STREAM INVENTORY REPORT

BUTTE CREEK

INTRODUCTION

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

Butte Creek is tributary to the Little Van Duzen River, tributary to the Van Duzen River, tributary to the Eel River, located in Humboldt County, California (Figure 1). Butte Creek's legal description at the confluence with the Little Van Duzen River is T1N R5E S19. Its location is 40°26'23" N. latitude and 123°39'17" W. longitude. Butte Creek is a second order stream and has approximately 8.0 miles of blue line stream, according to the USGS Larabee Valley 7.5 minute quadrangle. Butte Creek drains a watershed of approximately 17.0 square miles. Elevations range from about 2,000 feet at the mouth of the creek to 3,000 feet in the headwater areas. Grass, oak, and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for rangeland and timber production. Vehicle access exists from State Highway 36 via Butte Creek Road, approximately 32 miles east of Alton and Highway 101.

METHODS

The habitat inventory conducted in Butte 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). Butte Creek personnel were trained in May, 1992, by Gary Flosi and Scott Downie. This inventory was conducted by two person teams.

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 Butte Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used, see the Little Van Duzen River report.

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 Butte Creek to document the fish species composition and distribution. Two sites were electrofished in Butte 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.

SUBSTRATE SAMPLING

Gravel sampling is conducted using a 9 inch diameter standard McNeil gravel sampler. Sample sites are identified numerically beginning at the most upstream site in the stream. Gravel samples are separated and measured to determine respective percent volume using five sieve sizes (25.4, 12.5, 4.7, 2.37, and 0.85mm).

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. This program processes and summarizes the data, and 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 Butte 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 3, 17, 18, 20, 21, 24, 31, and September 1-3 & 8, 1992, was conducted by Ed Davis, Tony Sartori, Aaron Nadig, Brian Humphrey, Warren Mitchell, Michelle Rose and John Cleckler (CCC and contract seasonals). The total length of the stream surveyed was 31,817 feet, with an additional 815 feet of side channel. Of the total survey length, 27,544 feet was on the main stem of Butte Creek, and 4,273 feet was on an unnamed tributary of Butte Creek. The data from the unnamed tributary was combined with the main stem of Butte Creek for the purpose of statistical analysis.

Flows were not measured on Butte Creek.

This section of Butte Creek has three channel types: from the mouth to 7,038 feet a B2; next 9,065 feet a C1; next 6,700 feet a B2; and the upper 4,741 feet an A1. The unnamed tributary is a C1 channel type for the entire 4,273 feet surveyed. B2 channels are moderate gradient (1.0-2.5%), moderately confined streams, with stable stream banks. C1 channels are low gradient (1.0-1.5%), slightly confined meandering streams, with a developed flood plain. A1 channels are high gradient, well confined streams, with bedrock stream beds.

Water temperatures ranged from 52 to 65 degrees fahrenheit. Air temperatures ranged from 52 to 90 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, flatwater habitat types made up 35.4%, pools 35.2%, and riffles 28.9% (Graph 1). Flatwater habitat types made up 46.7% of the total survey **length**, pools 33.7%, and riffles 19.4% (Graph 2). Twenty-one Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were step runs, 21.6%; low gradient riffles, 19.6%; and mid-channel pools, 14.9% (Graph 3). By percent total **length**, step runs made up 35.2%, mid-channel pools 14.3%, and low gradient riffles 13.6%.

One hundred sixty-three pools were identified (Table 3). Main channel pools were most often encountered at 57.7%, and comprised 60.2% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. One hundred twenty-seven of the 163 pools (78%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 139 pool tail-outs measured, 3 had a value of 1 (2.2%); 36 had a value of 2 (25.9%); 57 had a value of 3 (41.0%); and 43 had a value of 4 (30.9%). 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 habitat types had the highest shelter rating at 51.6. Flatwater habitats followed with a rating of 40.6 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 55.2, main channel pools had a rating of 50.4, and backwater pools rated 29.0 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 38 of the 91 low gradient riffles (41.8%). Gravel was the next most frequently observed dominant substrate type, and occurred in 28.6% of the low gradient riffles (Graph 8).

Thirty percent of the survey reach lacked shade canopy. Of the 70% of the stream covered with canopy, 68% was composed of deciduous trees, and 32% was composed of coniferous trees. Graph 9 describes the canopy in Butte 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 38.7%. The mean percent left bank vegetated was 36.9%. The dominant elements composing the structure of the stream banks consisted of 24.6% bedrock, 10.4% boulder, 18.6% cobble/gravel, 4.2% bare soil, 9.8% grass, 6.4% brush. Additionally, 25.0% of the banks were covered with deciduous trees, and 0.5% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on Sept. 14, 1992 in Butte Creek. The units were sampled by John Crittenden and Russ Irvin (CCC and contract seasonal). All measurements are fork lengths unless noted otherwise.

The first site sampled included habitat units 111-113, a pool/riffle/pool sequence, approximately 9,216 feet from the confluence with the Little Van Duzen River. This site had an area of 2,048 sq ft, and a volume of 3,080 cu ft. The site yielded 13 steelhead, ranging from 79 to 143mm FL.

The second site included habitat units 227-228, a combination low gradient riffle and run, located approximately 16,239 feet above the creek mouth. This site had an area of 1,086 sq ft, and a volume of 578 cu ft. Seven steelhead were sampled. They ranged from 101 to 199mm FL.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Butte Creek.

DISCUSSION

The surveyed reach of Butte Creek has three channel types: A1, B2, and C1. The high energy and steep gradient of the A1 channel type is generally not suitable for instream enhancement structures. The B2 channel type is excellent for many types of low and medium stage instream enhancement structures. Many site specific projects can be designed within this channel type,

especially to increase pool frequency, volume and pool cover.

C1 channels 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 cover for fish. 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 this channel type.

The water temperatures recorded on the survey days August 3 through September 8, 1992 ranged from 52° F to 65° F. Air temperatures ranged from 52° F to 90° F. This is a good water temperature regime for salmonids. However, 65° F, if sustained, 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 46.7% of the total **length** of this survey, pools 33.7%, and riffles 19.4%. The pools are relatively deep with 127 of the 163 pools having a maximum depth of two feet or greater. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat.

One hundred of the 139 pool tail-outs measured had embeddedness ratings of 3 or 4. Only three had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In Butte 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 51.6. The shelter rating in the flatwater habitats was lower at 40.6. 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.

Sixty-four of the 91 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 70%. This is a relatively high 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) Butte Creek should be managed as an anadromous, natural production stream.

2) 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.

3) 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.

4) 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.

5) There are several log debris accumulations present on Butte 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.

6) There are sections where the stream is being impacted from cattle trampling the riparian zone, and defecating in the water. Alternatives should be explored with the grazier, and developed if 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 Little Van Duzen River. Reach #1 is a B2 channel type.
359'	Old culvert, 2' diameter x 20' long, buried mid-channel.
529'	Metal bridge 10' wide x 43' long x 8' high crosses the channel.

3985'	1+ salmonids observed.
5324'	Tributary enters from the left bank. Cattle access this tributary.
5421'	Highway 36 bridge 20' wide x 60' long x 18' high.
6885'	Cattle access to the channel for the next 1549 feet.
7038'	Channel type changes from a B2 to a C1 (reach #2).
9474'	Log and debris accumulation (LDA) 20' wide x 1' long x 2' high, retaining gravel and cobble.
9564'	Right bank erosion 5' high.
10079'	YOY observed.
10278'	Horse Creek (dry) enters from the right bank.
10335'	Road crosses the channel.
10401'	Barbed wire fence across the channel.
10633'	Left bank erosion 5' high.
11234'	Right bank erosion 4' high.
11687'	Two arch-culvert pipes 13' wide x 70' long x 3' high. YOY observed.
11819'	Barbed wire fence across the channel. Right bank erosion 3' high.
11901'	Swift Creek (dry) enters from the right bank. Mule Creek (dry) enters from the left bank.
12221'	Left bank erosion 20' high x 130' long.
13006'	Barbed wire fence crosses the channel. YOY observed.
13507'	Left bank erosion 8' high x 83' long.
14385'	LDA 35' wide x 3' long x 4' high.
14682'	LDA 29' wide x 17' long x 8' high, retaining gravel 4' high.
14769'	Left bank erosion 30' high.

15008' Tributary enters from the right bank.

15397' Left bank erosion 50' high x 165' long.

15433' Logs creating log weir 6' wide x 2' long x 2' high.

16103' Channel type changes from a C1 to a B2 (reach #3).

16164' Left bank erosion 30' high.

16239' Road access from the right bank.
16296' Right bank erosion 6' high x 185' long.

16512' Left bank erosion 6' high x 60' long.

17833' Road culvert crossing. Dry tributary enters from the right bank just upstream of crossing.

18839' Bridge made of a railroad car crosses the creek.

19211' Decaying log bridge crosses the creek.

20268' Tributary enters from the left bank through a culvert 10' above the creek.

21075' LDA 30' wide x 12' long x 10' high, retaining fines 100' long. Probable barrier but could be cleared easily.

22753' Small tributary enters from the right bank.

22803' Channel type changes from a B2 to an A1 (reach #4).

22864' Log jam consisting of 4 logs 3' high, retaining gravel 15' wide x 30' long.

23268' Tributary enters from the right bank. This tributary had good flow and was surveyed (see below).

23326' LDA 11' wide x 15' long x 6' high, retaining gravel 8' long. No apparent barrier at high flows.

23530' LDA 20' wide x 7' long x 6' high, retaining gravel 30' wide x 65' long x 6' high.

23984' LDA 30' wide x 20' long x 7' high, retaining gravel and cobble 75' long x 6' high.

24491' 3' high waterfall, retaining cobble and boulders.

24664' LDA 20' wide x 5' long x 6' high, retaining debris; possible barrier.

24836' LDA 15' wide x 5' long x 6' high, retaining gravel 20' wide x 75' long. Dry tributary enters from the left bank.

25940' Dry tributary enters from the left bank.

26112' LDA 15' wide x 10' long x 4' high, retaining gravel.

26334' LDA 7' wide x 10' long x 3' high.

26619' LDA 6' wide x 10' long x 3' high.

26860' LDA 15' wide x 50' long x 4' high, retaining gravel 15' wide x 12' long x 3' high. Could be easily cleared.

27013' Small tributary enters from the right bank.

27341' LDA 10' wide x 15' long x 5' high.

27544' Waterfall 15' high with LDA 12' wide x 7' long x 13' high. Steep bedrock walls on both sides of the channel. End survey of main stem Butte Creek.

0' Begin survey of unnamed tributary on Butte Creek's right bank, 23,268 feet above the Little Van Duzen River. Channel type is a C1 for this survey reach.

2040' LDA 25' wide x 10' long x 8' high, retaining gravel and cobble 30' wide x 100' long x 8' high. Possible barrier, but could be easily modified.

2213' YOY observed.

2964' LDA 20' wide x 3' long x 3' high, retaining gravel and cobble 20' wide x 40' long x 3' high.

3529' LDA 16' wide x 9' long x 7' high, retaining gravel 14' wide x 20' long x 8' high.

3897' Tributary enters from the left bank. More than half of the flow comes from this tributary.

4273' End of survey. Stream continues for approximately 400' upstream as combination of high gradient riffles

and small runs, until three boulders form a fish barrier.