CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT

Coleman Creek

Report Revised April 14, 2006
Report Completed 2005
Assessment Completed 2002

INTRODUCTION

A stream inventory was conducted during the summer of 2002 on Coleman Creek, a stream in the Russian River Basin. 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 Coleman Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution. Note: Coleman Creek was surveyed with Vasser Creek as a tributary to Coleman Creek.

The objective of this report is to document the current habitat conditions and, after analyzing historical and recent data, 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

Coleman Creek is a creek located in Mendocino and Lake Counties, California (see Coleman Creek map, APPENDIX A). The legal description at the confluence with Pieta Creek, a tributary of the Russian River, is T13N, R11W, and S35. Its location is 38º56'30.15"N latitude and 123º02'34.07"W longitude. Access exists from a four-wheel drive road off Hwy 101 past Squaw Rock, first road on the right after Pieta before fork in dirt road.

Coleman Creek and its tributaries drain a basin of approximately 4051.5 acres (6.33 square miles). Coleman Creek is a maximum third order stream and has approximately 36207.3 feet (6.86 miles) of blue line stream, according to the USGS "Hopland" 7.5 minute quadrangles. Major tributaries include Sheldon Creek which is described in separate reports. Elevations range from about 751 feet at the mouth of the creek to 2936 feet in the headwaters. The vegetation is primarily hardwood (45%) and shrubs (45%) with minor amounts of mixed hardwood/conifer (5%), herbaceous (4%) and conifer (1%). None of the basin is urban and only 7.91 acres are agricultural. The watershed is 47.1% privately owned and 52.9% federally owned and is managed for livestock grazing, timber production and recreation. The upper portion of Coleman Creek lies within Cow Mountain Recreation Area.

Salmonid fish species historically present include steelhead trout. Endangered, threatened, or sensitive species include serpentine cryptantha (*Cryptantha clevelandii var dissita*) and colusa layia *(Layia septentrionalis)*.

METHODS

The habitat inventory conducted in Coleman Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi, et al., 1998). The Americorp Volunteers and the California Department of Fish and Game (DFG) field crew that conducted the inventory was trained in standardized habitat inventory methods by DFG. This inventory was conducted by two person teams and was supervised by Derek Acomb, Russian River Planner (DFG).

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach. All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

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 Coleman Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, air and water temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

1. Flow:

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

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 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:

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 temperatures every 1.5 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. Coleman 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 were in feet to the nearest tenth. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a hip chain and a stadia rod.

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 Coleman Creek, embeddedness was visually estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). Additionally, a rating of "not suitable" (value 5) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Coleman 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 which are defined in the California Salmonid Stream Habitat Restoration Manual.

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 Coleman Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the top 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 Coleman 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, 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) electro fishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

IMPACT INVENTORY & ANALYSIS

Problems such as migration barriers, streambed erosion, poor water quality or temperatures are noted in the comments and landmarks section. In some cases measurements are taken, an analysis of what caused the problem is made and restoration potential and alternatives are recommended.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat for data storage and analysis. Habitat is a Visual Basic extension to Microsoft Access, developed by Zebulon Young, University of California, Berkeley. This program processes and summarizes the data, and produces the following tables and appendices:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters
- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of shelter by habitat types

- Summary of dominant substrates by habitat types
- Summary of fish habitat elements by stream reach

Graphics are produced from the tables using Microsoft Excel. Graphics developed for Coleman Creek include:

- Level II habitat types by % occurrence
- Level II habitat types by % total length
- Level IV habitat types by % occurrence
- Level I pool habitat types by % occurrence
- Maximum depth in pools
- Percent embeddedness estimated in pool tail-outs
- Mean percent cover types in pools
- Substrate composition in pool tail-outs
- Mean percent canopy
- Dominant bank composition in survey reach
- Dominant bank vegetation in survey reach

HISTORICAL STREAM SURVEYS:

In 1982, DFG sampled four stations in the middle reach of Coleman Creek to measure the impact of siltation by road development. The department concluded that the new road system had the potential to release large amounts of loose roadbed material into Coleman Creek during the rainy winter months.

Coleman Creek was included in two studies of the Pieta Creek Drainage conducted by the Mendocino County Resource Conservation District (MCRCD). In 1985, Sari Sommarstrom, Ph.D., conducted the Pieta Creek Gerothermal Watershed Assessment for MCRCD. The report sought to establish a baseline of biological and enviromemental factors to facilitate future geothermal energy development with minimal impact. Along with being a valuable steelhead habitat, a portion of Pieta Creek basin (but none of Coleman Creek) lies within the Geysers-Calistoga Known Geothermal Resource Area (KGRA). Coleman Creek was largely filled with gravel and became intermitent for about 3,200 ft for much of the year. Vegatative cover in the Coleman Creek Basin was 52.1% chapparal (2,301 acres), 32.1% oak woodland (1,420 acres), 13.6% grassland (603 acres) and some mixed evergreen and other (2.2 acres). In 1983 and 1984, perscribed fires burned a combined 600 acres, accounting for 13.4% of the area in the Hoil sub-basin. In addition, 1944-84 wildfires consumed 2,481 acres. Channel stability evaulation revealed 1.0 mile in excellent condition, 3.7 miles in good condition, and 0.5 mile in fair condition. Coleman had channel instability problems in the lower section. The study found the overall water quality of Pieta and its tributaries to be very good although Coleman appeared to be source of higher levels of metals. On July 24, 1985 at 1650 hours the water temperture was 69.8ºF.

The 1990-91 Pieta Creek Basin Stream Assesment was conducted by A. A. Rich and Associates

for MCRCD. The two year monitoring project was also conducted to obtain baseline data for various stream habitat parameters. Numerous erosion problems were reported including steep slopes, mass wasting, landslides, potential debris jams, denuded banks and bank cutting, and channel scour and deposition. Near the mouth, there was abundant spawning gravel, boulder pools, and fast currents. Despite high water temperatures 75.2ºF and limited vegetative cover, high numbers of salmonids were collected. The next site upstream had worse habitat with shallow depths, no canopy, sandy substate, bank failure and 77.0ºF water temperature but again high numbers of salmonids were collected. Above the mouth of Vasser Creek, there was clean cobbles and boulders and abundant shade but water depth was less than 4" and water temperature was 73.4ºF. The limiting factor appeared to be low streamflows. At the next site, below the mouth of Sheldon Creek, there was abundant shade, 60.8ºF water, and 30% good spawning gravel. The last site sampled was in a narrow channel above the mouth of Sheldon Creek and above a falls. There was abundant shade, cool water (57.2ºF) and excellent rearing habitat. Resident juvenile salmonids were collected. The best rearing habitat was in the upper portion of Coleman Creek but was under-utilized presumably because the upper reaches were inaccessable because of low water volume.

HABITAT INVENTORY RESULTS FOR COLEMAN CREEK

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

The habitat inventory of Coleman Creek, 7/9/2002 - 8/15/2002, was conducted by Douglas Mitchel (DFG), Amy Livingston (Americorps) and Mitsuko Terry (DFG) with supervision and analysis by California Department of Fish and Game (DFG). The survey began at the confluence of Pieta Creek and Vasser Creek and extended up through to Coleman Creek to the end of the survey. The total length of stream surveyed was 38176 feet, with an additional 437 feet of side channel.

A flow of 0.166 cfs was measured 9/27/02 in Reach 1, above a small left bank tributary upstream from the mouth of Salt Canyon Creek with a Marsh-McBirney Model 2000 flowmeter. Because of low flow velocity and low water volume, the surveyor averaged four tests and suggested that the flow meter needs a greater depth than was available to accurately determine flow.

This section of Coleman Creek has four reaches with four distinct channel types: from the mouth to 15520 feet a F4, 11403 feet a F3, 9771 feet a B3 and 1482 feet a A3.

F channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio. F4 channel types have a predominantly gravel substrate, F3 channel types have 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.

A3 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly cobble substrate.

Water temperatures ranged from 56ºF to 80ºF. Air temperatures ranged from 63ºF to 100ºF. Summer temperatures were also measured using a remote temperature recorder placed in a pool (see Temperature Summary graphs, Appendix E). The recorder in Reach 1 near habitat unit #83 logged temperatures every 1.5 hours from July 15 to September 27, 2002. The highest temperature recorded was 79.5°F on July 19 and 20 and the lowest was 59.4°F on September 7, 8 and 9. The mean of the daily highs was 77.2°F for the month of July, 74.0°F for August, and 69.7°F for September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 52% flatwater units, 29% pool units, 15% riffle units, 5% dry units, (Graph 1). Based on total **length** of Level II habitat types there were 66% flatwater units, 13% pool units, 10% riffle units, 11% dry units, (Graph 2).

Nineteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were 15% Run units, 2% Lateral Scour Pool - Bedrock Formed units, 22% Step Run units, 15% Mid-Channel Pool units, 11% Low Gradient Riffle units, 4% Lateral Scour Pool - Boulder Formed units, 14% Glide units, 3% Lateral Scour Pool - Root Wad Enhanced units, 1% Step Pool units, 1% Corner Pool units, 1% Lateral Scour Pool - Log Enhanced units, 5% Dry units, 2% High Gradient Riffle units, 1% Bedrock Sheet units, (Graph 3). Based on percent total **length**, 21% Run units, 1% Lateral Scour Pool - Bedrock Formed units, 38% Step Run units, 6% Mid-Channel Pool units, 8% Low Gradient Riffle units, 2% Lateral Scour Pool - Boulder Formed units, 8% Glide units, 2% Lateral Scour Pool - Root Wad Enhanced units, 1% Step Pool units, 11% Dry units, 1% High Gradient Riffle units.

A total of 139 pools were identified (Table 3). Main Channel pools were the most frequently encountered, at 56%, and comprised 53% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Sixteen of the 137 pools (12%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 119 pool tail-outs measured, 43 had a value of 1 (36.1%); 59 had a value of 2 (49.6%); 16 had a value of 3 (13.4%); one had a value of 4 (0.8%); (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders.

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 habitat types had a mean shelter rating of 10 , flatwater habitat types had a mean shelter rating of 9 , and pool habitats had a

mean shelter rating of 16 (Table 1). Of the pool types, the Scour pools had a mean shelter rating of 17, Main Channel pools had a mean shelter rating of 14, Backwater pools had a mean shelter rating of 20, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Coleman Creek. Graph 7 describes the pool cover in Coleman Creek. Boulders are the dominant pool cover type followed by root mass.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs.

The mean percent canopy density for the surveyed length of Coleman Creek was 58%. The mean percentages of hardwood and coniferous trees were 51% and 48%, respectively. Forty-two percent of the canopy was open. Graph 9 describes the mean percent canopy in Coleman Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 17%. The mean percent left bank vegetated was 16%. The dominant elements composing the structure of the stream banks consisted of 28% bedrock, 22% boulder, 32% cobble/gravel, 18% sand/silt/clay, (Graph 10). Brush was the dominant vegetation type observed in 19% of the units surveyed. Additionally, 31% of the units surveyed had hardwood trees as the dominant vegetation type, and 25% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

A cooperative effort by PG&E and DFG produced a thorough fisheries resource inventory, The Geysers KGRA Fisheries Investigation, released in 1980 by D. Price and R. Geary. The study, conducted in August and September 1976, estimated juvenile steelhead had a relative abundance of 53%, numbered 53 per 100', and had a mean fork length of 3.15". The relative abundance of the other fish species observed were California Roach at 38% and Pacific Lamprey at 9%. Average fish density was 7,183 fish per hectare (a range of 1,621-12,621 fish per hectare).

In the 1982 DFG study, surveyors electro-shocked 100' sections of middle Coleman and estimated the juvenile steelhead population to be 60 to 198 per 100'.

The 1985 study estimated juvenile salmonids had a relative abundance of 62%, numbered 96 per 100', and had a mean fork length of 2.77". The relative abundance of the other fish species observed were California Roach at 37% and Pacific Lamprey at 1%. Average fish density was 11,757 fish per hectare (a range of 1,222 to 33,252 fish per hectare). The study also noted fish populations vary naturally from year to year and that 1976 and 1985 were quite different, hydrologically, from each other.

The 1991 survey, which conducted biological inventories for two years, found steelhead averaged

0.4 to 1.1 fish per square meter in 1990 and 0.1 to 2.4 fish per square meter in 1991. Steelhead had a relative abundance of 29% in 1990 and 70% in 1991. California Roach collected averaged 0.2 to 0.8 fish per meter squared in 1990 and 0.3 to 1.2 fish per meter squared in 1991. Total fish estimates for steelhead and California Roach in 1990 were not significantly different from 1991 but, estimates for both species at specific sites were significantly different from 1990 to 1991. Hydrologically, both years were similar; drought conditions prevailed. Compared to historical data, the survey suggested that steelhead populations had not changed since 1976 but suspected past methods were not rigorous enough.

Species Observed in Historical and Recent Surveys

YEARS	**SPECIES**	**SOURCE**	**Native/ Introduced**
1976, 1985, 1990, 1991, 2002	Steelhead Trout *(Oncorhynchus mykiss)*	DFG, PG&E, MCRCD	N
1976, 1985, 2002	Pacific Lamprey (*Lampetra tridentatus)*	PG&E, DFG, MCRCD	N
2002	CALIFORNIA ROACH *(Hesperoleucus symmetricus)*	DFG	N

On 8/5/02 a biological inventory was conducted in Reach 1 on Coleman Creek to document fish species presence. A small section was electro-fished starting approximately 1500' from the confluence with Pieta Creek to the mouth of Salt Canyon Creek. Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 72-73ºF and the water temperature ranged from 68-69ºF. The observers were A. Livingston (Americorps) and M. Shugars (DFG).

The inventory began at 1145 hours and ended at 1330 hours. Habitat types sampled were runs, mid-channel pools, and glides. Multiple age classes of steelhead were observed. Other animals observed during the stream habitat inventory were frogs, newts, crayfish, skinks, owls, raccoons and cattle. The following table displays the total fish yielded from this site.

Species Observed	**Numbers recorded at Site 1**
STEELHEAD 0+	101
STEELHEAD 1+	10

STEELHEAD 2+	2
CALIFORNIA ROACH	24
PACIFIC LAMPREY	1

DISCUSSION FOR COLEMAN CREEK

Coleman Creek has four channel types: F4, F3, B3 and A3. Many site specific projects can be designed within F and B channel types, especially to increase pool frequency, volume and shelter.

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. 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. For F type channels, any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

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.

A3 channel types are good for bank-placed boulders and fair for low-stage weirs, opposing wing-deflectors and log cover.

The water temperatures recorded on the survey days 7/9/2002 - 8/15/2002 ranged from 56ºF to 80ºF. Air temperatures ranged from 63ºF to 100ºF. The warmest water temperatures were recorded in Reach 1. Water temperatures above 65°F, if sustained, are above the threshold stress level for salmonids. Water temperatures recorded in Reaches 3 and 4 did not exceed 65°F.

Summer temperatures measured using a remote temperature recorder in Reach 1 ranged from 59.4° to 79.5°F. The Temperature Summary graph shows that for much of the summer (July through August) the lower watershed exhibited temperatures above the optimal for salmonids. It is unknown if this thermal regime is typical. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months in more locations, and extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 66% of the total length of this survey, riffles 10%, and pools 13%. The pools are relatively shallow, with only 16 of the 137 (12%) pools having a maximum residual depth greater than 3 feet. In general, pool enhancement projects are considered when

primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum residual 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. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

One-hundred two of the 119 pool tail-outs measured had embeddedness ratings of 1 or 2. Seventeen of the pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Coleman Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

One hundred fourteen of the 137 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 16 . The shelter rating in the flatwater habitats was 9. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by Boulders in Coleman Creek. Boulders are the dominant cover type in pools followed by root mass . Log and root wad cover structures in the pool and flatwater habitats would enhance both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

The mean percent canopy density for the stream was 58%. Reach 1 had a canopy density of 27.3%, Reach 2 had a canopy density of 70.6%, Reach 3 had a canopy density of 75%, Reach 4 had a canopy density of 88.8%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 17% and 16%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

However, the riparian buffer is thin or nearly absent in areas of Reach 1 with livestock. Grazing within the riparian corridor could all lead to less stream canopy and channel incision causing bank erosion and higher water temperatures. Reach 1 had an average canopy of 29% with numerous bank erosion problems. This reach as well as other areas with bank erosion could benefit from bio-technical re-vegetation techniques using native species. Reaches 2 and 3 had fair canopy cover and Reach 4 had very good canopy cover.

Numerous major erosion sites were observed throughout the creek. Possible diversions were also

noted near the hunting camp.

GENERAL MANAGEMENT RECOMMENDATIONS

Coleman 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.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

1. There are several reaches 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.

2. Increase the canopy on Coleman Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. 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.

3. Coleman Creek would benefit from utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.

4. 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 or in conjunction with stream bank armor to prevent erosion. In some areas the material is at hand.

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

6. If riparian areas are not improved temperatures in Coleman Creek should be monitored to determine if they are having a deleterious effect upon juvenile salmonids. To achieve this,

biological sampling is also required.

COMMENTS AND LANDMARKS

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

0'	Steelhead were observed frequently throughout the creek from 0’ to 37021’. Rough fish were observed throughout the creek from 0’ to 26640’.
79'	Crayfish were observed throughout the creek form 79’ to 29785’.
420'	Left bank SLIDE 30' x 70', large pieces of shale.
1073'	Large amount of MASS WASTING/LANDSLIDE throughout unit: 100'H x 73'W; photo #16.
1557'	Right bank landslide. EROSION 100'H throughout unit.
1791'	Right bank GULLY at beginning of unit
2045'	Left bank spring
2289'	Confluence with Salt Canyon Creek on left bank at 252' into unit, tributary water temperature: 72°F.
2636'	Wet road crosses creek at 128' into unit. There is a cattle fence across creek and cattle are present on the upstream side of the fence. Significant cattle impact in creek, algal blooms, and left bank erosion 2636’ to 2897’.
2897'	Left bank EROSION 150' x 50' dumping gravel and silt into creek during bankfull and flood levels, exposed roots.
3495'	Gravel bar in middle of unit. Left bank EROSION 60’ x 15’ dumping gravel, silt and cobble into creek.
3535'	Live oak with exposed roots, huge boulder and bedrock all make-up this pool--excellent shade from oak.
3711'	Cattle fencing along right bank through HU#053; evidence of cattle in creek for next 10 units, at least; bay laurel and live oaks dominant riparian flora, with alders secondary: riparian zone poor HU#050-059.
3939'	Left bank EROSION through HU#054 - exposed roots of bay laurels hanging down; silt and shale deposits; right bank Gully, photo #18
3981'	Left bank EROSION continued
4399'	Wet Road 25' into unit
4537'	Evidence of cattle in creek until 378' into HU#062.
4656'	Cattle fence crosses creek at 378' into unit.
5142'	Boulder scour pools in unit; wet road @ 15' into unit; left bank EROSION @ 300' into unit 100' x 10'.
5662'	Right bank GULLY w/ 6' high banks; left bank EROSION/SLIDE 100' x 40' which ends in HU # 068.
5722'	Bedrock is actually clay/gravel composite thoroughly compacted.
5752'	LWD ACCUMULATION: Depth is 10' from bed (2' below water level) to top of debris jam (8' above water)x 70'L x 12'W, not retaining gravel, fish observed above accumulation, there is a scour pool under the debris accumulation, not downcutting.

6083' LWD fallen across creek at 200' into unit.
6727' Left bank EROSION/LANDSLIDE: 100' x 60'. Channel type measured in this pool.
7292' Right bank steep GULLY, source of sediment deposit into pool. SLIDE 150' x 50' not active.
7639' Right bank severe EROSION/LANDSLIDE 360' x 100'. Erosion continues through HU #094
7801' Right bank steep GULLY/tributary at end of unit; right bank EROSION continues.
7803' Right Bank EROSION continues.
7829' EROSION continues; GULLY at 88' into unit dumping substrate into creek
8053' Gully RIGHT BANK at 20' into unit. Left bank huge EROSION problems throughout unit, 100' x 95' and eroded ledge about 5' high.
8806' Right bank EROSION 25' x 100'.
9022' Right bank GULLY
9094' Steep GULLY/tributary on right bank (dry) at top of unit.
9416' Right bank GULLY/small tributary at 50' into unit; left bank much EROSION and exposed roots throughout unit.
9673' EROSION on left bank toward the end of this unit with many exposed roots.
9875' At 36' there is an artificial rock weir. Road runs along right bank above creek for next 17 units.
9942' Right bank GULLY/tributary 15' into unit; LWD in creek at top of unit. Much EROSION in the last part of the unit with exposed tree roots and boulders in the stream.
10110' Right bank CULVERT 25' into unit about 50' on the bank
10146' Left bank confluence with Vasser Creek; the mouth of Vasser is dry.
10293' Cattle presence; cattle fence at top of unit. Right bank road runs along creek for 100'.
10327' Cattle fencing running along left bank; unpaved roads run along both banks.
10499' Cattle presence. Right bank gully 30' into unit; right bank erosion close to road.
10577' At 93' there is a cattle fence across the creek
10670' LWD (Alder) left bank EROSION, exposed roots. A bay laurel and an oak will be lost soon due to erosion;
10910' Wet road
10938' Small cobble weir separating units 133 and 134.
11005' Right bank GULLY at bottom of unit with 12' steep banks.
11090' Right bank EROSION minor: 20' x 10'. Barbed wire fence hanging over edge, ready to fall in. Outdoor party area; deck, etc, on left bank. Right bank is covered w/exposed root mass keeping some substrate in place, but exposed in other places where it eroded out from between roots.
11139' Small foot bridge at 40' into unit: 12'W x 4'L. Barbed wire cattle fence crosses creek at 320' into unit.
11548' Abundant macroinvertebrates on pool tail samples.
11998' Cattle presence.
12061' Left bank path where cattle enters creek.
12290' Right bank EROSION and gully at 200': 40' x 15' dumping sand into creek. At 1010' into unit is a barbed wire cattle fence. At 1056' into the unit is a second barbed wire

fence. At 1060’ is channelization and a bridge - 8’L x 34’W x 10’H at thalweg, no gravel retention, no downcutting, no sill. At 1362’ wet road, rip rap at Old Toll Road and Coleman Ck. At 2299’ wet road exposed 2’ metal pipe running across creek.

15211' Left bank GULLY (wet).

15520' Channel Type Change F4 to F3

15755' Debris accumulation (Photo #1), dimensions: 7.5'D x 6'L x 18'W; not retaining gravel, fish observed upstream, scour pool under accumulation, no erosion, downcutting, causing scour and erosion near right bank gully.

15801' EROSION right bank where no trees are present.

15923' Pipe across bottom of creek

15995' Pipe in pool (3"); fence left bank.

16057' 2" pipe. Old rock and concrete Dam (12'W x 3'H x 3' L) crosses completely over creek.

16073' Fence right bank for at least next 10 units. GULLY left bank. Minor EROSION right bank. Cattle presence for next 40 units. Waterfall approximately 18’ from water level. Water level is now 5’, winter above 9’, possible 13’ jump during winter.

16139' 10’ vertical jump for fish up to small bedrock glide 8’ long, 12° slope, a pool and then 10’ vertical jump (photos 7, 8, & 9). Fencing and cattle presence continues through next many units.

16522' Minor EROSION right bank.

16554' GULLY right bank.

16830' Wet Road at 140' into unit which currently looks like a cattle trail.

17003' Exposed roots right and left bank.

17060' Left bank GULLY. Wood debris, 4 pieces LWD & 2-4 DBH, 10-20 ft long.

17120' Left Bank trib at 58’ into the unit, dry, not steep.

17197' Minor erosion left bank through HU#199.

17564' Left bank GULLY

17737' EROSION right bank

17944' EROSION

17958' Right bank EROSION

18314' A type channel, steep, deeply entrenched, boulders and bedrock. Bedrock pool, cool, dark water, few fish, 5-10’jumps.

18435' Fence right bank

18514' EROSION left bank

18652' Debris causing scour

18779' Newts observed periodically from 18711’ to 35512’.

19004' Fence across creek at 17'

19041' Dry tributary on left bank at 37' into unit. Right bank fence.

20135' Right bank EROSION

20221' Right bank EROSION

20687' Left bank EROSION: 50' x 100', exposed roots and dirt sliding into pool.

20780' Right bank EROSION: 100' x 12' with exposed roots and dirt sliding into unit.

20904' Right bank GULLY/tributary at bottom of unit.

20995' Minor left bank EROSION

21175' LWD at bottom of unit
21256' 1" diameter hose runs along right bank. Minor EROSION right bank: 100' x 8'.
21407' Left bank EROSION at bend: 60' x 8'
21581' Right bank EROSION 10' high.
21896' Many freshly cut trees in riparian zone. Right bank road ends at creek.
21997' Erosion on right bank dumping silt into pool
22138' Fence along right bank
22243' Left bank EROSION 50' x 40'.
22323' Wet Road @ 3' into unit. A lot of algae in unit. Left bank horse stable.
22439' Right bank erosion severe undercutting/roots exposed.
22482' Fence crosses creek at 10' into unit keeps livestock out, not a problem for fish. Right bank gully @ 70' into unit. Bridge @74' into unit, dimensions: 6.5'H x 25'W x 18'L, not downcutting, no sill, not retaining gravel.
22592' Left bank at erosion area @ 100' into unit with rip rap (concrete pieces) and chicken wire.
23256' Left bank minor EROSION.
23492' LWD runs half the length of the unit providing good scour
23525' Left bank EROSION 10' high runs along much of the unit. At 180' into unit a fallen alder across unit is creating good scour. Black water pipe 1.5" diameter in unit.
24257' Road and old wet road @ 339'. Old trailer @ 355'. Dry tributary (left bank) @ 450'. Irrigation/water 1" PVC pipe in much of unit.
25120' Small DEBRIS ACCUMULATION @ 332' is 3' high from water level, 4' high from creek bottom, 10'L x 20'W, not retaining gravel, fish observed upstream, scour pool under accumulation, no erosion, 3 pieces LWD.
25757' Left bank EROSION, long but minor.
25843' Left bank GULLY @ 100'. Left bank erosion @ top of unit, 30' x 30', bedrock breaking off, dumping substrate from gravel to boulders into creek.
26027' Right bank EROSION
26770' Erosion at end of unit right bank.
26923' Channel type change from F3 to B3. DEBRIS ACCUMULATION, dimensions: 10'D x 25'L x 40'W, retaining 10' of gravel and fines, fish can swim around on right bank side, fish observed upstream, scour pool under accumulation, no erosion or downcutting.
27195' EROSION left bank. DEBRIS ACCUMULATION on right bank (not in creek).
27332' Left bank EROSION at top of unit; right bank EROSION at bottom of unit.
27450' EROSION left bank at bottom of unit dumping large cobble.
27778' EROSION right bank this and next unit.
28193' Sheldon Creek confluence left bank, water temp: 60°F.
28316' 2 trees across creek 3' above; 6' jump
28797' Right bank EROSION: gravel, small cobble entering creek.
28943' Artificial weir @ 12' cemented together.
29389' DEBRIS ACCUMULATION @ 158', dimensions: 6'H x 53'L x 12'W, retaining 3' of gravel, no scouring. EROSION left bank.
30036' 4" jump at top of unit like a cascade.

30047' 10' jump
30105' Left bank GULLY
30258' EROSION left bank
30423' DEBRIS ACCUMULATION, dimension: 6' D x 10' L x 8" W, retaining 2' of gravel, no scouring under jam, no erosion/downcutting; accumulation consists of 4 pieces LWD.
30476' Left bank EROSION
30560' Right bank GULLY
30869' Left bank EROSION
30889' Left bank GULLY; right bank dry tributary.
30994' Downed tree 2' above and across creek.
31107' Downed tree along right bank 1.5' above bed.
31137' 3 downed trees across creek (3' above). EROSION right and left bank. Fallen tree on right bank w/exposed roots. DEBRIS ACCUMULATION @333'. Dry tributary left bank @ 630'. Weir @ 650'.
32050' EROSION left bank.
32359' Debris Accumulation @ 100' into unit, dimensions: 5' D x 16' L x 10' W, not retaining gravel, fish observed upstream, scour pool under accumulation, no erosion or downcutting.
32641' Downed tree left bank w/ exposed roots.
32870' Dry GULLIES left and right bank at bottom of unit.
33017' EROSION left bank.
33459' Many weirs through HU#399
33588' DEBRIS ACCUMULATION, dimensions: 4' D x 6' L x 15' W, retaining 2' gravel, fish were observed upstream, accumulation is causing a scour pool, no erosion/downcutting. This accumulation consists of 2 downed trees. Upstream 30’ is another DEBRIS ACCUMULATION, dimensions 4’ D x 4’ L x 20’ W, not retaining gravel, fish observed upstream. This accumulation consists of 2 across creek held in place by alder live trees on both banks, catching debris on bank.
33641' 2 glides separated by short riffle caused by weir.
33699' End of series of weirs
33752' Tributary right bank
33773' Road and hunting camp on right bank (access point).
33791' Road and hunting camp continue on right bank, tributary left bank, weir at top of unit. Stairs to hunting camp right bank at top of unit.
33925' End of hunting camp right bank
33974' 2" PVC and a series of weirs in unit. Tree on left bank fell causing 2-3 trees on right bank to fall causing EROSION on right bank-looks recent.
34079' EROSION right bank
34179' EROSION left bank
34482' Erosion right bank
34509' GULLY right bank causing light erosion
34598' EROSION right bank in 2 areas: 150'L x 30'H, actively dumping silt into creek
34764' EROSION left bank, tree fallen into creek, LWD fallen into creek

34859' EROSION left bank; hose in creek
35039' DEBRIS ACCUMULATION at 63' into unit at confluence of unnamed wet left bank tributary, dimensions: 8'D x 35'L x 25'W, retaining 3' gravel, scour pool under accumulation, no erosion/downcutting, oaks and bay retaining SWD and 5 pieces of LWD.
35119' Wet left bank Tributary water temperature 56°F
35185' Wet tributary right bank (58°F) at 30' into unit.
35220' Downed tree across creek (3' above creek).
35588' Cascade and 5' jump at end of unit
35613' 100' snag right bank. DEBRIS ACCUMULATION @ 200' into unit, dimensions: 5'D x 5'L x 25'W, retaining 2' gravel, fish observed upstream, no scour pool beneath accumulation, no erosion/downcutting.
36043' Fallen tree along left bank, 4 fallen trees across creek
36379' 5' jump
36389' 2 Gullies right bank within 20' of each other
36546' EROSION left bank
36694' Channel change from B3-->A3 with a slope of 18.75%
36839' Left bank GULLY
36934' 2' jump at top of unit
37140' Cave w/ stromatolite may be log enhanced. 10' jump at top of unit. An opening at top of the cave is the only way water can get in and out.
37162' 5' jump at top of unit
37179' Much lower flow above the cave in HU 454, 5' jump in unit
37418' 11' jump at 52' into unit. Spring on right bank
37710' 8' jump.
37761' END OF SURVEY, steep channel for a long stretch, no salmonids or other fish observed for over 740'.

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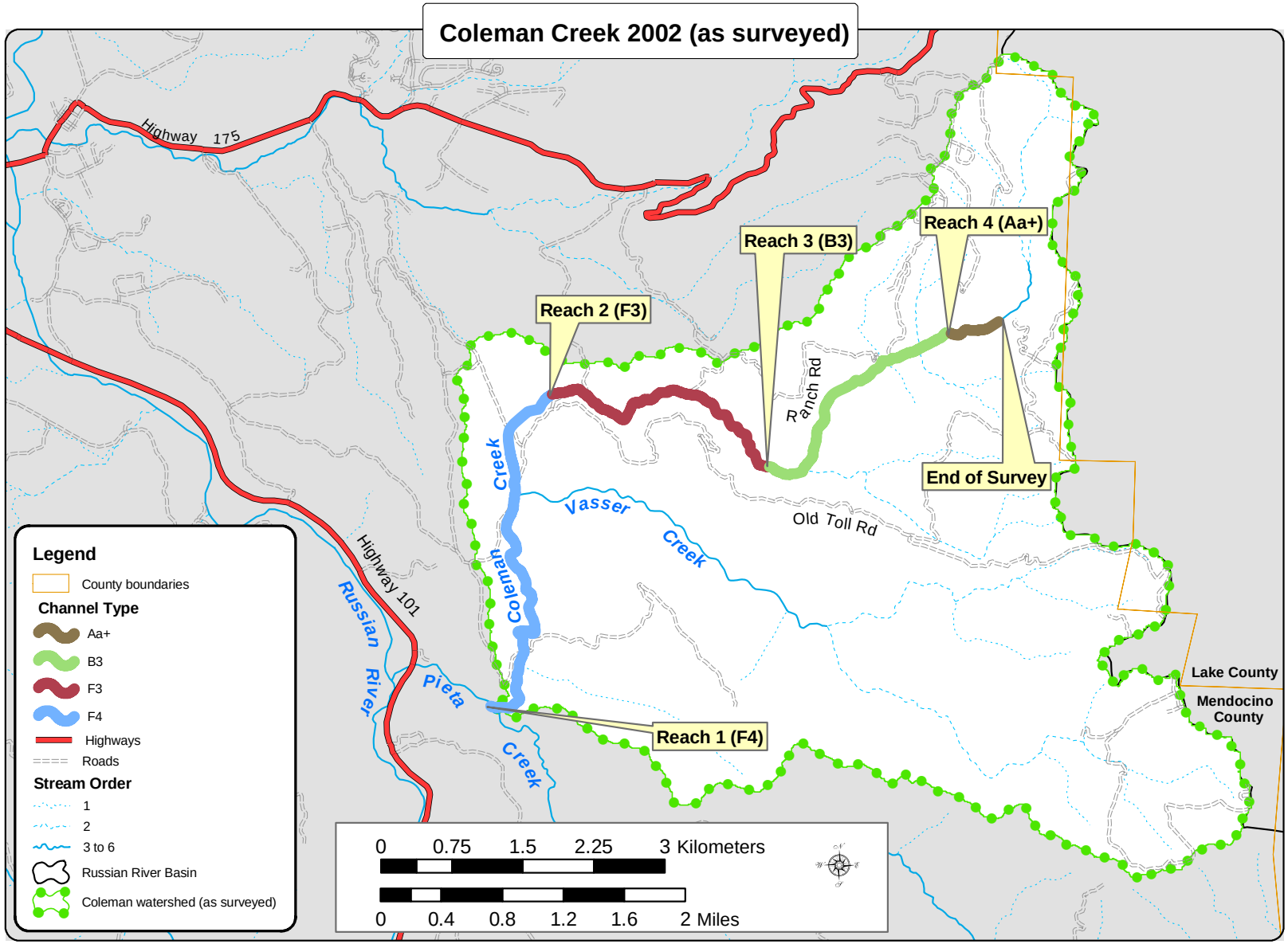

Note: GIS layer shows Coleman flowing into Vasser, but DFG crews surveyed as Vasser a tributary to Coleman

Prepared by: Ann-Marie Osterback, May 8, 2003

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APPENDIX B: TABLES

Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Coleman Creek

LLID: 1230428389415

Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Mean Max 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
24	0	DRY	4.9	180	4318.2	11.2									
251	74	FLATWATER	51.6	102	25545	66.2	10.7	0.6	1.2	646	162170	432	67328		9
139	134	POOL	28.6	37	5075	13.1	12.8	1.2	2.3	429	59640	649	89503	539	16
72	26	RIFFLE	14.8	51	3675	9.5	8.2	0.3	0.6	242	17426	90	4721		10

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
486	234	38613.2	239236	161551

Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Depth (ft.)	Max 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	Mean Canopy (%)
55	16	LGR	11.3	58	3213	8.3	9	0.3	1.3	304	16720	114	3916			54
10	5	HGR	2.1	30	304	0.8	6	0.3	0.8	158	1580	47	376			84
2	2	CAS	0.4	20	40	0.1	12	0.5	1.3	257	514	171	343		10	68
5	3	BRS	1.0	24	118	0.3	3	0.3	0.9	42	208	12	58			93
68	21	GLD	14.0	44	3011	7.8	9	0.6	2.3	437	29716	316	13315		13	59
74	21	RUN	15.2	108	8020	20.8	11	0.5	1.8	574	42465	363	15350		5	40
109	32	SRN	22.4	133	14514	37.6	11	0.6	1.7	831	90549	542	38768		6	61
1	1	TRP	0.2	11	11	0.0	2	1.9	1.9	22	22	46	46	42	5	95
72	69	MCP	14.8	31	2243	5.8	13	1.2	4.8	387	27847	625	44320	528	14	74
5	5	STP	1.0	88	438	1.1	13	1.0	3.3	339	1696	450	2251	401	21	70
3	3	CRP	0.6	56	167	0.4	12	0.9	2.3	654	1963	752	2257	596	5	46
5	5	LSL	1.0	30	152	0.4	8	1.1	2.9	234	1172	357	1785	296	16	49
17	17	LSR	3.5	42	710	1.8	13	1.1	4	561	9543	824	14008	683	23	69
11	10	LSBk	2.3	44	480	1.2	10	0.8	3.7	392	4308	437	4810	336	6	31
21	21	LSBo	4.3	36	753	2.0	15	1.2	4.5	539	11319	823	17273	676	19	28
1	1	PLP	0.2	44	44	0.1	12	1.6	2.8	475	475	855	855	760	25	89
2	1	BPB	0.4	26	51	0.1	8	0.9	2.4	184	368	184	368	166	10	65
1	1	BPR	0.2	26	26	0.1	21	0.7	1.7	519	519	778	778	363	40	0
24	0	DRY	4.9	180	4318	11.2										41

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
486	234	38613.2	240983	160877

Table 3 - Summary of Pool Types

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Units Fully Measured	Habitat Type	Habitat Occurrence (%)	Mean Length (ft.)	Total Length (ft.)	Total Length (%)	Mean Width (ft.)	Mean Residual Depth (ft.)	Mean Area (sq.ft.)	Estimated Total Area (sq.ft.)	Mean Residual Pool Vol (cu.ft.)	Estimated Total Resid.Vol. (cu.ft.)	Mean Shelter Rating
78	75	MAIN	56	35	2692	53	12.7	1.2	379	29540	513	39501	14
58	57	SCOUR	42	40	2306	45	12.7	1.1	498	28886	582	33762	17
3	2	BACKWATER	2	26	77	2	14.5	0.8	351	1054	264	793	20

Total Units	Total Units Fully Measured	Total Length (ft.)	Total Area (sq.ft.)	Total Volume (cu.ft.)
139	134	5075	59480	74056

Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Coleman Creek

LLID: 1230428389415

Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Habitat Type	Habitat Occurrence (%)	< 1 Foot Maximum Residual Depth	< 1 Foot Percent Occurrence	1 < 2 Feet Maximum Residual Depth	1 < 2 Feet Percent Occurrence	2 < 3 Feet Maximum Residual Depth	2 < 3 Feet Percent Occurrence	3 < 4 Feet Maximum Residual Depth	3 < 4 Feet Percent Occurrence	>= 4 Feet Maximum Residual Depth	>= 4 Feet Percent Occurrence
1	TRP	1	0	0	1	100	0	0	0	0	0	0
71	MCP	52	0	0	27	38	35	49	6	8	3	4
5	STP	4	0	0	1	20	3	60	1	20	0	0
3	CRP	2	0	0	2	67	1	33	0	0	0	0
5	LSL	4	0	0	2	40	3	60	0	0	0	0
17	LSR	12	0	0	8	47	8	47	0	0	1	6
10	LSBk	7	0	0	5	50	4	40	1	10	0	0
21	LSBo	15	0	0	5	24	12	57	3	14	1	5
1	PLP	1	0	0	0	0	1	100	0	0	0	0
1	BPR	1	0	0	1	100	0	0	0	0	0	0

Total Units	Total < 1 Foot Max Resid. Depth	Total < 1 Foot % Occurrence	Total 1< 2 Foot Max Resid. Depth	Total 1< 2 Foot % Occurrence	Total 2< 3 Foot Max Resid. Depth	Total 2< 3 Foot % Occurrence	Total 3< 4 Foot Max Resid. Depth	Total 3< 4 Foot % Occurrence	Total >= 4 Foot Max Resid. Depth	Total >= 4 Foot % Occurrence
137	0	0	52	38	69	50	11	8	5	4

Mean Maximum Residual Pool Depth (ft.): 2.3

Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002 Dry Units: 24

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Units Fully Measured	Habitat Type	Mean % Undercut Banks	Mean % SWD	Mean % LWD	Mean % Root Mass	Mean % Terr. Vegetation	Mean % Aquatic Vegetation	Mean % White Water	Mean % Boulders	Mean % Bedrock Ledges
55	0	LGR									
10	0	HGR									
2	1	CAS	0	20	0	0	0	0	10	70	0
5	0	BRS									
72	1	TOTAL RIFFLE	0	20	0	0	0	0	10	70	0
68	3	GLD	23	3	33	33	0	0	0	7	0
74	1	RUN	50	50	0	0	0	0	0	0	0
109	4	SRN	0	0	0	0	0	0	0	100	0
251	8	TOTAL FLAT	15	8	13	13	0	0	0	53	0
1	1	TRP	0	0	0	0	0	0	100	0	0
72	69	MCP	10	7	4	9	7	0	2	53	4
5	5	STP	0	0	4	0	0	0	7	87	2
3	3	CRP	33	10	0	0	30	0	0	27	0
5	5	LSL	0	9	64	13	14	0	0	0	0
17	17	LSR	14	11	6	59	0	0	0	11	0
11	9	LSBk	6	0	0	1	0	0	1	45	36
21	19	LSBo	6	3	0	3	2	0	0	79	8
1	1	PLP	0	10	0	0	0	0	0	30	60
2	2	BPB	0	5	0	5	0	5	0	55	0
1	1	BPR	0	0	100	0	0	0	0	0	0
139	132	TOTAL POOL	9	6	6	13	5	0	2	49	6
486	141	TOTAL	9	7	7	13	5	0	2	49	6

Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002 Dry Units: 24

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Habitat Units	Units Fully Measured	Habitat Type	% Total Silt/Clay Dominant	% Total Sand Dominant	% Total Gravel Dominant	% Total Small Cobble Dominant	% Total Large Cobble Dominant	% Total Boulder Dominant	% Total Bedrock Dominant
55	13	LGR	0	0	38	38	8	15	0
10	3	HGR	0	0	67	0	0	33	0
2	2	CAS	0	0	50	0	0	0	50
5	3	BRS	0	0	0	0	0	0	100
68	12	GLD	0	33	50	17	0	0	0
74	12	RUN	0	8	67	17	0	8	0
109	20	SRN	0	0	30	15	20	35	0
1	1	TRP	0	0	0	0	0	0	100
72	40	MCP	13	20	38	13	3	13	3
5	5	STP	0	0	20	0	0	40	40
3	2	CRP	100	0	0	0	0	0	0
5	3	LSL	0	0	100	0	0	0	0
17	8	LSR	13	13	50	13	0	13	0
11	6	LSBk	0	0	83	0	0	0	17
21	9	LSBo	0	11	67	11	11	0	0
1	1	PLP	0	0	0	0	0	0	100
2	1	BPB	0	0	0	100	0	0	0
1	1	BPR	0	0	0	100	0	0	0

Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Hardwood	Mean Percent Open Units	Mean Right Bank % Cover	Mean Left Bank % Cover
58	48	51	2	17	16

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Mean Percentage of Dominant Stream Bank Substrate

Dominant Class of Substrate	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Bedrock	33	35	28.1
Boulder	25	28	21.9
Cobble / Gravel	38	39	31.8
Sand / Silt / Clay	25	18	17.8

Mean Percentage of Dominant Stream Bank Vegetation

Dominant Class of Vegetation	Number of Units Right Bank	Number of Units Left Bank	Total Mean Percent (%)
Grass	16	17	13.6
Brush	20	25	18.6
Hardwood Trees	38	37	31.0
Coniferous Trees	33	27	24.8
No Vegetation	13	13	10.7

Total Stream Cobble Embeddedness Values: 2

Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Coleman Creek LLID: 1230428389415 Drainage: Russian River - Upper

Survey Dates: 7/9/2002 to 8/15/2002

Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

	Riffles	Flatwater	Pools
UNDERCUT BANKS (%)	0	15	9
SMALL WOODY DEBRIS (%)	20	8	6
LARGE WOODY DEBRIS (%)	0	13	6
ROOT MASS (%)	0	13	13
TERRESTRIAL VEGETATION (%)	0	0	5
AQUATIC VEGETATION (%)	0	0	0
WHITEWATER (%)	10	0	2
BOULDERS (%)	70	53	49
BEDROCK LEDGES (%)	0	0	6

Appendix C - Fish Habitat Inventory Data Summary

Stream Name: Coleman Creek LLID: 1230428389415 Drainage: Russian River -
Survey Dates: 7/9/2002 to 8/15/2002 Survey Length (ft.): 38613. Main Channel (ft.): 38176. Side Channel (ft.): 437
Confluence Location: Quad: HOPLAND Legal Description: T13NR11WS35 Latitude: 38:56:29.0N Longitude: 123:02:34.0W

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 1

Channel Type: F4
Reach Length (ft.): 15520
Riffle/Flatwater Mean Width (ft.): 18.9
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 60 - 80 Air (F): 64 - 100
Dry Channel (ft.): 3149

Canopy Density (%): 27.3
Coniferous Component (%): 49.2
Hardwood Component (%): 50.8
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 15.3
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Bedrock
Occurrence of LWD (%): 5.3
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 12.8
Pool Frequency (%): 30.9
Residual Pool Depth (%):
< 2 Feet Deep: 30.0
2 to 2.9 Feet Deep: 52.0
3 to 3.9 Feet Deep: 12.0
>= 4 Feet Deep: 6.0
Mean Max Residual Pool Depth (ft.): 2.468
Mean Pool Shelter Rating: 16

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 39.5	2. 53.5	3. 7.0	4. 0.0	5. 0.0		

STREAM REACH: 2

Channel Type: F3
Reach Length (ft.): 11403.2
Riffle/Flatwater Mean Width (ft.): 6.3
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 57 - 66 Air (F): 64 - 86
Dry Channel (ft.): 496.2

Canopy Density (%): 70.6
Coniferous Component (%): 32.1
Hardwood Component (%): 67.9
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 21.2
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Cobble/Gravel
Occurrence of LWD (%): 7.4
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 14.9
Pool Frequency (%): 28.1
Residual Pool Depth (%):
< 2 Feet Deep: 35.7
2 to 2.9 Feet Deep: 54.8
3 to 3.9 Feet Deep: 4.8
>= 4 Feet Deep: 4.8
Mean Max Residual Pool Depth (ft.): 2.27
Mean Pool Shelter Rating: 14

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 61.9	2. 35.7	3. 2.4	4. 0.0	5. 0.0		

Summary of Fish Habitat Elements By Stream Reach

STREAM REACH: 3

Channel Type: B3
Reach Length (ft.): 9771
Riffle/Flatwater Mean Width (ft.): 9.3
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 56 - 63 Air (F): 63 - 87
Dry Channel (ft.): 0

Canopy Density (%): 75.0
Coniferous Component (%): 65.6
Hardwood Component (%): 34.4
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 12.7
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Bedrock
Occurrence of LWD (%): 2.7
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 11.7
Pool Frequency (%): 26.4
Residual Pool Depth (%):
< 2 Feet Deep: 48.5
2 to 2.9 Feet Deep: 42.4
3 to 3.9 Feet Deep: 9.1
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.22
Mean Pool Shelter Rating: 13

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 63.6	3. 30.3	4. 3.0	5. 0.0		

STREAM REACH: 4

Channel Type: Aa+
Reach Length (ft.): 1482
Riffle/Flatwater Mean Width (ft.): 4.3
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 56 - 59 Air (F): 73 - 80
Dry Channel (ft.): 611

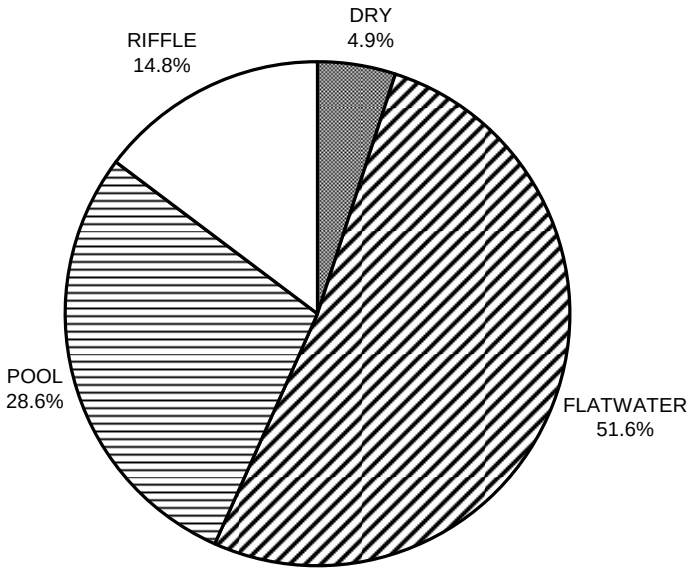
Canopy Density (%): 88.8
Coniferous Component (%): 70.0
Hardwood Component (%): 30.0
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 17.5
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 1.7
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 5.7
Pool Frequency (%): 20.0
Residual Pool Depth (%):
< 2 Feet Deep: 40.0
2 to 2.9 Feet Deep: 60.0
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.24
Mean Pool Shelter Rating: 29

Pool Tail Substrate (%):	Silt/Clay:	Sand:	Gravel:	Sm Cobble:	Lg Cobble:	Boulder:	Bedrock:
Embeddedness Values (%):	1. 0.0	2. 0.0	3. 40.0	4. 0.0	5. 0.0		

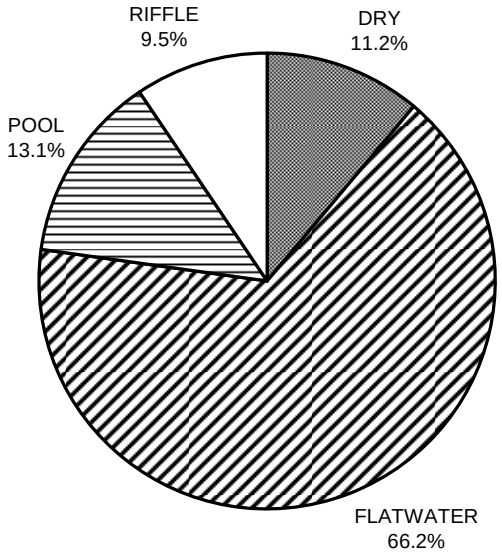
APPENDIX D: GRAPHS

COLEMAN CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



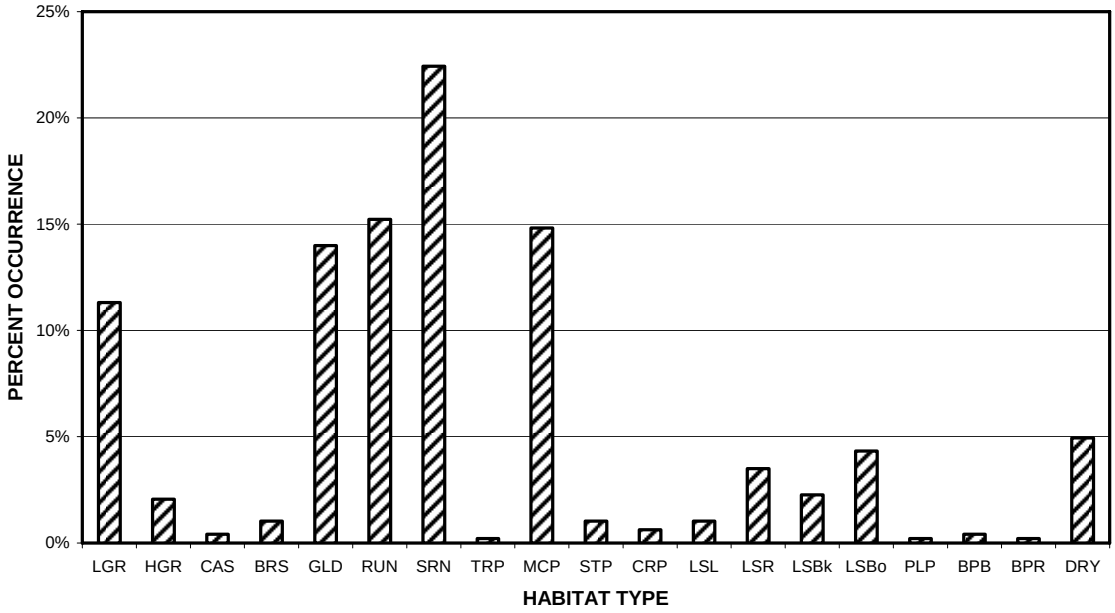
GRAPH 1: Level II habitat types by percent occurrence

COLEMAN CREEK
HABITAT TYPES BY PERCENT TOTAL LENGTH



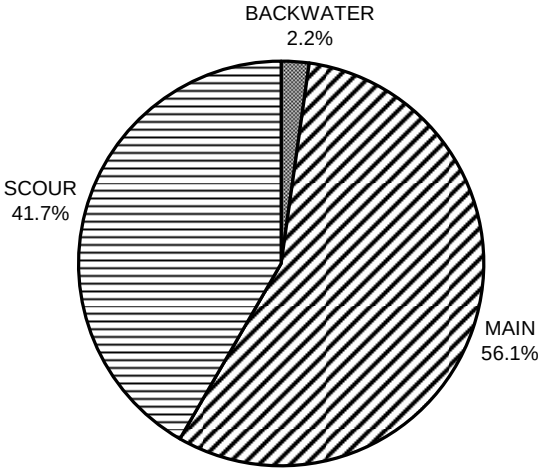
GRAPH 2: Level II habitat types by percent total length

COLEMAN CREEK
HABITAT TYPES BY PERCENT OCCURRENCE



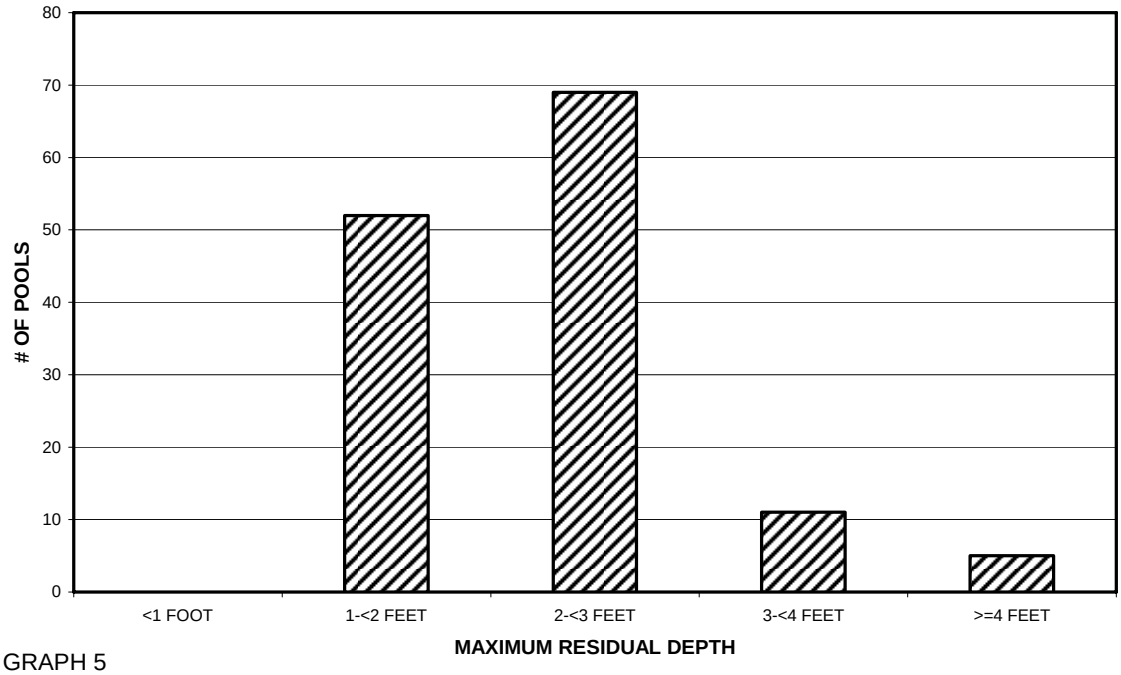
GRAPH 3: Level IV habitat types by percent occurrence

COLEMAN CREEK
POOL TYPES BY PERCENT OCCURRENCE



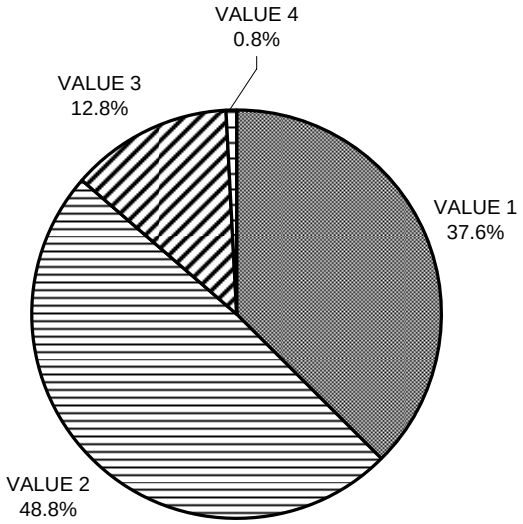
GRAPH 4: Level I pool types by percent occurrence

COLEMAN CREEK
MAXIMUM DEPTH IN POOLS



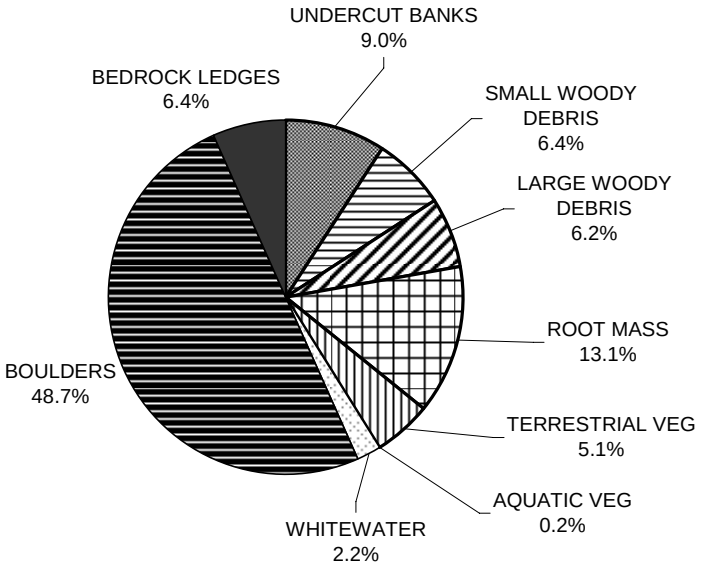
GRAPH 5

COLEMAN CREEK
PERCENT EMBEDDEDNESS



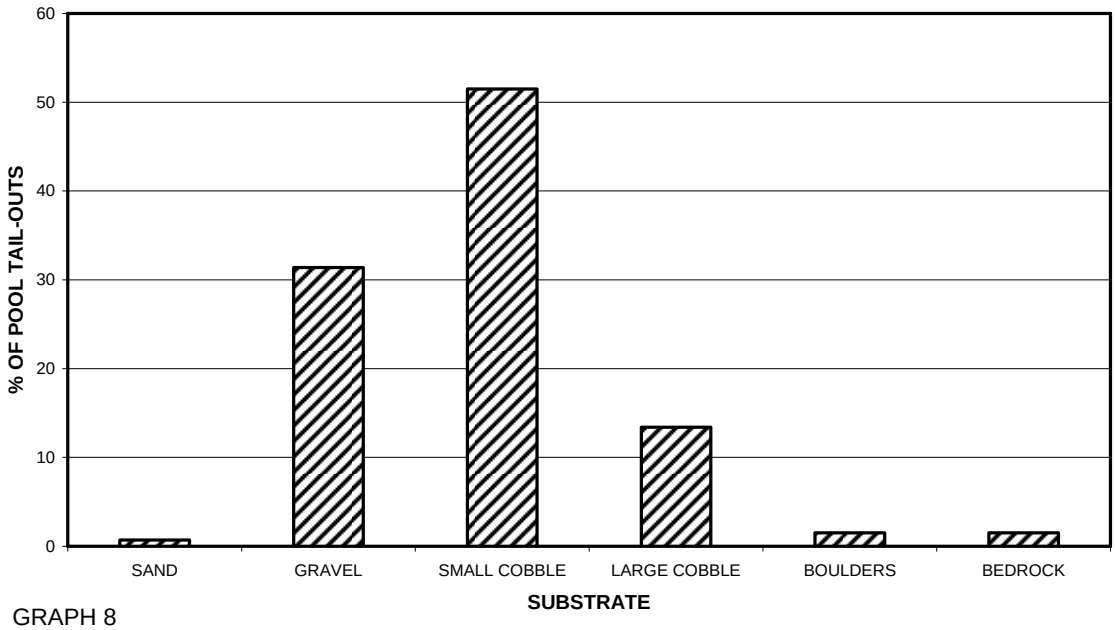
GRAPH 6

COLEMAN CREEK
MEAN PERCENT COVER TYPES IN POOLS



GRAPH 7

COLEMAN CREEK
SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

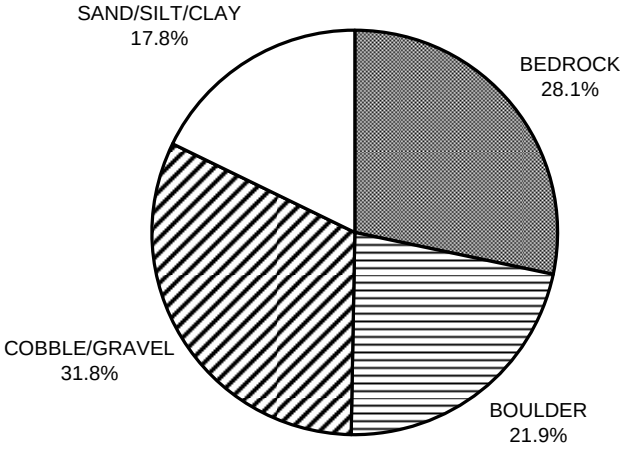


GRAPH 8

COLEMAN CREEK
MEAN PERCENT CANOPY

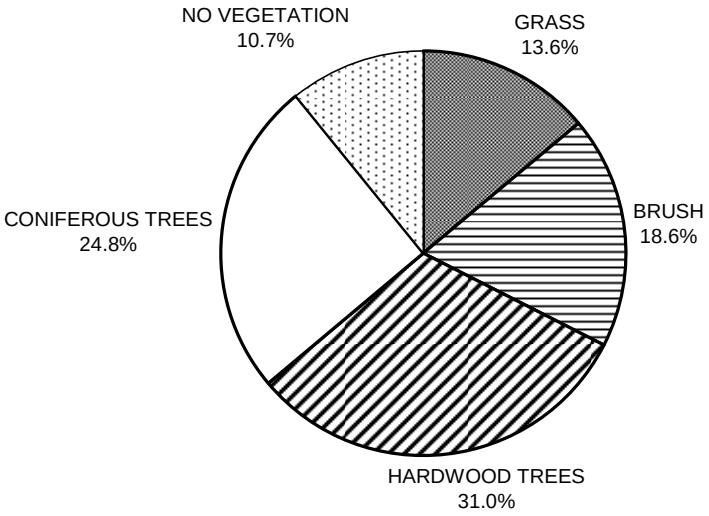
GRAPH 9

COLEMAN CREEK
DOMINANT BANK COMPOSITION IN SURVEY REACH



GRAPH 10

COLEMAN CREEK
DOMINANT BANK VEGETATION IN SURVEY REACH



GRAPH 11

Coleman Creek Water Temperature 2002
(Reach 1)