to 89%. 80% is generally considered desirable. Cooler water temperatures are desirable in the lower reaches of Franz Creek. Elevated water temperatures could be reduced by increasing stream canopy. The large trees required for adequate stream canopy would also eventually provide a long term source of large woody debris needed for instream shelter and bank stability.

SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. Steelhead were documented consistently during each past survey year. Overall, very few fish were observed during the electro-fishing and carcass/spawning surveys. The 1997 fall electro-fish surveys documented minimal 0+ fish indicating unsuccessful spawning in the lower reaches of Franz Creek. Few 1+ fish were observed indicating poor rearing conditions the year before or poor holding-over conditions in general. Fish numbers and quality of habitat generally increases in an upstream direction. Overall, habitat conditions for both steelhead and coho have declined over time.

In general, Reaches 1-5 of Franz Creek are marginal for salmon and steelhead habitat. Some long, deep sections of the stream occur which may be used as rearing habitat, however, shelter is lacking and stream temperatures are high. Little riffle habitat exists for spawning, and what does exist is unsuitable for spawning due to high gravel embeddedness.

Upstream of the Thorton Creek confluence conditions are better, where spawning and rearing habitat exists, canopy shading is higher, although instream shelter is still lacking and stream bank erosion is prevalent due to channel down-cutting. However, many opportunities and alternatives exist for habitat improvement due to the more stable channel type. Reaches 4 and 5 are excellent for many types of low and medium stage instream enhancement structures. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume

and shelter.

The best rearing habitat in the watershed exists within the upper portion of Franz Creek, although spawning gravels are more limited due to the natural geomorphology.

GENERAL RECOMMENDATIONS

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

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

SPECIFIC FISHERY ENHANCEMENT RECOMMENDATIONS

1) Vineyard cross-fencing at habitat units 305 and 325 (Reach 5) inhibits adult migration. Salmonid migration is inhibited until the high flows remove the deer fencing as barriers. A floating fence should be installed at each location in order to allow access for migrating salmonids.

2) There are at least three sections (Reaches 1, 2, and 3) where the stream is being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.

3) Increase the canopy on Franz Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reaches 1,2,3,5,and 6). The reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

4) Map sources of upslope and in-channel erosion, 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. Biotechnical techniques could be utilized in aggraded portions to reclaim the floodplain and decrease channel width to increase riparian vegetation and gravel transport. 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.

5) In Franz 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.

6) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. This must be done where the banks are stable (Reaches #6 and #8) or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

7) Where feasible, design and engineer pool enhancement structures to increase the number of pools in the lower reaches. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

PROBLEM SITES AND LANDMARKS - FRANZ 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.

The Franz Creek habitat survey started 1607 feet from the mouth.

HABITAT UNIT#	STREAM LEN (FT)	COMMENTS
1.00	1575	NO ACCESS-Map Wheeled.
2.00	1607	START SURVEY. Dry Tributary left bank.
3.00	1648	Bank erosion left bank-see form. 0+ SHD(?)
4.00	1851	Dry tributary left bank.
5.00	1869	Juv. squaw, suckers.

6.00	2165	Road crossing. Vehicle tracks in creek.
7.00	2260	Evidence of tree and brush cutting.
8.00	2296	Gravel beach, right bank.
9.00	2912	DSC, old car,and gravel beach, on right bank. Erosion and dry trib. on left bank.
11.00	4698	Water diversion, trail, and 20' concrete rock wall on right bank. Erosion (form) left bank. Dry trib. (2) left bank.
12.00	4711	High amount of silt in water.
13.00	4812	Bridge #2. Wire fence across creek.
14.00	4858	Cow feces in creek.
15.00	4938	Juv. roach, suckers. Cow feces.
16.00	5010	Cow feces
19.00	5567	DSC right bank. Rip-rap left bank (150'Long X 10' High).
21.00	6012	Dry trib. and DSC right bank. Next to Thomas Road, left bank.
22.00	6055	Boulder rip-rap on left bank.
24.00	6389	Boulder rip rap on left bank. Fish trap in creek bed.
28.00	7292	Crayfish, frogs.
29.00	7727	Cow feces. Streambed aggraded-base of alders covered with up to 3' of gravel.
30.00	7759	Crawdad. 8" culvert left bank. Water covered with gray film. Vineyards on left bank. Rip rap (100'Long X 10'High) left bank.
31.00	8342	DSC right bank. Vineyard left bank.
33.00	8697	Drainage pipe with small amount of water, left bank.
38.00	9640	DSC, right bank. Cow feces throughout channel.
39.00	9693	Green, cloudy water. Blowout, right bank-sheet.
40.00	10237	Small dry trib., right bank. Left bank denuded. DSC, right bank.
41.00	10326	Garter snake. Water is dark brown, possibly from cows. Fresh water snails.
42.00	10665	Fence across creek. Wide open channel with very little vegetation. Dry trib. right bank.
43.00	10739	Lots of silt. Road right bank (private-no access). Dirt piled on right bank.
44.00	10793	Row of young alder for 200', on

		right bank.
45.00	10960	DSC, right bank.
48.00	11197	Water is dark brown. Adult and juv. squaw and suckers.
49.00	11321	Barn on right bank.
50.00	11438	Crayfish. Two dry trib's, right bank.
51.00	11668	Pink house up on hill, right bank. Cow feces.
54.00	11823	Dry trib., right bank.
55.00	11888	Large dry trib., right bank.
57.00	12121	DSC, left bank.
58.00	12210	DSC, left bank.
59.00	12411	Cow feces. Old crossing. Water diversion pipe across creek.
61.00	12590	Road crossing, left bank.
62.00	12636	Juv. squaw. 2-6" squaw.
63.00	12869	Dry trib., left bank. Cow feces.
64.00	12927	Pipe hanging over creek.
67.00	13038	Dry trib., left bank. DSC, left bank.
68.00	13085	DSC, left bank.
69.00	13188	DSC, both banks.
70.00	13225	DSC, both banks.
72.00	13405	Cow feces.
75.00	13558	Great blue heron. Crawdad. Dry trib., right bank.
76.00	13633	Dry trib., right bank. DSC, left bank.
77.00	13734	DSC, left bank.
78.00	13951	DSC, left bank.
79.00	14038	Cow feces.
82.00	14220	Juv. roach and squaw. Old slide: 85'L X 75'H X 15'D, on left bank.
84.00	14360	Cow feces.
86.00	14450	Cow feces.
94.00	14857	Left bank eroded down to bedrock, top 1/3 active.
95.00	14909	Two small drainage trib's, left bank.
97.00	14985	Large dry trib., left bank-gravel built up at mouth.
101.00	15352	Small dry trib., left bank.
106.00	15676	Slide on right bank-see sheet.
107.00	15715	Crayfish.
109.00	15882	Cow feces throughout channel.
110.00	15951	Dry trib., right bank.
111.00	16001	Cows in creek.
112.00	16097	Erosion on right bank-see sheet. River otter scat, crawfish

		pinchers. Dry trib., right bank.
113.00	16162	Fresh water snails. Sunfish, 100's of squaw, roach, suckers.
114.10	16362	Yellow-legged frog
115.00	16422	1+ SHD (?)
116.00	16609	Dry trib., right bank.
118.00	16706	Dozens of tiny frogs.
122.00	17012	Dry trib., right bank.
123.00	17109	Dry trib., right bank.
134.00	17741	Slide on right bank: 20'H X 10'L X 5'D. Very erodible bank.
137.00	18117	Dry trib eroded at mouth, right bank.
138.00	18172	Dry side-channel, right bank.
140.00	18342	River otter scat.
141.00	18367	Dry trib., left bank.
142.00	18436	Dry trib., left bank.
145.00	18798	Dry trib., right bank. Blow out left bank:35'L X 30'H X 20'D.
146.00	18865	Right bank is actively eroding shale and fines.
147.00	18894	Dry trib, right bank.
151.00	19266	Dry trib., right bank.
152.00	19313	Property fence across creek. Dry trib., left bank.
153.00	19653	Dry trib., right bank. Active slide, left bank: 50% bedrock, 200'L X 75'H X 15'D.
154.00	19862	Dry trib., left bank.
155.00	19905	100's of juv. Western Toads on banks.
158.00	20247	Dry trib, right bank.
159.00	20333	Cow feces.
160.00	20370	Fence, right bank.
161.00	20465	Fence, right bank (Unit #161 through #169)
162.00	20531	50(+/-) Frogs.
164.00	20718	River otter scat.
166.00	20851	Erosion delivering fines and slate, left bank.
167.00	20909	Dry trib., right bank.
168.00	21101	Tiny worms in tubes on creek bottom, 1,000+.
169.00	21223	Juv. roach and squaw.
170.00	21678	Dry trib., left bank. Cow feces.
172.00	21867	Cow feces.
176.00	22125	Dry trib., right bank.
178.00	22368	Dry side-channel, right bank.
179.00	22418	Road next to creek, left bank. Dry trib., left bank.

180.00	22509	Dry side-channel, left bank.
181.00	22931	Dry trib., left bank.
182.00	23104	Fence, right bank- (Unit #182 through #185)
184.00	23255	Dry trib., right bank.
186.00	23485	Dry trib., right bank. Juv. squaw.
187.00	23630	Dry trib., right bank. Dry side-channel, left bank. Fence, right bank.
188.00	23744	Dry side-channel, left bank. Fence, right bank.
189.00	24069	Fence, right bank. Dry side-channel both banks.
189.30	24069	Dry trib., right bank, with cattle fence at mouth. No fish in pool.
191.00	24313	Road left bank.
192.00	24374	Road left bank. Cattle trails on left bank.
193.00	24618	Small dry trib., right bank. Dry trib., left bank. Cow feces.
193.20	24618	Dry side-channel on left bank.
196.00	24944	Road left bank. Large dry trib. left bank.
197.00	25236	Dry trib., right bank. Dry side-channel right bank.
198.00	25431	Small dry trib., right bank.
199.00	25524	Dry trib. on left bank.
200.00	25710	Wood duck boxes. Road left bank.
201.00	25759	Dry side-channel right bank.
202.00	25954	Small dry trib. right bank.
203.00	26001	Excess silt.
204.00	26209	Blowout on right bank: 250'L X 5'H
204.20	26209	Dry trib. left bank.
204.40	26209	10+ Wood ducks.
205.00	26404	Right bank blow-out- (Unit #205 to 206): 20'L X 10'H X 10'D. Dry side-channel.
208.00	26850	Dry trib. right bank.
209.00	27159	Knight's Valley Ranch (Ogg) road crossing.
212.00	27665	Large dry trib. and road left bank. Electrical cable crosses creek.
213.00	27958	Water very dark and obscure.
214.00	28116	Rainy Day. Eroded banks along entire unit; mostly left bank. Road crossing in stream.
218.00	29121	Dry trib. left bank. Franz Valley Road Bridge at end of unit (see form).
219.00	29216	Franz Valley Road Bridge #3 at

		beginning of this unit.
220.00	29722	Bidwell creek mouth/confluence.
221.00	29774	Water mass has increased due to rain.
222.00	30150	Boulders placed above FPW for 150' on right bank. Possibly going to be used for rip rap? Dry trib. at end of unit, right bank.
223.10	30344	Large debris jam extending 75' upstream in side channel: 5'H X 14'W
227.10	30949	Dry trib. right bank.
229.00	31201	Dry trib. right bank. Old culvert laying in creek.
234.00	31451	River otter scat.
238.00	31919	Dry trib. right bank.
241.00	32475	Juv. squaw and suckers.
242.00	32595	Possible substrate change.
257.00	33580	Juv. squaw and suckers.
258.00	34127	Small deposit of orange substance (fungus?) Located at end of run: 1'L X 1'W.
259.00	34187	Orange fungus on edge at end of wetted channel.
261.00	34321	Algae bloom at start of unit.
262.00	34372	12" culvert sticking 8' out from right bank.
263.00	34490	Algae.
264.00	34538	Juv. squaw and roach. Algae.
265.00	34700	Algae.
266.00	34744	Juv. squaw and roach. Algae.
268.00	34825	Algae. Juv. roach and squaw.
269.00	35061	Dry trib. left bank-culvert sheet-cobble agraded at bottom of trib.
270.00	35105	Franz Valley Road left bank.
271.00	35294	12" culvert left bank. Franz Valley Road (unit#271 through #273).
272.00	35327	Vertical left bank.Dirt road right bank.
273.00	35667	Vertical left bank, 10'H. Dirt road right bank. Franz Valley road, left bank.
274.00	35729	Dirt road right bank (unit#274 through #278).
275.00	35861	Dry trib. left bank-build up of cobble at mouth of trib.
277.00	36019	Fence left bank (beginning to fall into creek).
279.00	36383	Bridge #4. Dirt road right bank.

280.00	36404	Juv. squaw and roach.
285.00	36607	Blown out fence, used to cross creek.
286.00	36626	Old culverts (24"W X 2'L), stacked in two rows along right bank (75'L)
291.00	36920	Frog.
296.00	37178	Vineyard right bank, dry side-channel right bank.
300.00	37479	Crayfish, river otter scat. Vineyards right bank (Unit #300 through 305).
301.00	37584	Trail with steps left bank. Dry trib. left bank. Boulder rip rap left bank (15'L).
302.00	37697	Erosion right bank (20' X 20'H X 5'D).
304.00	37958	Polliwog(z). High amount of silt. Concrete rip rap left bank (15'H X 15'L)
305.00	37976	Vineyard fence across creek at end of unit-barrier fence (6'H).
306.00	38011	No trees on right bank, covered with blackberry. Vineyard right bank. Very silty water.
307.00	38135	Pile of concrete on right bank (5'H X 10'L)
308.00	38159	Vineyards on both banks. Water diversion pipe hanging across creek. Very silty water. No trees, only brush on left bank.
309.00	38191	Vineyards both banks (Unit#309 through #314).
310.00	38231	No trees on left bank, only brush. Water is very silty. Boulder rip rap left bank (20' X 8'). Juv. squaw and roach.
311.00	38320	Orange fungus.Oil floating on water. Unit clogged with cat-tails and willow. No trees on either bank. Rip rap (30' X 8')
312.00	38350	Algae blooms.
313.00	38751	Grass covers creek for first 50'. Algae. 75+ frogs. No trees. 12" culvert on right bank.
314.00	39091	Road crossing. Erosion around road crossing. Vineyard run-off pipe on left bank. Lack of riparian vegetation on both banks.
315.00	39239	Vineyards both sides. Grape and blackberry cover most of right

		bank. Dry trib. left bank. At mouth of trib. there are vineyards and erosion.
316.00	39289	House right bank. Vineyards left bank.
317.00	39334	Vineyards left bank. House right bank. Concrete foundation remains in creek.
319.00	39549	Houses and vineyards both banks.
320.00	39569	Bridge #5, bridge acts as canopy. Chemical smell.104' X 12' of wood dumped.
321.00	39671	Vineyards and blackberry on both sides.
322.00	39714	Vineyards left bank. Blackberry both banks. Rip rap left bank: 10' X 20'.
323.00	39750	Concrete blocks on left bank. Vineyards left bank.
324.00	39827	Concrete blocks in creek. Blackberry both banks. Rip rap and Vineyards, left bank.
325.00	39905	House, right bank. Unit ends with deer fence (possible fish barrier). End of R and L vineyard property.
326.00	39937	Dry Trib. right bank (fork?). House right bank.
327.00	39987	Apple orchard right bank, (Unit #327 to #328).
329.00	40114	Rip rap on left bank, falling into creek (30' X 15'). Blackberry on both sides. Film on water.
331.00	40284	12+ wood ducks. Blackberry on left bank (40' X 20')
333.00	40323	Erosion, right bank. blackberry.
334.00	40337	Erosion right bank. blackberry.
335.00	40358	Leaf litter is creating dark colored water. Erosive right bank.Blackberry.
336.00	40514	Many leaves in water.
337.00	40539	Many leaves in water.
339.00	40700	Bad erosion on right bank.
340.00	40724	Dead deer in creek.
342.00	40950	Leaves cover water-very dark water. Right bank very erosive.
345.00	41071	Huge redwood on right bank (31' diameter)
346.00	41083	Concrete dam at end of unit. Old road on right bank. Orchard right bank (Unit #346 through #350).

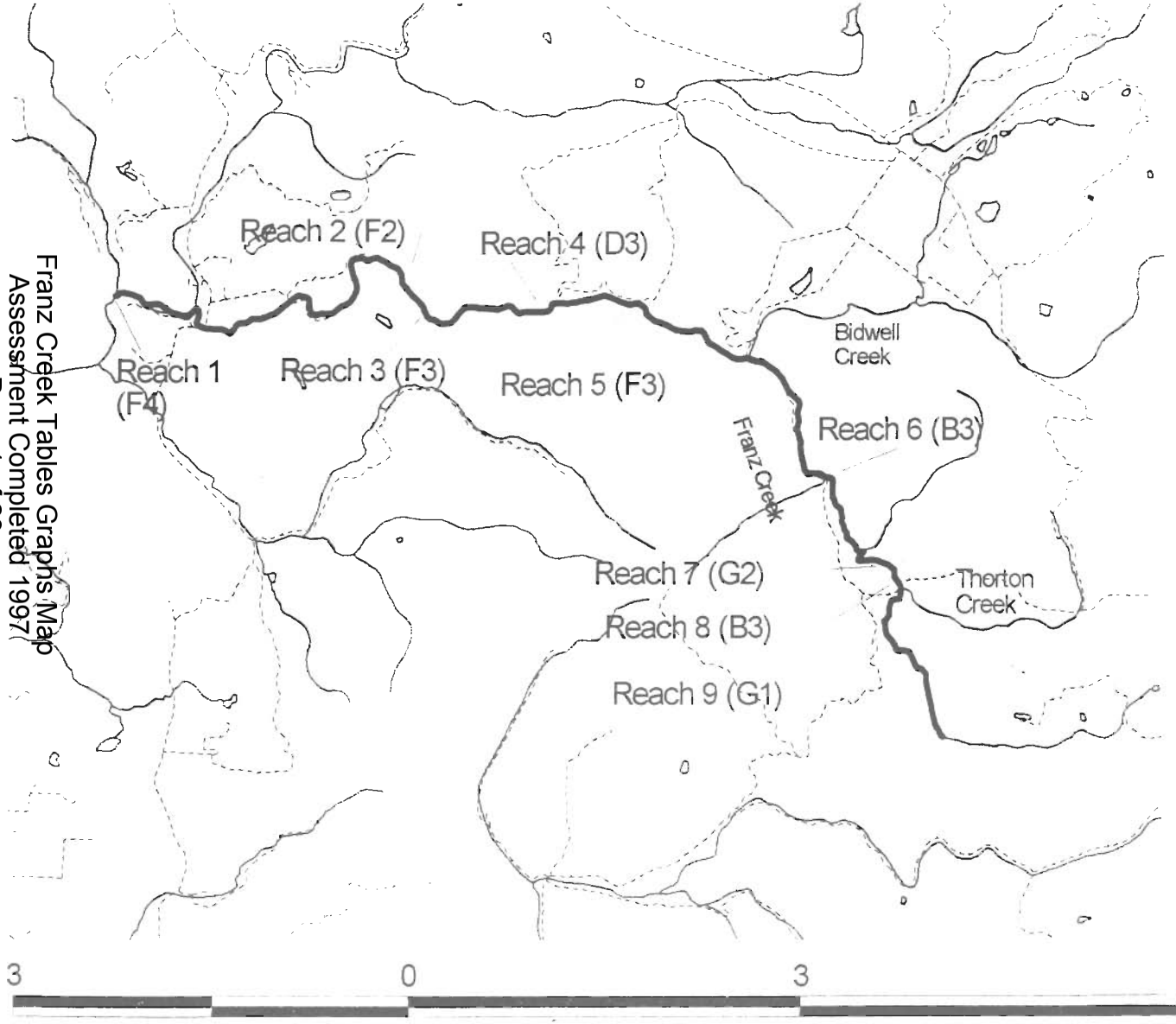
348.00 41178 Concrete chunks right bank (15' X 20')
351.00 41266 Large clearing right bank (Unit#351 through #354)
353.00 41434 Scummy film on water. Entering debris jam.
354.00 41478 Debris Jam (see form). Juv. roach.
356.00 41680 Tributary enters on right bank.
359.00 41913 Trailer left bank.
362.00 42149 Slimy gray 2" X 2" modules embedded in cobble. Busted fence left bank.
363.00 42187 Macro-invertebrates seen at pool tail. Busted fence left bank. Erosive left bank.
364.00 42243 Busted, blown over fence on left bank. Erosive left bank.
365.00 42299 Blown over fence. Wild Turkey heard.
366.00 42325 Erosion left bank. Blown out fence, left bank.
367.00 42390 7 logs span creek. Apple orchards right bank. Debris pile of branches (25' X 20).
368.00 42405 Apple orchards on right bank.
369.00 42433 Erosive right bank. Blackberry both banks.
371.00 42511 Apple orchard on right bank. Submerged fence, left bank.
372.00 42626 10(+/-) logs clustered together. Bridge #6. Juv. roach and squaw.
373.00 42657 Vineyards right bank.
374.00 42739 Vineyards on right bank. Vinca covers both banks. Blackberry covers right bank.
376.00 42811 Wet trib (Thorton Branch), right bank. Thorton Temp.=50°F Franz Temp.=59°F
377.00 44385 NO ACCESS. Map wheeled.
378.00 44423 Begnal Property begins.
380.00 44512 23' wide concrete road crosses creek. Two 8" pipes pass creek water under road.
381.00 44531 No flowing water in pool.
383.00 44636 Brush pile (30'L X 20'H) on right bank. Brush pile (40'L X 20'H) on left bank. 5.5' high pedestrian bridge. Trailer left bank. Erosion and debris left bank. Metal posts

		and wire mesh fence holds back debris on left bank. Piped water flowing into creek, left bank.
384.00	44888	Bank stabilizing 3'6" high metal fence continues.
385.00	44914	Bank stabilizing 3'6" high metal fence continues.
389.00	45065	Erosion, left bank.
392.00	45157	Erosion right bank.
393.00	45191	Large (15' X 15') redwood root mass.
399.00	45683	Erosion right bank. Juv. squaw.
400.00	45841	1 0+SHD. Concrete dam #3.
401.00	45873	7' X 7' orange film on water.
405.00	46076	Dry trib., left bank.
411.00	46431	Minor pedestrian trail crossing.
413.00	46482	Dry trib. right bank.
414.00	46546	Debris jam: about 30'L X 40'W. Property access ends.
415.00	48120	NO ACCESS. Map Wheeled.
416.00	48148	Pressey property begins. Huge boulder, 30' X 30', marks beginning of Pressey property.
417.00	48188	Huge boulder covers most of unit.
422.00	48452	Dry Trib. right bank.
425.00	48601	Four white slimy blobs, 4" X 4". Film on water.
430.00	48950	Wet trib. at end of unit. Franz water temp.=52°F, Intermittent trib. water temp.=48°F
435.00	49255	Wet trib. 30' into unit, left bank Franz Water Temp.=52°F Trib. Water Temp.=50°F
439.00	49419	Bedrock left bank, (unit #439 through #441).
440.00	49466	Many Horsetails on right bank.
443.00	49523	Spring on right bank.
446.00	49785	Dry trib. left bank.
448.00	49927	Vertical bedrock (15'H) on right bank.
449.00	50066	Dry trib., left bank.
450.00	50112	3' X 2' Orange custard substance at mouth of miniature trickle, sulfur spring?
451.00	50227	Dry trib., right bank.
452.00	50314	Vertical bedrock wall, (10-20'H), left bank, spans unit.
453.00	50361	1+ SHD.

454.00	50410	Vertical bedrock wall, 10-20'H, spans unit.
456.00	50596	10'-30' Bedrock wall spans 3/4 of unit.
460.00	50815	Two intermittent trib.'s left bank. Franz Water Temp.=52°F #1 Intermittent Trib. Water Temp.=60°F #2 Intermittent Trib. Water Temp.=57°F
466.00	51429	10-60' Exposed bedrock wall fills entire left bank of unit.
467.00	51510	Redwood groves on right bank (Unit #467 through #470)
479.00	52053	Dry trib., left bank. Sharp grass, right bank
480.00	52084	SHARP GRASS BOTH BANKS.
481.00	52126	Sharp grass cover creek and banks.
483.00	52265	Sharps grass in creek on mounds of earth.
486.00	52336	Orange slime 2' X 2' (sulfur?)
487.00	52474	Dry trib. right bank. Pieces of old dam. Orange slime 2' X 1'
494.00	53033	Two wet trib.s, right bank. Dry trib., left bank.
500.00	53194	Trail.
503.00	53466	Dry trib., left bank. (2).
507.00	53828	A few tires on bank. Lots of bunch grass in creek. Broken drip line hose in creek.
509.00	53943	AFTER UNIT #509- END OF ACCESS, END OF SURVEY.

END SURVEY
The Franz Creek habitat survey ended because of lack of landowner access.

Franz Creek



Inland Fisheries Division
Department of Fish and Game
1997

Franz Creek Survey
Roads
Streams

N
W
E
S

Franz Creek Tables Graphs Map
Assessment Completed 1997
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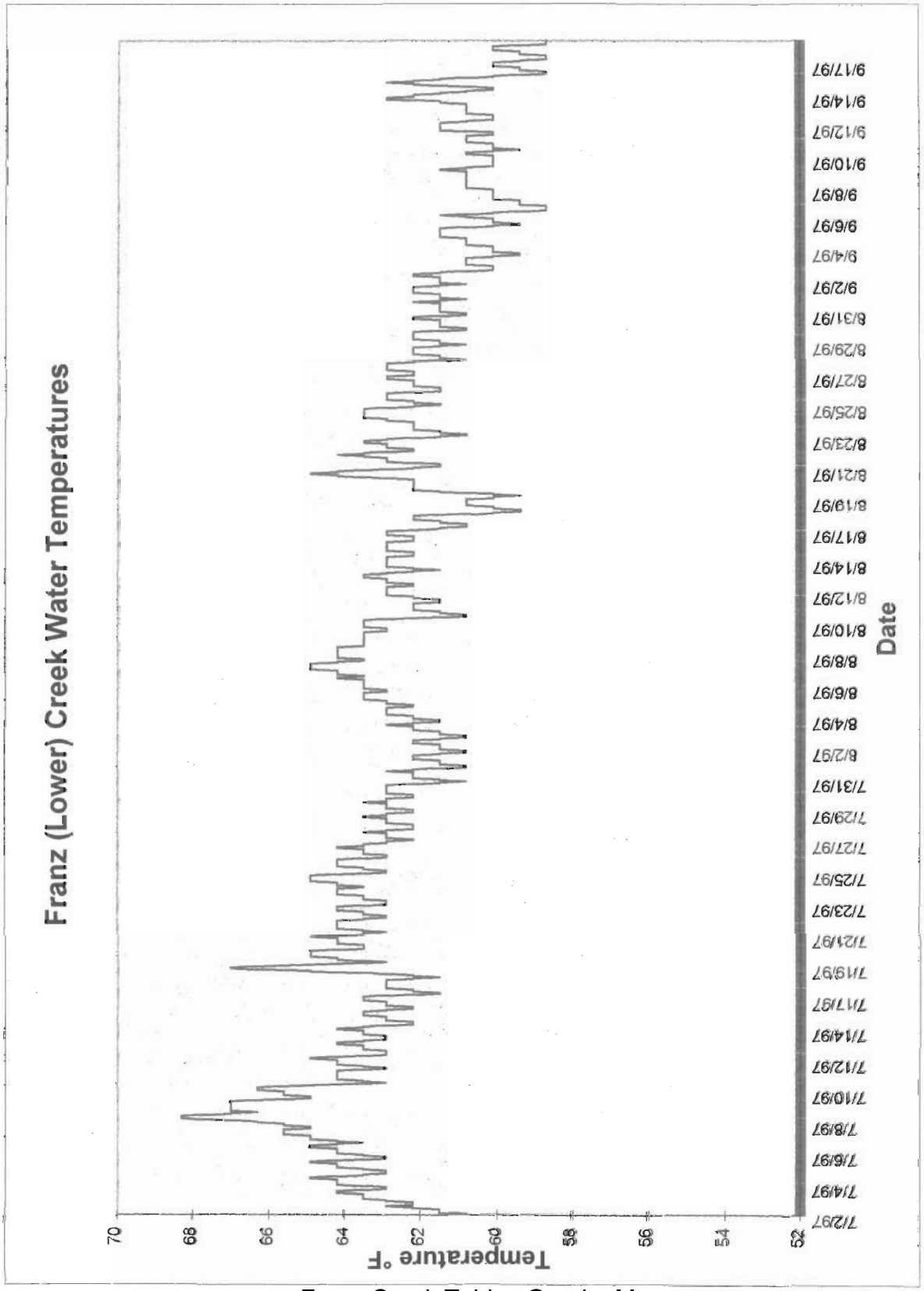
Franz (Lower) Creek Water Temperatures
Temperature °F
70
68
66
64
62
60
58
56
54
52
Date
7/2/97
7/4/97
7/6/97
7/8/97
7/10/97
7/12/97
7/14/97
7/17/97
7/19/97
7/21/97
7/23/97
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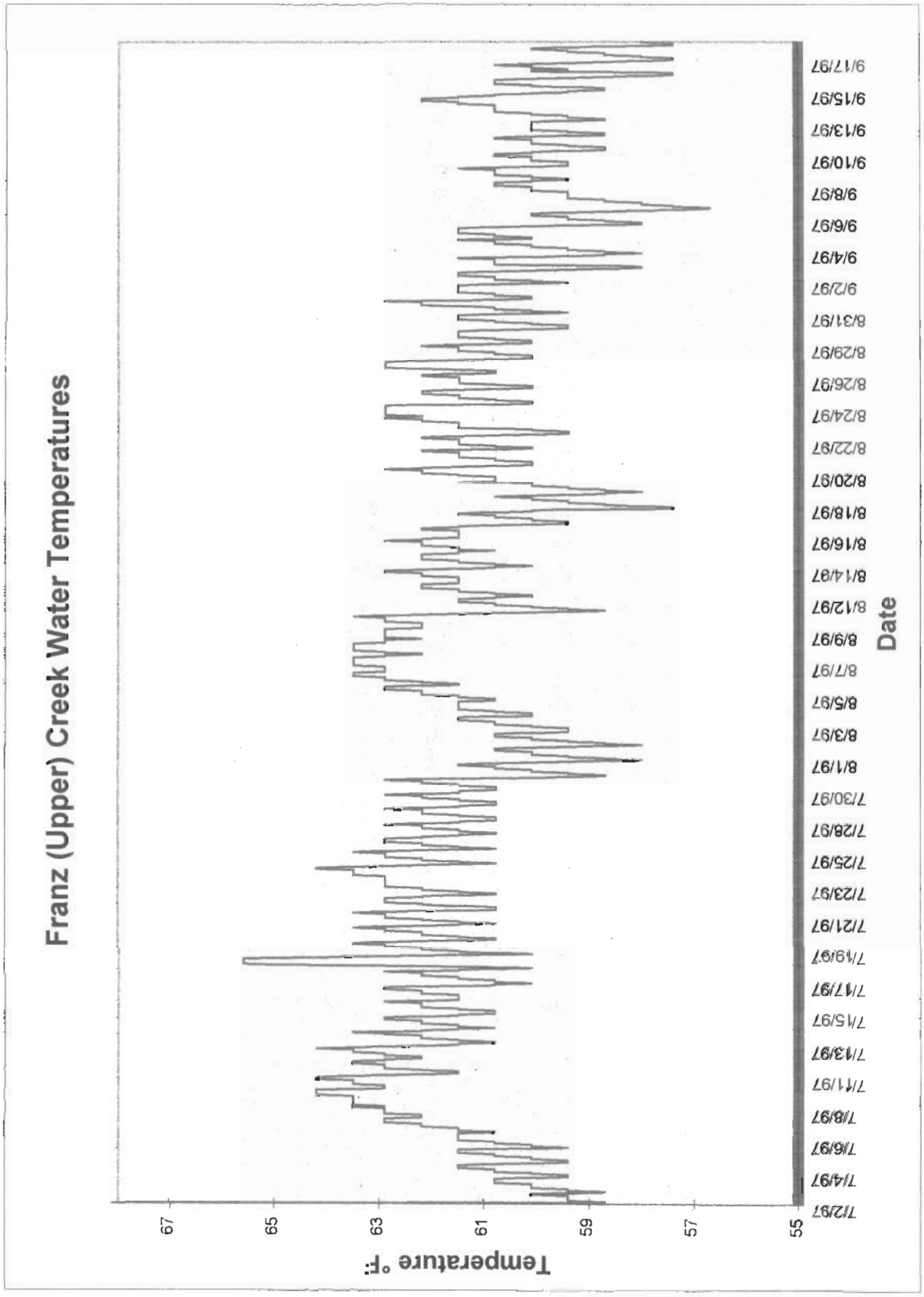
Franz (Upper) Creek Water Temperatures
Temperature °F:
67
65
63
61
59
57
55
Date
7/2/97
7/4/97
7/6/97
7/8/97
7/11/97
7/13/97
7/15/97
7/17/97
7/19/97
7/21/97
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9/8/97
9/10/97
9/13/97
9/15/97
9/17/97

Franz Creek

Drainage: Russian River

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

Survey Dates: 09/10/97 to 11/09/97

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	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
52	19	RIFFLE	10	55	2849	5	7.3	0.3	309	16064	152	7901	0	4
203	35	FLATWATER	38	125	25289	46	10.3	0.5	1049	212939	678	137731	0	12
226	71	POOL	42	69	15529	28	14.0	1.5	1056	238633	1789	404283	1506	22
51	0	DRY	10	229	11684	21	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.)
532	125	55350	467637	549915

Franz Creek

Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/10/97 to 11/09/97

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

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 %
43	14	LGR	8	57	2454	4	6	0.3	0.9	301	12938	130	5584	0	4	74
5	3	CAS	1	24	122	0	10	0.5	2.1	118	592	41	205	0	7	91
4	2	BRS	1	68	274	0	11	0.6	2.1	651	2605	418	1670	0	3	65
13	6	GLD	2	73	943	2	17	0.7	1.4	1746	22702	1383	17984	0	13	77
130	15	RUN	24	130	16892	31	11	0.5	1.5	935	121537	605	78617	0	6	67
60	14	SRN	11	124	7455	13	7	0.5	1.8	892	53501	475	28509	0	19	78
77	17	MCP	14	69	5309	10	14	1.6	6.5	1118	86120	2006	154436	1725	21	67
3	3	CCP	1	52	157	0	17	1.2	2.3	793	2380	1030	3089	882	13	80
4	3	STP	1	84	335	1	8	1.1	2.8	547	2187	564	2255	371	15	85
3	3	CRP	1	57	172	0	17	2.0	4.0	937	2810	1883	5648	1500	13	67
1	1	LSL	0	16	16	0	13	1.5	2.3	208	208	312	312	250	10	90
58	19	LSR	11	82	4765	9	14	1.4	5.4	1372	79602	2272	131800	1970	29	78
45	11	LSBk	8	62	2804	5	12	1.5	5.8	771	34716	1239	55764	1021	18	71
30	10	LSBo	6	61	1841	3	15	1.5	6.8	926	27793	1555	46646	1081	23	76
4	3	PLP	1	26	105	0	25	1.5	3.5	573	2292	886	3545	574	16	93
1	1	DPL	0	25	25	0	21	1.5	2.9	525	525	788	788	0	10	80
51	0	DRY	10	229	11684	21	0	0.0	0.0	0	0	0	0	0	0	51

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
532	125	55350	452507	536852

Franz Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 09/10/97 to 11/09/97

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

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	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
84	23	MAIN	37	69	5801	37	14.1	1.5	1080	90687	1902	159780	1632	21
141	47	SCOUR	62	69	9703	62	13.9	1.5	1046	147420	1728	243715	1425	23
1	1	BACKWATER	0	25	25	0	21.0	1.5	525	525	788	788	0	10

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
226	71	15529	238633	404283

Franz Creek

Drainage: Russian River

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

Survey Dates: 09/10/97 to 11/09/97

Confluence Location: QUAD:

LEGAL DESCRIPTION:

LATITUDE: 0°0'0" LONGITUDE: 0°0'0"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT 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
77	MCP	34	0	0	21	27	30	39	14	18	12	16
3	CCP	1	0	0	1	33	2	67	0	0	0	0
4	STP	2	0	0	2	50	2	50	0	0	0	0
3	CRP	1	0	0	0	0	0	0	2	67	1	33
1	LSL	0	0	0	0	0	1	100	0	0	0	0
58	LSR	26	0	0	12	21	25	43	12	21	9	16
44	LSBk	19	0	0	7	16	21	48	12	27	4	9
30	LSBo	13	0	0	6	20	16	53	5	17	3	10
4	PLP	2	0	0	1	25	2	50	1	25	0	0
1	DPL	0	0	0	0	0	1	100	0	0	0	0

TOTAL UNITS 225

Franz Creek | Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type | Survey Dates: 09/10/97 to 11/09/97

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

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
43	14	LGR	0	3	0	0	59	0	0	38	0
5	3	CAS	3	0	0	0	6	0	0	91	0
4	2	BRS	0	0	0	0	100	0	0	0	0
13	6	GLD	22	6	0	28	32	12	0	0	0
130	17	RUN	3	53	0	5	1	1	0	37	0
60	13	SRN	9	10	7	2	21	0	0	51	0
77	76	MCP	10	23	5	18	16	12	0	10	5
3	3	CCP	0	10	0	63	7	0	0	20	0
4	4	STP	1	7	4	13	2	4	0	20	48
3	3	CRP	3	17	10	23	5	0	0	42	0
1	1	LSL	0	35	40	25	0	0	0	0	0
58	58	LSR	7	18	7	48	15	0	0	5	1
45	43	LSBk	10	19	3	18	16	12	0	10	12
30	28	LSBo	5	4	0	10	3	23	0	56	0
4	4	PLP	0	2	4	22	2	0	16	46	8
1	1	DPL	40	0	0	60	0	0	0	0	0
51	0	DRY	0	0	0	0	0	0	0	0	0
ALL HABITAT TYPES 532	276		8	18	4	26	14	8	0	17	4
POOLS ONLY 226	221		8	18	5	28	14	9	0	15	4

Franz Creek | Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE | Survey Dates: 09/10/97 to 11/09/97

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

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
43	14	LGR	0	0	43	29	21	0	7
3	3	CAS	0	0	0	0	0	0	100
2	2	BRS	0	0	0	0	0	0	100
6	6	GLD	0	67	33	0	0	0	0
15	15	RUN	0	33	20	20	20	0	7
16	16	SRN	0	0	6	19	31	19	25
18	18	MCP	6	61	11	6	6	0	11
3	3	CCP	33	33	33	0	0	0	0
3	3	STP	0	33	0	0	0	33	33
3	3	CRP	0	100	0	0	0	0	0
1	1	LSL	0	100	0	0	0	0	0
19	19	LSR	5	68	11	11	0	0	5
11	11	LSBk	0	64	18	0	0	0	18
10	10	LSBo	10	60	0	10	0	10	10
3	3	PLP	0	0	67	33	0	0	0
1	1	DPL	0	100	0	0	0	0	0
51	8	DRY	13	13	50	13	13	0	0

Franz Creek

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

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
70.84	36.99	62.67	53.77	58.41

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	13	27	14.18
Boulder	5	7	4.26
Cobble/Gravel	20	13	11.70
Silt/clay	103	94	69.86

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	17	10	9.57
Brush	11	14	8.87
Deciduous Trees	75	83	56.03
Evergreen Trees	35	33	24.11
No Vegetation	3	1	1.42

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Franz Creek
SAMPLE DATES: 09/10/97 to 11/09/97
SURVEY LENGTH:
MAIN CHANNEL: 53904 ft. SIDE CHANNEL: 1523 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: Latitude: 0°0'0"
Legal Description: Longitude: 0°0'0"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-113)

Channel Type: F4	Mean Canopy Density: 53%
Main Channel Length: 16155 ft.	Evergreen Component: 30%
Side Channel Length: 0 ft.	Deciduous Component: 69%
Riffle/Flatwater Mean Width: 8.1 ft.	Pools by Stream Length: 16%
Pool Mean Depth: 1.4 ft.	Pools >=2 ft. Deep: 74%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 26%
Water: 62-71°F Air: 65-77°F	Mean Pool Shelter Rtn: 24
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 49%	Occurrence of LOD: 13%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 10545 ft.
Embeddness Value: 1. 5% 2. 26% 3. 39% 4. 29%	

STREAM REACH 2 (Units 114-137)

Channel Type: F2	Mean Canopy Density: 53%
Main Channel Length: 1954 ft.	Evergreen Component: 31%
Side Channel Length: 31 ft.	Deciduous Component: 69%
Riffle/Flatwater Mean Width: 7.6 ft.	Pools by Stream Length: 41%
Pool Mean Depth: 2.0 ft.	Pools >=2 ft. Deep: 100%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 50%
Water: 64-65°F Air: 72-73°F	Mean Pool Shelter Rtn: 34
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 38%	Occurrence of LOD: 0%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 140 ft.
Embeddness Value: 1. 0% 2. 20% 3. 70% 4. 10%	

STREAM REACH 3 (Units 138-184)

Channel Type: F3	Mean Canopy Density: 56%
Main Channel Length: 5136 ft.	Evergreen Component: 34%
Side Channel Length: 0 ft.	Deciduous Component: 66%
Riffle/Flatwater Mean Width: 15.3 ft.	Pools by Stream Length: 34%
Pool Mean Depth: 1.8 ft.	Pools >=2 ft. Deep: 100%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 55%
Water: 57-65°F Air: 58-78°F	Mean Pool Shelter Rtn: 14
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 51%	Occurrence of LOD: 20%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 413 ft.
Embeddness Value: 1. 0% 2. 30% 3. 40% 4. 30%	

STREAM REACH 4 (Units 185-209)

Channel Type: D3	Mean Canopy Density: 85%
Main Channel Length: 3900 ft.	Evergreen Component: 18%
Side Channel Length: 833 ft.	Deciduous Component: 82%
Riffle/Flatwater Mean Width: 0.0 ft.	Pools by Stream Length: 39%
Pool Mean Depth: 1.9 ft.	Pools >=2 ft. Deep: 90%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 80%
Water: 56-59°F Air: 59-78°F	Mean Pool Shelter Rtn: 20
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 51%	Occurrence of LOD: 8%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 309 ft.
Embeddness Value: 1. 0% 2. 27% 3. 53% 4. 20%	

STREAM REACH 5 (Units 210-324)

Channel Type: F3	Mean Canopy Density: 72%
Main Channel Length: 12655 ft.	Evergreen Component: 23%
Side Channel Length: 592 ft.	Deciduous Component: 77%
Riffle/Flatwater Mean Width: 13.4 ft.	Pools by Stream Length: 33%
Pool Mean Depth: 1.5 ft.	Pools >=2 ft. Deep: 84%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 42%
Water: 49-62°F Air: 44-79°F	Mean Pool Shelter Rtn: 22
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 77%	Occurrence of LOD: 12%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 47% 3. 33% 4. 20%	

STREAM REACH 6 (Units 325-397)

Channel Type: B3	Mean Canopy Density: 75%
Main Channel Length: 5605 ft.	Evergreen Component: 27%
Side Channel Length: 0 ft.	Deciduous Component: 73%
Riffle/Flatwater Mean Width: 9.3 ft.	Pools by Stream Length: 34%
Pool Mean Depth: 1.5 ft.	Pools >=2 ft. Deep: 70%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 35%
Water: 48-59°F Air: 49-73°F	Mean Pool Shelter Rtn: 27
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Root masses
Bank Vegetative Cover: 39%	Occurrence of LOD: 24%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddness Value: 1. 3% 2. 35% 3. 30% 4. 32%	

STREAM REACH 7 (Units 398-407)

Channel Type: G2	Mean Canopy Density: 88%
Main Channel Length: 786 ft.	Evergreen Component: 66%
Side Channel Length: 0 ft.	Deciduous Component: 34%
Riffle/Flatwater Mean Width: 5.0 ft.	Pools by Stream Length: 53%
Pool Mean Depth: 1.2 ft.	Pools >=2 ft. Deep: 67%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 17%
Water: 52-52°F Air: 60-60°F	Mean Pool Shelter Rtn: 19
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 39%	Occurrence of LOD: 5%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 33% 2. 0% 3. 0% 4. 67%

STREAM REACH 8 (Units 408-425)

Channel Type: B3	Mean Canopy Density: 89%
Main Channel Length: 2378 ft.	Evergreen Component: 53%
Side Channel Length: 0 ft.	Deciduous Component: 47%
Riffle/Flatwater Mean Width: 6.6 ft.	Pools by Stream Length: 17%
Pool Mean Depth: 1.4 ft.	Pools >=2 ft. Deep: 56%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 11%
Water: 52-52°F Air: 60-60°F	Mean Pool Shelter Rtn: 23
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 55%	Occurrence of LOD: 35%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2. 75% 3. 13% 4. 13%

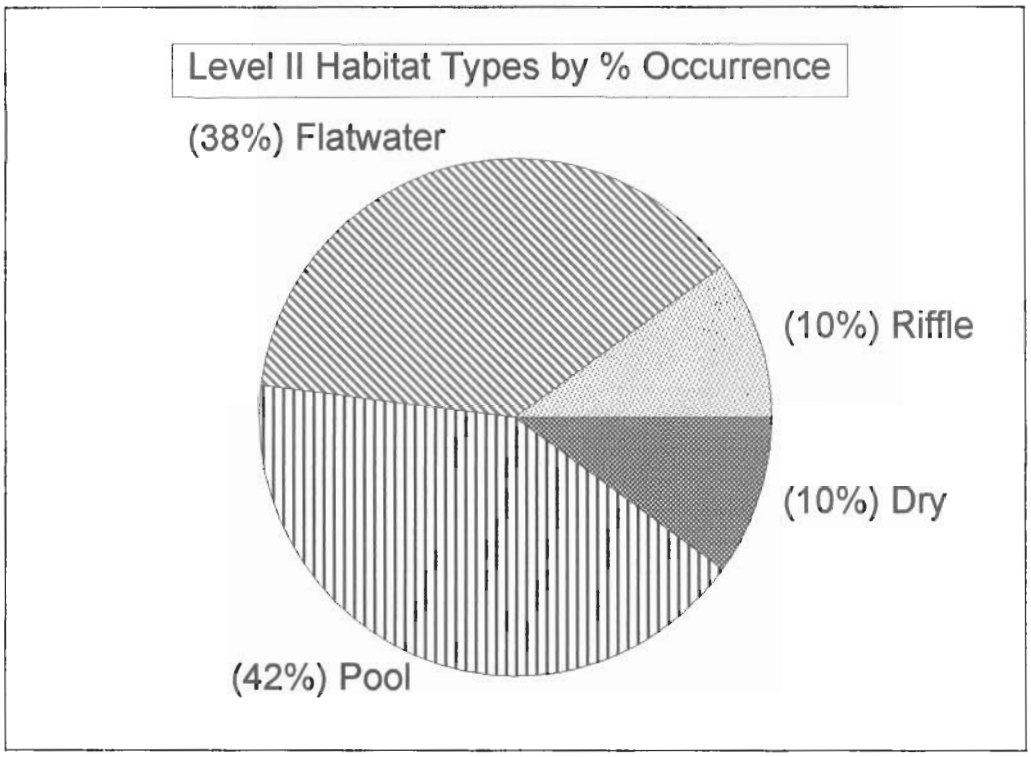
STREAM REACH 9 (Units 426-509)

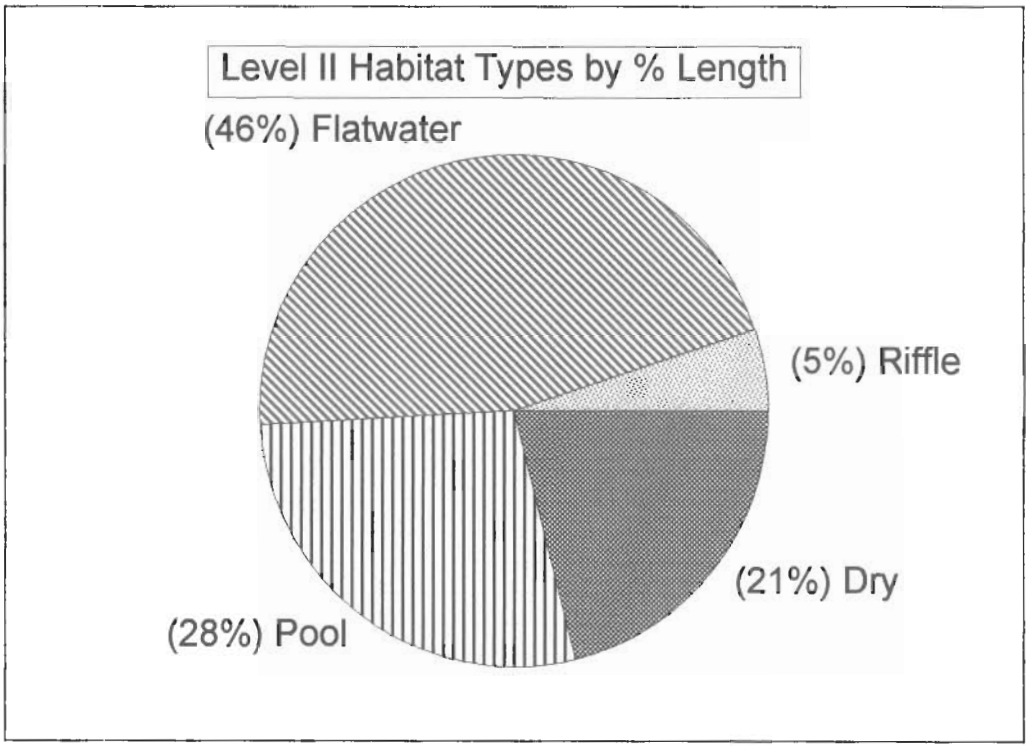
Channel Type: G1	Mean Canopy Density: 85%
Main Channel Length: 5336 ft.	Evergreen Component: 71%
Side Channel Length: 68 ft.	Deciduous Component: 29%
Riffle/Flatwater Mean Width: 5.0 ft.	Pools by Stream Length: 34%
Pool Mean Depth: 1.4 ft.	Pools >=2 ft. Deep: 70%
Base Flow: 0.0 cfs	Pools >=3 ft. Deep: 8%
Water: 45-54°F Air: 50-63°F	Mean Pool Shelter Rtn: 19
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Terrestrial Veg.
Bank Vegetative Cover: 71%	Occurrence of LOD: 6%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 66 ft.

Embeddness Value: 1. 25% 2. 23% 3. 5% 4. 48%

Franz Creek

Level II Habitat Types

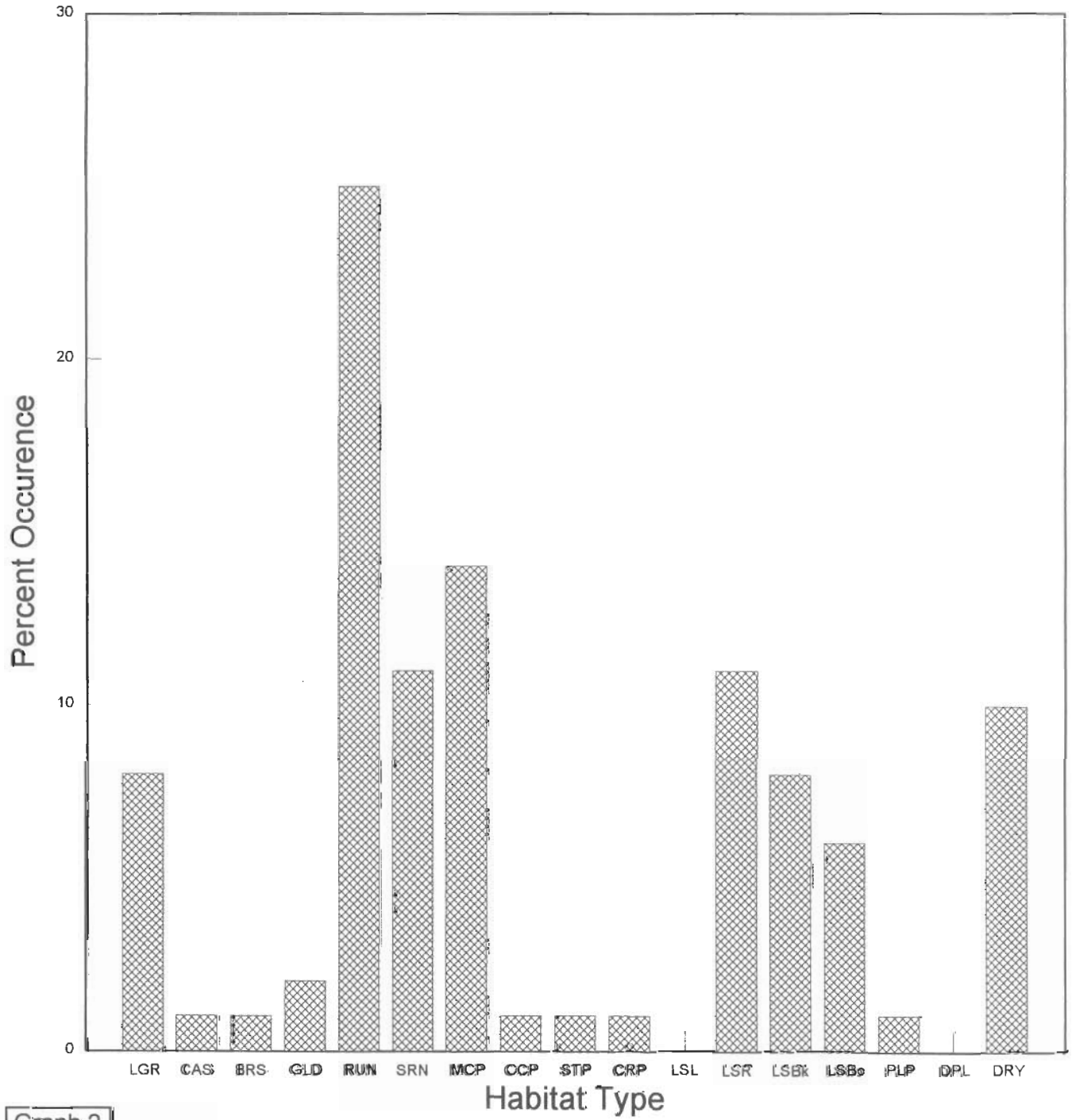




Graph 1

Franz Creek

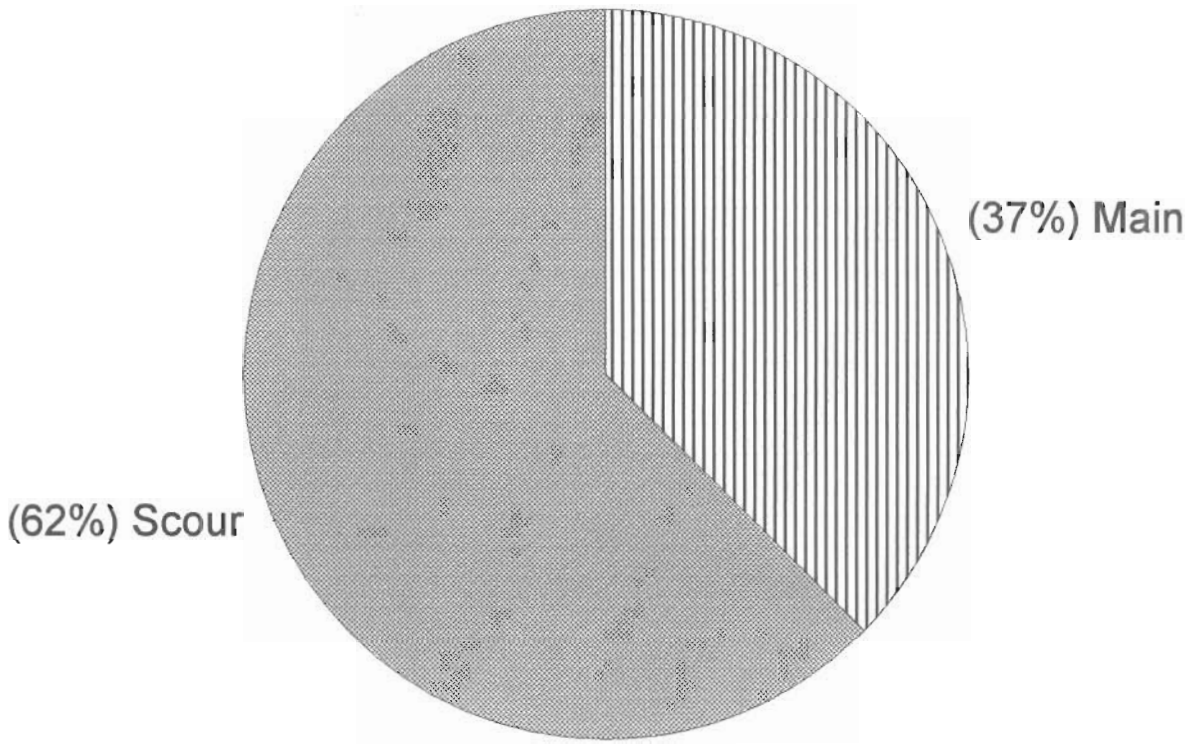
Level IV Habitat Types by % Occurrence



Graph 2

Franz Creek

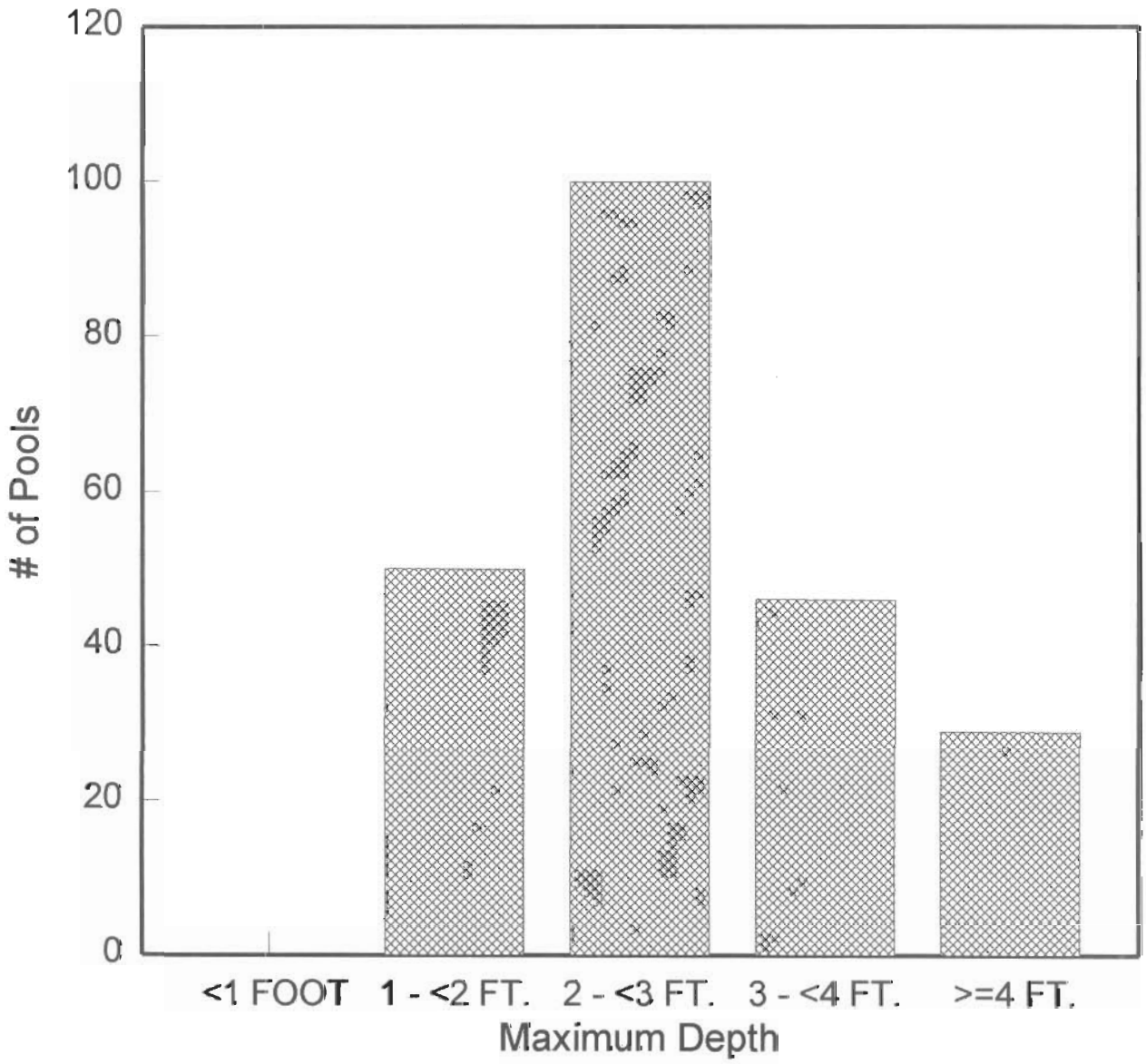
Pool Habitat Types by % Occurrence



Graph 3

Franz Creek

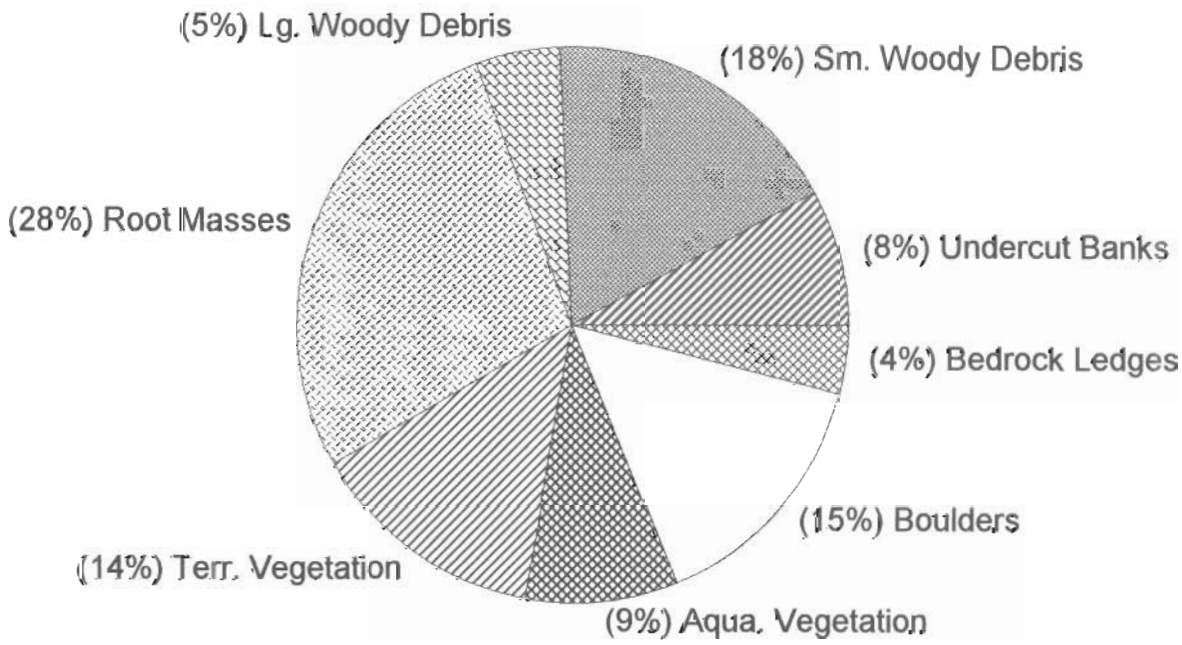
Maximum Depth in Pools



Graph 4

Franz Creek

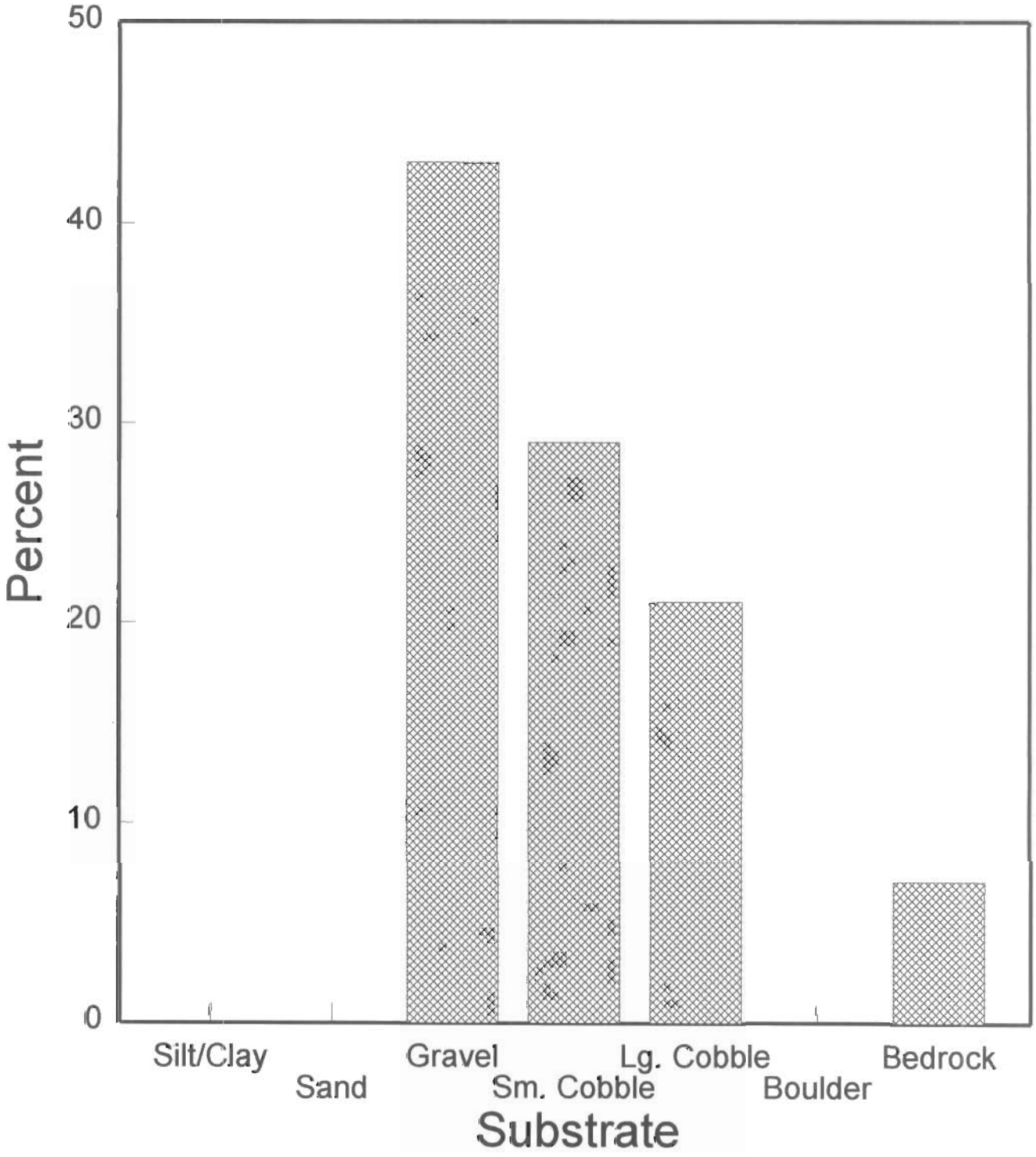
Pool Shelter Types by % Area



Graph 5

Franz Creek

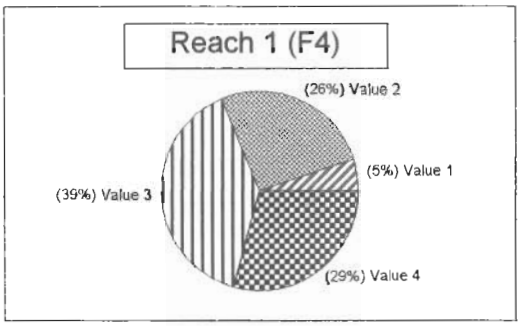
Substrate Composition in Low Gradient Riffles

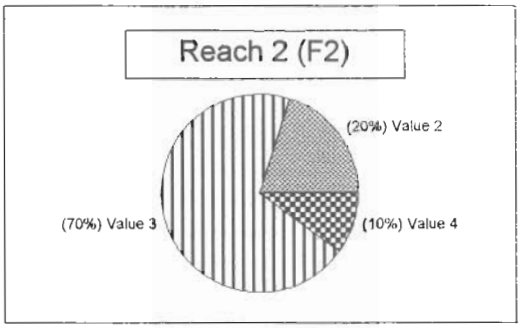


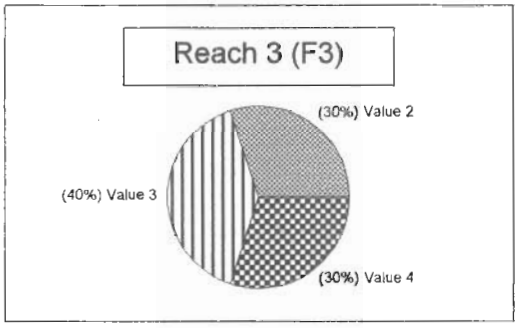
Graph 6

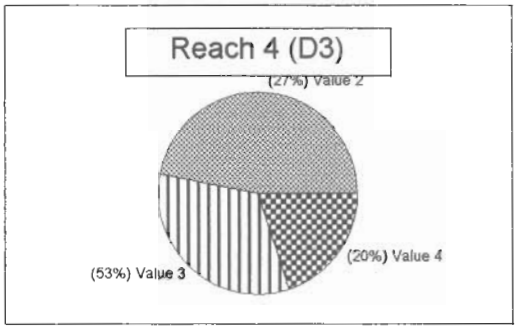
Franz Creek

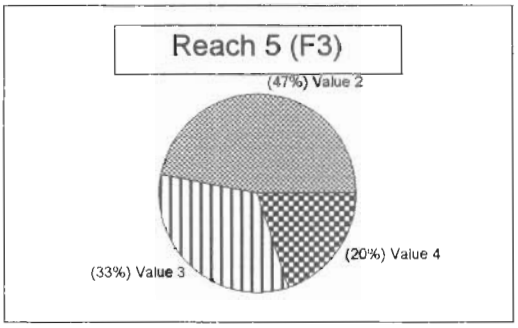
Percent Cobble Embeddedness by Reach

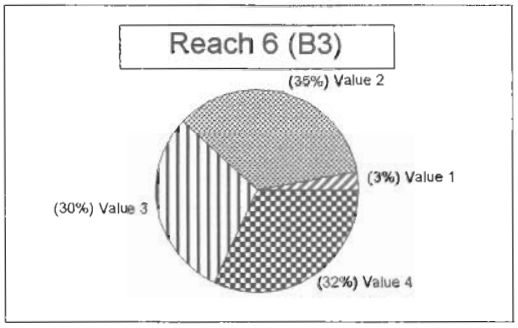


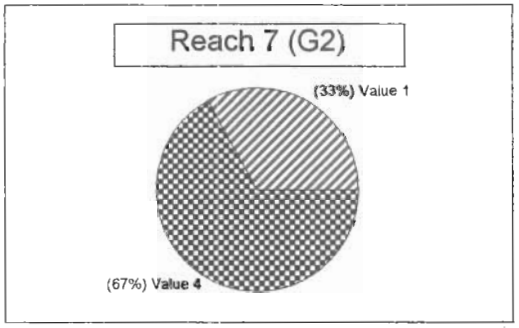


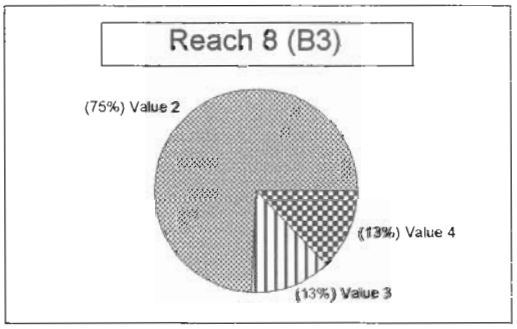


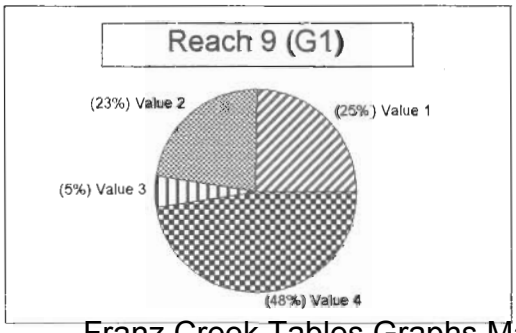








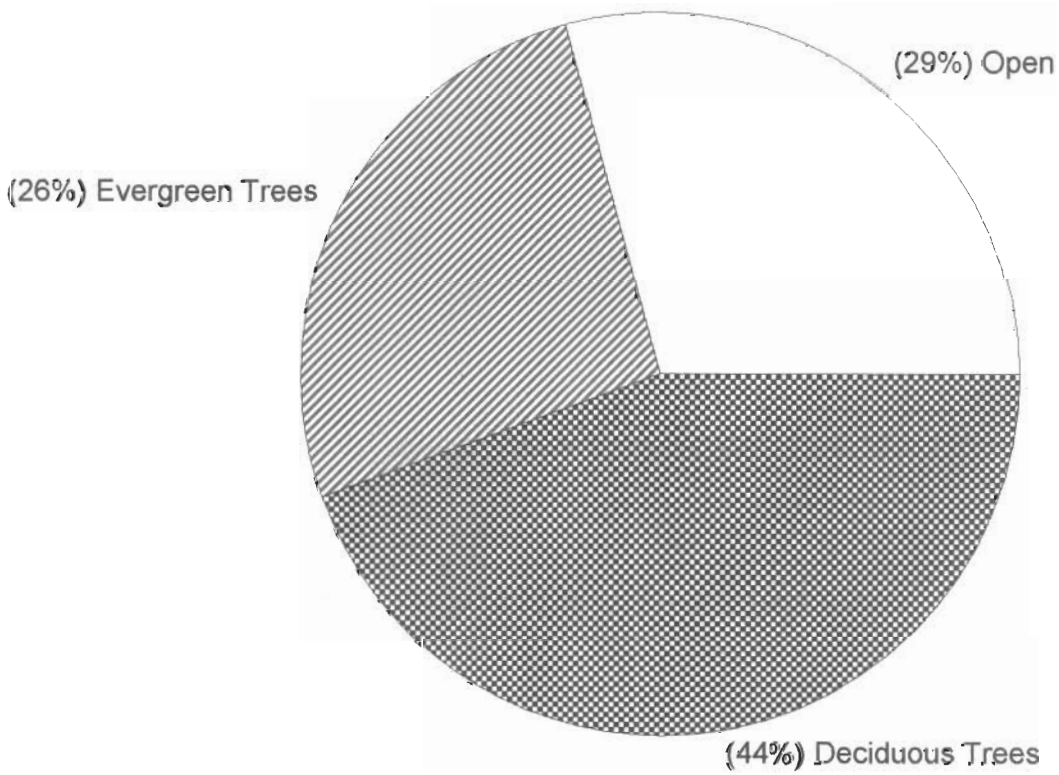




Graph 7

Franz Creek

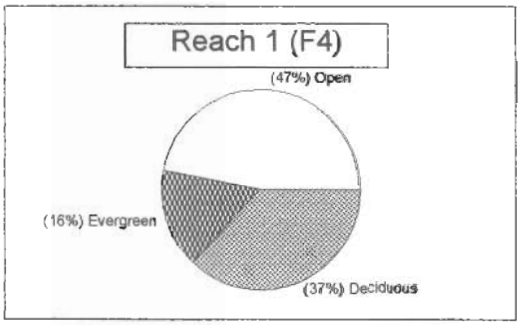
Mean Percent Canopy

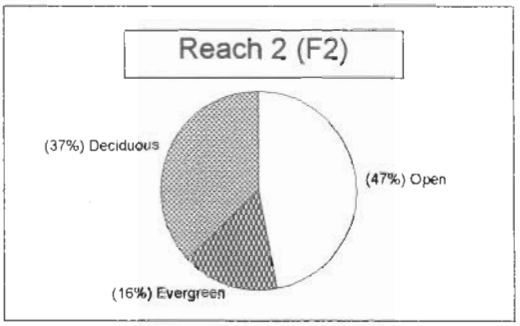


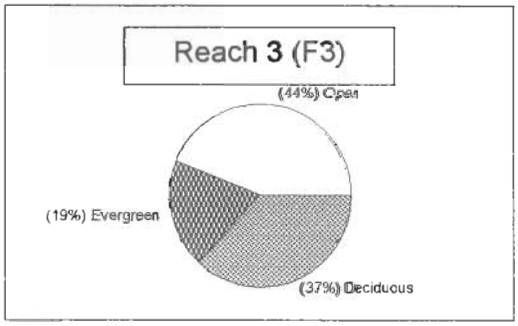
Graph 8

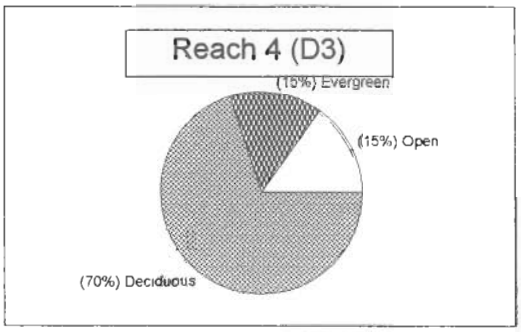
Franz Creek

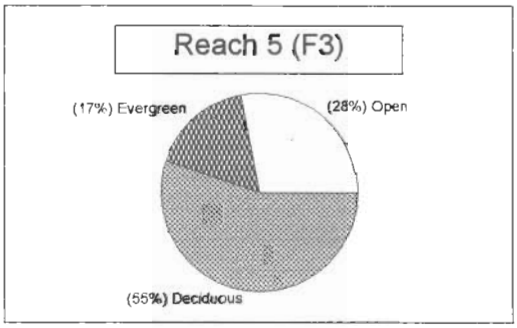
Percent Canopy By Reach

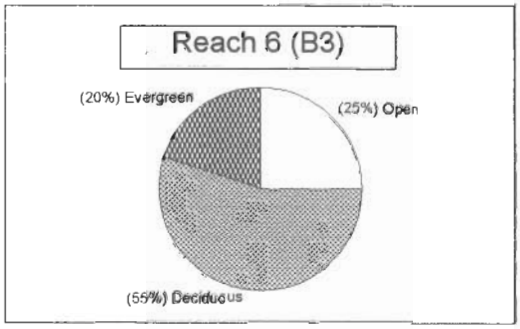


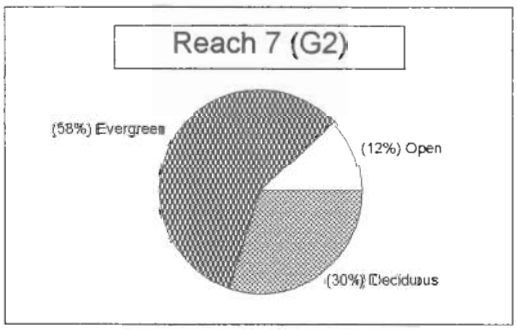


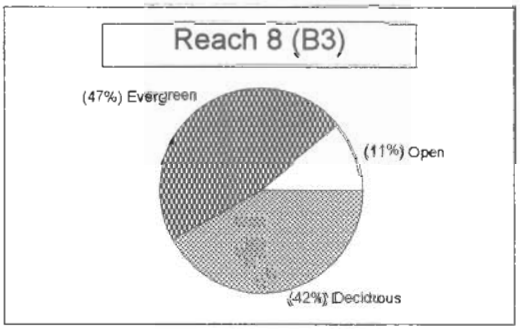


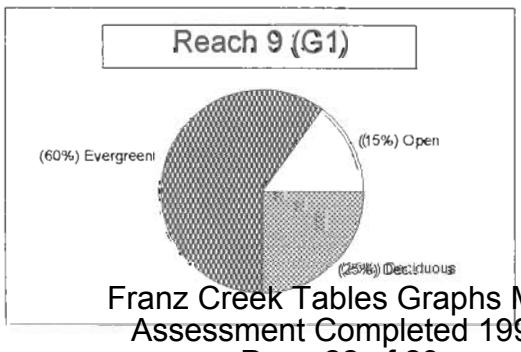








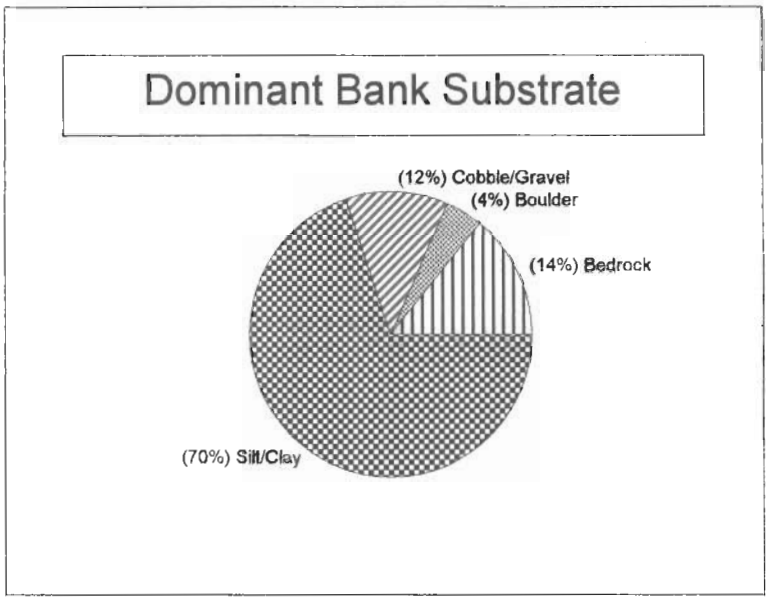


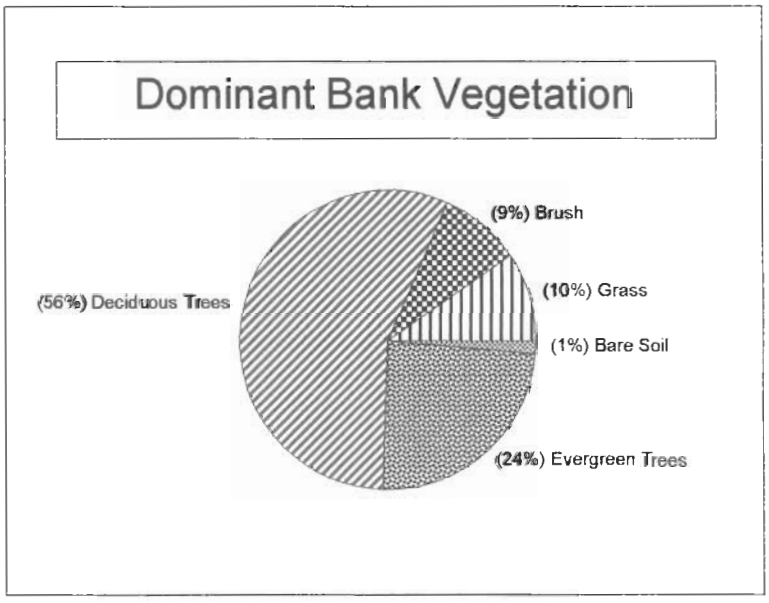


Graph 9

Franz Creek

Percent Bank Composition





Graph 10