STREAM INVENTORY REPORT

EAST BRANCH WEST FORK SPROUL CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1992 on East Branch West Fork Sproul 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 East Branch West Fork Sproul 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.

An adult carcass survey was conducted in East Branch West Fork Sproul Creek on December 26, 1990. During that survey no fish were observed. 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

East Branch West Fork Sproul Creek is a tributary to the West Fork Sproul Creek, tributary to Sproul Creek, tributary to the South Fork Eel, located in Humboldt County, California. East Branch West Fork Sproul Creek's legal description at the confluence with West Fork Sproul Creek is T5S R2E S8. Its location is 40°02'59" N. latitude and 123°53'01" W. longitude. East Branch West Fork Sproul Creek is a first order stream and has approximately 1.0 mile of blue line stream, according to the USGS Briceland 7.5 minute quadrangle. East Branch West Fork Sproul Creek drains a watershed of approximately 1.6 square miles. Grass, oak and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via State Highway 101 to Garberville via the Sprowel Creek Road.

METHODS

The habitat inventory conducted in East Branch West Fork Sproul 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). East Branch West Fork Sproul Creek personnel were trained in May, 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 East Branch West Fork Sproul Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the West Fork Sproul Creek 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 East Branch West Fork Sproul Creek to document the fish species composition and distribution. Three sites were electrofished in East Branch West Fork Sproul 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 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. Graphics developed for East Branch West Fork Sproul Creek include:

- Riffle, flatwater, pool habitats by percent occurrence
- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence

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- 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 October 23, 26, and 27, 1992, was conducted by John Crittenden, Chris Coyle and Russ Irvin (CCC and contract seasonal). The total length of the stream surveyed was 7,013 feet.

Flows were not measured on East Branch West Fork Sproul Creek.

East Branch West Fork Sproul Creek is an B3 channel type for the entire 7,013 feet of stream reach surveyed. B3 channels have a moderate gradient (1.5-4.0%), are very well confined streams, with unstable rejuvenating stream banks.

Water temperatures ranged from 51 to 56 degrees fahrenheit. Air temperatures ranged from 59 to 70 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 33.5%, flatwater types 31.2%, and pools 28.2% (Graph 1). Flatwater habitat types made up 43.8% of the total survey **length**, riffles 32.5%, and pools 17.4% (Graph 2).

Ten 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, 33.5%; step runs, 18.2%; and mid-channel pools, 15.9% (Graph 3). By percent total **length**, step runs made up 36.4%, low gradient riffles 32.5%, and mid-channel pools 10.9%.

Forty-eight pools were identified (Table 3). Main-channel pools were most often encountered at 56.3%, and comprised 62.8% of the total length of pools (Graph 4).

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Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Thirteen of the 48 pools (27%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 48 pool tail-outs measured, five had a value of 1 (10.4%); 22 had a value of 2 (45.8%); 18 had a value of 3 (37.5%); and 3 had a value of 4 (6.3%). 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 38.5. Riffle habitats followed with a rating of 21.1. (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 41.7, and main-channel pools rated 36.1 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large and small woody debris are the dominant cover type in East Branch West Fork Sproul Creek. Graph 7 describes the pool cover in East Branch West Fork Sproul Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 40 of the 57 low gradient riffles (70.2%). Small cobble was the next most frequently observed dominant substrate type, and occurred in 26.3% of the low gradient riffles (Graph 8).

Fifteen percent of the survey reach lacked shade canopy. Of the 85% of the stream covered with canopy, 71% was composed of deciduous trees, and 29% was composed of coniferous trees. Graph 9 describes the canopy in East Branch West Fork Sproul 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 77.0%. The mean percent left bank vegetated was 74.4%. The dominant elements composing the structure of the stream banks consisted of 2.1% bedrock, 0.6% cobble/gravel, 10.6% bare soil, 15.3% grass, 50% brush. Additionally, 9.7% of the banks were covered with deciduous trees, and 11.8% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished on Oct. 28, 1992 in East Branch West Fork Sproul Creek. The units were sampled by Chris Coyle and John Crittenden (CCC). All measurements are fork lengths unless noted otherwise.

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The first site sampled was habitat unit #17, a plunge pool, approximately 837 feet from the confluence with the West Fork Sproul Creek. This site had an area of 176 sq ft, and a volume of 110 cu ft. The unit yielded 2 steelhead, ranging from 48 to 64 mm. Sixteen coho salmon, ranging from 48 to 76mm, and two Pacific lamprey ranging in length from 96 to 155mm.

The second site, was habitat unit 118, a run, located approximately 5,156 feet above the creek mouth. This site had an area of 110 sq ft, and a volume of 55 cu ft. Four steelhead were sampled ranging from 52 to 75mm. Additionally, one Pacific lamprey 145mm in length was observed.

The third site sampled was located directly upstream from habitat unit 170, the last habitat unit of the survey. No fish were found.

DISCUSSION

The B3 channel type is generally not suitable for fish habitat improvement structures. B3 channels are found in moderate gradient stream reaches. They have channels dominated by cobble/ gravel, do not retain gravel very well, and have unstable stream banks. Usually within the B3 channel there are zones of stable stream banks where instream structures can be designed. This seems to be the case in East Branch West Fork Sproul Creek, but any structure sites must be selected with care.

The water temperatures recorded on the survey days October 23, 26, and 27, 1992, ranged from 51° to 56° F. Air temperatures ranged from 59° 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.

Flatwater habitat types comprised 43.8% of the total **length** of this survey, riffles 32.5%, and pools 17.4%. The pools are relatively shallow with only 13 of the 48 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. 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 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-one of the 48 pool tail-outs measured had embeddedness ratings of 3 or 4. Only five had a 1 rating. Cobble embeddedness of less than 25%, a rating of 1, is considered best for the needs of salmon and steelhead. In East Branch West Fork Sproul Creek, sediment sources should be mapped

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and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for pools was low with a rating of 38.5. The shelter rating in the flatwater habitats was lower at 17.7. However, a pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders 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.

Fifty-five of the 57 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 85%. This is a 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) East Branch West Fork Sproul 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) There are several log debris accumulations present on East Branch West Fork Sproul 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.

4) Increase woody cover in the pools and flatwater habitat units. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

5) 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.

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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 West Fork Sproul Creek.

837' Biological inventory site #1.

1100' Large woody debris accumulation (LDA) 5' high by 20' wide by 10' long causing gravel retention 3' high by 70' long. Probable barrier to fish during low flows.

1611' No fish observed since the LDA 1100' from the confluence.

1722' Exposed right bank 70' long by 20' high contributing fines and gravel.

1834' 3' plunge over gravel retention bar.

1965' Left bank slide 50' long by 60' high contributing fines and gravel.

2268' Cut left bank 6' high by 50' long contributing fines.

2406' Undercut right bank 5' high by 50' long contributing fines.

2535' LDA 4' high by 15' wide by 8' long.

2914' Left bank erosion 10' high by 45' long contributing fines.

3477' LDA 4' high by 30' wide by 6' long retaining sand 4' x 30' at the base. Probable barrier.

3817' Left bank erosion 7' high by 40' long contributing fines.

3834' LDA 4' high by 30' wide by 5' long.

4089' Right bank slide 50' high by 20' long, retaining gravel.

4153' Left bank cut 5' high by 20' long contributing fines.

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4251' Undercut left bank 8' high by 40' long contributing fines.

4295' LDA 4' high by 25' wide by 15' long retaining sand 3' high by 10' wide at base. Possible barrier.

4402' Right bank erosion 10' high by 80' long contributing fines.

5019' Right bank cut 7' high by 20' long contributing fines. Left bank cut 6' high by 80' long contributing fines.

5044' Right bank cut 7' high by 15' long contributing fines.

5093' LDA 5' high by 35' wide by 20' long, retaining gravel 3' high by 15' wide at the base.

5134' Both banks cut 4' high.

5156' Biological inventory 10/28/92.

5336' Left bank cut 4' high by 40' long, contributing cobble and fines to creek.

5488' Left bank cut 6' high by 20' long contributing fines and gravel into creek.

5514' LDA 3' high by 15' wide by 10' long.

5737' Left cut bank 4' high by 3' long contributing fines.

5779' Right bank cut 6' high by 65' long contributing fines.

5930' Collapsed left bank 6' high by 30' long contributing fines. From units 141-144 deeply incised clay and sand channel banks cut 6' high contributing fines.

6051' LDA 4' high x 15' wide x 5' long. Second LDA in unit 3' high x 10' wide x 15' long retaining gravel 2' x 15' at base. Possible barrier.

6096' LDA 6' high by 25' wide by 10' long retaining gravel 6' high by 20' wide at base. Possible barrier.

6392' Right bank cut 5' high x 30' long contributing fines.

6414' Right bank cut 12' high by 25' long retaining gravel and fines. LDA 5' high by 12' wide by 7' long

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retaining sand 5' x 15' at base. Possible barrier.

6530' Left bank cut 3' high by 20' long contributing fines.

6588' Collapsed left bank 4' high by 30' long.

6634' Tributary enters from right bank. Embedded log 5' high by 15' long retaining sand 5' high by 10' wide at base. Possible barrier.

7013' End of survey. From this point on stream is intermittent.

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	
Dammed Pool		[DPL]		6.5