STREAM INVENTORY REPORT

CUNEO CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1991 on Cuneo 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 Cuneo 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 Cuneo Creek. The objective of this report is to document the current habitat conditions, and recommend options for the enhancement of habitat for chinook salmon, coho salmon and steelhead trout.

WATERSHED OVERVIEW

Cuneo Creek is tributary to Bull Creek, tributary to the South Fork Eel River, tributary to the Eel River, located in Humboldt County, California (Figure 1). Cuneo Creek's legal description at the confluence with Bull Creek is T01S R01E S35. Its location is 40°20'02" latitude and 124°01'29" longitude. Cuneo Creek is a third order stream. The total length of blue line stream, according to the USGS Bull Creek quadrangle is 2.5 miles.

Cuneo Creek drains a watershed of approximately 4.4 square miles. Elevations range from about 400 feet at the mouth of the creek to 2,400 feet in the headwater areas. Douglas fir and hardwood forest dominates the watershed. The watershed is owned by the State of California, and is managed by Humboldt Redwoods State Parks. Vehicle access exists from Highway 101 at Dyerville, via the Bull Creek-Mattole Road. This road crosses the channel near its mouth, approximately 7 miles from Highway 101. Prior to State ownership, c. 1965, the watershed was extensively logged, and is now young forest.

METHODS

The habitat inventory conducted in Cuneo Creek follows the methodology as presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds). The inventory was conducted by two person teams. The California Conservation Corps (CCC), Technical Advisors conducting the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Cuneo Creek personnel were trained in May and June, 1991, by Gary Flosi and Scott Downie.

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 Cuneo Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured at the beginning of the stream survey reach using standard flow measuring equipment. The flow is recorded in cubic feet per second of discharge.

2. Channel Type:

Channel typing was 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 operations 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 each tenth unit typed. The time of the measurement is also recorded. 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 used 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". Cuneo 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 measurements were accomplished 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 Cuneo 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 Cuneo 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 Cuneo Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The percentages of the total canopy area was then further analyzed and recorded according to whether it was composed of either coniferous or deciduous trees.

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 Cuneo 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 Cuneo Creek to document the salmonid species composition and distribution. Three sites were electrofished using one Smith Root Model 12 electrofisher. 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 Cuneo Creek include:

- Riffle, flatwater, pool habitats by percent occurrence

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- 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 July 11, 12 and 18, 1991, was conducted by Jerry Suissa, Chris Coyle and Jay Miller (CCC). The total length of the stream surveyed was 7,440 feet, with an additional 81 feet of side channel.

Cuneo Creek is a C2 channel type for the first 4,590 feet from the confluence with Bull Creek, then it changes to a B3 for the next 1,108 feet, then to A3 for the remaining 1,742 feet of the stream reach surveyed. C2 channels are low gradient (< 1%), moderately confined streams, with stable stream banks. B3 channels are well confined, with a moderate gradient (1.5 - 4.0%), and cobble/gravel stream beds. A3 channels are steep, high gradient (4.0 - 10.0%) and very well confined.

Water temperatures ranged from 57 to 68 degrees fahrenheit. Air temperatures ranged from 72 to 88 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles make up 43.4%, flatwater types make up 36.0%, and pools make up 20.6% (Graph 1). Riffles make up 62.5% of the total **length**, flatwater habitats make up 30.6%, and pools make up 6.9% (Graph 2).

Twelve 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, 32.4%, step runs, 18.4%, and runs, 16.9% (Graph 3). By percent total **length**, low gradient riffles made up 56.0%, step runs made up 22.3%, and runs made up 7.5%.

Table 3 summarizes the pool habitat types. Of these pools, 60.7% were main channel pools. These main channel pool types comprised 75.3% of the total length for all pools (Graph 4).

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Table 4 (Graph 5) is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. The maximum depth for all 28 pools was less than three feet.

The depth of cobble embeddedness was estimated at the pool tail-outs. Of the 24 pool tail-outs, zero had a value of 1; 18 (75.0%) had a value of 2; 5 (20.8%) had a value of 3; and 1 (4.2%) had a value of 4. Graph 6 describes embeddedness.

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 types had the highest mean shelter rating at 38.21 (Table 1). For the pool types, the scour pools had the highest mean shelter rating at 51.7, main channel pools had a mean shelter rating of 33.5, and backwater pools had a rating of 17.5 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Cuneo Creek and are extensive. White water is the next most common cover type. Graph 7 describes the pool cover in Cuneo Creek.

Table 6 (Graph 8) describes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 63.6% of the low gradient riffles. Small cobble was the next most frequently observed dominant substrate type, and occurred in 25.0% of the 44 low gradient riffles.

Nearly 67% of Cuneo Creek lacked shade canopy. Of the 33% of the stream that was covered with canopy, 96% was composed of deciduous trees, and 4% was composed of coniferous trees. Graph 9 describes the canopy in Cuneo Creek.

Table 2 summarizes the mean percent of the right and left stream banks covered with vegetation by habitat unit type. For the stream reach surveyed, the mean percent right bank vegetated was 64.3%. The mean percent left bank vegetated was 58.2%. The dominant elements composing the structure of the stream banks consisted of 0.0% bedrock, 2.9% boulder, 28.7% cobble/gravel, 5.9% bare soil, 2.2% grass and 4.4% brush. Additionally, 55.9% of the banks were composed of deciduous trees, and 0.0% of coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

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Three electrofishing sites were sampled on Cuneo Creek, on July 25, 26 and 30, 1991 by Craig Mesman, Steve Liebhart, Chris Coyle and Tony Sartori (CCC).

The first unit sampled was habitat unit 052, a run, approximately 4,450' upstream of the confluence with Bull Creek. This site had an area of 256.0 sq ft and a volume of 153.6 cu ft. Twenty-four steelhead were sampled. They ranged from 27 to 65mm fork length.

The second unit was habitat unit 080, a plunge pool, approximately 5,056' from the confluence with Bull Creek. This site had an area of 168.0 sq ft and a volume of 134.4 cu ft. Twenty-four steelhead were sampled. They ranged from 30 to 65mm fork length.

The third unit was habitat unit 112, a mid-channel pool, approximately 6,329' from the confluence with Bull Creek. The site had an area of 112 sq ft and a volume of 112 cu ft. Eight steelhead were sampled. They ranged from 40 to 105mm fork length.

DISCUSSION

Cuneo Creek has three channel types: A3, B3, and C2. The high energy and unstable stream banks of the A3 channel type is generally not suitable for instream enhancement structures. The B3 channel type is marginally suitable for fish habitat improvement structures. B3 channels are found in medium energy, moderate gradient stream reaches and have channels dominated by cobble/gravel. However, they have unstable stream banks that can be jeopardized with the construction of instream structures. Therefore, any work in this reach will require careful design, placement, and construction that must include protection for the unstable banks.

The lower 4,590 feet of Cuneo Creek is a C2 channel type. C2 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 ranged from 57° F to 68° F. Air temperatures ranged from 72° F to 88° F.

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This is a good water temperature regime for salmonids. However, 68° F, if sustained, is near the threshold stress level for salmonids. To make any further conclusions, temperatures need to be monitored for a longer period of time through the critical summer months, and more extensive biological sampling conducted.

Riffles comprised 62.5% of the total **length** of this survey, flatwater habitats 30.6%, and pools 6.7%. The pools are shallow with all 28 pools having a maximum depth of less than three feet. 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 increase or deepen pool habitat is recommended for locations where their installation will not subject the structures to high stream energy.

Six of the 24 pool tail-outs measured had embeddedness ratings of 3 or 4. Zero had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In Cuneo 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 38.2. The shelter rating in the flatwater habitats was lower at 18.1. 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, white water contributes 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.

Thirty-nine of the 44 low gradient riffles had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy for the survey reach was only 33%. This is a very low percentage of canopy, since 80 percent is generally considered desirable. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

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

2)Increase the canopy on Cuneo Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this inventory section must be treated as well, since the water being delivered here is being warmed above. In many cases, planting will need to coordinated to follow bank stabilization or upslope erosion control projects.

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.

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.

6)Where feasible, increase woody cover in the pool and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations. In some areas the material is at hand.

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 Bull Creek. Reach #1 is a C2 channel type.

402'Old Bull Creek roadbed.

575'Bull Creek Road bridge 95' long x 35' wide.

597'Off-road vehicle crossing.

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2583'Right bank erosion 8-15' high x 500' long, contributing fines, cobble and gravel into the channel.

3402'Left bank erosion 15' high x 350' long.

4066'Right bank erosion 12' high x 100' long, contributing gravel into the channel.

4225'Left bank erosion 10' high x 20' long, contributing gravel into the channel.

4250'Large woody debris accumulation (LDA) 12' wide x 20' long.

4590'Creek forks. Channel changes from a C2 to a B3 channel type (reach #2).

4678'Right bank exposed terrace 5' high x 25' long, contributing gravel into the channel.

4932'Right bank terrace erosion 5' high x 20' long, contributing gravel into the channel.

5089'Trail crossing.

5413'Left bank exposed terrace 5' high x 10' long, contributing gravel into the channel.

5497'Left bank terrace partially vegetated 20' high x 10' wide.

5688'3' diameter culvert in channel.

5698'Channel changes to an A3 channel type (reach #3).

5926'Large boulder in channel causes stream to fork, small channel to south.

6087'3' step.

6110'Young-of-the-year (YOY) observed.

6555'Small pool under 2' step plunge 2' wide x 3' long x 2' deep.

6622'Plunge pool accumulating sand and gravel.

6686'Unstable right bank contributing silt. YOY observed.

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7217'Fallen trees help hold right and left banks together.

7440'Large fallen log on left bank. End of survey.