STREAM INVENTORY REPORT

Eubank Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Eubank Creek. 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 Eubank Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species. There is no known record of adult spawning surveys having been conducted on Eubank 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. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Eubank Creek is tributary to the Mattole River, located in Humboldt County, California. Eubank Creek's legal description at the confluence with the Mattole River is T04S R02E S30. Its location is 40°05'09" north latitude and 123°59'55" west longitude. Eubank Creek is a second order stream and has approximately 3.3 miles of blue line stream according to the USGS Briceland 7.5 minute quadrangle. Eubank Creek drains a watershed of approximately 3.4 square miles. Summer base runoff is approximately 0.8 cubic feet per second (cfs) at the mouth, but over 20 cfs is not unusual during winter storms. Elevations range from about 720 feet at the mouth of the creek to 1,400 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is primarily used for rural residence. Vehicle access exists via the Briceland/Shelter Cove Road. Drive approximately 0.5 miles west of Thorn Junction, and take the first road north after crossing the Mattole River. Foot access to the mouth of Eubank Creek is available by request from the landowners at the end of Eubank Road.

METHODS

The habitat inventory conducted in Eubank Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The Pacific Coast Fisheries, Wildlife, and Wetlands Restoration Association (PCFWWRA) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Eubank Creek personnel were trained in

May, 1996, by Scott Downie and Ruth Goodfield. This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach (Hopelain, 1994). All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth. Habitat unit types encountered for the first time are further measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

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 Eubank 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.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). 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 five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees 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". Eubank 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. All units were measured for mean length; additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were sampled for all features on the sampling form (Hopelain, 1995). Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were 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 Eubank 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). Additionally, a rating of 5 or not suitable" (NS) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

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 fully-described 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 Eubank 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 fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two respectively.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Eubank Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or deciduous trees.

9. Bank Composition and Vegetation:

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 Eubank Creek, the dominant composition type (options 1-4) and the dominant vegetation type (options 5-9) of both the right and left banks for each fully-described unit were selected from 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. In Eubank Creek fish presence was observed from the stream banks, and one site was electrofished using one Smith-Root Model 12 electrofisher. 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 0.85 mm)(Valentine, 1995).

DATA ANALYSIS

Data from the habitat inventory form are entered into *Habitat*, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, 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 Eubank 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
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 8 through 15, 1996, was conducted by Dave Smith and Ray Bevitori (PCFWWRA). The total length of the stream surveyed was 17,556 feet with no additional feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.1 cfs on July 8, 1996.

Eubank Creek is a B1 channel type for the first 15,895 feet, and a B4 type for the remaining 1,661 feet of stream reach surveyed. B-type channels are moderately entrenched, moderate gradient (<2%), riffle dominated channels with infrequently spaced pools and very stable plan and profile. B1 channels are classified as predominantly bedrock; in B4 channels gravel is the dominant substrate.

Water temperatures taken during the survey period ranged from 57 to 68 degrees Fahrenheit. Air temperatures ranged from 61 to 85 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 42% riffle units, 30% pool units, and 28% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 37% flatwater units, 34% pool units, and 30% riffle units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low gradient riffles, 37%; mid-channel pools, 24%; and runs, 16% (Graph 3). Based on percent total **length**, low gradient riffles made up 29%, mid-channel pools 25%, and step runs 21%.

A total of 110 pools were identified (Table 3). Main channel pools were most frequently encountered at 87% and comprised 80% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Seventy-four of the 110 pools (67%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 107 pool tail-outs measured, none had a value of 1; 41 had a value of 2 (38%); 56 had a value of 3 (52%); one had a value of 4 (2%); and nine had a value of 5 (8%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

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 a mean shelter rating of 58, and flatwater habitats had a mean shelter rating of 26 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 60. Main channel pools had a mean shelter rating of 58 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in eight of the 11 low gradient riffles measured (73%). Bedrock and small cobble were the next most frequently observed dominant substrate types and each occurred in 9% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 78%. The mean percentages of deciduous and coniferous trees were 82% and 18%, respectively. Graph 9 describes the canopy in Eubank Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 77%. The mean percent left bank vegetated was 85%. The dominant elements composing the structure of the stream banks consisted of 11.2% bedrock, 2.1% cobble/gravel, and 86.7% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 20% of the units surveyed. Additionally, 68.4% of the units surveyed had deciduous trees as the dominant vegetation type, and 5.1% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on July 8, 1996, in Eubank Creek. The site was sampled by Ruth Goodfield (DFG) and Kelley Garrett (WSP\AmeriCorps).

The site sampled included habitat units 004-005, a riffle/run sequence, approximately 263 feet from the confluence with the Mattole River. This site had an area of 675 sq ft and a volume of 540 cu ft. The site yielded 11 steelhead young-of-the-year (YOY) and two steelhead 1+ years in

age.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Eubank Creek.

DISCUSSION

Eubank Creek is a B1 channel type for the first 15,895 feet of stream surveyed and a B4 for the remaining 1,661 feet. The suitability of B1 channel types for fish habitat improvement structures is excellent for bank-placed boulders and bank cover; good for log cover; and poor for low-stage weirs and boulder clusters. Suitability of B4 channel types for fish habitat improvement structures is excellent for low-stage weirs, boulder clusters and log cover structure; and good for medium-stage plunge weirs.

The water temperatures recorded on the survey days July 8 - 15, 1996, ranged from 57 to 68 degrees Fahrenheit. Air temperatures ranged from 61 to 85 degrees Fahrenheit. This is an acceptable water temperature range for salmonids. However, 68° F, if sustained, is near the threshold stress level for salmonids. This does not seem to be the case here, and Eubank Creek seems to have temperatures favorable to salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 37% of the total **length** of this survey, riffles 30%, and pools 34%. The pools are relatively deep, with 72 of the 110 (79.2%) pools having a maximum depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. 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. 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 modification of the numerous log debris accumulations (LDA's) in the stream. The LDA's in the system are retaining needed gravel. Any necessary modifications to them should be done with the intent of metering the gravel out to downstream reaches that will trap the gravel for future spawning use. Therefore, gravel retention features may need to be developed prior to any LDA modification.

Fifty-seven of the 107 pool tail-outs measured had embeddedness ratings of 3 or 4. None had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In Eubank Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures should be taken.

The mean shelter rating for pools was low with a rating of 58. The shelter rating in the flatwater habitats was slightly lower at 26. 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, bedrock ledges contribute 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.

Nine of the 11 low gradient riffles measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 78%. This is a relatively high percentage of canopy. In general, re-vegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 77% and 85%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

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

2) There are several log debris accumulations present on Eubank 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.

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 locally available.

4) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 8364', should then be treated to reduce the amount of fine sediments entering the stream.

5) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

0'	Begin survey at confluence with the Mattole River. Channel type is a B4 for the first 15,895' of stream surveyed.
195'	Stream flow measured on July 8, 1996. Measured at 1.1 cfs.
263'	Bioinventory site - July 8, 1996.
2011'	Spring on left bank (LB) - temperature is 57°F.
4052'	I-beam bridge crosses stream - appears to be in good condition.
4212'	Spring on LB - 55°F.
4720'	Spring on LB - 55°F.
4989'	Spring on right bank (RB) - 56°F.
6277'	Tributary enters from right bank. Presence of salmonids observed. Temperature measured at 57°F.
6928'	Spring on RB.
7478'	Spring on RB - 57°F.
7677'	Tributary enters from LB - 56°F.
8364'	Large slide on LB - several pieces of large woody debris available.
11208'	Tributary enters from LB - 61°F.
11505'	Dirt road crosses stream.
11832'	Spring on RB - 59°F.
12015'	Large slide on RB - fir trees are blocking the stream channel; retaining gravel and fines.
12650'	Spring on RB - 56°F.
13430'	Spring on LB - 58°F.
14298'	Stream branches (intermittent on map). North branch has very little water.

Survey continues up the south branch.

14494' Foot bridge crosses stream. Evidence of footpaths.

15895' Channel type changes from a B1 to a B4 for the remaining 1661' of stream surveyed.

16138' Large debris accumulation (LDA) in stream channel. Appears to causing some bank erosion and retaining gravel. Road is just above RB - possible access for a restoration project?

17229' Spring on RB.

17282' LDA blocking stream channel, retaining gravel and fines.

17556' Stream running out of water; no fish observed for the last 1/4 mile. End of survey.

References

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department of Fish and Game, Sacramento, California.

Hopelain, J. 1995. Sampling levels for fish habitat inventory, unpublished manuscript. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California.

Valentine, B. 1995. Stream substrate quality for salmonids: guidelines for sampling, processing, and analysis, unpublished manuscript. California Department of Forestry and Fire Protection, Santa Rosa, California.

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