CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Thompson Creek
Report Revised April 14, 2006
Report Completed *2000*
Assessment Completed 1996

INTRODUCTION

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

Thompson Creek is a tributary to East Austin Creek which flows into Big Austin Creek, a tributary of the Russian River, located in Sonoma County, California (see Thompson Creek map, page 2). The legal description at the confluence with East Austin Creek is T8N, R11W, S2. Its location is 38°34'15" N. latitude and 123°2'6" W. longitude. Seasonal vehicle access exists from a dirt road at the mouth in State Park lands. See also trail access (Gilliam Creek Report).

Thompson Creek and its tributaries drain a basin of approximately 4 square miles. Thompson Creek is a first order stream and has approximately 1.7 miles of blue line stream, according to the USGS Cazadero 7.5 minute quadrangles. Elevations range from about 320 feet at the mouth of the creek to 1,580 feet in the headwaters. The creek flows through a steep mountainous canyon with vegetation dominated by oak trees and annual grasses. In the middle and lower sections there are also Big-leaf Maple, California Laurel, Coast Redwood and Douglas-fir. The Cedars Fairylantern (*Calochortus raichei*) is listed in DFG's Natural Diversity Database for Thompson Creek Watershed. Much of the watershed lies within Austin Creek State Recreation Area, the uppermost headwaters are private.

METHODS

The habitat inventory conducted in Thompson Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1994). The NEAP crew 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 Thompson 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 a Marsh-McBirney Model 2000 flow meter.

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. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

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". Thompson 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 measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Thompson 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) and 76 - 100% (value 4). Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, bedrock, 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. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Thompson Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were visually

estimated using a list of seven size classes and recorded as a one and two, respectively. In addition, the dominant substrate composing the pool tail-outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Thompson 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 and Vegetation:

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 Thompson Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully-described unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation (including downed trees, logs, and rootwads) 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 Thompson 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 surveys of Thompson Creek in April 1962 and August 1977. The 1962 survey started at the mouth and continued to the headwaters. The gradient was described as steep in the headwaters, and moderate in the lower half. The wetted width averaged 5' and the depth averaged 9". Numerous springs were observed throughout the entire section and no diversions were noted. Water velocity was described as rapid in the lower mid section and cascading in the headwater areas. Flow was estimated to be 1.5 cfs on the date of the survey. A 15' high rock falls was noted as completely blocking anadromous fish passage.

Pool development was considered very good with a few pools in the mid section averaging 10' x 20' x 5'. The pools were formed mainly by boulders and undercut banks. Shelter consisting of roots, rocks and undercut banks was considered very satisfactory for small salmonids. The air temperature was 80°F and the water temperature was 57°F at 1200 hours. Insects and larvae were noted to be common. In general, this creek was considered to be one of the better spawning and nursery streams for steelhead in the upper East Austin Creek drainage.

The August 1977 survey started at the mouth and continued to the

headwaters. The gradient was 8.2'/100' overall, but slightly greater in the middle 1/3 of the stream. The wetted width averaged 2' and ranged from several inches to 17'. The depth averaged 2-3" and ranged from less than 1" to 5'. No diversions were observed and springs were common throughout the surveyed area. The surrounding vegetation indicated the springs were drying up. No flow was observed from the mouth to 1 mile upstream. Starting 1 mile from the mouth and continuing for .7 miles was an intermittent flow estimated to be .01 cfs. Three pools were located near the mouth and 1 pool was located .5 miles from the mouth. The velocity was described as sluggish to moderate. The winter water line indicated a 2-4' high water level.

In the 1977 survey, partial barriers included a log jam .2 miles upstream from the mouth (removal was recommended) and a boulder-bedrock falls with a 5' drop located 1.3 miles from the mouth. A split-level bedrock falls, with the lower drop measuring approximately 10' and the upper drop measuring approximately 15', was identified as a complete barrier.

The pool to riffle ratio was 5 to 1 in the areas with water. The average size pool was 8' x 3' x 2'. Pools were created by boulders, bedrock, and undercut banks. Shelter consisted of undercut banks, logs, bedrock, boulders, and roots. Canopy provided an average of 65% cover. The air temperature was 76°F and the water temperature was 59°F at 1300 hours. Trichoptera larvae, water striders, aquatic snails and aquatic beetles were noted.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 31 and August 5-6, 1996 was conducted by Mark Kipp and Mark Bolin (NEAP) and data analyzed by Ken Bunzel (DFG). The survey began at the confluence with East Austin Creek and extended up Thompson Creek 744 feet past a 10 foot cascade fish barrier. The total length of the stream surveyed was 3,653 feet.

This section of Thompson Creek has a B3 channel type. B3 channels 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.

Water temperatures ranged from 59°F to 71°F. Air temperatures ranged from 63°F to 94°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 48% pool units, 42% riffle units, and 10% flatwater units. Based on total **length** there were 59% riffle units, 30% pool units, and 11% flatwater units (Graph 1).

Forty-eight habitat units were measured and 35% were completely sampled. Twelve Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent **occurrence** were high gradient riffles at 19%, plunge pools 17%, cascades 15% and runs 10% (Graph 2). By percent total **length**, high gradient riffles made up 33%, cascades 20%, step pools 12%, and runs 11%.

Twenty-three pools were identified (Table 3). Scour pools were most often encountered at 61%, but only comprised 43% of the total length of pools. No backwater pools were identified (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Fourteen of the 23 pools (61%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 18% 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 109. Flatwater had the lowest rating with 15 and pools rated 95 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 108 and main channel pools rated 71 (Table 3).

Table 5 summarizes fish shelter by habitat type. The dominant pool shelter types were boulders at 36%, white water 22%, and aquatic vegetation 12%. Graph 5 describes the pool shelter in Thompson Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in the one low gradient riffle measured for substrate. The two high gradient riffles measured had large cobble and boulder substrates.

In the 1962 survey, the substrate was described as rubble, gravel and boulders with some bedrock sections. Spawning habitat was considered to be excellent from the mouth to the rock falls barrier. Above the falls, suitable spawning habitat was limited due to the steep gradient.

In the 1977 survey, the substrate was described as 40% rubble, 30% gravel, 15% boulder, 5% bedrock, and 10% mud, silt, sand, and

detritus. Only 25% of the area surveyed was considered to have good spawning gravel, and silt was present in 20% of the available spawning gravels.

The 1996 survey estimated the depth of cobble embeddedness at pool tail-outs. Of the 23 pool tail-outs measured, 2 had a value of 1 (9%) and 21 had a value of 2 (91%). No values of 3 or 4 were noted. On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 81%. The mean percentages of deciduous and evergreen trees were 39% and 61%, respectively. Graph 8 describes the mean percent canopy for the entire survey.

For the stream reach surveyed, the mean percent right bank vegetated was 62% and the mean percent left bank vegetated was 74%. For the habitat units measured, the dominant vegetation types for the stream banks were: 47% evergreen trees, 44% deciduous trees, 6% brush, and 3% grass. The dominant substrate for the stream banks were: 41% bedrock, 29% silt/clay/sand, 18% cobble/gravel and 12% boulder (Graph 10).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In the 1962 survey, an estimated numerous young of the year (0+) steelhead were observed from the mouth to the rock falls barrier. In addition, an estimated 100 1+ steelhead and 6 2+ steelhead were observed. Pacific giant salamanders were extremely abundant during the survey.

In the 1977 survey, 0+ and 1+ steelhead were observed starting 1 mile upstream from the mouth to the split-level falls barrier at a density of 5/100'. In general, it was noted that because of the low rainfall conditions of the past two years, Thompson Creek was supporting few juvenile steelhead.

On October 10, 1996 a biological inventory was conducted to document the fish species composition and distribution. Single pass electrofishing was the method used. Fish from each site were counted by species, and returned to the stream. The observers were Kipp, Bolin (NEAP), Campo (Americorps) and Coey (DFG).

The inventory started at the mouth and continued for 995 feet in habitat units 1-10. In pool, riffle and run habitat types 93 0+ and 7 1+ steelhead were observed (10/100') along with 73 Sacramento Squawfish, 7 Yellow-legged Frogs and 3 newts. No squawfish were

observed above a bedrock falls located approximately midway through the inventory.

During the habitat inventory, no salmonids were observed upstream of unit 38, 2,909 feet (.6 miles) above the mouth, where a 10 foot cascade appears to impede further passage.

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
1962,1977,1995	Steelhead Trout	DFG	N
1995	Sacramento Pikeminnow	DFG	N
1995	newt (unidentified)	DFG	N
1995	Yellow-legged Frog	DFG	N

No known hatchery stocking, transfers or rescue operations have occurred in Thompson Creek Watershed.

DISCUSSION

Thompson Creek has a B3 channel type. 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. This channel type has a suitable gradient and 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. 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 July 31 and August 5-6, 1996 ranged from 59°F to 71°F. Air temperatures ranged from 63°F to 94°F. These temperatures, if sustained, are above the

threshold stress level (65°F) for salmonids. 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 30% 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 Thompson Creek, the pools are relatively deep with 61% having a maximum depth of at least 2 feet. However, these pools comprised only 18% 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. Log and root wad scour structures in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

The mean shelter rating for pools was 95. Shelter ratings in this stream were measured in regard to 0+ fish. Shelter for 1+ fish is scarce. The existing pool shelter is being provided primarily by boulders (36%), white water (22%), and aquatic vegetation (12%).

Small cobble was the dominant substrate observed. Nine percent of pool tail outs had embeddedness ratings of 1 and 91% had a rating of 2. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. These embeddedness ratings indicate salmonid spawning habitat is "fair".

The mean percent canopy for the survey was 81%. This is a good percentage of canopy, since 80 percent is generally considered desirable. However, high water temperatures recorded indicate stream canopy may be low above the surveyed reach, or in smaller un-surveyed tributaries. There was very little indication of upslope disturbances causing erosion or delivery of sediment to the stream along the surveyed section. Some Park Road and gully runoff features were noted in the lower reach from Tom King campground to confluence which could be addressed through road maintenance.

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, and coho were never observed. This is likely because physiological and environmental requirements for coho are more

stringent than for steelhead, or coho were absent or present only in small numbers in some years. During the 1962 survey, steelhead of all age classes were observed. Young of the year steelhead were especially abundant indicating good spawning conditions. In the 1977 survey, steelhead were less common, although it was noted that the previous 2 years had been very dry. The 1996 survey documented many 0+ steelhead, indicated successful spawning. However, fewer 1+ fish were observed than expected indicating poor holding-over conditions in general. In addition, Sacramento Squawfish, a native warm water predator species, were common below the bedrock falls barrier near the mouth. The combination of warm temperatures and many predator fish may be limiting salmonid production to the 1+ stage.

Although stream shade canopy and shelter values are good, water temperatures and embeddedness ratings are higher than is suitable for salmonids. Historical surveys indicate overall, habitat conditions for steelhead have declined over time.

GENERAL RECOMMENDATIONS

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

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. 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) Access for migrating salmonids is possibly limited by a 10 foot cascade barrier, located .6 miles from the mouth. There are two additional falls (15 and 25 feet high) located approximately 260 feet upstream of the first barrier. Modification of these natural barriers may not be desirable.

2) The non-anadromous reach above the survey section and smaller unsurveyed tributaries should be assessed for riparian planting with willow, alder, redwood, and Douglas-fir. In many cases, planting would also be needed to be coordinated to follow bank stabilization or upslope erosion control projects.

3) Adding high quality complexity with larger woody cover may be desirable. Most of the existing shelter is from boulders and white water. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations, to increase the number, length, and depth of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

RESTORATION IMPLEMENTED

1) The unimproved park access road into Thompson Creek has erosive gullies and culverts which need maintenance. These road problems need to be inventoried, prioritized and treated to decrease sedimentation to the stream.

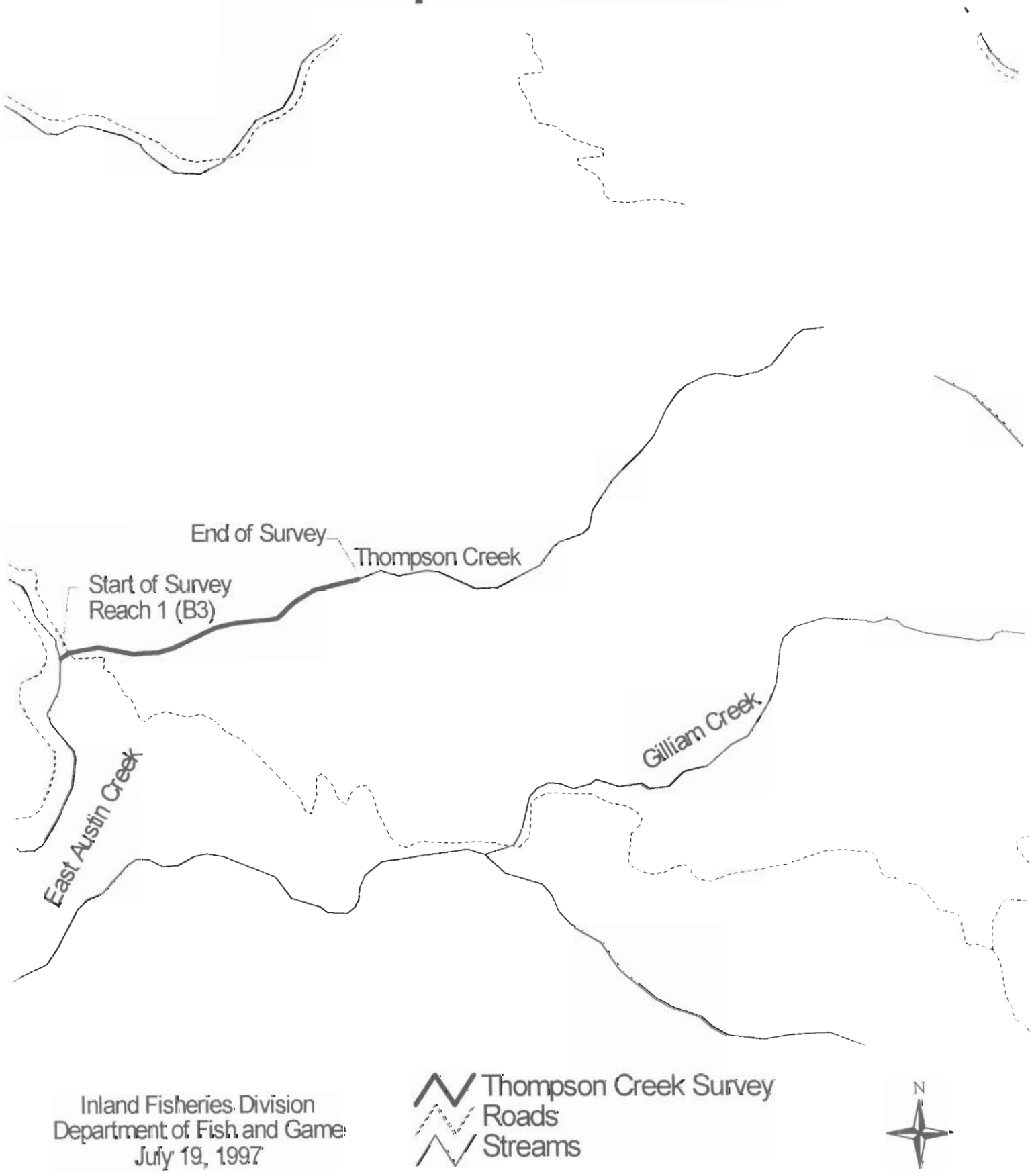
PROBLEM SITES AND LANDMARKS - THOMPSON CREEK SURVEY COMMENTS

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	103	CONFLUENCE WITH EAST AUSTIN
4.00	391	CULVERT LF BANK UP AT RD
5.00	467	LOG JAM
6.00	503	NICE POOL, 1+, 0+ SALMONIDS
12.00	1064	SALMONIDS
14.00	1146	DRY TRIB LF BANK
18.00	1493	DRY TRIB RT BANK
25.00	2028	TOM KING CAMPGROUND L/B RATTLESNAKE
32.00	2482	CLASS 3 STREAM, DRY RT BANK
33.00	2670	LARGE SALMONIDS
35.00	2772	5.2' WATERFALL 30 FT BOULDER RT BANK, DRY TRIB LF BANK
37.00	2887	NICE POOL, LARGE 8" SALMONID,0+,1+,2+
38.00	2909	NO FISH SEEN ABOVE HERE, POSS FISH BARRIER, 10' CASCADE
40.00	3142	FLAG #039 (ACTUAL UNIT 40) AT TOP OF UNIT AT POOL, DRAGONFLY NYMPHS
41.00	3173	15' WATERFALL TOP OF UNIT, NO SALMONIDS OBSERVED W/ MASK AND SNORKEL
42.00	3189	25' WATERFALL TOP OF UNIT
43.00	3218	POOL AT TOP OF WATERFALL

45.00	3283	NO VISIBLE FISH
48.00	3653	NO FISH SEEN ABOVE UNIT 38 AT CASCADE, FLAG #49 (ACTUAL 48) AT LF BANK AT POOL

Thompson Creek



Thompson Creek

Drainage: East Austin Creek, Big Austin Creek, Russian River

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

Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO LEGAL DESCRIPTION: T8NR11WS2 LATITUDE: 38°34'15" LONGITUDE: 123°2'6"

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
20	4	RIFFLE	42	107	2148	59	7.0	0.4	352	7044	138	2761	0	109
5	1	FLATWATER	10	82	411	11	5.0	0.4	330	1650	132	660	0	15
23	12	POOL	48	48	1094	30	14.4	1.3	478	10993	597	13727	472	95

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
48	17	3653	19687	17148

Thompson Creek

Drainage: East Austin Creek, Big Austin Creek, Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO LEGAL DESCRIPTION: T8NR11WS2 LATITUDE: 38°34'15" LONGITUDE: 123°2'6"

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 %
4	1	LGR	8	45	178	5	6	0.2	0.3	34	134	7	27	0	0	65
9	2	HGR	19	136	1223	33	9	0.3	1.2	478	4302	126	1134	0	168	94
7	1	CAS	15	107	747	20	4	0.7	1.2	419	2934	293	2054	0	100	67
5	1	RUN	10	82	411	11	5	0.4	0.7	330	1650	132	660	0	15	86
2	2	TRP	4	38	76	2	5	1.0	2.8	175	349	160	321	125	70	38
3	3	MCP	6	33	100	3	11	1.5	4.1	320	960	546	1637	473	78	97
4	1	STP	8	113	451	12	6	0.9	2.5	797	3187	862	3447	638	60	80
1	1	LSL	2	54	54	1	8	1.2	1.9	432	432	518	518	389	105	75
3	3	LSR	6	33	100	3	9	0.9	2.3	266	798	250	750	170	148	93
1	0	LSBk	2	33	33	1	12	0.7	1.7	396	396	277	277	198	30	0
1	1	LSBo	2	36	36	1	6	1.2	2.2	205	205	246	246	205	105	80
8	1	PLP	17	31	244	7	27	1.7	4.3	583	4667	816	6530	668	103	80

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
48	17	3653	20014	17602

Thompson Creek

Drainage: East Austin Creek, Big Austin Creek, Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO LEGAL DESCRIPTION: T8NR11WS2 LATITUDE: 38°34'15" LONGITUDE: 123°2'6"

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	6	MAIN	39	70	627	57	7.3	1.1	500	4496	601	5405	469	71
14	6	SCOUR	61	33	467	43	18.9	1.4	464	6498	594	8322	475	108

TOTAL UNITS	TOTAL UNITS	TOTAL LENGTH (ft.)	TOTAL AREA (sq.ft.)	TOTAL VOL. (cu.ft.)
23	12	1094	10993	13727

Thompson Creek | Drainage: East Austin Creek, Big Austin Creek, Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES | Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO | LEGAL DESCRIPTION: T8NR11WS2 | LATITUDE: 38°34'15" | LONGITUDE: 123°2'6"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH	>=4 FEET PERCENT OCCURRENCE
2	TRP	9	0	0	0	0	2	100	0	0	0	0
3	MCP	13	0	0	1	33	1	33	0	0	1	33
4	STP	17	0	0	3	75	1	25	0	0	0	0
1	LSL	4	0	0	1	100	0	0	0	0	0	0
3	LSR	13	1	33	1	33	1	33	0	0	0	0
1	LSBk	4	0	0	1	100	0	0	0	0	0	0
1	LSBo	4	0	0	0	0	1	100	0	0	0	0
8	PLP	35	0	0	1	13	3	38	1	13	3	38

TOTAL UNITS 23

Thompson Creek

Drainage: East Austin Creek, Big Austin Creek, Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO LEGAL DESCRIPTION: T8NR11WS2 LATITUDE: 38°34'15" LONGITUDE: 123°2'6"

	UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	SQ. FT. UNDERCUT BANKS	SQ. FT. SWD	SQ. FT. LWD	SQ. FT. ROOT MASS	SQ. FT. TERR. VEGETATION	SQ. FT. AQUATIC VEGETATION	SQ. FT. WHITE WATER	SQ. FT. BOULDERS	SQ. FT. BEDROCK LEDGES
	4	1	LGR	0	0	0	0	0	0	0	0	0
	9	2	HGR	0	0	0	0	0	144	277	906	0
	7	1	CAS	0	13	0	0	13	52	79	105	0
	5	2	RUN	0	0	0	0	0	0	0	83	0
	2	2	TRP	0	0	0	0	5	28	48	38	5
	3	3	MCP	10	57	0	35	0	0	18	113	53
	4	3	STP	4	40	0	0	0	36	45	32	26
	1	1	LSL	45	0	8	0	15	30	0	53	0
	3	3	LSR	181	58	0	14	15	145	5	66	0
	1	1	LSBk	0	0	0	0	24	0	12	24	0
	1	1	LSBo	0	38	19	0	0	0	0	19	0
	8	8	PLP	47	72	106	0	9	159	598	857	126
TOTAL	48	28		287	278	133	49	81	594	1082	2296	210
				6%	6%	3%	1%	2%	12%	22%	46%	4%
TOTAL FOR POOLS	23	22		287	265	133	49	68	398	726	1202	210
				9%	8%	4%	1%	2%	12%	22%	36%	6%

Thompson Creek

Drainage: East Austin Creek, Big Austin Creek, Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/31/96 to 08/06/96

Confluence Location: QUAD: CAZADERO LEGAL DESCRIPTION: T8NR11WS2 LATITUDE: 38°34'15" LONGITUDE: 123°2'6"

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
4	1	LGR	0	0	0	100	0	0	0
9	2	HGR	0	0	0	0	50	50	0
7	1	CAS	0	0	0	0	0	0	100
5	1	RUN	0	0	0	0	100	0	0
2	1	TRP	0	0	0	0	0	0	100
3	3	MCP	0	33	33	0	0	0	33
4	1	STP	0	0	0	0	0	0	100
1	1	LSL	0	0	0	0	100	0	0
3	3	LSR	0	0	33	0	33	33	0
1	0	LSBk	0	0	0	0	0	0	0
1	1	LSBo	0	0	0	100	0	0	0
8	1	PLP	0	0	100	0	0	0	0

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

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Decidous	Mean Right bank % Cover	Mean Left Bank % Cover
81.48	61.48	38.52	62.06	73.53

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Bedrock	7	7	41.18
Boulder	1	3	11.76
Cobble/Gravel	3	3	17.65
Silt/clay	6	4	29.41

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Grass	1	0	2.94
Brush	1	1	5.88
Deciduous Trees	6	9	44.12
Evergreen Trees	9	7	47.06
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Thompson Creek
SAMPLE DATES: 07/31/96 to 08/06/96
STREAM LENGTH: 3653 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: CAZADERO Latitude: 38°34'15"
Legal Description: T8NR11WS2 Longitude: 123°2'6"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

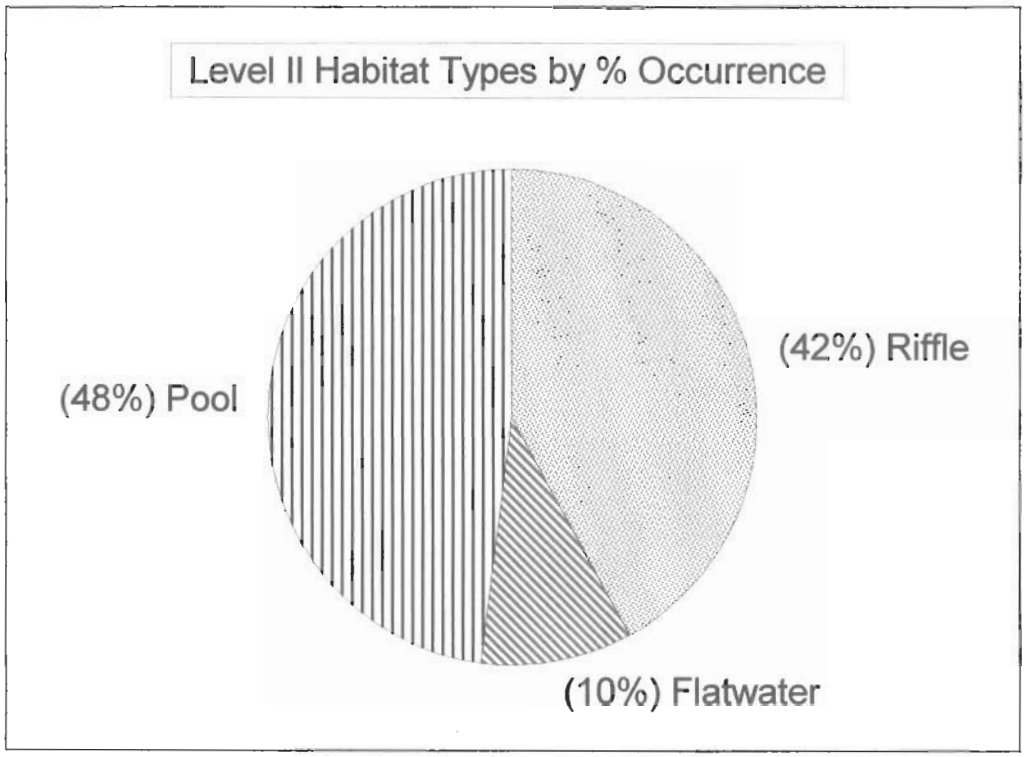
STREAM REACH 01

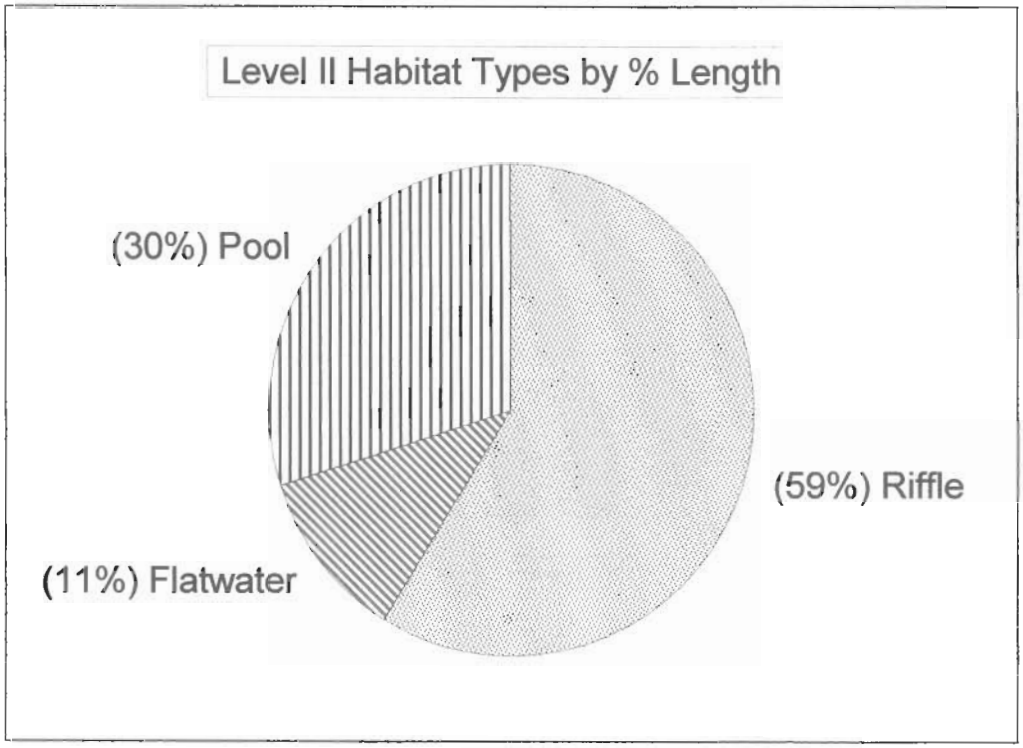
Channel Type: B3	Canopy Density: 81%
Channel Length: 3653 ft.	Evergreen Component: 61%
Riffle/Flatwater Mean Width: 7 ft.	Deciduous Component: 39%
Total Pool Mean Depth: 1.3 ft.	Pools by Stream Length: 30%
Base Flow: 0.0 cfs	Pools >=3 ft.deep: 22%
Water: 59 - 71 °F Air: 63 - 94 °F	Mean Pool Shelter Rtn: 95
Dom. Bank Veg.: Evergreen Trees	Dom. Shelter: Boulders
Vegetative Cover: 68%	Occurrence of LOD: 30%
Dom. Bank Substrate: Bedrock	Dry Channel: 0 ft.

Embeddness Value: 1. 9% 2. 91% 3. 0% 4. 0%

Thompson Creek

Level II Habitat Types

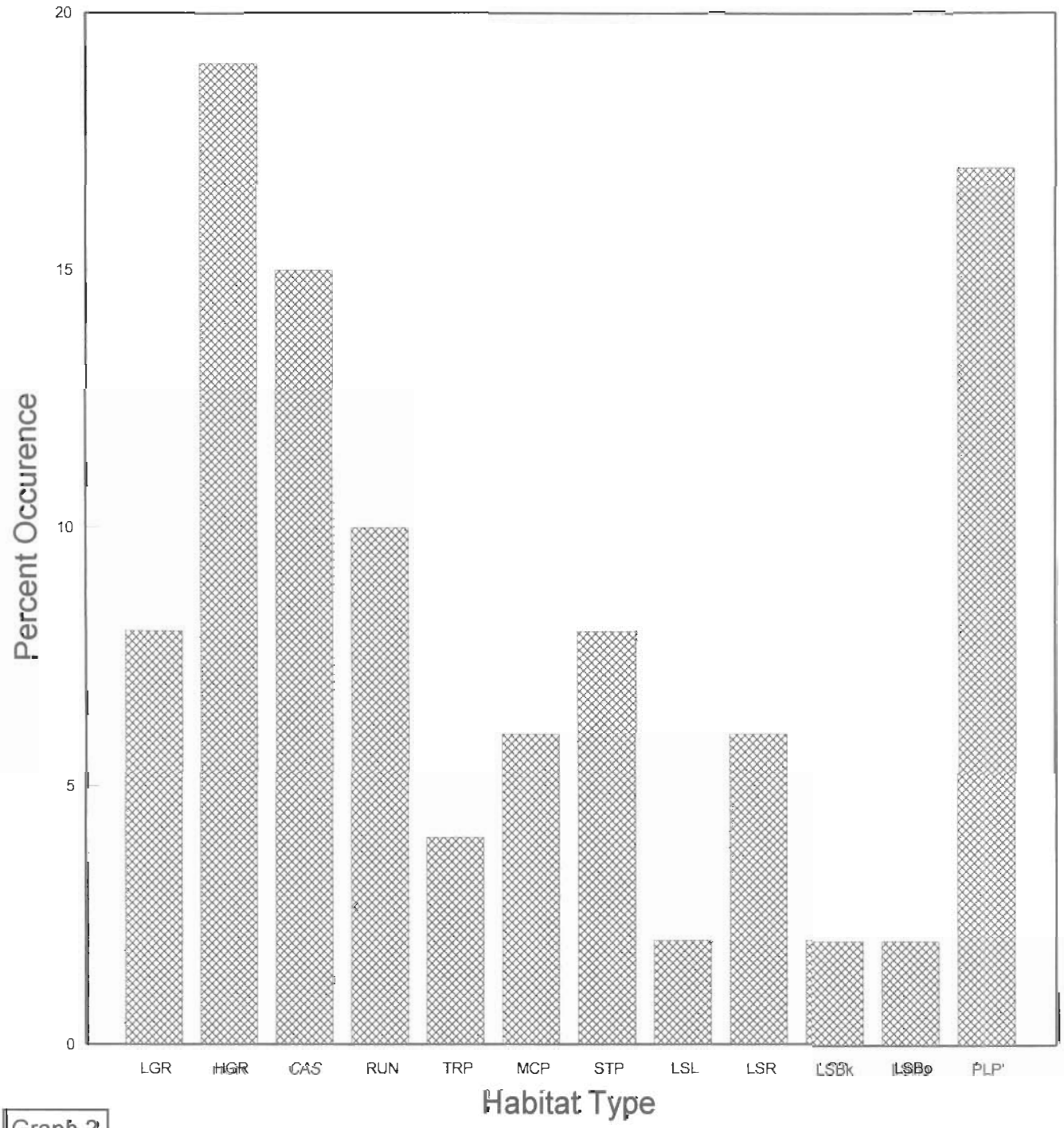




Graph 1

Thompson Creek

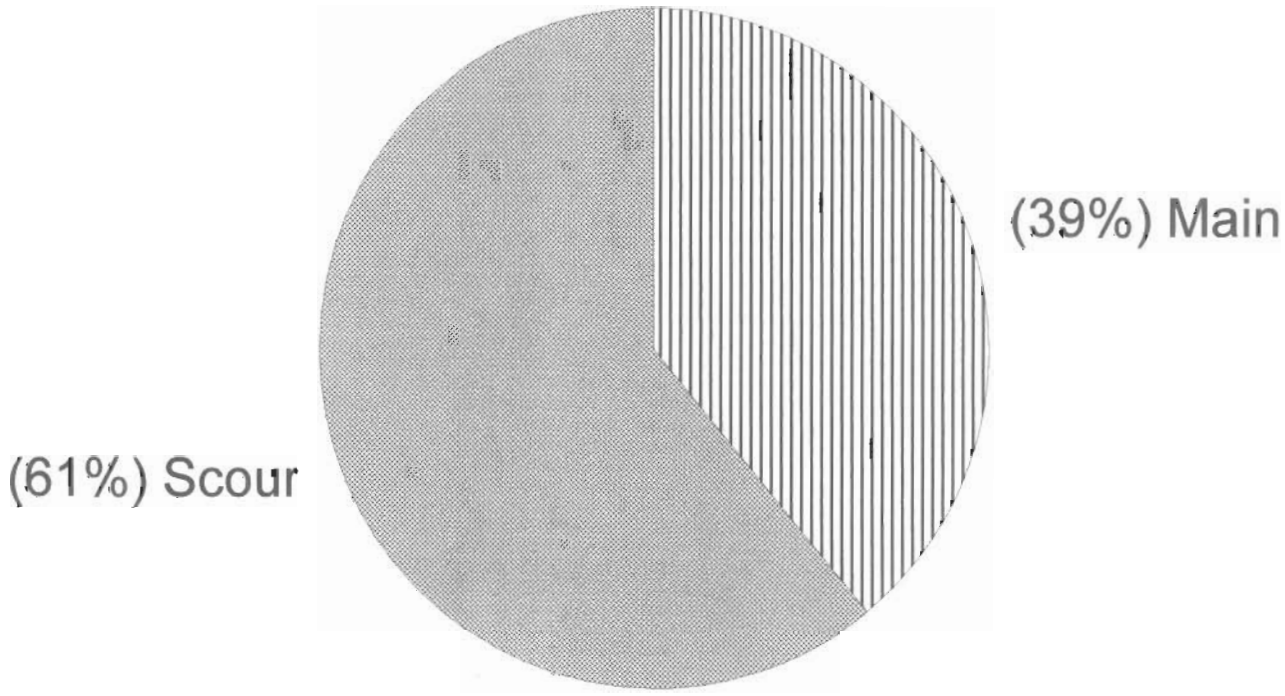
Level IV Habitat Types by % Occurrence



Graph 2

Thompson Creek

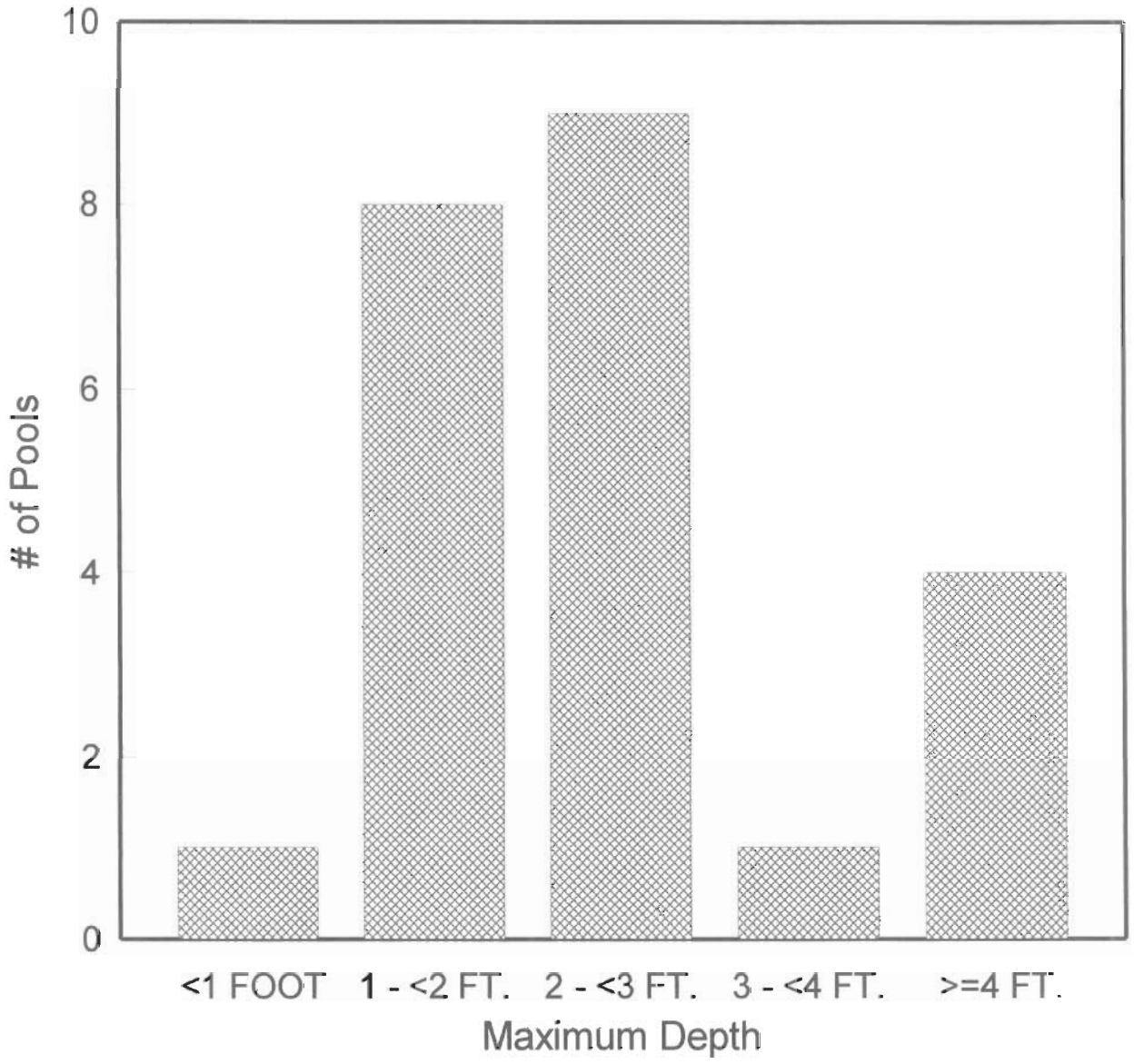
Pool Habitat Types by % Occurrence



Graph 3

Thompson Creek

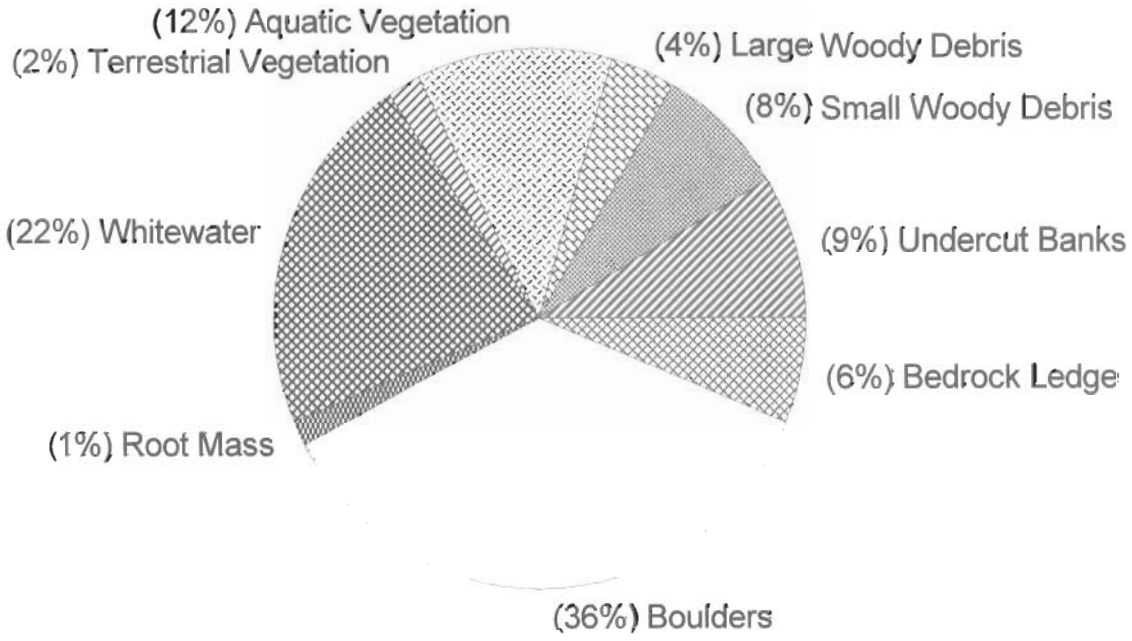
Maximum Depth in Pools



Graph 4

Thompson Creek

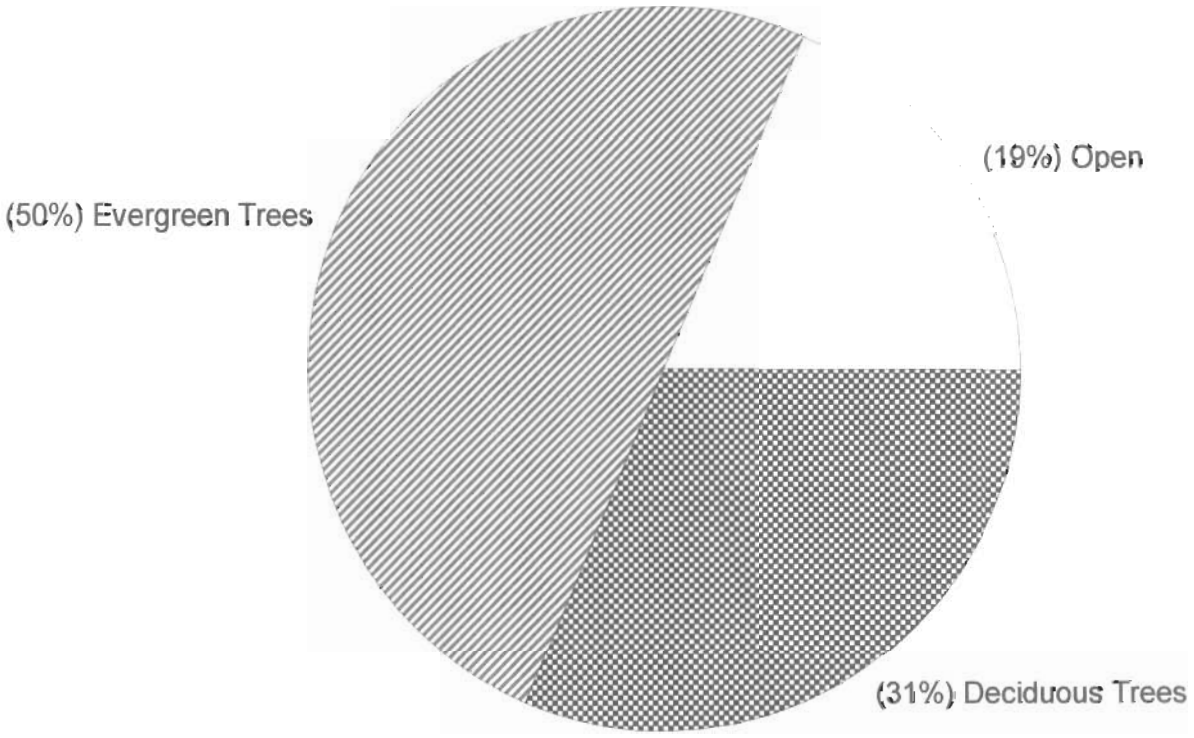
Pool Shelter Types by % Area



Graph 5

Thompson Creek

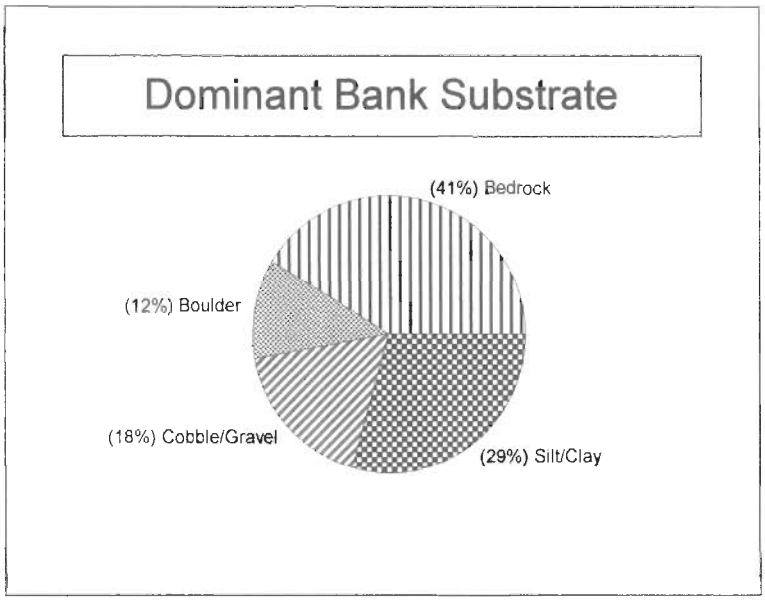
Mean Percent Canopy

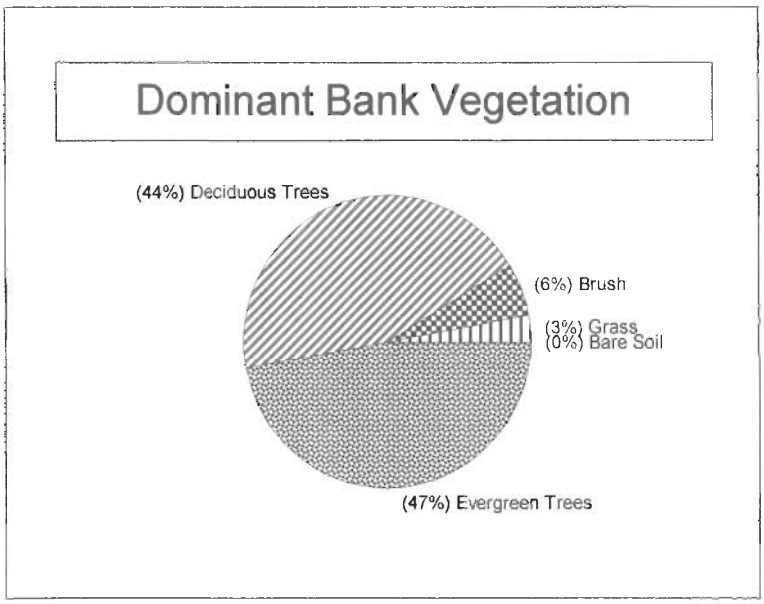


Graph 8

Thompson Creek

Percent Bank Composition





Graph 10