STREAM INVENTORY REPORT

BALCOM CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1992 on Balcom 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 Balcom 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 Balcom 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

Balcom Creek is tributary to Larabee Creek, tributary to the Eel River, located in Humboldt County, California (Figure 1). Balcom Creek's legal description at the confluence with Larabee Creek is T1S R2E S01. Its location is 40°24'30" N. latitude and 123°53'59" W. longitude. Balcom Creek is a first order stream and has approximately 1.3 miles of blue line stream, according to the USGS Redcrest 7.5 minute quadrangle. Balcom Creek drains a watershed of approximately 0.7 square miles. Elevations range from about 160 feet at the mouth of the creek to 1,500 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is owned by the Pacific Lumber Company and is managed for timber production. Vehicle access exists from Highway 101 one mile south of Scotia, via Shively Road, to Larabee Valley.

METHODS

The habitat inventory conducted in Balcom Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) Technical Advisors that conducted the

inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Balcom 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 Balcom 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". Balcom 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 Balcom 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 Balcom 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 Balcom 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 Balcom 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 Balcom Creek to document the fish species composition and distribution. One site was electrofished in Balcom Creek using one Smith Root Model 12 electrofisher. The site was end-blocked with nets to contain the fish within the sample reach. Fish from the 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 Balcom 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 *

The habitat inventory of June 18 and 22, 1992, was conducted by Chris Coyle and Brian Humphrey (CCC). The total length of the stream surveyed was 1,787 feet.

Flow was not measured in Balcom Creek.

Balcom Creek is a B4 channel type for the entire 1,787 feet of stream reach surveyed. B4 channels are moderate gradient (1.5-4.0%), well confined streams, with unstable stream banks.

Water temperatures ranged from 56 to 58 degrees fahrenheit. Air temperatures ranged from 61 to 75 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, pools made up 48.2%, flatwater types 24.6%, and riffles 23.6% (Graph 1). Pools made up 43.7% of the total survey **length**, flatwater 29.2%, and riffles 21.9% (Graph 2).

Thirteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were mid-channel pools, 22.7%; low gradient riffles, 14.4%; and plunge pools, 17.3% (Graph 3). By percent total **length**, mid-channel pools made up 22.8%, low gradient riffles 16.1%, and plunge pools 14.2% (Table 2).

Fifty-three pools were identified (Table 3). Main channel pools were most often encountered at 47.2%, and comprised 52.2% of the total length of pools. Scour pools were also encountered at 47.2%, and comprised 41.5% of the pool length (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Thirty-six of the 53 pools (68%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 52 pool tail-outs measured, zero had a value of 1; zero had a value of 2; 15 had a value of 3 (28.9%); and 37 had a value of 4 (71.1%). 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 42.9. Riffles followed with a rating of 38.1 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 47.4, backwater pools had a rating of 40.0, and main channel pools rated 38.8 (Table 3).
Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in Balcom Creek and are extensive. Large and small woody debris are the next most common cover types (Graph 7).

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 18 of the 20 low gradient riffles (90%). Graph 8 describes the dominant substrates in Balcom Creek.

Three percent of the survey reach lacked shade canopy. Of the 97% of the stream covered with canopy, 67% was composed of deciduous trees, and 33% was composed of coniferous trees. Graph 9 describes the canopy in Balcom 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 83.6%. The mean percent left bank vegetated was 85.3%. The dominant elements composing the structure of the stream banks consisted of 2.3% bedrock, 0.5% boulder, 2.3% bare soil, 11.9% grass, 77.0% brush. Additionally, 2.3% of the banks were covered with deciduous trees, and 3.6% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

One electrofishing site was sampled on Balcom Creek. The objective was to identify fish species and distribution. The unit was sampled on July 1, 1992, by Erick Elliot and Brian Humphrey (CCC). The unit was end-blocked with nets to contain the fish within the sample reach. Three passes were conducted at the site, fork lengths (FL) measured and recorded, and the fish returned to the stream.

The site sampled was habitat unit 018, a mid-channel pool, approximately 277 feet from the confluence with Larabee Creek. This site had an area of 55.0 sq ft, and a volume of 82.5 cu ft. No fish were found.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Balcom Creek.

DISCUSSION

The B4 channel type is generally not suitable for fish habitat improvement structures. B4 channels are found in moderate gradient streams, with unstable stream banks. Usually within the B4 channel there are stable areas where structures can be constructed. This seems to be the case in Balcom Creek, but any structure sites must be selected with care because of the fine-grained stream beds which can create problems with stream bank erosion and structure stability.

The water temperatures recorded on the survey days June 18 and 22, 1992, ranged from 56° F to 58° F. Air temperatures ranged from 61° F to 75° 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.

Flatwater habitat types comprised 29.2% of the total **length** of this survey, riffles 21.9%, and pools 43.7%. The pools are relatively shallow with only 17 of the 53 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 deepen pool habitat is recommended for locations where their installation will not be threatened by the unstable stream banks of the B4 channel type.

All 52 of the pool tail-outs measured had embeddedness ratings of 3 or 4. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Balcom 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 42.9. The shelter rating in the flatwater habitats was lower at 21.3. However, a pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by undercut banks in all habitat types. Additionally, large and small woody debris contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats are needed to improve 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.

Nineteen of the 20 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 97%. This is a very high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

RECOMMENDATIONS

1) Balcom Creek should be managed as an anadromous, natural production stream.

2) The failure to observe or electrofish salmonids indicates that the suspected barrier at 94' should be inspected after a season of more normal rainfall than has been experienced in recent years. If it is determined to be a barrier, it should be modified to allow migration.

3) 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.

4) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

5) Increase woody cover in the flatwater habitat units. Most of the existing cover is from undercut banks. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

6) There are several log debris accumulations present on Balcom 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.

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 Larabee Creek. Channel type is a B4 for the entire survey reach.
94'	Bedrock sheet 8' long with 50% gradient and no jump pool; possible barrier.
224'	Log and debris accumulation (LDA) 2' wide x 7' long x 4' high, retaining silt.
233'	Side channel enters from the left bank through a one foot diameter culvert.
274'	Vehicle bridge crossing 5' high.
342'	Majority of flow goes down log flume 3' wide x 20' long.
856'	Right bank slump 10' high x 15' long, contributing silt and diverting the channel.
985'	Decaying logs embedded in the channel 12' long; possible barrier.
1038'	LDA 20' wide x 16' long x 7' high, retaining gravel 10' wide x 7' high. Probable barrier.
1164'	LDA 3.5' high; low flow barrier. No fish have been observed to this point.
1183'	Plunge 7' high over log; low flow barrier.
1218'	LDA 10' wide x 8' long x 3' high, retaining silt. Low flow barrier.
1233'	Right bank erosion 6' high x 15' long, contributing fines into the channel.
1244'	Right bank erosion 5' high x 20' long, contributing fines and a root wad into the channel.
1346'	Plunge 3' high; low flow barrier.
1361'	LDA 10' wide x 10' long x 4' high, retaining gravel and sand 10' wide x 4' high. Low flow barrier.
1617'	LDA 10' wide x 7' long x 4' high, retaining gravel 8' wide x 4' high. Low flow barrier.

1677' Plunge 4' high over log sill. Gravel retention 6' wide x 4' high; low flow barrier.

1700' Left bank erosion 5' high x 20' long, contributing fines into the channel.

1749' LDA 15' wide x 25' long x 6' high, retaining sand. Probable barrier.

1787' Channel is completely clogged with debris and is intermittent above this point. No fish observed during survey. 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