STREAM INVENTORY REPORT

Cherry Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Cherry 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 Cherry 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 Cherry 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

Cherry Creek is tributary to Outlet Creek, tributary to the Mainstem Eel River, located in Mendocino County, California. Cherry Creek's legal description at the confluence with Outlet Creek is T20N R14W S02. Its location is 39°36'38" N. latitude and 123°22'55" W. longitude. Cherry Creek is a second order stream and has approximately 3.2 miles of blue line stream according to the USGS Longvale 7.5 minute quadrangle. Cherry Creek drains a watershed of approximately 8.8 square miles. Elevations range from about 1080 feet at the mouth of the creek to 2000 feet in the headwater areas. Mixed hardwood forest and grassland dominates the watershed. The watershed is privately owned and is managed as a wildlife refuge and residential subdivision. Vehicle access exists via the Irvine Rest Area on Highway 101.

METHODS

The habitat inventory conducted in Cherry Creek follows the methodology presented in the California Salmonid Stream Habitat

Restoration Manual (Flosi and Reynolds, 1991 rev. 1994). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Cherry Creek personnel were trained in May, 1995, by Ruth Goodfield. 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 Cherry 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 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 each tenth unit typed. 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". Cherry 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 measured for mean width, mean depth, and maximum depth (*Sampling Levels for Fish Habitat Inventory*, 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 Cherry 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 Cherry 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 is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In Cherry 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. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results were recorded.

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 Cherry 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. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, or 3) electrofishing. 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 .85 mm) *(Stream Substrate Quality for Salmonids: Guidelines for Sampling, Processing, and Analysis,* Valentine, 1995).

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat7.2, 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 Quattro Pro 4. Graphics developed for Cherry 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 September 27, 28, and October 12, 16,

and 17, 1995, was conducted by Jennifer Terwilliger, Jeffrey Jahn (AmeriCorps/WSP), and Brie Darr (CCC). The total length of the stream surveyed was 9,429 feet with an additional 269 feet of side channel.

Flows were not measured on Cherry Creek.

Cherry Creek is an A2 channel type for the first 4,135 feet of stream reach surveyed. A2 channels are steep (4-10% gradient), high energy streams, with boulder channel. The second channel type is a B1 for 3,254 feet. B1 channels are moderately entrenched, moderate gradient (2-4%), with a bedrock channel. The stream then becomes a B2 channel type for the remaining 2,040 feet. B2 channels are moderately entrenched, moderate gradient, with a boulder channel.

Water temperatures ranged from 48 to 61° Fahrenheit. Air temperatures ranged from 50 to 74° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 37%, pool types 34%, and flatwater 29% (Graph 1). Pool habitat types made up 34% of the total survey **length**, riffles 33%, and flatwater 33% (Graph 2).

Four hundred and twenty Level IV habitat types were identified. These data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were mid-channel pools, 31%; runs, 17%; and low gradient riffles, 16% (Graph 3). By percent total **length**, mid-channel pools made up 32%, step runs 19%, and runs 14%.

One hundred and forty-four pools were identified (Table 3). Main channel pools were most often encountered at 91% and comprised 93% 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. Sixty-six of the 144 pools (46%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs.

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Of the 144 pool tail-outs measured, 6 had a value of 1 (4%); 47 had a value of 2 (33%); 35 had a value of 3 (24%); and 56 had a value of 4 (39%). On this scale, a value of 1 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 8.0. Riffle and flatwater habitats followed with a rating of 7.0 (Table 1). Of the pool types, the main and scour pools each had a mean shelter rating at 8.0, and backwater pools rated 5.0 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 5 of the 9 low gradient riffles measured (56%). Gravel was the next most frequently observed dominant substrate type and occurred in 33% of the low gradient riffles (Graph 8).

The mean percent canopy for the stream reach surveyed was 78.3%. The mean percentages of deciduous and coniferous trees were 68.8% and 9.5%, respectively. Graph 9 describes the canopy in Cherry Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 60%. The mean percent left bank vegetated was 59%. The dominant elements composing the structure of the stream banks consisted of 29.9% bedrock, 12.8% boulder, 37.8% cobble/gravel, and 19.5% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 78.7% of the units surveyed. None of the units had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

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Streambank observations were made throughout the habitat inventory. Steelhead fry and juveniles were observed throughout the survey reach Cherry Creek.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Cherry Creek.

DISCUSSION

Cherry Creek is an A2 channel type for the first 4,135 feet of stream surveyed, a B1 for 3,254 feet, and a B2 for the remaining 2,040 feet. The A2 channel type is generally not suitable for habitat improvement structures. A2 channels consist of high energy streams with stable stream banks, and poor gravel retention capabilities. The B1 channel type is excellent for bank-placed boulders and bank covers. It is also good for log covers. However, B2 channels are poor for low-stage weirs, single and opposing wing-deflectors, and boulder clusters. The B2 channel type is excellent for low and medium stage plunge weirs, single and opposing wing deflectors, and bank covers.

The water temperatures recorded on the survey days September 27, 28, and October 12, 16 and 17, 1995, ranged from 48 to 61° Fahrenheit. Air temperatures ranged from 50 to 74° Fahrenheit. This is an acceptable water temperature range for salmonids. Cherry 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 33% of the total **length** of this survey, riffles 33%, and pools 34%. The pools are relatively shallow, with only 66 of the 144 pools having a maximum depth greater than 2 feet. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total 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.

Ninety-one of the 144 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 6 had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Cherry 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 8.0. The shelter rating in the flatwater habitats was slightly lower at 7.0. 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, terrestrial vegetation 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.

Five of the nine 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 for the stream was 78.3%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

The percentage of right and left bank covered with vegetation was moderate at 60% and 59%, 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.

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RECOMMENDATIONS

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

2) Due to the high gradient in the lower reach of the stream, access for migrating salmonids is an ongoing potential problem. There is also a cement dam at 7847' that poses an access problem. Good water temperature and flow regimes exist in this portion of the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved wherever possible.

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) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 3341', should then be treated to reduce the amount of fine sediments entering the stream.

5) Where feasible, design and engineer pool enhancement structures to increase the number and depth of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

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 Outlet Creek. Stream is an A2 channel type for the first 4,135' of survey.

2465' Small, dry gulch on the right bank (RB).

3072' Dry tributary enters from RB.

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3341' Failure on RB, 60'W X 30'H. Contributing fines.

3600' A foot trail enters from RB.

4135' Channel type changes from an A2 to a B1 for 3,254' of survey.

4230' Alder Creek enters from the left bank (LB). It is approximately 40% of the flow.

4292' A trail enters from LB.

4622' Failure on LB, 20'H X 30"L. Contributing fines.

5730' Stream drops 10 feet, possible fish barrier. There is an alternate channel during high flows.

6819' Foot trail on LB. Trail originates on Cherry Creek road.

6946' Spring fed tributary on LB.

7088' Failure on RB, 60'L X 20"H. A piece of large woody debris is at the base of the failure and is holding back fines.

7149' Streambed falls 21 feet in four separate drops.

7389' Channel type changes from a B1 to a B2 for the remaining 2,040' of survey.

7847' Concrete dam, 13'H X 12'W X 8'L. Possible fish barrier.

8108' Foot trail on LB.

8877' Fawn Road bridge crosses the creek.

8941' Failure on RB, 40'L X 30'H. It is contributing some fines.

9167' Dry tributary enters from RB.

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9429' End of survey, no fish observed since the dam.

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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

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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