STREAM INVENTORY REPORT

SOUTH FORK COTTANEVA CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on South Fork Cottaneva 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 South Fork Cottaneva 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 South Fork Cottaneva 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

South Fork Cottaneva Creek is tributary to Cottaneva Creek, tributary to the Pacific Ocean, located in Mendocino County, California (Figure 1). South Fork Cottaneva Creek's legal description at the confluence with Cottaneva Creek is T22N R17W S19. Its location is 39°44′22 ″ north latitude and 123°48′59″ west longitude. South Fork Cottaneva Creek is a third order stream and has approximately 5.5 total miles of blue line stream according to the USGS Westport and Hales Grove 7.5 minute quadrangles. South Fork Cottaneva Creek drains a watershed of approximately 5.3 square miles. Summer base runoff is approximately 1.6 cubic feet per second (cfs) at the mouth. Elevations range from about 10 feet at the mouth of the creek to 1800 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via private road from State Route 1 at the community of Rockport.

METHODS

The habitat inventory conducted in South Fork Cottaneva 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 (WSP/AmeriCorps) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). South Fork Cottaneva Creek personnel were trained in May, 1995, by Gary Flosi.

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 South Fork Cottaneva 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". South Fork Cottaneva 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 (*Sampling Levels for Fish Habitat Inventory*, 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 South Fork Cottaneva 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 South Fork Cottaneva 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 South Fork Cottaneva 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 South Fork Cottaneva 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 South Fork Cottaneva Creek fish presence was observed from the stream banks, and three sites were electrofished using one Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

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 South Fork Cottaneva 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 14 -20, 1995, was conducted by Kyle Young (WSP/AmeriCorps) and Craig Mesman and Chris Coyle (CCC). The total length of the stream surveyed was 14,352 feet with an additional 1,083 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 1.6 cfs on August 2, 1995.

South Fork Cottaneva Creek is an F4 channel type for the first 7,215 feet of stream reach surveyed and a B3 for the remaining 7,137 feet. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. B3 channels are moderately entrenched, moderate-gradient, riffle-dominant channels with infrequently spaced pools, stable banks, and cobble-dominant channels.

Water temperatures ranged from 52 to 56 degrees Fahrenheit. Air temperatures ranged from 54 to 66 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 40% riffle units, 39% pool units, and 20% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 46% riffle units, 29% pool units, and 23% flatwater units (Graph 2).

Eighteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low-gradient riffles, 36%; mid-channel pools, 14%; and runs, 10% (Graph 3). Based on percent total **length**, low-gradient riffles made up 43%, mid-channel pools 11%, and step runs 9%.

A total of 202 pools were identified (Table 3). Scour pools were most frequently encountered at 49% and comprised 49% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of

pool quality. Twenty of the 202 pools (10%) had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 196 pool tail-outs measured, 91 had a value of 1 (46.4%); 88 had a value of 2 (44.9%); 13 had a value of 3 (6.6%); and 4 had a value of 4 (2.0%) (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 46, and flatwater habitats had a mean shelter rating of 12 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 59. Backwater pools had a mean shelter rating of 45 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in South Fork Cottaneva Creek. Graph 7 describes the pool cover in South Fork Cottaneva Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 13 of the 22 low gradient riffles measured (59%). Gravel was the next most frequently observed dominant substrate type and occurred in 41% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 96%. The mean percentages of deciduous and coniferous trees were 72% and 28%, respectively. Graph 9 describes the canopy in South Fork Cottaneva Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 86%. The mean percent left bank vegetated was 88%. The dominant elements composing the structure of the stream banks consisted of 2.1% bedrock, 6.9% boulder, 72.2% cobble/gravel, and 18.8% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 51% of the units surveyed. Additionally, 17% of the units surveyed had deciduous trees as the dominant vegetation type, and 17% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Three sites were electrofished on July 5, 6, and 31 and August 2, 1995, in South Fork Cottaneva Creek. The sites were sampled by Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps). Site one was within the F4 channel type reach, while sites two and three were within the B3 channel type reach.

The first site sampled included habitat units 21-27, a series of runs, pools, riffles, and glides

approximately 836 feet from the confluence with Cottaneva Creek. This site had a length of 313 feet. The unit yielded twelve 0+ steelhead, three 1+ steelhead, forty-eight sculpin, one red-legged frog, and one garter snake.

The second site included habitat units 195-201, a series of pools and riffles located approximately 7,749 feet above the creek mouth. This site had a length of 167 feet. The site yielded two 0+ coho, eleven 0+ steelhead, three 1+ steelhead, and twenty Pacific giant salamanders.

The third site sampled included habitat units 328-331, two pools, a run, and a riffle located approximately 11,480 feet above the creek mouth. The site had a length of 81 feet. The site yielded fourteen 0+ steelhead, four 1+ steelhead, one 2+ steelhead, two tailed frog tadpoles, and fifteen Pacific giant salamanders.

DISCUSSION

South Fork Cottaneva Creek is an F4 channel type for the first 7,215 feet of stream surveyed and a B3 for the remaining 7,137 feet. The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for low-stage weirs, single and opposing wing deflectors, channel constrictors, and log cover; and poor for medium-stage weirs and boulder clusters. B3 channels are considered: excellent for low-stage plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing deflectors, and log cover; and good for medium-stage plunge weirs.

The water temperatures recorded on the survey days June 14-20, 1995, ranged from 52 to 56 degrees Fahrenheit. Air temperatures ranged from 54 to 66 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any further conclusions, temperatures would need to be monitored for several years throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 23% of the total **length** of this survey, riffles 46%, and pools 29%. The pools are relatively shallow, with only 20 of the 202 (10%) pools having a maximum depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third order streams, a primary pool is defined to have a maximum depth of at least three 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.

Seventeen of the 196 pool tail-outs measured had embeddedness ratings of 3 or 4. Ninety-one 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.

The mean shelter rating for pools was low with a rating of 46. The shelter rating in the flatwater habitats was much lower at 12. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, undercut banks 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.

All of the 22 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 96%. This is a relatively high percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 86% and 88%, respectively.

RECOMMENDATIONS

1) South Fork Cottaneva 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 or deepen existing 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. Adding high quality complexity with woody cover is desirable and in some areas the material is locally available.

4) 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 Cottaneva Creek. Channel type is F4.

482' State Route 1 bridge 43' long x 90' wide x 8' clearance.

2196' Rockport Creek enters left bank (see separate report).

3859' Log debris accumulation (LDA) 4' high x 20' wide x 30' long retaining gravel 5' deep at base. Not a barrier.

4635' Left bank tributary.

6365' Left bank culvert. Estimated discharge 2 gallons per minute (gpm).

7088' Slaughterhouse Gulch enters right bank (see separate report).

7180' Iron pipe culvert 7.5' diameter x 35' long. No baffles. Not a barrier.

7215' Channel type changes to B3.

7536' Left bank tributary. Estimated flow 1 gpm. Not accessible to fish (NAF).

8468' LDA. Not a barrier.

8910' Left bank spring.

9927' LDA 7' high x 75' wide x 23' long retaining gravel 6' deep x 60' wide at base. Possible barrier.

11180' Kimball Gulch enters right bank (see separate report).

11790' LDA 4' high x 30' wide x 10' long retaining gravel 3' deep at base. Not a barrier.

12009' LDA 4' high x 30' wide x 5' long. Possible barrier.

13133' Left bank tributary. Estimated flow <0.1 cfs.

13772' Left bank tributary.

14352' End of survey. Stream forks. Both forks have approximate 20% gradients and are clogged with large boulders and debris.

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.

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