CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT

Lancel Creek
(Trib. to Dutch Bill Creek)
Report revised April 14, 2006
Report Completed 2000
Assessment Completed 1997

INTRODUCTION

A stream inventory was conducted during the summer of 1997 on Lancel Creek beginning at it's confluence with Dutch Bill 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 Lancel 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 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

Lancel Creek is a tributary to Dutch Bill Creek, a tributary of the Russian River, located in Sonoma County, California (see Lancel Creek map, page 2). The legal description at the confluence with Dutch Bill Creek is T7N, R10W, S27. Its location is 38°25'18" N. latitude and 122°57'7" W. longitude. Year round vehicle access exists near Camp Meeker via Occidental-Camp Meeker Road off of Bohemian Highway.

Lancel Creek and its North Fork tributary drains a basin of approximately 1.6 square miles. Lancel Creek is a first order stream and has approximately 3.1 miles of blue line stream, according to the USGS Camp Meeker 7.5 minute quadrangles. The only tributary to Lancel Creek is the North Fork (included in this report). Elevations range from about 580 feet at the mouth of the creek to 800 feet in the headwaters. Evergreen forest dominates the watershed, but there are zones of grassland and oak-woodland in the upper watershed. The watershed is entirely owned by private landowners.

METHODS

The habitat inventory conducted in Lancel Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al., 1998). The AmeriCorps Volunteers that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two person team and was supervised by Bob Coey, Russian River Basin Planner (DFG).

HABITAT INVENTORY COMPONENTS

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the California Salmonid Stream Habitat Restoration Manual. This form was used in Lancel 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 (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 were 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". Lancel 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 Lancel 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). A rating of "not suitable" (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 Lancel 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 Lancel 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 Lancel 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 Lancel Creek include:

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

HISTORICAL STREAM SURVEYS

No historical stream surveys exist.

HABITAT INVENTORY RESULTS

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

The habitat inventory of Lancel Creek 08/11/97 to 08/20/97 was conducted by Sarah Nossaman and Stephanie Carey (AmeriCorps) and data was analyzed by Stephanie Carey. The survey began at the confluence with Dutch Bill Creek and extended up Lancel to the end of the survey. The total length of the stream surveyed was 3876 feet, with an additional 178 feet of side channel.

Flow was estimated to be 0.09 cfs on 8/21/97. A Marsh-McBirney Model 2000 flowmeter was used to measure the flow.

This section of Lancel Creek has two channel types: from the mouth to 1073 feet a B2 and the upper 2803 feet an F3.

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.

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

Water temperatures ranged from 59°F to 65°F. Air temperatures ranged from 60°F to 77°F. Summer temperatures were also measured using a remote temperature recorder placed in a pool (see Temperature Summary graph at end of report). A recorder placed in Reach 1 logged temperatures every 2 hours from July 2 - September 26, 1997. The highest temperature recorded was 62°F and the lowest was 55°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 33% flatwater units, 33% pool units, 26% riffle units, and 8% dry streambed units. Based on total **length** there were 47% flatwater units, 23% riffle units, 21% pool units, and 9% dry streambed units (Graph 1).

Sixty six habitat units were measured and 20% were completely sampled. Eight Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were mid-channel pools at 29%, runs 24%, low gradient riffles 20% and step runs 9% (Graph 2). By percent total **length**, runs made up 37%, mid-channel pools 19%, low gradient riffles 16%, and step runs 10%.

Twenty two pools were identified (Table 3). Main Channel pools were most often encountered at 86%, and comprised 90% 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. 14 of the 22 pools (64%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 14% 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. Riffle types had the highest shelter rating at 38.

Pool had the lowest rating with 20 and flatwater rated 25 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 30 and main channel pools rated 18. (Table 3)

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were terr. vegetation at 30%, boulders 30%, undercut banks 23%, and bedrock ledges 11%. Graph 5 describes the pool shelter in Lancel Creek.

Table 6 summarizes the dominant substrate by habitat type. Sand was the dominant substrate observed in two of the three low gradient riffles measured. Large cobble was dominant in one 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 22 pool tail-outs measured, none had a value of 1; eight had a value of 2 (36%); three had a value of 3 (14%); and seven had a value of 4 (32%). On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 72%. The mean percentages of deciduous and evergreen trees were 50% and 50%, 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 83% and the mean percent left bank vegetated was 78%. For the habitat units measured, the dominant vegetation types for the stream banks were: 46% evergreen trees, 31% deciduous trees, and 23% brush. The dominant substrate for the stream banks were: 62% silt/clay/sand, 19% boulder, 12% bedrock and 8% cobble/gravel (Graph 10).

HABITAT INVENTORY RESULTS FOR NORTH FORK LANCEL

The habitat inventory of North Fork Lancel Creek 8/20 to 08/21/97 was conducted by Sarah Nossaman and Stephanie Carey (AmeriCorps) and data was analyzed by Stephanie Carey. The survey began at the confluence with Lancel Creek and extended up North Fork Lancel Creek to the dam. The total length of the stream surveyed was 3315 feet.

Flows were not measured on North Fork Lancel Creek.

This section of North Fork Lancel Creek has two channel types: from the mouth to 1879 feet an F3 and the upper 1437 feet an F6. F3 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly cobble substrate. F6 channel types have the same characteristics but with a silt/clay substrate.

Water temperatures ranged from 60°F to 62°F. Air temperatures ranged from 56°F to 71°F.

*Based on frequency of **occurrence**; there were 33% flatwater units, 33% pool units, and 31% dry streambed units and total **length**; there were 52% dry streambed units, 34% flatwater units, and*

13% pool units.

Thirty six habitat units were measured and 17% were completely sampled. The most frequent habitat types by percent ***occurrence*** *were dry streambed at 31%, runs 28%, mid-channel pools 25% and step runs 6%. By percent total* ***length****, dry streambed made up 52%, runs 27%, mid-channel pools 11%, and step runs 7%.*

Main Channel pools were most often encountered at 75%, and comprised 91% of the total length of pools. Fifty percent of the pools had a depth of two feet or greater and comprised 8% of the total length. Pool types had the highest shelter rating at 17 and flatwater rated 8. Of the pool types, the main channel pools had the highest mean shelter rating at 18 and scour pools rated 15. By percent area, the dominant pool shelter types were boulders at 46%, terr. vegetation 40%, aquatic vegetation 7%, and small woody debris 4%. Of the 12 pool tail-outs measured, 8% had a value of 1; 17% had a value of 2; 0% had a value of 3; and 75% had a value of 4.

The mean percent canopy density for the stream reach surveyed was 71% (deciduous and evergreen trees were 33% and 67%, respectively).

The mean percent right bank vegetated was 74% and the mean percent left bank vegetated was 71%. For the habitat units measured, the dominant vegetation types for the stream banks were: 39% evergreen trees, 22% grass, 22% deciduous trees and 17% brush. The dominant substrate for the stream banks were: 61% silt/clay/sand, 17% boulder, 11% bedrock and 11% cobble/gravel.

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In 1997, biological inventories were conducted on Lancel Creek and North Fork Lancel Creek to document the fish species composition and distribution at several locations. Each site was single pass electrofished in the creek using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream.

Lancel Creek

Below the culvert #2 at unit #017 (a run), 6 sculpin and 5 0+ steelhead were found. In an adjacent pool, 7 sculpin, 9 0+ steelhead, 6 1+ steelhead, 1 2+ steelhead, and 2 crayfish were found. Above the culvert in a pool, 2 sculpin, 1 bluegill, 1 0+ steelhead, and 4 1+ steelhead were found. At the second site in Lancel Creek, in a run, 13 sculpin were observed and, in a pool, 18 sculpin and 1 1+ steelhead were observed. During the habitat inventory, very few salmonids were observed upstream of unit #017, 926 feet above the confluence with Dutch Bill Creek, where a double culvert appears to impede passage. However, resident rainbow trout were observed above this site.

North Fork Lancel Creek

In the inventory of North Fork Lancel Creek one site was electrofished. In the pool, 8 sculpin, 1 2+ steelhead, and 2 bluegill were found.

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

Species Observed in Historical and Recent Surveys			
YEARS	**SPECIES**	**SOURCE**	**Native/Introduced**
1997	Steelhead	DFG	N
1997	Sculpin	DFG	N
1997	Bluegill	DFG	I
1997	Crayfish	DFG	N
1997	California Newt	DFG	N

A summary of recent data collected for North Fork Lancel Creek appears in the table below.

Species Observed in Historical and Recent Surveys			
YEARS	**SPECIES**	**SOURCE**	**Native/Introduced**
1997	Steelhead	DFG	N
1997	Sculpin	DFG	N
1997	Bluegill	DFG	I

No known fish rescue operations have occurred in the watershed.

DISCUSSION OF LANCEL CREEK

Lancel Creek has two channel types: B2 (1073 ft.) and F3 (2803 ft.).

There are 1073 feet of B2 channel type in Reach 1. 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 2803 feet of F3 channel type in Reach 2. 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. 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 08/11/97 to 08/20/97 ranged from 59°F to 65°F. Air temperatures ranged from 60°F to 77°F. The warmer water temperatures were recorded in Reach 2. These temperatures are at threshold stress levels (65°F) for salmonids.

Summer temperatures measured using a remote temperature recorder placed in a pool in Reach 1 ranged from 55°F to 62°F.

Pools comprised 21% 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 Lancel Creek, the pools are relatively deep with 64% having a maximum depth of at least 2 feet. However, these pools comprised only 14% 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 20. 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 terr. vegetation (30%), boulders (30%), undercut banks (23%), and bedrock ledges (11%). Log and root wad cover in the pool and flatwater habitats are needed to 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.

Forty five percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4 (55% rated 2). None 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.

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 72%. This is a lower than desirable percentage of canopy, since 80 percent is generally considered desirable. Elevated water temperatures could be reduced by increasing stream canopy. Cooler water temperatures are desirable in Lancel Creek. The large trees required for adequate stream canopy would also eventually provide a long term source of large woody debris needed for instream structure and bank stability.

DISCUSSION OF NORTH FORK LANCEL CREEK

North Fork Lancel Creek has two channel types: F3 (1879 ft.) and F6 (1437 ft.).

There are 1879 feet of F3 and 1437 feet of F6 channel types. According to the DFG Salmonid Stream Habitat Restoration Manual, these 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.

In North Fork Lancel Creek, the pools are relatively deep with 42% having a maximum depth of at least 2 feet. These pools comprised only 8% of the total length of stream habitat.

The mean shelter rating for pools was 17(provided primarily by boulders (46%), terr. vegetation (40%), aquatic vegetation (7%), and small woody debris (4%)).

Seventy five percent of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 8% had a rating of 1. In a reach comparison, Reach 1 had the best ratings and Reach 2 had the poorest ratings. In North Fork Lancel Creek Reaches 1 and 2, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 71%. This is a lower than desirable percentage of canopy, since 80 percent is generally considered desirable.

SUMMARY

In general, the Reaches of Lancel Creek and it's fork are marginal for salmon and steelhead habitat. Some fair sections of the stream occur which may be used as rearing habitat, however, shelter is lacking. Little riffle habitat exists for spawning, and what does exist is unsuitable for spawning due to high gravel embeddedness. The unstable banks in these reaches limits instream habitat improvement alternatives, although some opportunity exists. In Reach 2 bank protection, riparian planting and exclusionary fencing for livestock is recommended. Log cover structures can be used to increase instream shelter.

GENERAL RECOMMENDATIONS

Lancel Creek and North Fork Lancel should be managed as an anadromous, natural production streams.

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. 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) Baffles should be installed in the culverts and removal, modification or replacement of the double culvert should be considered to facilitate easier fish access.

2) The upper reach of the North Fork Lancel Creek 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 Lancel Creek and on North Fork Lancel Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reach 2 on Lancel and Reach 2 on North Fork Lancel). The reaches 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. 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) Pool habitat could be increased by adding large organic woody debris to run habitats and pools. Large organic woody debris will help to lengthen and deepen existing pools.

PROBLEM SITES AND LANDMARKS - LANCEL CREEK SURVEY COMMENTS

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

HABITAT UNIT #	STREAM LEN(FT.)	COMMENTS
1.00	46	Cobble at mouth 2-3" higher than grade of Dutch Bill. 59 degrees in Dutch Bill.
2.00	110	Signs of old crossing-railroad easement perhaps. Water murky and dark (but not muddy).
3.00	255	Culvert-see sheet
4.00	284	Four young maples planted on left bank with drip hose. Crawdad.
6.00	377	Footbridge 19'H X 1.5'W X 45'L. Crawdad.
7.00	438	Cable across creek. Property fence right bank. Chicken wire along bank.
9.00	521	Sculpin
13.00	724	8' (boulder)
14.00	785	(3) crayfish; (3)0+ Salmonid
16.00	928	Water continues to be dark and murky brown
17.00	936	Road crossing; Double culvert (see form)

19.00	1016	(2) crayfish; 0+ SH
22.00	1421	Channel almost completely covered by sedge and black berry in creek not visible or surveyed.
29.00	1680	Crayfish
32.00	1870	North Fork of Lancel- dry at mouth. Continue thick veg. cover
40.00	2476	Small dry trib RB; Overgrown with blackberry; -244' Dry trib RB
41.00	2521	Rusted diversion pipe in creek 9' long. Run-off from hill RB Sculpin; Crayfish ; LB & RB Blownout
42.00	2533	Blowout LB (15'h x 45'l x 13'd) caused by instream boulder almost down to bedrock.
46.00	2744	20 foot rusted out diversion pipe laying in creek
49.00	2840	Lots of silt and sediment. this field work was done after 1.8 inches of rain in 24 hours.
52.00	2945	Six inches of silt on bottom of pool
54.00	3037	No visibility in pools-lots of sediment
55.00	3201	Vegetation covering channel
58.00	3337	Dry trib l/b; dry trib r/b; redwoods present, blackberry decreasing
60.00	3510	Dry trib r/b under bay tree; very small wet trib l/b (<1foot wide) 59 degrees at confluence
64.00	3882	Dry trib l/b; too much brush and woody veg. clogging creek and covering banks. unable to access channel. L. owner access ends approximately 500 upstream = END SURVEY

PROBLEM SITES AND LANDMARKS - NORTH FORK LANCEL CREEK SURVEY COMMENTS

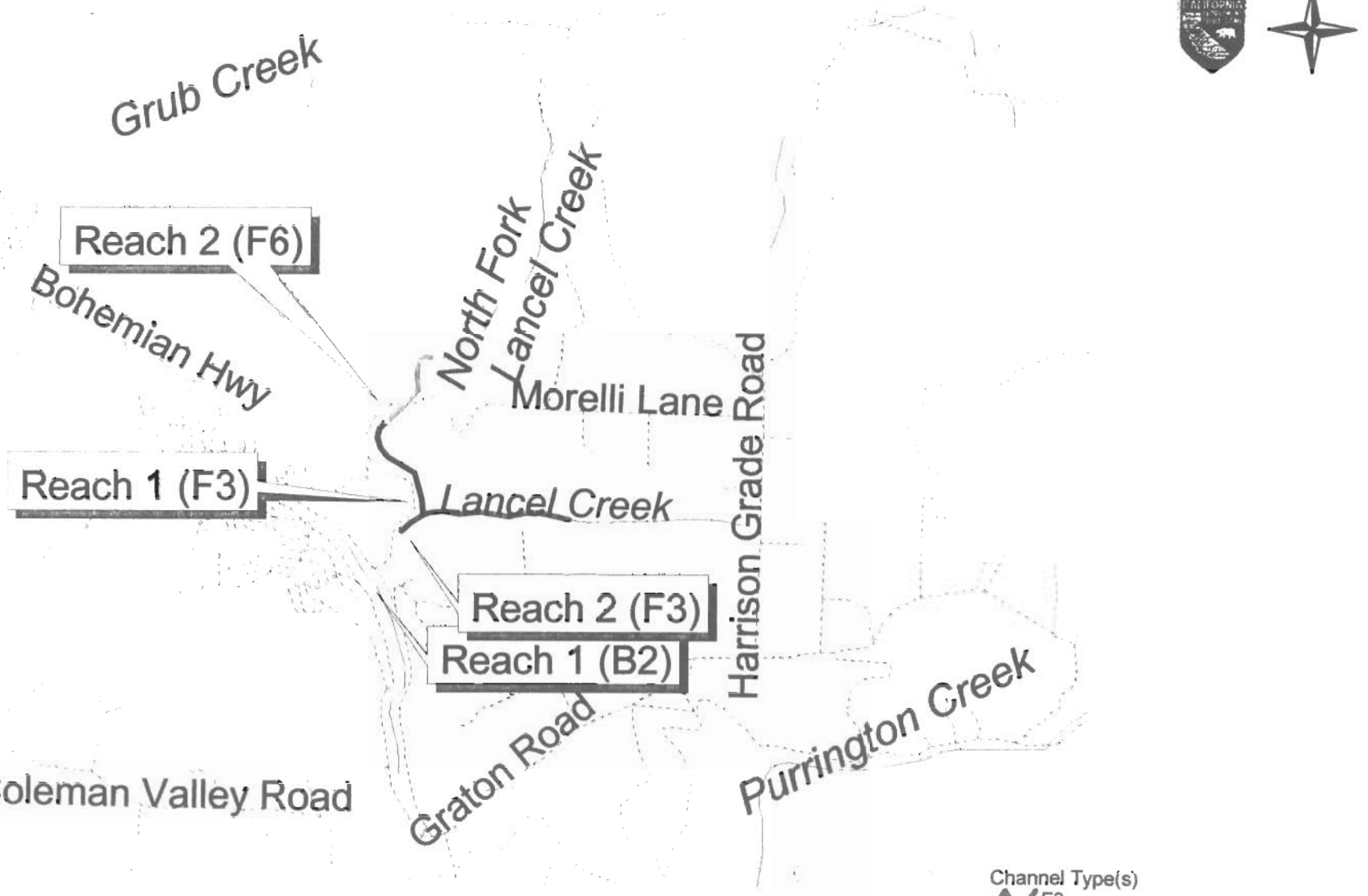
The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

HABITAT UNIT #	*STREAM LEN(FT.)*	*COMMENTS*
2.00	*705*	*Water dark brown-orange*
4.00	*1022*	*Poor visibility for determining shelter*
5.00	*1178*	*Creek COVERED with brush and berries. Banks too difficult to walk in or along creek. Dry trib RB*
6.00	*1355*	*CA. Newt*
13.00	*1589*	*Newt*
15.00	*1722*	*-Begin A2 channel type ANOMOLY. Water murky orange-brown (dark) throughout creek. Small dry trib RB; Newts (2)*
16.00	*1755*	*Dry side channel*
17.00	*1881*	*Small dry riffles between possible site of old slide?; Many boulders in channel; End A2 type anomoly*

18.00	*2012*	*Begin F6 Channel*
19.00	*2194*	*Dry trib RB*
23.00	*2335*	*Channel Clogged with vegetation*
25.00	*2549*	*Brown foam on water surface; Cattle fence at start of unit; Unit was dry 3 days ago; Evidence of cows in creek; Dry trib RB; Bridge*
27.00	*2699*	*Cow feces in creek*
29.00	*2793*	*Cow feces in creek*
30.00	*2862*	*Dry trib RB*
31.00	*2890*	*Many cattle trails along both banks; Cow feces in creek*
33.00	*3011*	*Lots of sediment; Evidence of cows in creek*
35.00	*3138*	*20 fish (roach) 1"; Erosion 15'l x 50'w x 10'd RB; Chain-link fence RB: attempt to control erosion; Dam/Spillway LB.*
36.00	*3319*	*Gully RB; Bushes cover creekbed; Small pockets of water; Dry trib RB; Lg.;Dam; stream stops completely; See Dam Sheet Pond behind Dam +/- 1 acre*

*****End of Survey*****

Lancel Creek & North Fork Lancel Creek



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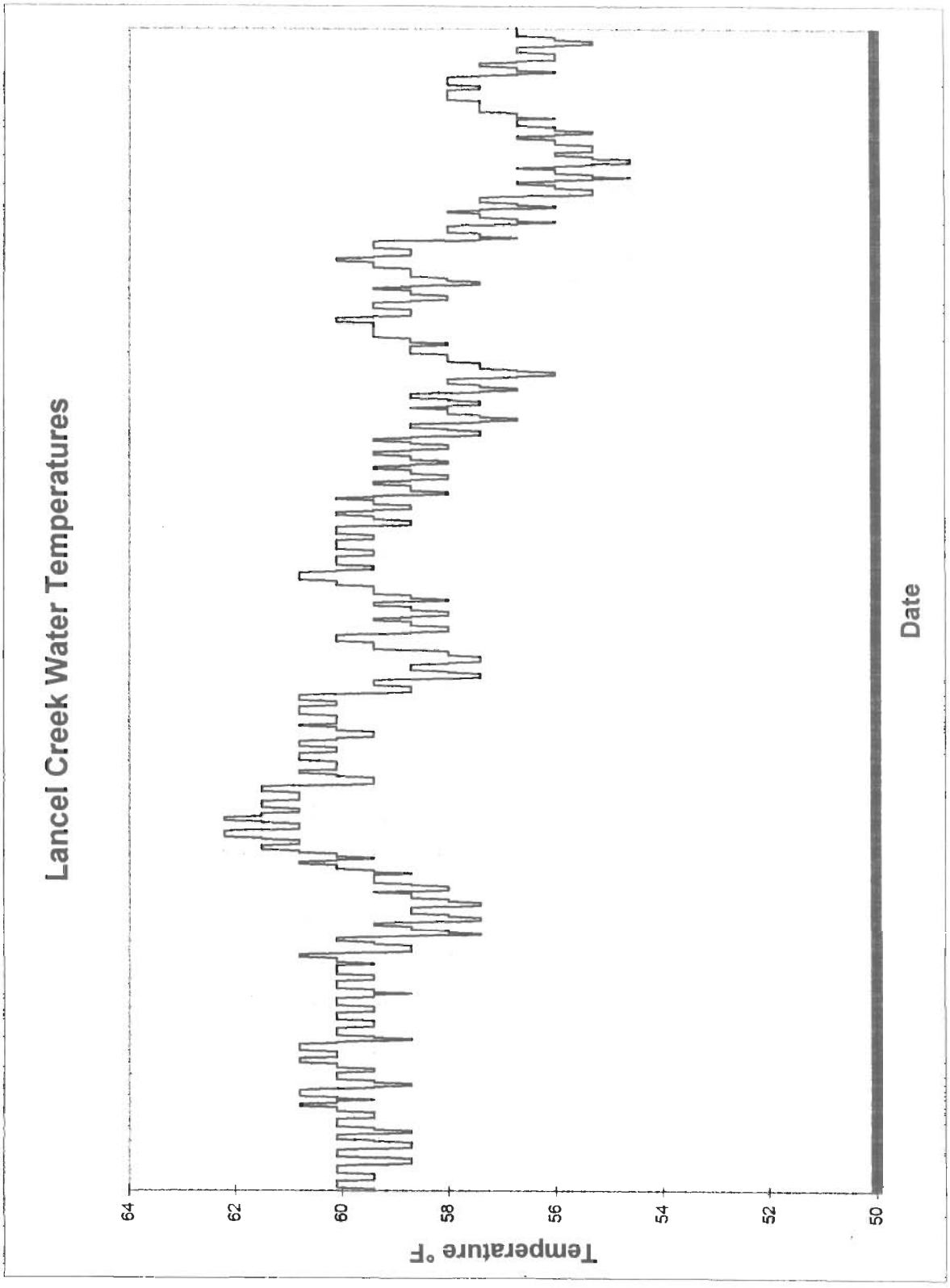

Lancel Creek Water Temperatures
Temperature °F
64
62
60
58
56
54
52
50
Date

Lancel (Trib. to D. Bill) Drainage: Russian River

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

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
17	4	RIFFLE	26	54	922	23	5.8	0.3	104	1768	31	526	0	38
22	4	FLATWATER	33	87	1918	47	5.3	0.6	153	3372	85	1872	0	25
22	5	POOL	33	39	857	21	10.2	1.5	429	9427	819	18027	395	20
5	0	DRY	8	71	357	9	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.)
66	13	4054	14567	20425

Lancel (Trib. to D. Bill) Drainage: Russian River

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

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 %
13	3	LGR	20	49	636	16	5	0.3	0.7	92	1199	32	416	0	48	57
4	1	HGR	6	72	286	7	8	0.2	1.5	139	557	28	111	0	5	85
16	3	RUN	24	93	1494	37	4	0.6	1.6	98	1571	60	966	0	27	72
6	1	SRN	9	71	425	10	10	0.5	1.4	319	1911	159	956	0	20	89
19	3	MCP	29	41	773	19	10	1.6	6.0	461	8762	913	17344	436	18	69
2	1	LSR	3	31	61	2	9	1.1	2.3	246	493	255	510	161	40	100
1	1	LSBo	2	23	23	1	10	1.0	1.8	173	173	173	173	121	10	95
5	0	DRY	8	71	357	9	0	0.0	0.0	0	0	0	0	0	0	50

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
66	13	4054	14666	20475

Lancel (Trib. to D. Bill) Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES Survey Dates: 08/11/97 to 08/20/97

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
19	3	MAIN	86	41	773	90	10.4	1.6	461	8762	913	17344	436	18
3	2	SCOUR	14	28	84	10	9.0	1.0	222	665	228	683	148	30

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
22	5	857	9427	18027

Lancel (Trib. to D. Bill) Drainage: Russian River

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

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
19	MCP	86	0	0	6	32	11	58	0	0	2	11
2	LSR	9	0	0	1	50	1	50	0	0	0	0
1	LSBo	5	0	0	1	100	0	0	0	0	0	0

TOTAL UNITS
22

Lancel (Trib. to D. Bill) Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type Survey Dates: 08/11/97 to 08/20/97

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
13	3	LGR	0	0	0	0	75	0	0	25	0
4	1	HGR	0	0	0	0	0	0	0	100	0
16	3	RUN	0	0	0	0	78	0	0	22	0
6	1	SRN	0	0	0	0	0	0	0	100	0
19	19	MCP	18	3	0	2	33	0	0	32	11
2	2	LSR	72	3	0	17	7	0	0	0	0
1	1	LSBo	0	0	0	0	0	0	0	50	50
5	0	DRY	0	0	0	0	0	0	0	0	0
66	30	ALL HABITAT TYPES	18	2	0	3	36	0	0	31	9
22	22	POOLS ONLY	23	3	0	4	30	0	0	30	11

Lancel (Trib. to D. Bill) Drainage: Russian River

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

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
13	3	LGR	67	0	0	0	33	0	0
	1	HGR	0	0	0	0	0	100	0
	3	RUN	33	0	0	0	67	0	0
	1	SRN	0	0	0	0	0	100	0
	3	MCP	0	100	0	0	0	0	0
	1	LSR	0	100	0	0	0	0	0
	1	LSBo	0	100	0	0	0	0	0
	0	DRY	0	0	0	0	0	0	0

Lancel (Trib. to D. Bill)

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
71.57	50.00	50.00	83.08	78.08

APPENDIX B.

Mean Percentage of Dominant Substrate

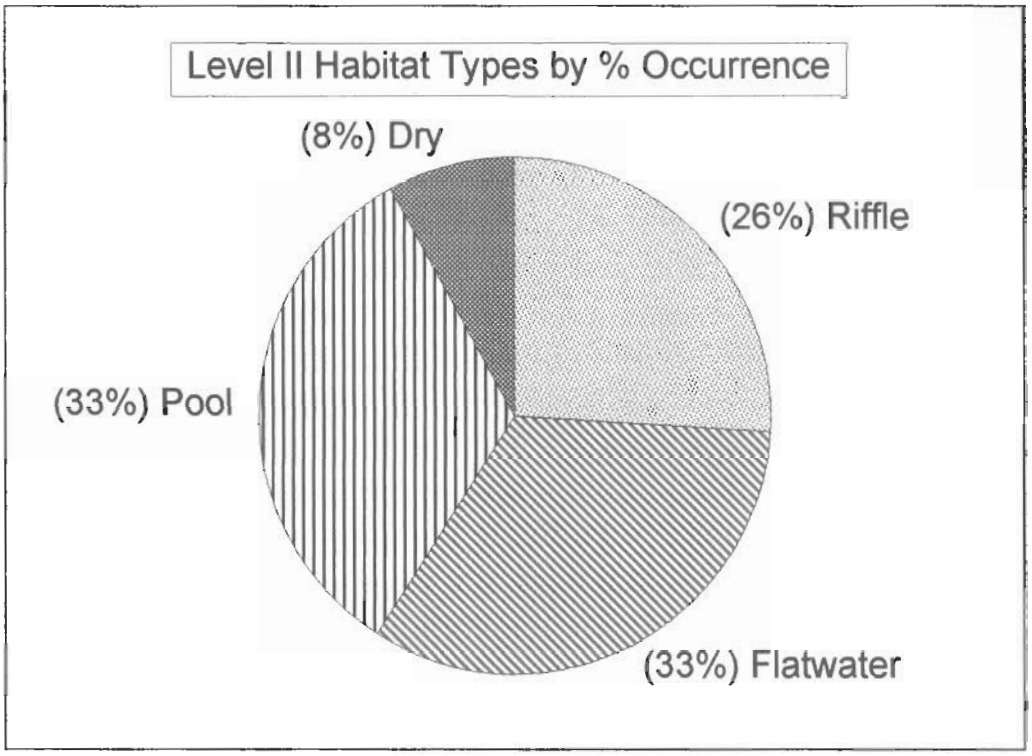
Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	1	2	11.54
Boulder	2	3	19.23
Cobble/Gravel	1	1	7.69
Silt/clay	9	7	61.54

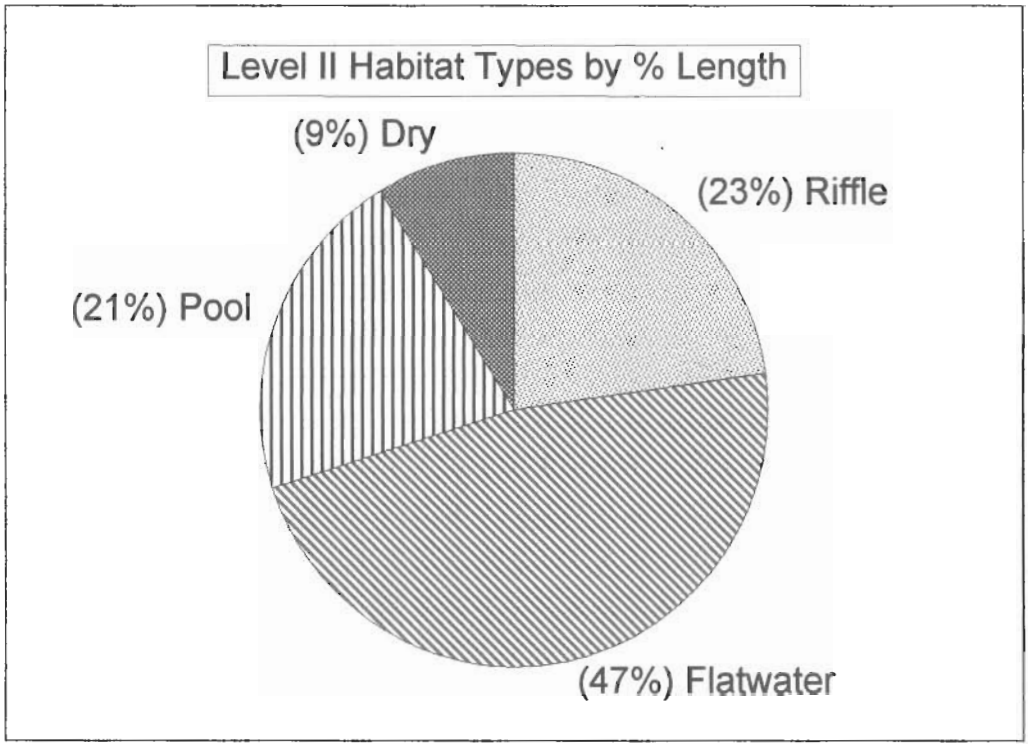
Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	0	0	0
Brush	4	2	23.08
Deciduous Trees	4	4	30.77
Evergreen Trees	5	7	46.15
No Vegetation	0	0	0

Lancel Creek

Level II Habitat Types

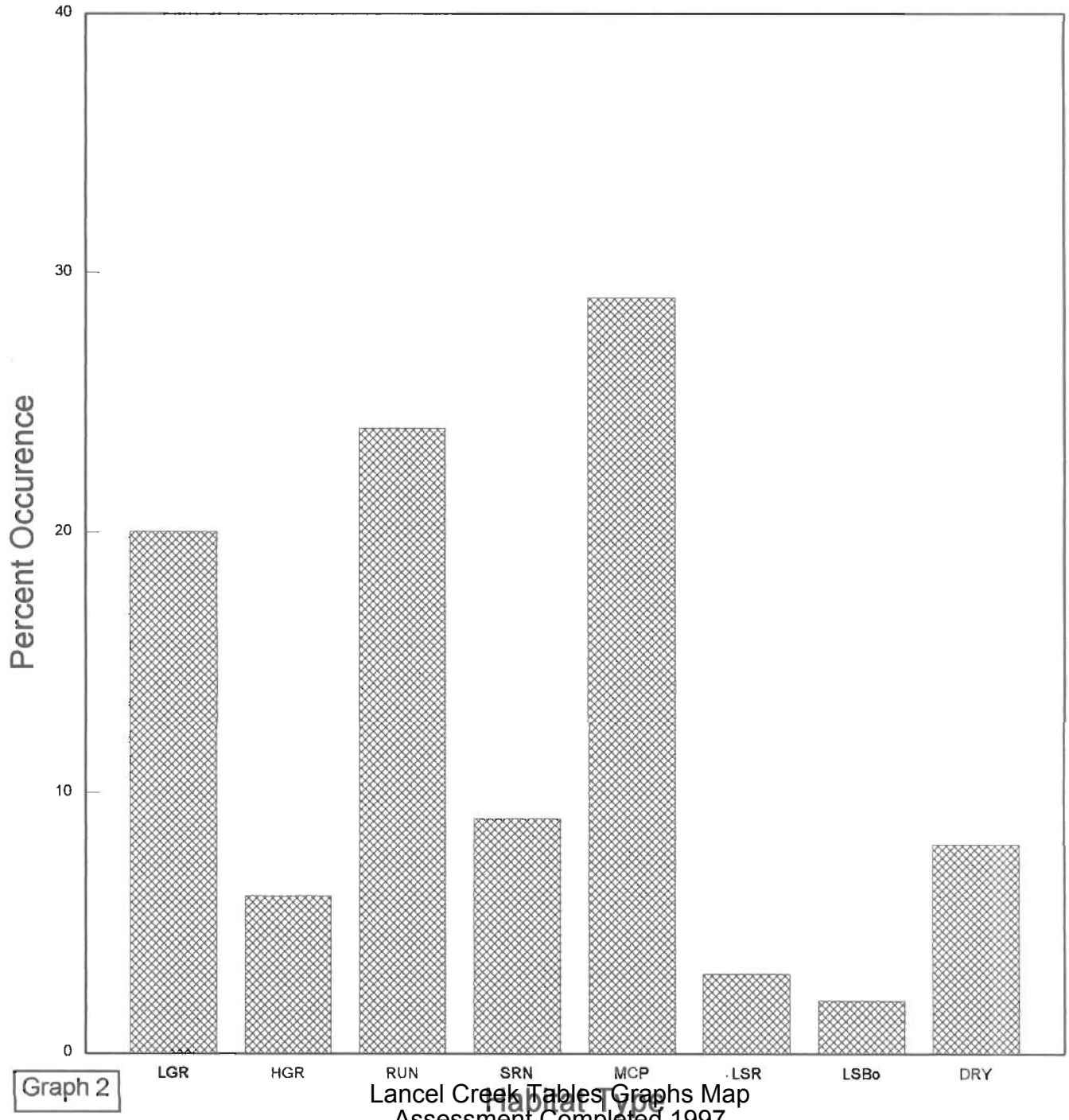




Graph 1

Lancel Creek

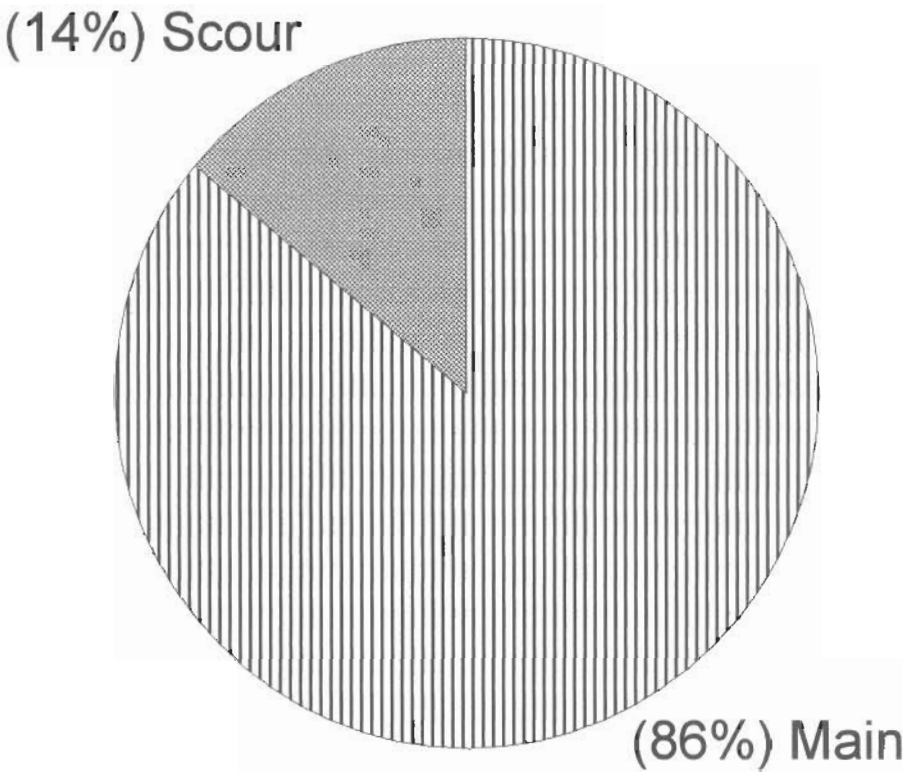
Level IV Habitat Types by % Occurrence



Graph 2

Lancel Creek

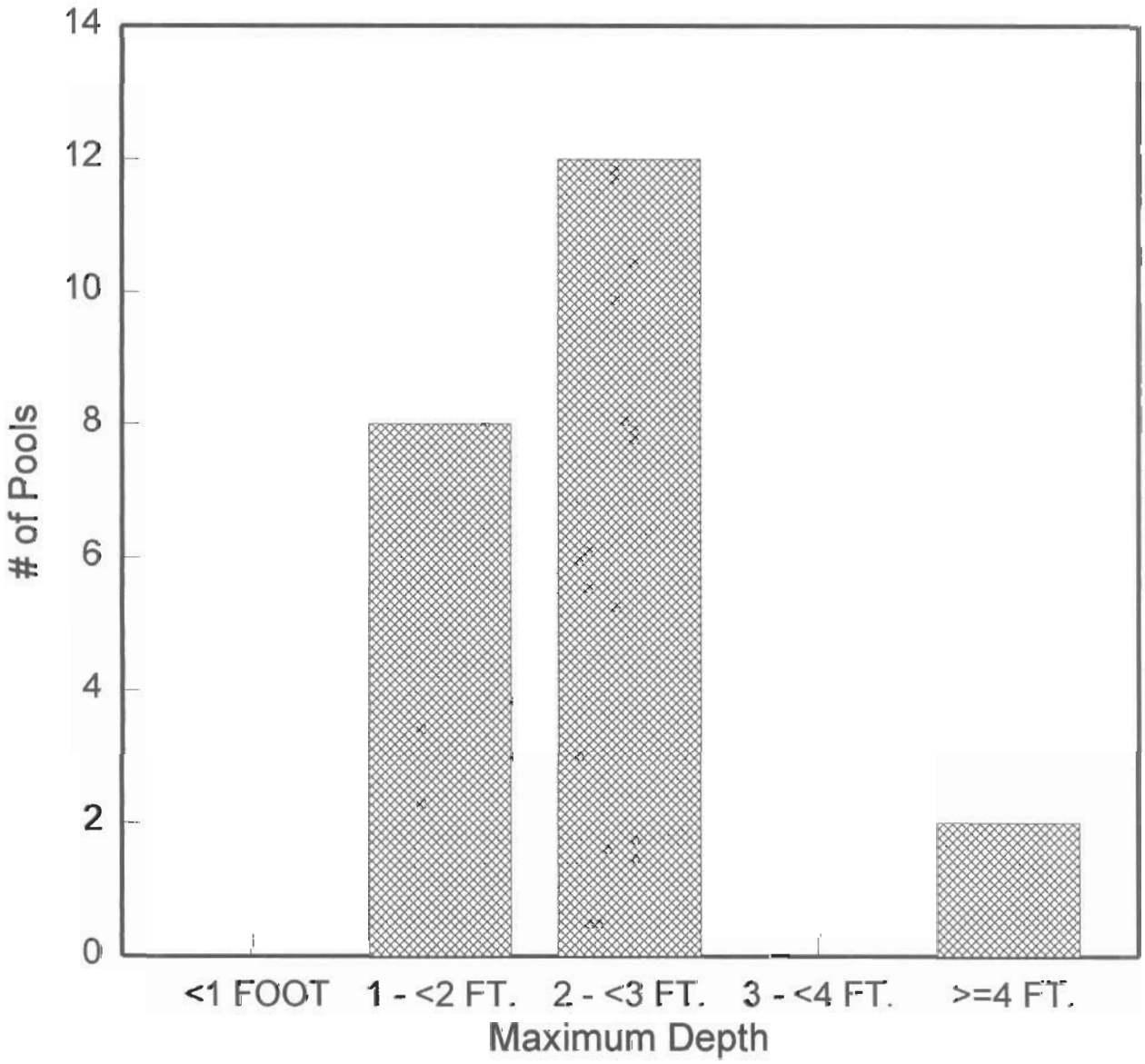
Pool Habitat Types by % Occurrence



Graph 3

Lancel Creek

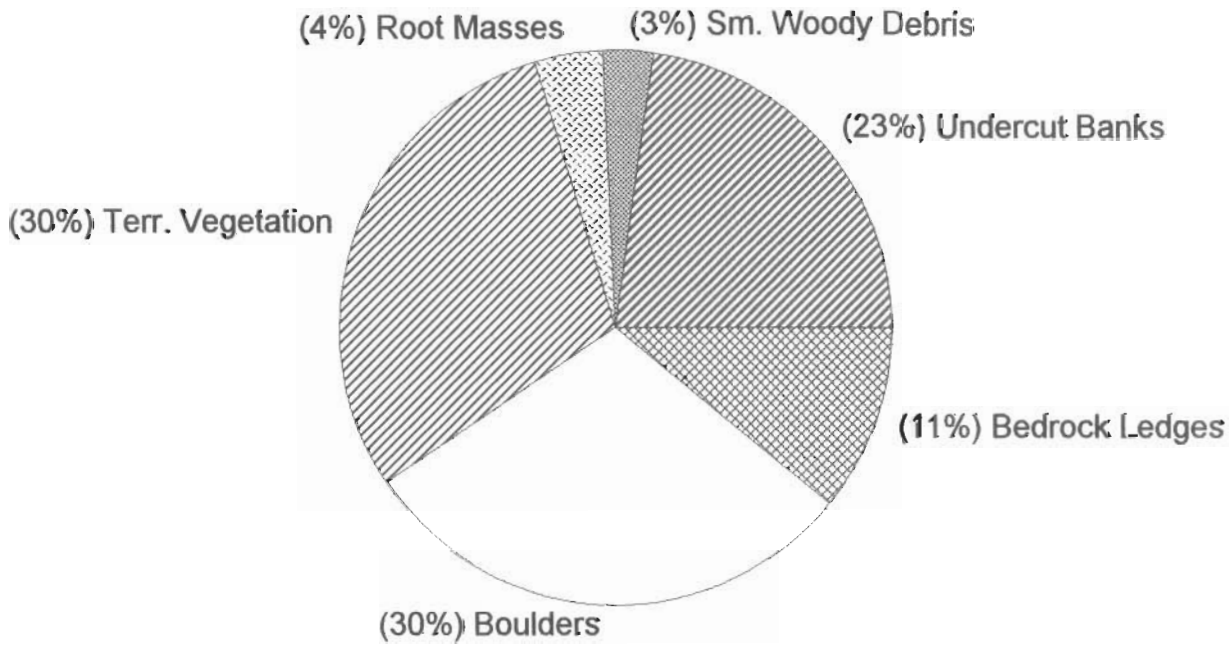
Maximum Depth in Pools



Graph 4

Lancel Creek

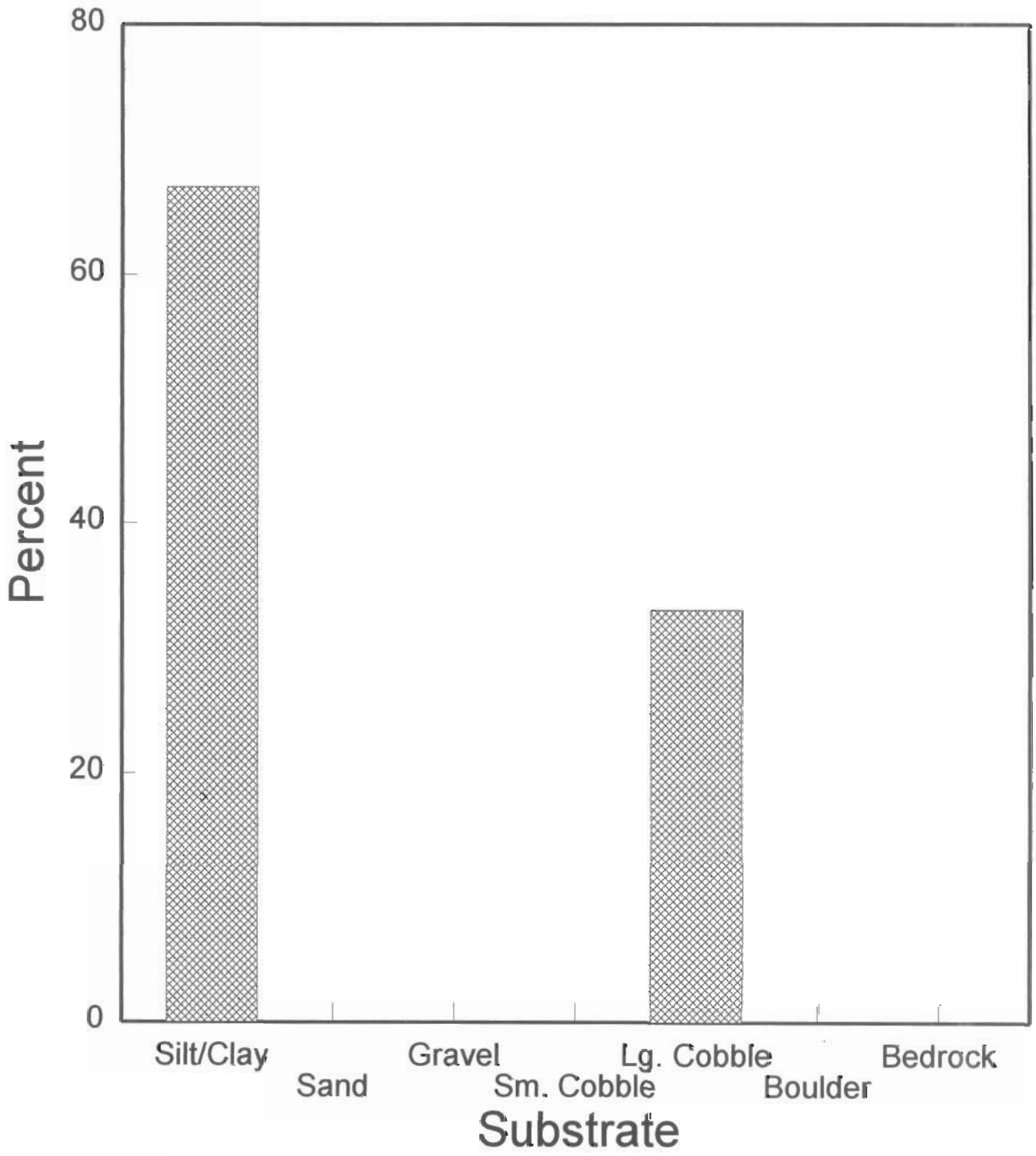
Pool Shelter Types by % Area



Graph 5

Lancel Creek

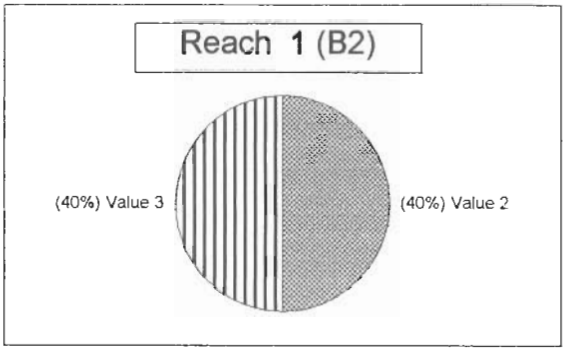
Substrate Composition in Low Gradient Riffles

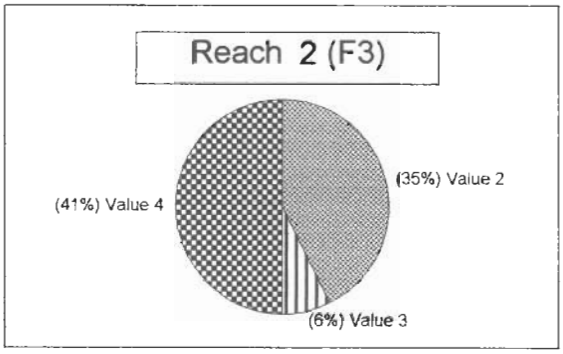


Graph 6

Lancel (Trib. to D. Bill)

Percent Cobble Embeddedness by Reach



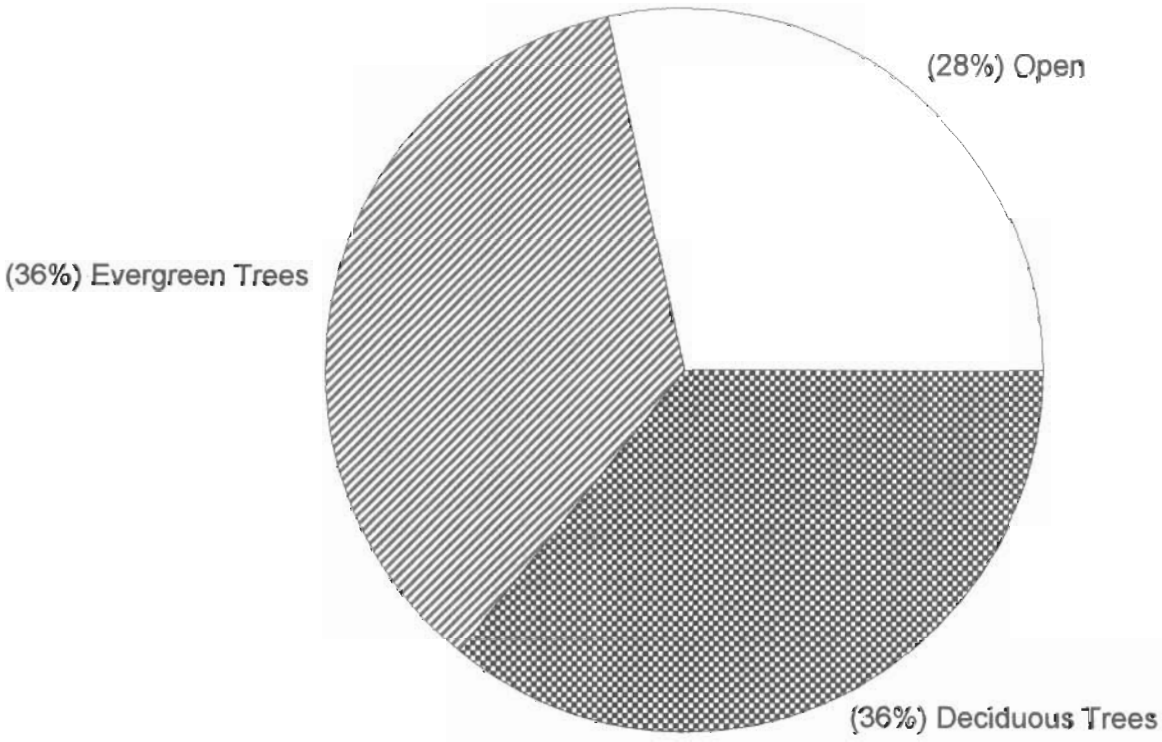


Value 1 = <25% Value 2 = 25-50% Value 3 = 51-75% Value 4 = >76%

Graph 7

Lancel Creek

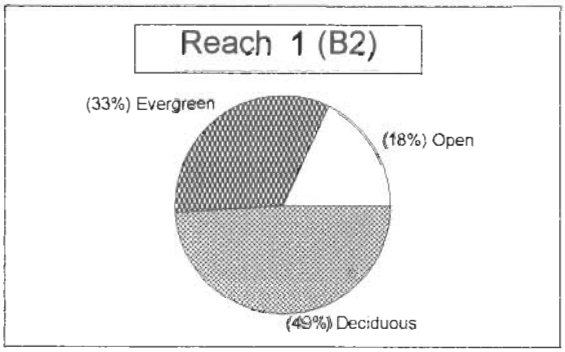
Mean Percent Canopy

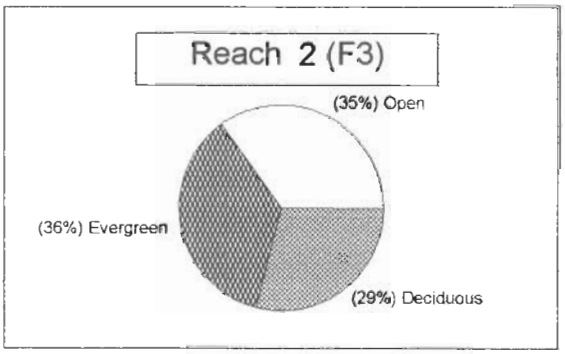


Graph 8

Lancel (Trib. to D. Bill)

Percent Canopy By Reach

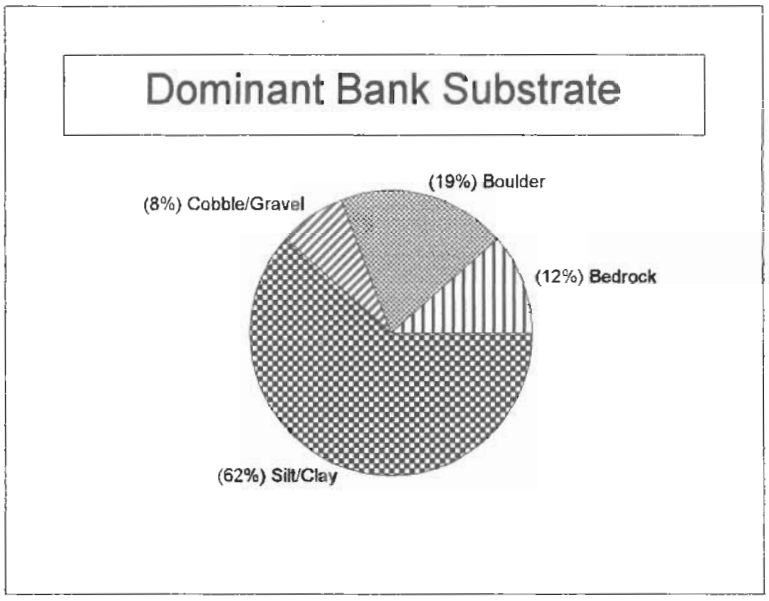


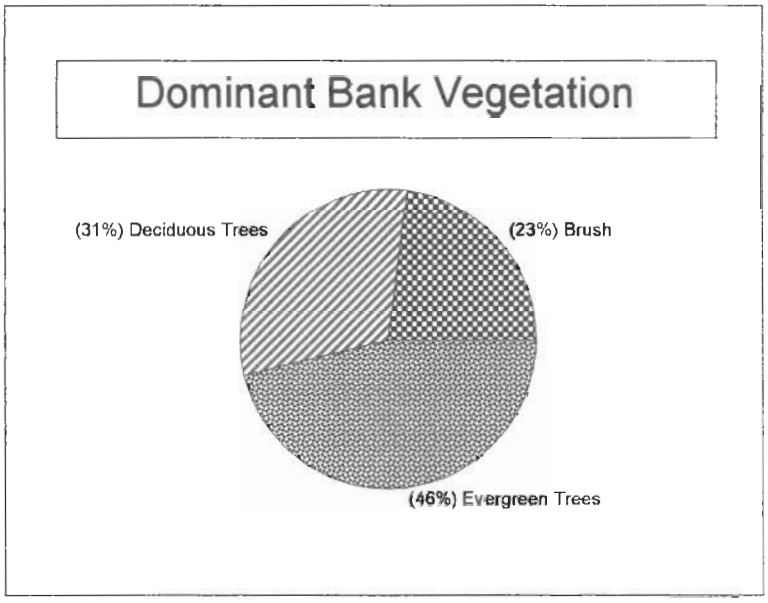


Graph 9

Lancel Creek

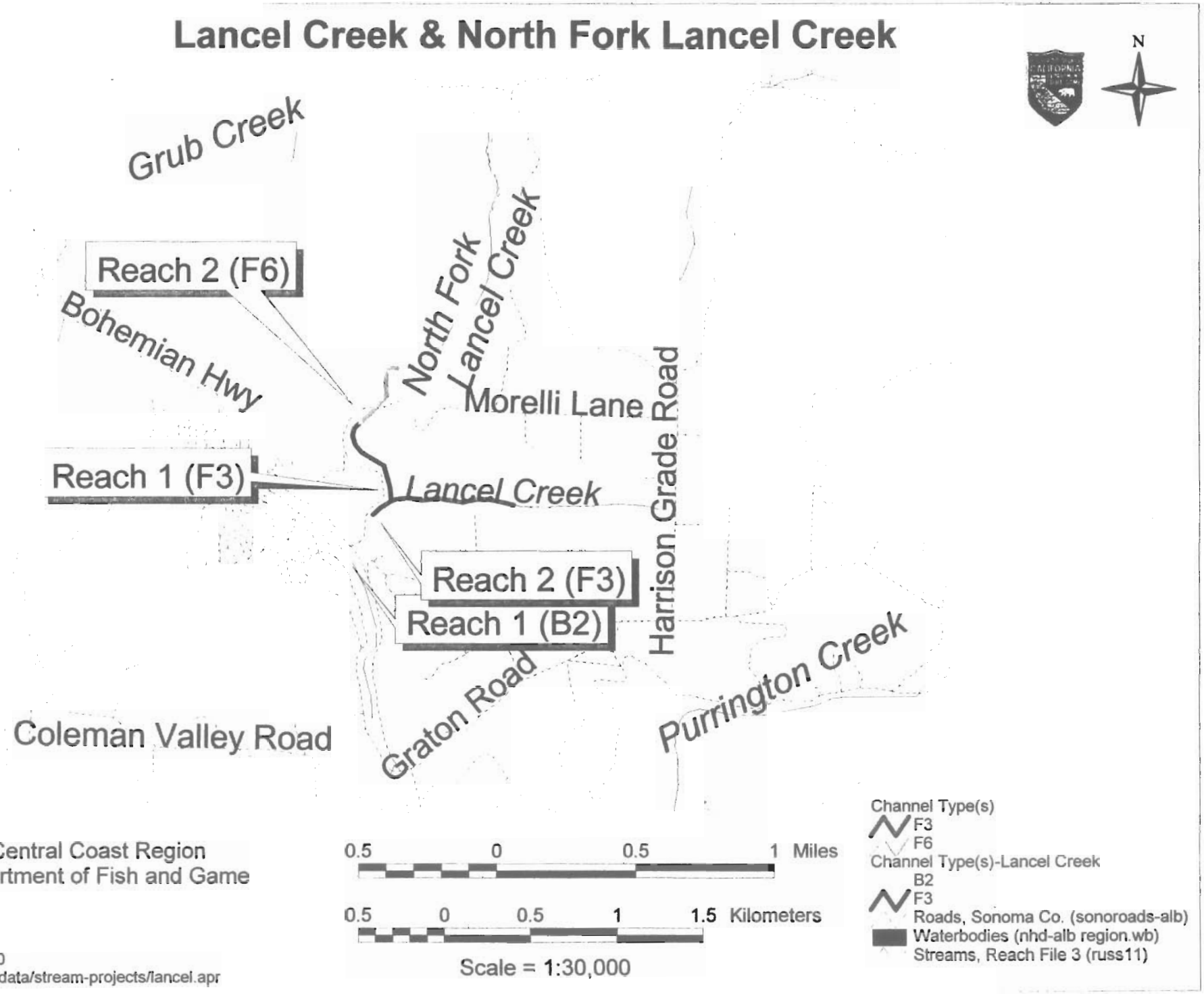
Percent Bank Composition





Graph 10

Lancel Creek & North Fork Lancel Creek



North Fork Lancel Creek | Drainage: Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES | Survey Dates: 08/20/97 to 08/21/97

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
1	0	RIFFLE	3	53	53	2	0.0	0.0	0	0	0	0	0	0
12	2	FLATWATER	33	93	1114	34	3.5	0.4	241	2887	87	1046	0	8
12	4	POOL	33	35	419	13	18.4	1.4	508	6093	795	9541	710	17
11	0	DRY	31	157	1730	52	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.)
36	6	3315	8980	10587

North Fork Lancel Creek | Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS | Survey Dates: 08/20/97 to 08/21/97

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 %
1	0	LGR	3	53	53	2	0	0.0	0.0	0	0	0	0	0	0	0
10	1	RUN	28	88	884	27	4	0.4	1.4	252	2517	76	762	0	8	61
2	1	SRN	6	115	230	7	4	0.5	1.5	218	437	109	218	0	10	93
9	2	MCP	25	42	379	11	11	1.6	4.0	505	4549	904	8134	710	18	69
2	1	LSBo	6	15	31	1	55	0.9	1.8	743	1486	669	1337	0	13	90
1	1	PLP	3	9	9	0	8	1.2	1.9	58	58	69	69	0	20	90
11	0	DRY	31	157	1730	52	0	0.0	0.0	0	0	0	0	0	0	64

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
36	6	3315	9047	10521

North Fork Lancel Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 08/20/97 to 08/21/97

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
9	2	MAIN	75	42	379	91	11.4	1.6	505	4549	904	8134	710	18
3	2	SCOUR	25	13	40	9	39.3	1.0	515	1544	469	1406	0	15

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
12	4	419	6093	9541

North Fork Lancel Creek | Drainage: Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES | Survey Dates: 08/20/97 to 08/21/97

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
9	MCP	75	0	0	4	44	3	33	1	11	1	11
2	LSBo	17	0	0	2	100	0	0	0	0	0	0
1	PLP	8	0	0	1	100	0	0	0	0	0	0

TOTAL UNITS 12

North Fork Lancel Creek | Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type | Survey Dates: 08/20/97 to 08/21/97

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
1	0	LGR	0	0	0	0	0	0	0	0	0
10	2	RUN	0	0	0	0	32	0	0	68	0
2	1	SRN	0	0	0	0	0	0	0	100	0
9	8	MCP	0	5	0	5	58	10	0	21	0
2	2	LSBo	0	0	0	0	0	0	0	100	0
1	1	PLP	0	0	0	0	0	0	0	100	0
11	0	DRY	0	0	0	0	0	0	0	0	0
36	14	ALL HABITAT TYPES	0	3	0	3	37	6	0	51	0
12	11	POOLS ONLY	0	4	0	4	40	7	0	46	0

North Fork Lancel Creek

Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 08/20/97 to 08/21/97

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
	0	LGR	0	0	0	0	0	0	0
	2	RUN	50	50	0	0	0	0	0
	1	SRN	0	0	0	0	0	0	100
	2	MCP	0	50	50	0	0	0	0
	1	LSBo	0	100	0	0	0	0	0
	1	PLP	0	0	0	0	0	100	0
	2	DRY	0	50	0	50	0	0	0

North Fork Lancel 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
71.18	67.06	32.94	74.44	70.56

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	1	1	11.11
Boulder	2	1	16.67
Cobble/Gravel	1	1	11.11
Silt/clay	5	6	61.11

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	1	3	22.22
Brush	2	1	16.67
Deciduous Trees	2	2	22.22
Evergreen Trees	4	3	38.89
No Vegetation	0	0	0