STREAM INVENTORY REPORT

KAPPLE CREEK

INTRODUCTION

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

Kapple Creek is tributary to the Eel River, located in Humboldt County, California. Kapple Creek's legal description at the confluence with the Eel River is T1S R3E S29. Its location is 40° 20'36" N. latitude and 123°50'53" W. longitude. Kapple Creek is a second order stream and has approximately 1.6 miles of blue line stream, according to the USGS Myers Flat 7.5 minute quadrangle. Kapple Creek drains a watershed of approximately 1.4 square miles. Elevations range from about 200 feet at the mouth of the creek to 1,700 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 Dyerville, via a private road.

METHODS

The habitat inventory conducted in Kapple 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). Kapple 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 Kapple 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". Kapple 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 Kapple 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 Kapple 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 Kapple 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 Kapple 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 Kapple Creek to document the fish species composition and distribution. Three sites were electrofished in Kapple 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 (DFG). This program also processes and summarizes the data.

The Habitat Runtime program produces the following 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 Kapple 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

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HABITAT INVENTORY RESULTS

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

The habitat inventory of June 17, 19, 22, and 23, 1992, was conducted by Judah Sanders and Jason Cleckler (contract seasonals). The total length of the stream surveyed was 3,683 feet, with an additional 80 feet of side channel.

Flows were not measured on Kapple Creek.

Kapple Creek is a B1 channel type for the first 2,405 feet of stream reach surveyed, then it changes to a B2 channel type for the next 949 feet, then it changes to an A3 channel type for the remaining 329 feet of the survey. B1 channels are moderate gradient (2.5-4.0%), moderately confined streams, with boulder/cobble channels. B2 channels have moderate gradients (1.0-2.5%), moderately confined, cobble/gravel channels. A3 channels are steep (4-10% gradient), very well confined with coarse-grained stream beds.

Water temperatures ranged from 57 to 64 degrees fahrenheit. Air temperatures ranged from 66 to 89 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 46.3%, flatwater types 32.4%, and pools 21.3% (Graph 1). Riffle habitat types made up 56.9% of the total survey **length**, flatwater 32.6%, and pools 10.5% (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, 34.6%; step runs, 16.9%; runs, 11.0%; and high gradient riffles, 10.3% (Graph 3). By percent total **length**, low gradient riffles made up 42.3%, step runs 23.1%, high gradient riffles, 12.1%, and runs 6.6%.

Twenty-nine pools were identified (Table 3). Main channel pools were most often encountered at 51.7%, and comprised 56.9% 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-five of the 29 pools (86%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 25 pool tail-outs measured, zero had a value of 1 (0.0%); 26 H3 had a value of 2 (12.0%); 10 had a value of 3 (40.0%); and 12 had a value of 4 (48.0%). 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 77.9. Flatwater habitats followed with a rating of 63.1 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 105.4, and main channel pools rated 52.3 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 27 of the 47 low gradient riffles (57.5%). Small cobble was the next most frequently observed dominant substrate type, and occurred in 17.0% of the low gradient riffles (Graph 8).

Thirty-seven percent of the survey reach lacked shade canopy. Of the 63% of the stream covered with canopy, 77% was composed of coniferous trees, and 23% was composed of deciduous trees. Graph 9 describes the canopy in Kapple 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 39.7%. The mean percent left bank vegetated was 36.5%. The dominant elements composing the structure of the stream banks consisted of 11.4% cobble/gravel, 37.6% bare soil, 4.0% grass, 43.4% brush. Additionally, 0.7% of the banks were covered with deciduous trees, and 2.9% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished on July 2, 1992 in Kapple Creek. The units were sampled by Erick Elliot and Brian Humphrey (CCC). All measurements are fork lengths unless noted otherwise.

The first site sampled was habitat unit 004, a mid-channel pool, approximately 385 feet from the confluence with the Eel River. This site had an area of 91 sq ft, and a volume of 64 cu ft. The unit yielded one steelhead, 63mm FL.

The second site was habitat unit 020, a mid-channel pool, located approximately 892 feet above the creek mouth. This site had an area of 128 sq ft, and a volume of 116 cu ft. One steelhead was sampled, 63mm FL.

The third site sampled was habitat unit 084, a log enhanced lateral scour pool, located approximately 2,320 feet above the creek mouth. The site had an area of 63 sq ft, and a volume of 76 cu ft. No fish were found.

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DISCUSSION

There are three channel types in the surveyed reach of Kapple Creek: A3, B1, and B2. The high energy and steep gradient of the A3 channel type is generally unsuitable for instream enhancement structures. Both the B1 and B2 channel types are excellent for many types of low and medium stage instream enhancement structures. Many site specific projects can be designed within these channel types, especially to increase pool frequency, volume and pool cover.

The water temperatures recorded on the survey days June 17-23, 1992 ranged from 57° F to 64° F. Air temperatures ranged from 66° F to 89° F. This is a good 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.

Riffle habitat types comprised 56.9% of the total **length** of this survey, flatwater 32.6%, and pools 10.5%. The pools are relatively shallow with only 4 of the 29 pools having a maximum depth greater than 2 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 be threatened by high stream energy.

Twenty-two of the 25 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 Kapple 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 77.9. The shelter rating in the flatwater habitats was lower at 63.1. However, a pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by boulders and large woody debris in all habitat types.

Thirty-five of the 47 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 63%. 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

Kapple Creek

1) Kapple 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) 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) There are several log debris accumulations present on Kapple 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.

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 the Eel River. Channel type is a B1 (reach #1).

529' Bridge crossing 30' wide x 40' long x 10' high.

1046' Small log jam with potential for build up in the future.

1158' Log and debris accumulation (LDA), 25' wide x 20' long x 6' high; difficult passage for anadromous salmonids.

1458' LDA, 20' wide x 15' long x 6' high.

1711' Large LDA 20' wide x 17' long x 7' high, retaining gravel 8' high; possible barrier.

1763' LDA 20' wide x 16' long x 5' high. Water cascades through large amount of woody debris.

1826' Large amount of woody debris creates difficult passage for fish. Left bank erosion 35' high x 75' long, contributing silt into the channel.

2295' Small tributary enters from the left bank.

2405' LDA retaining gravel/cobble 4' high. Channel type changes from a B1 to a B2 (reach #2).

2848' Sediment problem noted here and throughout the remainder of the survey.

3354' Channel type changes from a B2 to an A3 (reach #3).

3683' Large LDA 85' wide x 35' long x 25' high, retaining gravel/cobble 20' high; fish barrier. Above this LDA, the stream flows underground for 35'. Stream forks 150' upstream from this LDA and is poor salmonid habitat. Left bank slide is depositing sediment into the channel. End of survey.

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