STREAM INVENTORY REPORT

WEBER CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1992 on Weber 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 Weber 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.

There is no known record of adult spawning surveys having been conducted on Weber Creek. 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.

WATERSHED OVERVIEW

Weber Creek is tributary to the Eel River, located in Humboldt County, California (Figure 1). Weber Creek's legal description at the confluence with the Eel River is T1S R2E S14. Its location is 40°22'39" N. latitude and 123°55'05" W. longitude. Weber Creek is a second order stream and has approximately 3.9 miles of blue line stream, according to the USGS Redcrest, Weott, and Bridgeville 7.5 minute quadrangles. Weber Creek drains a watershed of approximately 1.8 square miles. Elevations range from about 120 feet at the mouth of the creek to 2,400 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is owned primarily by the Pacific Lumber Company and is managed for timber production. Vehicle access exists from U.S. Highway 101 at Holmes Road. From there, take the road to Larabee Valley, and walk approximately 1-1/2 miles south along the railroad tracks to the mouth of Weber Creek.

METHODS

The habitat inventory conducted in Weber Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) and contract seasonal Technical Advisors that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Weber Creek personnel were trained in May and June, 1992, by Gary Flosi and Scott Downie. This inventory was conducted by

a two person team.

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

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 should also be measured or estimated at major tributary confluences.

2. Channel Type:

Channel typing is 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 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 taken and recorded at each tenth unit typed. The time of the measurement is also recorded. Both 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 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". Weber 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 dimensions were measured 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 Weber 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 Weber 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 Weber Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results recorded.

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 Weber 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.

Weber Creek

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 Weber Creek to document the fish species composition and distribution. Four sites were electrofished in Weber Creek using one Smith Root Model 12 electrofisher. Each site was end-blocked with nets to contain the fish within the sample reach. Fish from each site were counted by species, measured, and returned to the stream.

DATA ANALYSIS

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

The Runtime program produces the following summary 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 Weber 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 RESULTS *

Weber Creek

The habitat inventory of June 11 & 12, 1992, was conducted by Jason Cleckler and Craig Mesman (CCC and contract seasonal). The total length of the stream surveyed was 2,215 feet, with an additional 12 feet of side channel.

Flow was not measured in Weber Creek.

Weber Creek is an A4 channel type for the entire 2,215 feet of stream reach surveyed. A4 channels are steep (4-10% gradient), well confined streams, with unstable stream banks.

Water temperatures ranged from 56 to 58 degrees fahrenheit. Air temperatures ranged from 58 to 70 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 45.9%, flatwater types 31.1%, and pools 23.0% (Graph 1). Riffle habitat types made up 69.7% of the total survey **length**, flatwater 20.1%, and pools 10.2% (Graph 2).

Nine 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, 32.4%; runs, 20.3%; and high gradient riffles, 13.5% (Graph 3). By percent total **length**, low gradient riffles made up 47.1%, high gradient riffles 22.7%, and runs 9.6% (Table 2).

Seventeen pools were identified (Table 3). Scour pools were encountered at 47.1%, and comprised 48.0% of the total length of pools. Main channel pools were also encountered at 47.1%, and comprised 46.7% of the pool lengths. (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Sixteen of the 17 pools (94%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 17 pool tail-outs measured, zero had a value of 1; 7 had a value of 2 (41.2%); 7 had a value of 3 (41.2%); and 3 had a value of 4 (17.6%). On this scale, a value of one is the best for fisheries (Graph 6).

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 habitats had the highest shelter rating at 59.1. Flatwater habitats followed with a rating of 43.0 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 63.8, main channel pools had a rating of 58.1, and backwater pools rated 30.0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in all habitats in Weber Creek and are extensive. Large and small woody debris are the next most common cover types. Graph 7 describes the pool cover in Weber Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 17 of the 24 low gradient riffles (70.8%). Large cobble was the next most frequently observed dominant substrate type, and occurred in 16.7% of the low gradient riffles (Graph 8).

Forty-eight percent of the survey reach lacked shade canopy. Of the 52% of the stream covered with canopy, 38% was composed of deciduous trees, and 62% was composed of coniferous trees. Graph 9 describes the canopy in Weber Creek.

Table 2 summarizes the mean percentage of the right and left stream banks covered with vegetation by habitat type. For the stream reach surveyed, the mean percent right bank vegetated was 35.6%. The mean percent left bank vegetated was 29.0%. The dominant elements composing the structure of the stream banks consisted of 25.7% cobble/gravel, 18.2% bare soil, 2.7% grass, 27.0% brush. Additionally, 11.5% of the banks were covered with deciduous trees, and 14.9% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Four electrofishing sites were sampled on Weber Creek. The objective was to identify fish species and distribution. The units were sampled on July 1, 1992, by Chris Coyle and Craig Mesman (CCC). Each unit was end-blocked with nets to contain the fish within the sample reach. Three passes were conducted at each site, fork lengths (FL) measured and recorded, and the fish returned to the stream.

The first site sampled included habitat units 008-011, a combination lateral scour pool (root wad enhanced), step run, low gradient riffle, and plunge pool, approximately 294 feet from the confluence with the Eel River. This site had an area of 538.2 sq ft, and a volume of 175.8 cu ft. The unit yielded 4 steelhead, ranging from 37 to 60mm FL. One 1+ steelhead was also observed but not caught.

The second site included habitat units 012-013, a combination step run and low gradient riffle, located approximately 381 feet

above the creek mouth. This site had an area of 1256.4 sq ft, and a volume of 335.4 cu ft. One steelhead was sampled, 113mm FL.

The third site sampled was habitat unit 016, a plunge pool, located approximately 697 feet above the creek mouth. The site had an area of 88.0 sq ft, and a volume of 79.2 cu ft. One steelhead were sampled, 111mm FL.

The fourth site was habitat units 071-073, a high gradient riffle, plunge pool, high gradient riffle sequence, located approximately 2,113 feet from the confluence with the Eel River. The site had an area of 664.2 sq ft, and a volume of 252.2 cu ft. No fish were found.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Weber Creek.

DISCUSSION

The A4 channel type is generally not suitable for fish habitat improvement structures. A4 channels are found in high energy, steep gradient stream reaches, and have unstable stream banks. Usually within the A4 channel there are zones of lower gradient where enhancement projects can be accomplished. This seems to be the case in Weber Creek, but any structure sites must be selected with care because of the high stream energy which can create problems with stream bank erosion and structure stability.

The water temperatures recorded on the survey days June 11-12, 1992, ranged from 56° F to 58° F. Air temperatures ranged from 58° F to 70° F. This is a very good water temperature regime for salmonids. However, to make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling conducted.

Riffle habitats comprised 69.7% of the total **length** of this survey, flatwater 20.1%, and pools 10.2%. The pools are relatively shallow with only one of the 17 pools having a maximum depth greater than 2 feet. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat. 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. 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. Ten of the 17 pool tail-outs measured had embeddedness ratings of 3 or 4. Zero had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Weber Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for pools was moderate with a rating of 59.1. The shelter rating in the flatwater habitats was lower at 43.0. However, a pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large and small woody debris contribute a small amount.

Nineteen of the 24 low gradient riffles had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy for the stream was 52%. This is a moderate 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) Weber Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Increase the canopy on Weber Creek by planting willow, alder, redwood, 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.

4) There are several log debris accumulations present on Weber Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully over time to avoid excessive sediment loading in downstream reaches.

5) Inventory and map sources of stream bank erosion, and prioritize them according to present and potential sediment yield. Identified sites, like the site at 2,290', should then be treated to reduce the amount of fine sediments entering the stream.

5) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Fish passage should be monitored, and improved where possible.

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 Eel River. Channel type is an A4 for the entire survey reach.
204'	Railroad bridge 80' long x 20' wide x 35' high.
381'	Log and debris accumulation (LDA) 11' long x 40' wide x 9' high.
535'	Dirt road accesses the creek from the left bank.
917'	4' high plunge.
924'	CCC site #4, 8-5-85. Large root wad has caused channel to move 20' to the left of site.
1358'	CCC site #5, 8-5-85. LDA 14' long x 50' wide x 7' high.
1543'	Plunge 5.5' high.
2103'	LDA 10' long x 40' wide x 6' high, retaining gravel 30' long x 15' wide x 6' high.
2215'	LDA 40' long x 10' wide x 8' high, retaining gravel 7' long x 20' wide. Above this unit, the channel splits and goes around debris/tree crown accumulation; possible barrier. Upstream both banks are eroding. Left bank slump 120' high x 125' long; right bank slump 120' high x 250' long. End of survey.

LEVEL III and LEVEL IV HABITAT TYPE KEY:

HABITAT TYPE	LETTER	NUMBER
RIFFLE		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
CASCADE		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
FLATWATER		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
MAIN CHANNEL POOLS		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
SCOUR POOLS		
Corner Pool	[CRP]	5.1
Lateral Scour Pool - Log Enhanced	[LSL]	5.2
Lateral Scour Pool - Root Wad Enhanced	[LSR]	5.3
Lateral Scour Pool - Bedrock Formed	[LSBk]	5.4
Lateral Scour Pool - Boulder Formed	[LSBo]	5.5
Plunge Pool	[PLP]	5.6
BACKWATER POOLS		
Secondary Channel Pool	[SCP]	6.1
Backwater Pool - Boulder Formed	[BPB]	6.2
Backwater Pool - Root Wad Formed	[BPR]	6.3
Backwater Pool - Log Formed	[BPL]	6.4