STREAM INVENTORY REPORT

Albee Creek

INTRODUCTION

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

WATERSHED OVERVIEW

Albee Creek is a tributary to Bull Creek, a tributary to the South Fork Eel River, a tributary to the Eel River, which drains to the Pacific Ocean. It is located in Humboldt County, California (Figure 1). Albee Creek's legal description at the confluence with Bull Creek is T01S R01E S30. Its location is 40.3522 degrees north latitude and 124.0056 degrees west longitude. Albee Creek is a first order stream and has approximately 2.8 miles of blue line stream, according to the USGS Bull Creek 7.5 minute quadrangles. Albee Creek drains a watershed of approximately 1.3 square miles. Elevations range from about 280 feet at the mouth of the creek to 2,000 feet in the headwater areas. Redwood 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. From it, Albee Campground Road provides access to both the upper and lower reaches of the watershed. All access roads have locked gates controlled by the park. Access for hikers and equestrians is allowed via the access roads. Prior to State ownership, c. 1965, the watershed was extensively logged, and is now young forest.

METHODS

The habitat inventory conducted in Albee 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). Albee Creek personnel were trained in May and June, 1991, by Gary Flosi and Scott Downie. This inventory was conducted by a two person team.

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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 Albee 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 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". Albee 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 Albee 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 Albee 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 Albee 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 Albee 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 Albee Creek to document the fish species composition and distribution. Three sites were electrofished in Albee 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 Habtype, a dBASE 3+ data entry program developed by the Department and Fish and Game. From Habtype, the data are summarized by Habtabs, a dBASE 4.1 program in development by DFG.

The Habtabs 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 Albee 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
- Fish species by length

HABITAT INVENTORY RESULTS:

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of August 14 and 15, 1991 was conducted by Erick Elliot and Chris Coyle (CCC). The total length of the stream surveyed was 2,926 feet, with an additional 36 feet of side channel.

Flow was not measured on Albee Creek.

Albee Creek is a B3 channel type for the first 988 feet of stream reach surveyed (Reach 1), and an A3 channel type for the remaining 1,938 feet of the survey (Reach 2). B3 channels are moderate (1.5 - 4% gradient), well confined streams with unstable stream banks. A3 channels

are steep (4 - 10% gradient), very well confined streams, with unstable stream banks.

Water temperatures ranged from 58 to 62 degrees Fahrenheit. Air temperatures ranged from 64 to 89 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent occurrence, riffles made up 41%; pools 34%; and flatwater 24% (Graph 1). Riffle habitat types made up 59% of the total survey length, flatwater 27%, and pools 14% (Graph 2).

Eight 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, 23%; mid-channel pools, 19%; and both step runs and high gradient riffles, each at 17% (Graph 3). By percent total length, low gradient riffles made up 34%, high gradient riffles 24%, step runs 23%, and mid-channel pools 7% (Table 2).

Twenty-four pools were identified (Table 3). Main channel pools were most often encountered at 75%, and comprised 85% 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. Twenty-three of the 24 pools (96%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, one had a value of 1 (6%); 16 had a value of 2 (56%); six had a value of 3 (33%); and one had a value of 4 (6%). 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 54. Flatwater habitats followed with a rating of 27 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 79. Main channel pools had a shelter rating of 46 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in eight of the 16 low gradient riffles (50%). Boulders were the next most frequently observed dominant substrate type, and occurred in 38% of the low gradient riffles (Graph 8).

Approximately 22% of the survey reach lacked shade canopy. Of the 78% of the stream covered with canopy, 65% was composed of deciduous trees, and 35% was composed of coniferous trees. Graph 9 describes the canopy in Albee 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 58%. The mean percent left bank vegetated was 59%. The dominant elements composing the structure of the stream banks consisted of 20% bare soil, 14% grass, 9% brush, 4% boulders,

3% cobble/gravel, and 1% bedrock,. Additionally, 20% of the banks were covered with deciduous trees, and 29% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three electrofishing sites were sampled on Albee Creek. The objective was to identify fish species and distribution. The units were sampled on October 18, 1991 by Erick Elliott, 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 unit sampled was Habitat Unit #006, a mid-channel pool, approximately 223 feet from the confluence with Bull Creek. This site had an area of 154 square feet, and a volume of 92 cubic feet. The unit yielded 20 steelhead/rainbow trout, ranging from 40 to 78mm fork length.

The second sample unit was Habitat Units #032 and #033, a plunge pool and high gradient riffle, located approximately 2,168 feet above the creek mouth at a suspected fish barrier. This site had a combined area of 342 square feet, and a volume of 175 cubic feet. Fifteen steelhead/rainbow trout were sampled. They ranged from 41 to 78mm fork length.

The third unit sampled was Habitat Unit #069, a plunge pool, located approximately 2,926 feet above the creek mouth. This unit is 758 feet above the suspected fish barrier of the previous sampling site. The site had an area of 72 square feet, and a volume of 58 cubic feet. No fish were found.

DISCUSSION

Albee Creek has two channel types: A3 and B3. 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 also unsuitable for enhancement structures due to its unstable stream banks.

The water temperatures recorded on the survey days ranged from 58 to 62 degrees Fahrenheit. Air temperatures ranged from 64 to 89 degrees Fahrenheit. This is a very good water temperature regime for salmonids. However, to make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 27% of the total length of this survey, riffles 59%, and pools 14%. The pools are shallow with only one of the 24 pools having a maximum depth greater than two feet. 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. 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 be threatened by high stream energy, or where their installation will not conflict with the unstable stream banks of the A3 and B3 channel types.

Seven of the 18 pool tail-outs measured had embeddedness ratings of 3 or 4. Only one had an embeddedness rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Albee 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 54. The shelter rating in the flatwater habitats was lower at 27. 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 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

Eight of the 16 low gradient riffles had gravel as the dominant substrate. Six had boulders as the dominant substrate. This is generally considered fair for spawning salmonids.

The mean percent canopy for the stream was 79%. This is a high 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

1) Albee 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. 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) There are several log debris accumulations present on Albee Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable over time.

5) Inventory and map sources of stream bank erosion, and prioritize them according to present and potential sediment yield.

6) 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 beginning with the site 2,168' above the stream's mouth.

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.

Position (ft):	Comments:
0'	Start of survey at confluence with Bull Creek. Right bank erosion site measures 8' high x 20' wide. Reach #1 is a B3 channel type.
223'	Trail along left bank.
437'	Albee Creek bridge.
507'	Unstable left bank.
591'	Right bank erosion site measures 10' high x 15 wide and is contributing silt and gravel to the stream.
797'	Old bridge abutments on both banks.
857'	Trail crosses the channel.
988'	Channel type changes from a B3 to an A3 (reach #2).
1038'	Right bank erosion site measures 25' high x 50' wide.
1055'	Gravel retention measures 7' long x 5' wide x 5' high.
1402'	Left bank unstable and eroding. The erosion site measures 20' high x 40' wide. Gravel retention is forming an island measuring 16' long x 15' wide.
1552'	Black pipes crossing stream.
1700'	Log debris accumulation (LDA) measurse 4' high x 25' wide x 15' long and is causing left bank erosion which is contributing silt and gravel to the channel. Cobble retention at upper part of accumulation measures 3' high x 20' wide x 7' long.
1799'	LDA on right bank measures 4' high x 15' long x 10' wide.
1845'	Old hatchery on left bank.
1884'	Foot bridge crosses the channel.

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2168' LDA creating a 6' high plunge.

2349' Fallen log (7' high) in stream, root mass on left bank.

2519' LDA measures 5' high x 8' wide x 12' long and is retaining gravel.

2550' LDA measures 15' wide x 7' long. There is a 7' high plunge over the LDA

2620' Old landslide on left bank measures 65' high x 25' wide, it is re-vegetating.

2926' Fish have not been observed since suspected barrier at 2,168'. End of survey.