STREAM INVENTORY REPORT

COULBORN CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1993 on Coulborn 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 Coulborn 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 Coulborn 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

Coulborn Creek is tributary to the Indian Creek, tributary to the South Fork Eel River, located in Mendocino County, California. Coulborn Creek's legal description at the confluence with Indian Creek is T24N R18W S06. Its location is 39°57'49" N. latitude and 123°53'27" W. longitude. Coulborn Creek is a first order stream and has approximately 0.6 miles of blue line stream, according to the USGS Bear Harbor 7.5 minute quadrangle. Coulborn Creek drains a watershed of approximately 2.5 square miles. Summer base runoff is approximately 0.8 cfs at the mouth. Elevations range from about 760 feet at the mouth of the creek to 1,400 feet in the headwater areas. Redwood and Douglas fir forests dominate the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists from Highway 101 to Highway 1, and then via Georgia-Pacific's WRP Road, which is gated with access controlled by G-P.

METHODS

The habitat inventory conducted in Coulborn Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) Technical Advisors and the contract seasonals that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Coulborn Creek personnel were trained in June 1, 1993, 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 Coulborn 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 measured 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". Coulborn 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. Pool tail crest depth at each pool unit was measured in 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 Coulborn 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 Coulborn 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 Coulborn 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 Coulborn 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 Coulborn Creek to document the fish species composition and distribution. Three sites were electrofished in Coulborn 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 six 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.

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Graphics developed for Coulborn 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 17 and 23, 1993, was conducted by Erick Elliot, Brian Michaels, and Chris Coyle (CCC and contract seasonal). The total length of stream surveyed was 7,530 feet.

The flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.8 cfs on July 27, 1993.

Coulborn Creek has two channel types for the stream reach surveyed; a B1-1 for the first 5,892 feet and a C3 for the remaining 1,638 feet. B1-1 types are moderate gradient, bedrock controlled channels with coarse textured, depositional bank materials. C3 types are low gradient, slightly confined channels, with unconsolidated, noncohesive gravel beds, and unstable banks.

Water temperatures ranged from 54 to 61 degrees fahrenheit. Air temperatures ranged from 57 to 77 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, flatwater types made up 35.8%, pools 35.1%, and riffles 28.4% (Graph 1). Flatwater habitat types made up 59.3% of the total survey **length**, riffles 21.5%, and pools 19.0% (Graph 2).

Sixteen 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, 27.0%; step runs, 21.0%; and runs, 14.2% (Graph 3). By percent total **length**, step runs made up 44.0%, low gradient riffles 20.4%, and runs 13.5%.

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Fifty-two pools were identified (Table 3). Scour pools were most often encountered at 51.9%, and comprised 55.2% 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. Thirty-one of the 52 pools (60%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 49 pool tail-outs measured, eight had a value of 1 (16.3%); 14 had a value of 2 (28.6%); 16 had a value of 3 (32.7%); and 11 had a value of 4 (22.4%). 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 48.1. Flatwater habitat types followed with a rating of 24.0 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 75.0, and scour pools rated 51.7 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Coulborn Creek and are extensive. Root mass and terrestrial vegetation are lacking in nearly all habitat types. Graph 7 describes the pool cover in Coulborn Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 19 of the 40 low gradient riffles (47.5%). Small cobble was the next most frequently observed dominant substrate type, and occurred in 30.0% of the low gradient riffles (Graph 8).

Eleven percent of the survey reach lacked shade canopy. Of the 89% of the stream covered with canopy, 73% was composed of deciduous trees, and 16% was composed of coniferous trees. Graph 9 describes the canopy in Coulborn 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 30.3%. The mean percent left bank vegetated was 25.5%. The dominant elements composing the structure of the stream banks consisted of 24% bedrock, 1.0% boulder, 2.4% cobble/gravel, 2.7% bare soil, 1.4% grass, 5.4% brush. Additionally, 45.3% of the banks were covered with deciduous trees, and 17.9% with coniferous trees, including downed trees, logs, and root wads

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(Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished on July 28 and August 30, 1993 in Coulborn Creek. The units were sampled by Brian Michaels, Craig Mesman, and Erick Elliot (contract seasonal and CCC). All measurements are fork lengths unless noted otherwise.

The first site sampled was habitat unit 5, a run, approximately 208 feet from the confluence with the Indian Creek. This site had an area of 602 sq ft, and a volume of 361 cu ft. The unit yielded 20 steelhead, ranging from 39 to 73mm FL and 23 coho, ranging from 60 to 76mm FL.

The second site included habitat units 112 and 113, a pool/run sequence, located approximately 5,690 feet above the creek mouth. This site had an area of 667 sq ft, and a volume of 308 cu ft. Four steelhead and seven coho were sampled. They ranged from 43 to 164mm FL and 66 to 73mm FL respectively.

The third site sampled included habitat units 122, 123, and 124, a pool, run, pool sequence, located approximately 6,201 feet above the creek mouth. This site is 309 feet above a road and culvert crossing. Site three had an area of 162sq ft, and a volume of 81 cu ft. Twelve steelhead were sampled, ranging from 49 to 160mm FL.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Coulborn Creek.

DISCUSSION

Coulborn Creek has two channel types: B1-1 and C3. The B1-1 channel type is excellent for bank placed boulders and submerged shelters in straight reaches. Channel aggrading structures are not recommended for this channel type because B1-1 channels are susceptible to lateral migration and stream bank erosion. There are 5,892 feet of this type of channel in Coulborn Creek.

C3 channel types, like the B1-1, are suitable for bank placed boulders, overhead log cover and submerged shelters in straight reaches. Again as with the B1-1, C3 types are susceptible to lateral migration and stream bank erosion. Prior to the

installation of habitat improvement structures, these factor would be counted for. There are 1,638 feet of C3 channel type for the stream reach surveyed.

The water temperatures recorded on the survey days August 17 and 23, 1993 ranged from 54° F to 61° F. Air temperatures ranged from 57° F to 77° F. This is a very good water temperature regime 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 59.3% of the total **length** of this survey, riffles 21.5%, and pools 19.0%. The pools are relatively shallow with only 31 of the 52 pools having a maximum depth greater than 2 feet. 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, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream. The LDA's in the system are retaining needed gravel. Any necessary modifications to them should be done with the intent of metering the gravel out to downstream reaches that will trap the gravel for future spawning use. Therefore, gravel retention features may need to be developed prior to any LDA modification.

Twenty-seven of the 49 pool tail-outs measured had embeddedness ratings of 3 or 4. Eight 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 Coulborn 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 low with a rating of 48.1. The shelter rating in the flatwater habitats was lower at 24.0. 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 some. 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.

Thirty-one of the 40 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 89%. This is a very 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)Coulborn 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, and improve the quality of existing pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

3)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 and in some areas the material is at hand.

4)Inventory and map sources of stream bank erosion, and rank them according to present and potential sediment yield. Identified sites, like the site at 7439', should then be treated to reduce the amount of fine sediments entering the stream.

5)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.

6)There are several log debris accumulations present on Coulborn 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

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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 Indian Creek. Confluence is open and accessible to anadromous fish. DFG flow profile station is in this first unit.

208'Biological Sample Site # 1, habitat unit 005.

788'Log debris accumulation (LDA) 4' high x 20' long x 40' wide retaining gravel 20' long x 20' wide. Not a barrier.

949'LDA 5' high x 30' wide x 40' long. Not a barrier.

973'LDA covering all of habitat unit 022. Passible.

1427'8" diameter PVC pipe in channel functioning as a digger log.

1460'Large pile of split wood on right bank. Possible old project.

1529'Right bank stabilization project.

2076'Tributary entering from right bank. Flow estimated at 0.2 cfs. Approximately 160' up tributary, a large LDA is blocking channel. No fish observed above it, however, steelhead were seen below.

2713'Spring enters from left bank.

4089'Unnamed tributary entering from right bank. Flow estimated at 0.2 cfs. Old, dilapidated, railroad bridge crosses tributary approximately 200' from confluence. LDA forming on downstream side of bridge creating probable fish barrier. No fish were observed.

4328'LDA 5' high x 25' long x 30' wide, retaining gravel 4' high x 20' long x 30' wide causing flow to go subsurface. Habitat Unit #083 is dry.

4384'LDA 5' high 4' long x 30' wide causing gravel tension and subsurface flow in proceeding unit. Possible low flow barrier.

4760'LDA 6' high x 30' wide x 15' long creating possible passage

barrier.

4791'Dry tributary entering from right bank.

5107'Right bank erosion 20' long x 30' high contributing fines and gravel.

5447'LDA 5' high x 30' wide x 15' long retaining gravel 2' high x 15' wide x 20' long. Possible fish barrier.

5472'Right and left bank erosion 15' high x 100' long. Entrenched channel.

5690'Biological Sample Site # 2, habitat units 112-113.

5783'LDA 4' high x 30' long x 8' wide. Not a barrier.

5843'Road crossing creek with 6' diameter culvert. Plunge created from culvert 4'. Possible barrier.

5892'Channel type change from a B1-1 to a C3.

6201'Biological Sample Site # 3, habitat units 122-124.

6585'Dry tributary on left bank.

7399' LDA 6' high x 20' wide x 20' long. Not a barrier.

7439'Right bank erosion 15' high x 40' long, contributing gravel and fines.

7498'LDA 5' high x 20' wide x 6' long. Not a barrier.

7506'Six foot high plunge without adequate jump pool. Possible barrier.

7530'Dramatic decrease in flow, estimated to be 0.1 cfs. 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

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Dammed Pool	[DPL]	6.5