STREAM INVENTORY REPORT

JONES CREEK

INTRODUCTION

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

Jones Creek is tributary to Indian Creek, tributary to the South Fork Eel River, tributary to the Eel River, located in Mendocino and Humboldt Counties, California. Jones Creek's legal description at the confluence with Indian Creek is T5S R3E S27. Its location is 39°59'12" N. latitude and 123°49'44" W. longitude. Jones Creek is a first order stream and has approximately 1.3 miles of blue line stream. The USGS Piercy and Garberville 7.5 minute quadrangles show Jones Creek as being intermittent for its entire length. Jones Creek drains a watershed of approximately 2.2 square miles. Elevations range from about 550 feet at the mouth of the creek to 1,600 feet in the headwater areas. Redwood, Douglas fir forest, and grassland dominate the watershed. The watershed is privately owned and is managed for timber production and rangeland. Vehicle access exists from U.S. Highway 101 at Piercy, via State Highway 271. Follow Highway 271 north approximately 0.7 miles, and turn left on a private road controlled by Georgia Pacific Corporation. The road crosses the South Fork Eel River and follows along Indian Creek approximately four miles to the mouth of Jones Creek.

METHODS

The habitat inventory conducted in Jones Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California

Conservation Corps (CCC) Technical Advisor and contract seasonal that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Jones Creek personnel were trained in May, 1993, 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 Jones Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the Indian Creek report.

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". Jones 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 Jones 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 Jones 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 Jones 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 Jones 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.

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. Graphics developed for Jones 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 21 and 22, 1993, was conducted by Erick Elliot and Brian Michaels (CCC and contract seasonal). The total length of the stream surveyed was 3,930 feet.

Flows were not measured on Jones Creek.

Jones Creek is a B1 channel type for the entire 3,930 feet of stream reach surveyed. B1 channels are moderate gradient (2-4%), moderately confined streams, with stable stream banks and boulder/cobble substrate.

Water temperatures ranged from 55 to 64 degrees fahrenheit. Air temperatures ranged from 66 to 78 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 43.7%, flatwater types 30.0%, and pools 26.3% (Graph 1). Flatwater habitat types made up 52.7% of the total survey **length**, flatwater 32.4%, and pools 14.9% (Graph 2).

Eleven 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, 43.7%; runs, 15.0%; and step runs, 12.5% (Graph 3). By percent total **length**, low gradient riffles made up 52.7%, step runs 18.5%, and runs 11.8%.

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Twenty-one pools were identified (Table 3). Scour pools were most often encountered at 61.9%, and comprised 64.6% 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. Fifteen of the 21 pools (71%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 21 pool tail-outs measured, 4 had a value of 1 (19.0%); 9 had a value of 2 (42.9%); 7 had a value of 3 (33.3%); and one had a value of 4 (4.8%). 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 60.2. Flatwater habitats followed with a rating of 30.6 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 82.5, scour pools had a rating of 67.7, and main channel pools rated 36.7 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Boulder was the dominant substrate observed in 17 of the 35 low gradient riffles (48.6%). Large cobble was the next most frequently observed dominant substrate type, and occurred in 31.4% of the low gradient riffles (Graph 8).

Thirty-six percent of the survey reach lacked shade canopy. Of the 64% of the stream covered with canopy, 39% was composed of deciduous trees, and 61% was composed of coniferous trees. Graph 9 describes the canopy in Jones 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 60.7%. The mean percent left bank vegetated was 61.2%. The dominant elements composing the structure of the stream banks consisted of 5.0% bedrock, 0.6% boulder, 1.9% cobble/gravel, 3.7% bare soil, 26.9% grass, 6.3% brush. Additionally, 13.1% of the banks were covered with deciduous trees, and 42.5% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

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BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on October 12, 1993 in Jones Creek. The units were sampled by Chris Coyle and Brian Micheals (CCC and seasonal contracts). All measurements are fork lengths (FL) unless noted otherwise.

The first site sampled was habitat unit 010, a mid-channel pool, approximately 519 feet from the confluence with Indian Creek. This site had an area of 320 sq ft, and a volume of 352 cu ft. The unit yielded 7 steelhead, ranging from 71 to 92mm FL, and one coho salmon, measured at 78mm FL.

The second site was habitat unit 0980, a root enhanced lateral scour pool, located approximately 25 feet below the end of survey. This site had an area of 384 sq ft, and a volume of 307 cu ft. Twenty-six steelhead were sampled. They ranged from 60 to 149 mm FL.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Jones Creek.

DISCUSSION

The B1 channel type is generally quite suitable for fish habitat improvement structures. B1 channels are found in moderately entrenched, moderate gradient stream reaches. They have channels dominated by bedrock, and have stable stream banks. Usually within the B1 channel there are areas where structures designed for fish shelter can be constructed. This seems to be the case in Jones 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 days June 21-22, 1993 ranged from 55° F to 64° F. Air temperatures ranged from 66° F to 78° F. This is a fair water temperature regime for salmonids. However, 64° 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 32.4% of the total **length** of

this survey, riffles 52.7%, and pools 14.9%. The pools are relatively deep with 15 of the 21 pools having a maximum depth greater than 2 feet. However, in coastal coho and steelhead streams where primary pools comprise less than approximately 40% of total habitat, pool improvement projects are usually recommended. 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. In Jones Creek pool improvement projects are recommended where their installation will not be threatened by high stream energy, or cause streambank erosion.

Eight of the 21 pool tail-outs measured had embeddedness ratings of 3 or 4. Four 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 Jones 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 60.2. The shelter rating in the flatwater habitats was lower at 30.6. 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 woody debris and root wads contribute a small amount. Additional log and root wad cover structures in the 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.

Twenty-eight of the 35 low gradient riffles had boulder or large cobble as the dominant substrate. This is generally considered poor for spawning salmonids.

The mean percent canopy for the stream was 64%. 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)Jones Creek should be managed as an anadromous, natural production stream.

2)Temperatures in this section of Jones Creek, as well as

upstream, should be monitored to determine if they are having a deleterious effect upon juvenile salmonids. To achieve this, biological sampling is also required.

3) 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.

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

5)Spawning gravels on Jones Creek are limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravels in order to expand redd site distribution in the stream.

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 Indian Creek. Mouth is approximately 16' wide and accessible to anadromous salmonids. Jones Creek is a B1 channel type for the entire 3930' of stream surveyed.

598' Young-of-the-year (YOY) coho salmon and steelhead observed.

1908' Tributary enters from the left bank (LB). Tributary is high gradient (>10 percent), and supplies approximately 1/6 of Jones Creek flow.

1981' More than 15 steelhead YOY and 1+ observed.

2283' Property line; end of Georgia Pacific property.

3465' Small tributary enters from LB, with no apparent rearing habitat.

3565' Six steelhead YOY observed.

3743' Right bank (RB) erosion 15' high x 75' long; not contributing fines into the channel.

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3930'End survey due to access denial by landowner.

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