STREAM INVENTORY REPORT

Lost Man Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Lost Man 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 Lost Man Creek. The objective of the biological inventory was to document the presence and range of juvenile salmonids and cyprinidae. There is no known record of adult spawning surveys having been conducted on Lost Man Creek.

The objective of this report is to document the current habitat conditions, and recommend options for the potential improvement 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

Lost Man Creek is tributary to the Mattole River, located in Mendocino County, California. Lost Man Creek's legal description at the confluence with the Mattole River is T05S R02E. Its location is 39°59'36" North latitude and 123°55'21" West longitude. Lost Man Creek is a first order stream and has approximately 1.5 miles of blue line stream according to the USGS Bear Harbor and Briceland 7.5 minute quadrangles. Lost Man Creek drains a watershed of approximately 1.3 square miles. Summer base flow is approximately .5 cubic feet per second (cfs) at the mouth, but over 10 cfs is not unusual during winter storms. Elevations range from about 1,060 feet at the mouth of the creek to 1,350 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Whitethorn Road south past Our Lady of the Redwoods Abbey to the first bridge across the Mattole River. The mouth of Lost Man Creek is approximately 700 feet upstream of the bridge.

METHODS

The habitat inventory conducted in Lost Man Creek follows the methodology presented in the *California Salmonid Stream Habitat*

Restoration Manual (Flosi and Reynolds, 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). Lost Man Creek personnel were trained in May, 1996, by Scott Downie and Ruth Goodfield. This survey was conducted by a two person crew.

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 Lost Man 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:

Water and air temperatures are measured and recorded at every tenth habitat unit. The time of the sample is also noted. 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". Lost Man 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 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 Lost Man 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 "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 Lost Man 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.

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 Lost Man 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 Lost Man 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 Lost Man Creek fish presence was observed from the stream banks, and two sites were 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 Lost Man 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 June 25, 26, and 27, 1996, was conducted by Rick Abbey and Dave Smith (PCFWWRA). The total length of the stream surveyed was 6,112 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 1.0 cfs on June 16, 1996.

Lost Man Creek is an E4 channel type for the entire 6,112 feet of stream reach surveyed. E4 channels are low gradient,

meandering riffle/pool channels with low width/depth ratios and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 52 to 58° Fahrenheit. Air temperatures ranged from 54 to 72° F. Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 60% flatwater units, 29% pool units, and 10% riffle units (Graph 1). Based on total **length** of Level II habitat types there were 80% flatwater units, 17% pool units, and 3% riffle units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were runs, 41%; glides, 15%; and mid-channel pools, 15% (Graph 3). Based on percent total **length**, runs made up 58%, glides 17%, and mid-channel pools 8%.

A total of thirty-two pools were identified (Table 3). Main channel pools were most frequently encountered at 59% and comprised 61% 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. Eighteen of the 32 pools (56%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 32 pool tail-outs measured, four had a value of 1 (12%); 24 had a value of 2 (75%); one had a value of 3 (4%); and none had a value of 4 (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 32, and flatwater habitats had a mean shelter rating of 24 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 37. Main channel pools had a mean shelter rating of 27 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover type in Lost Man Creek and are extensive. Graph 7 describes the pool cover in Lost Man Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in two of the three low gradient riffles measured (67%). Sand was the next most frequently observed dominant substrate type and occurred in 33% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 81%. The mean percentages of deciduous and coniferous trees were 79% and 21%, respectively. Graph 9 describes the canopy in Lost Man Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 82%. The mean percent left bank vegetated was 83%. The dominant elements composing the structure of the stream banks consisted of 2.8% bedrock, 0% boulder, 2.8% cobble/gravel, and 94.4% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 61% of the units surveyed. Additionally, 5.6% of the units surveyed had deciduous trees as the dominant vegetation type, and 8.3% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on June 16, 1996, in Lost Man Creek. The sites were sampled by Scott Downie and Ruth Goodfield (DFG).
The first site sampled included habitat units 004-005, a run\pool sequence approximately 138 feet from the confluence with the Mattole River. This site had an area of 700 sq ft and a volume of 560 cu ft. The site yielded two young-of-the-year (YOY) steelhead rainbow trout, and one 1+ steelhead rainbow trout.

The second site included habitat units 0070-0071, a run/pool sequence located approximately 3,677 feet above the creek mouth. This site had an area of 1,000 sq ft and a volume of 800 cu ft. The site yielded three YOY and one 1+ steelhead rainbow trout.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Lost Man Creek.

DISCUSSION

Lost Man Creek is an E4 channel type for the entire 6,112 feet of stream surveyed. The suitability of E4 channel types for fish habitat improvement structures is good for bank-placed boulders; fair for opposing wing-deflectors; and poor for medium-stage weirs, boulder clusters, and single wing-deflectors.

The water temperatures recorded on the survey days June 26 and

27, 1996, ranged from 52 to 58 degrees Fahrenheit. Air temperatures ranged from 54 to 72 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 Lost Man 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 80% of the total **length** of this survey, riffles 3%, and pools 17%. The pools are relatively deep, with 18 of the 32 (56%) 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.

One of the 32 pool tail-outs measured had embeddedness ratings of 3 or 4. Only four 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 Lost Man 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 32. The shelter rating in the flatwater habitats was slightly lower at 24. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by undercut banks in all habitat types. Additionally, woody debris 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.

Two of the three 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 81%. 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 82% and 83%, 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) Lost Man Creek should be managed as an anadromous, natural production stream.

2) The debris accumulation just upstream of the confluence with the Mattole River is likely functioning as a selective barrier. It should be modified to facilitate fish passage and monitored in the future.

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) There are several log debris accumulations present on Lost Man 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 distances are approximate and measured from the beginning of the survey reach.

0' Begin survey at confluence with the Mattole River. Channel type is an E4 for the entire 6,112' of stream surveyed. Selective barrier, debris formed, 20' upstream of confluence.

138'	Bioinventory site #1.
1892'	Small tributary enters from right bank (RB).
2282'	Small tributary enters from left bank (LB).
2857'	Tributary enters from LB - see separate unnamed tributary report.
3677'	Bioinventory site #2.
4419'	Dry tributary enters from LB.
4788'	Corrugated metal pipe (CMP), 5' diameter, in stream channel. Dense vegetative growth at inflow of culvert.
4912'	Vegetation getting thick in stream channel; flow has stopped.
5435'	Small tributary enters from LB.
6112'	Stream has stopped flowing - very marshy, shallow, and silty. 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