STREAM INVENTORY REPORT

LITTLE LARABEE CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1991 on Little Larabee Creek to assess habitat conditions for anadromous salmonids. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Little Larabee Creek. The objective of the biological inventory was to document the salmonid species present and their distribution. After analysis of the information and data gathered, stream restoration and enhancement recommendations are presented.

Adult spawning surveys in December 1987, and January 1988 found no salmonids in Little Larabee Creek. The objective of this report is to document the current habitat conditions, and recommend options for the enhancement of habitat for chinook salmon, coho salmon and steelhead trout.

WATERSHED OVERVIEW

Little Larabee Creek is tributary to the Van Duzen River, tributary to the Eel River, located in Humboldt County, California (Figure 1). Little Larabee Creek's legal description at the confluence with the Van Duzen River is T01N R03E S12. Its location is 40°28'42" latitude and 123°46'53" longitude. Little Larabee Creek is a second order stream. The total length of blue line stream, according to the USGS Bridgeville and Larabee Valley 7.5 minute quadrangles, is 5.0 miles.

Little Larabee Creek drains a watershed of approximately 13.4 square miles. Grass, oak and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for timber production and rangeland. Vehicle access exists from State Highway 36, which crosses Little Larabee Creek near its mouth, 1-1/4 miles northeast of Bridgeville.

METHODS

The habitat inventory conducted in Little Larabee Creek follows the methodology as presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds). The inventory was conducted by two person teams. The California Conservation Corps (CCC), Technical Advisors conducting the inventory were

trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Little Larabee Creek personnel were trained in May and June, 1991, by Gary Flosi and Scott Downie.

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 Little Larabee Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured at the beginning of the stream survey reach using standard flow measuring equipment. The flow is recorded in cubic feet per second of discharge.

2. Channel Type:

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

3. Temperatures:

Both water and air temperatures are measured and recorded each tenth unit typed. The time of the measurement is also recorded. Temperatures are taken in fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing used 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". Little Larabee 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. Channel measurements were accomplished using hip chains, range

finders, tape measures, and stadia rods. Unit measurements included mean length, mean width, mean depth, and maximum depth. Depth of the pool tail crest at each pool habitat unit was measured at the thalweg. All measurements were taken in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Little Larabee creek embeddedness was ocularly 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).

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 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 Little Larabee 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 habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

8. Canopy:

Stream canopy is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In Little Larabee Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The percentages of the total canopy area was then further analyzed and recorded according to whether it was composed of either coniferous or deciduous trees.

9. Bank Composition:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Little Larabee Creek, the dominant composition type in both the right and left banks was selected from a list of eight options on the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

Biological inventory was conducted in Little Larabee Creek to document the salmonid species composition and distribution. Three sites were electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, measured, and returned to the stream.

SUBSTRATE SAMPLING

Gravel sampling is conducted using 9 inch diameter standard McNeil gravel sampler. Sample sites are identified numerically beginning at the most upstream site in the stream.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat Runtime, a dBASE 4.1 data entry program developed by the California Department of Fish and Game (DFG). This program also processes and summarizes the data.

The Habitat Runtime program produces the following tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Little Larabee Creek include:

- Riffle, flatwater, pool habitats by percent occurrence
- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence
- Pool types by percent occurrence
- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in low gradient riffles
- Percent canopy
- Bank composition by composition type

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 27, 28, 29, and 30, 1991, was conducted by Jerry Suissa, Shea Monroe and Jay Miller (CCC). The total length of the stream surveyed was 10,564 feet, with an additional 156 feet of side channel.

Little Larabee Creek is a B2 channel type for the first 5,399 feet from the confluence with the Van Duzen River, then it changes to a A3 for the remaining 5,165 feet of stream reach surveyed. B2 channels are moderate gradient (1.0 - 2.5%), moderately confined streams, with stable stream banks. A3 channels are steep and erodible, and have a high gradient (4.0 - 10.0%).

Water temperatures ranged from 59 to 64 degrees fahrenheit. Air temperatures ranged from 61 to 80 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 25.9%, flatwater types were up 36.8%, and pools 37.3% (Graph 1). Riffles made up 26.3% of the total survey **length**, flatwater habitats were 44.4%, and pools 29.3% (Graph 2).

Seventeen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles and runs at 18.1%, step runs, 16.9%; and mid-channel pools, 13.9% (Graph 3). By percent total **length**, low gradient riffles and runs made up 20.0% and 15.5% respectively, step runs made up 27.5%, and mid-channel pools made up 12.5%.

Table 3 summarizes the pool habitat types. Of these pools, 54.8% were main channel pools. These main channel pool types comprised 62.8% of the total length for all pools (Graph 4).

Table 4 (Graph 5) is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. The maximum depth for 50 of the 62 pools (80.6%) was two feet or deeper. This level indicates a good quality of pool habitat in Little Larabee Creek.

The depth of cobble embeddedness was estimated at the pool tail-outs. Of the 52 pool tail-outs, 9 had a value of 1 (17.3%); 18 had a value of 2 (34.6%); 18 had a value of 3 (34.6%); and 7 had a value of 4 (13.5%). Graph 6 describes embeddedness.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Pool types had the highest shelter rating at 55.2 (Table 1). For the pool types, the scour pools had the highest mean shelter rating at 58.5, main channel pools had a mean shelter rating of 54.0, and backwater pools had a rating of 45.0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Little Larabee Creek. Small woody debris is the next most common cover type. Graph 7 describes the pool cover in Little Larabee Creek.

Table 6 (Graph 8) describes the dominant substrate by habitat type. Large cobble was the dominant substrate observed in 36.7% of the low gradient riffles. Small cobble was the next most frequently observed dominant substrate type, and occurred in 30.0% of the 30 low gradient riffles.

Nearly 53% of Little Larabee Creek lacked shade canopy. Of the 47% of the stream that was covered with canopy, 98% was composed of deciduous trees, and 2% was composed of coniferous trees. Graph 9 describes the canopy in Little Larabee Creek.

Table 2 summarizes the mean percent of the right and left stream banks covered with vegetation by habitat unit type. For the stream reach surveyed, the mean percent right bank vegetated was 52.5%. The mean percent left bank vegetated was 63.6%. The dominant elements composing the structure of the stream banks consisted of 4.2% bedrock, 4.2% boulder, 1.2% cobble/gravel, 2.4% bare soil, 8.5% grass, and 8.5% brush. Additionally, 70.9% of the banks were composed of deciduous trees, and 0.0% coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three electrofishing sites were sampled on Little Larabee Creek. The objective was to identify fish species and distribution. The units were sampled on September 12, 1991 by Erick Elliot, and Brian Humphrey (CCC). Each unit was end-blocked with nets to contain the fish within the sample reach. Fork lengths (FL) were measured and recorded, and the fish returned to the stream.

The first unit sampled was habitat unit 003, a mid-channel pool, approximately 146 feet from the confluence with the Van Duzen River, and directly under the Highway 36 bridge. This site had an area of 731.5 sq ft, and a volume of 804.7 cu ft. The unit yielded 28 steelhead, ranging from 36 to 207mm FL, 78 roach, which were not measured, and three suckers, 54, 58, and 95 mm fork length.

The second sample unit was habitat unit 061, a boulder formed lateral scour pool, located approximately 3,903 feet from the confluence with the Van Duzen River. This site had an area of 2,479.5 sq ft, and a volume of 4,711.1 cu ft. The unit yielded 81 steelhead, ranging from 41 to 169mm FL, two suckers, 101 and 143 mm FL, three roach, which were not measured, and one Pacific lamprey ammocete, 106 mm in length.

The third unit sampled was habitat unit 159, a root wad enhanced lateral scour pool, located approximately 10,347 feet above the creek mouth. The site had an area of 592.8 sq ft, and a volume of 652.1 cu ft. The unit yielded 47 steelhead, ranging from 35 to 170mm FL, and one Pacific lamprey ammocete, 135 mm in length.

GRAVEL SAMPLING RESULTS

No gravel samples were collected on Little Larabee Creek.

DISCUSSION

Little Larabee Creek has two channel types: B2 and A3. The high energy and unstable stream banks of the A3 channel type are generally not suitable for instream enhancement structures. The B2 channel type is suitable for many stream enhancement structures. For the most part, B2 channels are found in stable, low gradient stream reaches. Well placed and engineered structures that constrict the channel to form pool habitat or cover structures are usually appropriate and have a good chance of success in these channel types.

The water temperatures recorded on the survey days ranged from 59° F to 64° F. Air temperatures ranged from 61° F to 80° F. This is a warm water temperature regime for salmonids. If sustained, 64° F is near the threshold stress level for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling conducted.

Flatwater habitat types comprised 44.4% of the total **length** of this survey, riffles 26.3%, and pools 29.3%. The pools are relatively deep with 50 of the 62 pools having a maximum depth of two feet or greater. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat. Therefore, 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 interfere with unstable stream banks.

Twenty-five of the 52 pool tail-outs measured had embeddedness ratings of 3 or 4. Nine had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In Little Larabee Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for flatwater habitats was moderate with a rating of 37.5. The shelter rating in the pools was better at 55.2. However, a pool shelter rating of approximately 100 is desirable. The of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large and small debris and root wads contribute a small amount.

Fifteen of the 30 low gradient riffles had gravel or small cobble as the dominant substrate. Eleven had large cobble; this is on the high end of the size substrate considered desirable for spawning salmonids.

The mean percent canopy for the stream was 41%. This is a relatively low percentage of canopy, since 80 percent is generally considered optimum in these north coast streams. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Little Larabee Creek should be managed as an anadromous,

natural production stream.

2) Increase the canopy on Little Larabee Creek by planting willow, alder, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

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

4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable.

5) Inventory and map sources of stream bank erosion, and prioritize them according to present and potential sediment yield. Identified sites, should then be treated to reduce the amount of fine sediments entering the stream.

PROBLEM SITES AND LANDMARKS

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

0'	Begin survey at confluence with the Van Duzen River. Reach #1 is a B2 channel type.
146'	Highway 36 bridge.
246'	Concrete wall from bridge holding 50' of left bank (LB).
443'	Man made dam of large cobbles, right bank (RB) erosion contributing fines into the channel.
540'	RB erosion 20' high contributing fines into the channel.
665'	Steep RB eroding, YOY observed.
1302'	RB eroding, partially vegetated, steep LB.
1344'	RB slide.

1384' Old car on LB, retaining large woody debris (LWD).

1629' LB erosion contributing fines into the channel.

1689' Large boulder on LB (20' high), large fallen log on RB.

1759' RB slide contributing fines and boulders into the channel.

1792' Boulder barely retaining RB.

1956' LB bedrock ledge 90' high, RB erosion 30' high contributing fines and gravel into the channel.

1988' RB erosion 15' high, LB bedrock ledge 100' high.

2527' Small RB slide at bottom of unit. YOY observed.

2717' LB erosion contributing fines and gravel into the channel. YOY observed.

2909' LB erosion 15' high, boulders at toe.

3049' Dry tributary enters LB.

3139' Dry tributary enters RB. YOY observed.

3173' Fallen log on LB.

3298' Three root masses retaining small woody debris (SWD) on RB.

3332' Unstable RB slide 80' high x 130' long contributing fines. LWD accumulation 10' long x 30' wide 5' high.

3575' Small man-made dam of large cobble and boulders.

3708' RB erosion begins 10' high.

3768' Braided channel.

3858' Dry tributary enters LB. LB erosion 40' high x 30' long. YOY observed.

3918' RB erosion begins 10' high, contributing fines.

3963' RB erosion continues. Fallen log over unit.

4021' Dry tributary enters RB. RB erosion continues. LB

erosion begins 8' high.

4109' Fallen log in unit. Steep LB erosion 25' high. YOY observed.

4174' RB erosion 15' high contributing fines and gravel.

4208' Log protruding from RB erosion 8' above water. YOY observed.

4343' LB erosion contributing fines and gravel. Mid-channel island 4' wide x 20' long.

4423' Dry RB overflow channel.

4468' LB erosion 80' high, re-vegetated. Dry RB overflow.

4751' LB erosion 10' high, re-vegetated.

4816' LB erosion 30' high, fallen log on RB. YOY observed.

4871' Dry overflow channel on R & L banks, Log debris accumulation (LDA) on RB.

4908' RB erosion 30' high contributing fines. Dry LB overflow channel.

4948' Dry LB overflow. RB erosion 20' high.

5189' Two pools separated by 4' wide x 20' long island.

5399' Channel changes from a B2 to an A3 channel type (reach #2).

5558' Dry tributary enters LB.

5590' LB slide 150' contributing fines and gravel. RB erosion toed by alders.

5831' LB slide 100' high contributing fines.

5961' RB overflow channel, small pool at bottom of unit.

6271' Braided at bottom of unit. Large boulder in mid-channel causing LDA (20' wide x 8' long x 15' high) and gravel retention (3' high x 20' long x 5' wide).

6282' YOY observed.

6314' LB slide 75' high x 40' long contributing SWD and

fines.

6563' LB slide 80' high contributing fines.

6620' Braided at bottom of unit, overflow channel on LB.

6847' LDA at top of unit, no barrier. YOY observed.

7026' Tributary enters LB with YOY observed at 4' wide confluence. Dry tributary enters RB.

7091' Dry RB overflow. Large root mass causing LDA on LB.

7409' LB slide 40' high, toed with boulders. Very steep gradient. Very large boulders.

7426' LB slide 40' high contributing gravel. Small overflow on RB.

7486' LB slide 50' high contributing gravel and fines. YOY observed. Three fallen logs over unit.

7590' Large boulders are the walls of the trench pool.

7700' LDA on RB, 5' high plunge in middle of unit, YOY observed. Steep gradient.

7798' LDA on RB.

7908' LDA 110' long x 65' wide x 10' high, not a barrier, YOY observed. Small pool on LB due to overflow. Gravel retention 40' wide x 100' long x 8' high.

8089' SWD accumulation in middle of unit, not a barrier. Very steep gradient with 2'- 5' high plunges.

8286' YOY observed.

8344' SWD accumulation on LB at bottom of unit, YOY observed.

8398' Small LB slide 40' high contributing gravel, YOY observed.

8429' 4' plunge onto boulders at top of unit.

8489' RB erosion 30' high, re-vegetated. YOY observed. 2' high plunge at top of pool.

8535' Small LB slide 30' high x 20' long contributing gravel and fines. LWD and SWD accumulation at top of unit on

RB. Unit is slightly braided in middle of unit.

8782' Two pools separated by gravel bar 4' high x 30' long x 7' wide. Large RB slide 100' high. Dry overflow on LB.

8919' RB slide 100' high x 200' long contributing gravel and fines. YOY observed. LWD accumulation on both banks. Very steep gradient, steps primarily 1'- 4' high plunges.

8946' LWD on LB. Steep re-vegetated RB 200' high.

8957' RB slide 60' high contributing cobble.

9010' SWD accumulation on both banks.

9142' Blue clay slide 75' high x 200' long contributing fines.

9316' SWD on both banks.

9370' LB boulder slide, YOY observed.

9398' Multiple LWD over unit and on both banks.

9533' LB slide 40' high contributing gravel, re-vegetated at toe.

9738' RB slide 40' high, re-vegetated with grasses. LWD on RB. YOY observed.

9818' RB bedrock slide 20' high, small riffle separates pools, YOY observed.

10215' Large boulder in middle of channel. SWD on both banks.

10263' Dry overflow, SWD and LWD on LB, LWD on RB. YOY observed.

10450' Log weir in middle of unit. SWD and LWD on both banks. YOY observed.

10564' Tributary forks on LB. SWD on both banks. Little flow. End of survey.