STREAM INVENTORY REPORT

SCOTT CREEK

INTRODUCTION

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

Scott Creek is tributary to Larabee Creek, tributary to the Eel River, located in Humboldt County, California (Figure 1). Scott Creek's legal description at the confluence with Larabee Creek is T1S R3E S06. Its location is 40°24'22" N. latitude and 123°52'20" W. longitude. Scott Creek is a second order stream and has approximately 3.5 miles of blue line stream, according to the USGS Bridgeville 7.5 minute quadrangle. Scott Creek drains a watershed of approximately 1.7 square miles. Elevations range from about 260 feet at the mouth of the creek to 2,600 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 U.S. Highway 101 at Redcrest, via Avenue of the Giants (northbound). From here, Holmes Road accesses the mouth of Scott Creek, approximately five miles east of the Avenue of the Giants.

METHODS

The habitat inventory conducted in Scott 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). Scott 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 Scott 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". Scott 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 Scott 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 Scott 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 Scott 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 Scott 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 Scott Creek to document the fish species composition and distribution. Three sites were electrofished in Scott 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 Scott 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 June 24, 1992, was conducted by Chris Coyle and Brian Humphrey (CCC). The total length of the stream surveyed was 1,320 feet, with an additional 105 feet of side channel.

Flow was not measured on Scott Creek.

Scott Creek is an A2 channel type for the entire 1,320 feet of stream reach surveyed. A2 channels are steep (4-10% gradient), well confined streams, with stable stream banks.

Water temperatures ranged from 57 to 58 degrees fahrenheit. Air temperatures ranged from 64 to 72 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 50.0%, pools 30.0%, and flatwater 20.0% (Graph 1). Riffle habitats made up 49.1% of the total survey **length**, pools 34.5%, and flatwater 16.4% (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 cascades, 23.3%; step pools, 18.3%; and high gradient riffles, also 18.3% (Graph 3). By percent total **length**, step pools made up 27.6%, high gradient riffles 23.3%, and cascades 21.3% (Table 2).

Eighteen pools were identified (Table 3). Main channel pools were most often encountered at 72.2%, and comprised 84.8% 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. Ten of the 18 pools (56%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 7 pool tail-outs measured, zero had a value of 1; 2 had a value of 2 (28.6%); 4 had a value of 3 (57.1%); and 1 had a value of 4 (14.3%). 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. Riffle habitat types had the highest shelter rating at 110.7. Pool habitats followed with a rating of 71.7 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 83.9, and scour pools rated 40.0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Scott Creek and are extensive. Large and small woody debris are lacking in nearly all habitat types (Graph 7).

Table 6 summarizes the dominant substrate by habitat type. There were only four low gradient riffles observed in the survey reach. Gravel was the dominant substrate observed in three of these four low gradient riffles (75%). Graph 8 describes the dominant sustrates in Scott Creek.

Nine percent of the survey reach lacked shade canopy. Of the 91% of the stream covered with canopy, 78% was composed of deciduous trees, and 22% was composed of coniferous trees (Graph 9).

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 66.7%. The mean percent left bank vegetated was 60.8%. The dominant elements composing the structure of the stream banks consisted of 2.5% bedrock, 30.0% boulder, 3.3% cobble/gravel, 5.0% bare soil, 3.3% grass, 48.3% brush. Additionally, 5.0% of the banks were covered with deciduous trees, and 2.5% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three electrofishing sites were sampled on Scott Creek. The objective was to identify fish species and distribution. The units were sampled on July 1, 1992, by Erick Elliot and Brian Humphrey (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 was habitat unit 002, a log enhanced lateral scour pool, approximately 13 feet from the confluence with Larabee Creek. This site had an area of 172.8 sq ft, and a volume of 172.8 cu ft. The unit yielded 12 steelhead, ranging from 37 to 58 mm FL, and 11 Pacific lamprey ammocetes, ranging from 115 to 140 mm total length.

The second site was habitat unit 046, a mid-channel pool, located approximately 1,025 feet above the creek mouth. This site had an area of 135 sq ft, and a volume of 135 cu

ft. One steelhead was sampled, 67 mm FL.

The third site sampled was a step run, located approximately 40 feet above the logging road, and 1/2 mile upstream from the end of the habitat inventory. No fish were found.

DISCUSSION

The A2 channel type is generally not suitable for fish habitat improvement structures. A2 channels are found in high energy, steep gradient stream reaches. They have channels dominated by boulders, do not retain gravels very well, but do have stable stream banks. Usually within the A2 channel, there are zones of lower gradient where structures designed to trap gravels can be constructed. This seems to be the case in Scott 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 day June 24, 1992 ranged from 57° F to 58° F. Air temperatures ranged from 64° F to 72° 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 habitat types comprised 49.1% of the total **length** of this survey, pools 34.5%, and flatwater 16.4%. The pools are relatively shallow with only 8 of the 18 pools having a maximum depth of two feet or greater. However, 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 deepen pool habitat is recommended for locations where their installation will not be threatened by the high stream energy of the A2 channel type.

Five of the 7 pool tail-outs measured had embeddedness ratings of 3 or 4. None had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In Scott 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 relatively high with a rating of 71.7. The shelter rating in the flatwater habitats was even higher at 110.7. 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, white water contributes a small amount.

There were only four low gradient riffles in the survey reach. This is generally considered poor for spawning salmonids.

The mean percent canopy for the stream was 91%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

RECOMMENDATIONS

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

2) 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.

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.

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 an A2 for the entire survey reach.

101' Channel gradient is approximately 45%.

164' Bridge crossing 18' wide x 15' long x 6.5' high.

201' Channel gradient is approximately 35%.

214' Plunge 6' high.

234' Channel gradient is approximately 65%.

316' Plunge 9' high.

326' Left bank erosion 20' high x 50' long, contributing boulders and gravel into the channel; gradient is approximately 55%.

357' Right bank erosion 40' high x 50' long, contributing gravel and fines into the channel.

442' Left bank erosion 15' high x 50' long, contributing gravel and fines into the channel.

450' Right bank erosion 25' high x 40' long, contributing fines into the channel.

646' Channel gradient is approximately 33%.

726' Right bank erosion 40' high x 40' long, contributing gravel and large woody debris into the channel.

781' Channel gradient steepens to 87%; probable barrier.

950' Channel gradient is approximately 25%. Large woody debris to 3' diameter, retaining gravel in several places. Probable barrier.

1050' Right bank erosion 15' high x 15' long, contributing fines into the channel.

1062' Young-of-the-year steelhead (YOY) observed.

1174' Right bank erosion 60' high x 75' long, contributing gravel and fines into the channel. 1+ steelhead observed in side channel.

1320' End of survey.