STREAM INVENTORY REPORT

COTTANEVA CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on 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 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 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

Cottaneva Creek is tributary to the Pacific Ocean, located in Mendocino County, California (Figure 1). Cottaneva Creek's legal description at its confluence with the Pacific Ocean is T22N R18W S23. Its location is 39°44′10″ north latitude and 123°49′41″ west longitude. Cottaneva Creek is a third order stream and has approximately 15.1 total miles of blue line stream according to the USGS Westport and Hales Grove 7.5 minute quadrangles. Cottaneva Creek drains a watershed of approximately 16.3 square miles. Summer base runoff is approximately 5 cubic feet per second (cfs) at the mouth. Elevations range from sea level at the mouth of the creek to 1800 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed, but there are areas of pasture land along the main stem and coastal chaparral near the mouth. The watershed is privately owned and is managed for timber production and rangeland. Vehicle access exists via State Route 1.

METHODS

The habitat inventory conducted in 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). 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 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 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". 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

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 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 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 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 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 Cottaneva Creek fish presence was observed from the stream banks, and five 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 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 6 through July 5, 1995, was conducted by Chris Coyle and Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps). The total length of the stream surveyed was 32,432 feet with an additional 4,834 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 4.9 cfs on August 2, 1995.

Cottaneva Creek is an F4 channel type for the first 18,190 feet of stream reach surveyed, a G4 for the next 540 feet, an F4 for the next 1,828 feet, a D4 for the next 2,164 feet, and a B4 for the remaining 9,710 feet. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. G4 channels are entrenched, gully-like, step-pool channels on moderate gradients with low width/depth ratios and gravel-dominant substrates. D4 channels are multiple-thread channels with wide flood plains, transverse and longitudinal bars, eroding banks, and gravel-dominant substrates. B4 channels are moderately entrenched, moderate gradient, riffle-dominant channels with stable banks, gravel-dominant substrates, and infrequently spaced pools.

Water temperatures ranged from 55 to 62 degrees Fahrenheit. Air temperatures ranged from 58 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 43% pool units, 31% riffle units, and 26% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 46% pool units, 28% flatwater units, and 26% riffle units (Graph 2).

Seventeen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low-gradient riffles, 31%; mid-channel pools, 18%; and runs, 14% (Graph 3). Based on percent total **length**, low-gradient riffles made up 26%, mid-channel pools 18%, and runs 12%.

A total of 375 pools were identified (Table 3). Main channel pools were most frequently encountered at 45% and comprised 45% 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. One hundred and twenty-four of the 375 pools (33%) had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 344 pool tail-outs measured, 43 had a value of 1 (12.5%); 132 had a value of 2 (38.4%); 141 had a value of 3 (41.0%); and 28 had a value of 4 (8.1%) (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 45, and riffle habitats had a mean shelter rating of 11 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 51. Scour pools had a mean shelter rating of 46 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 19 of the 20 low-gradient riffles measured (95%). Small cobble was the next most frequently observed dominant substrate type and occurred in 5% 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 79% and 21%, respectively. Graph 9 describes the canopy in Cottaneva Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 83%. The mean percent left bank vegetated was 81%. The dominant elements composing the structure of the stream banks consisted of 1.4% bedrock, 1.4% boulder, 49.0% cobble/gravel, and 48.1% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 57% of the units surveyed. Additionally, 10% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Five sites were electrofished on August 3 and 7, 1995, in Cottaneva Creek. The units were sampled by Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps).

The first site sampled included habitat units 155-165, a series of pools, runs, and riffles approximately 9,379 feet from the confluence with the Pacific Ocean. This site was located within the first F4 channel type reach and had a length of 515 feet. The unit yielded thirty-two 0+ steelhead, three 1+ steelhead, forty-seven sculpin, one three-spine stickleback, and four Pacific giant salamanders.

The second site included habitat units 372-378, a series of pools and riffles located approximately 18,272 feet above the creek mouth. This site was located within the G4 channel type reach and had a length of 230 feet. The site yielded twenty-two 0+ steelhead, five 1+ steelhead, four stickleback, and seven sculpin.

The third site sampled included habitat units 386-394, a series of pools, runs, and riffles located approximately 18,825 feet above the creek mouth. The site was located within the second F4 channel type reach and had a length of 283 feet. The site yielded twenty-four 0+ steelhead, four 1+ steelhead, four stickleback, and eighteen sculpin.

The fourth site sampled included habitat units 476-477, including side channel units 476.1-476.6, a series of pools, riffles, and a step run located approximately 22,377 feet above the creek mouth. The site was located within the D4 channel type reach and had a length of 229 feet. The site yielded one 0+ coho, forty-seven 0+ steelhead, three 1+ steelhead, three stickleback, three sculpin, and one red-legged frog.

The fifth site sampled included habitat units 641-646, a series of pools, runs, and a riffle located approximately 28,856 feet above the creek mouth. The site was within the B4 channel type reach and had a length of 184 feet. The site yielded twenty 0+ steelhead, four 1+ steelhead, four

Pacific giant salamanders, and one tailed frog.

DISCUSSION

Cottaneva Creek is an F4 channel type for the first 18,190 feet of stream surveyed, a G4 for the next 540 feet, an F4 for the next 1,828 feet, a D4 for the next 2,164 feet, and a B4 for the remaining 9,710 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. G4 channel types are considered: good for bank-placed boulders; fair for low-stage weirs, opposing wing deflectors, and log cover; and poor for medium-stage weirs, boulder clusters, and single wing deflectors. D4 channel types are considered: fair for bank-placed boulders, single and opposing wing deflectors, and channel constrictors; and poor for low- and medium-stage weirs, boulder clusters, and log cover. B4 channel types 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 26 through July 5, 1995, ranged from 55 to 62 degrees Fahrenheit. Air temperatures ranged from 58 to 69 degrees Fahrenheit. This is a fair water temperature range for 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 28% of the total **length** of this survey, riffles 26%, and pools 46%. The pools are relatively shallow, with only 124 of the 375 (33.1%) 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 deepen existing pool habitat is recommended.

One hundred and sixty-nine of the 344 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 43 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 Cottaneva 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 45. The shelter rating in the flatwater habitats was much lower at 8. 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, small woody debris and 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 20 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 83% and 81%, 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) Cottaneva Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Where feasible, design and engineer pool enhancement structures to deepen the existing pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

4) 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.

5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 25,723', should then be treated to reduce the amount of fine sediments entering the stream.

6) Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

7) There is one section where the stream is being impacted from cattle in the riparian zone. Alternatives should be explored with the grazier and developed if possible.

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 Pacific Ocean. Channel type is F4. The first 1,680 feet of stream is an estuary created by a seasonal bar at the mouth of the stream. The bar was open and passable at the time of survey.

1938' Flatcar bridge 12' long x 9' clearance.

2758' Dodge Gulch enters left bank. Estimated flow <0.1 cfs. Not accessible to fish (NAF).

4244' South Fork Cottaneva Creek enters left bank (see separate report).

4887' Log debris accumulation (LDA) 4' high x 25' wide x 10' long. Not a barrier and no gravel retained (NBNG).

5151' Left bank ravine.

6334' LDA, 3' high x 30' wide x 10' long. NBNG.

6598' Flatcar bridge 16' long x 40' wide x 6' clearance.

8024' Left bank tributary enters through 2' diameter PVC culvert with rip-rap splash apron. NAF.

9794' LDA, 7' high x 50' wide x 40' long. NBNG.

9964' Left bank tributary. Estimated flow 0.2 cfs. Accessible to fish, but none observed in tributary.

10546' Right bank 1' diameter corrugated metal pipe (CMP) culvert. No discharge.

11763' Eight foot diameter log spans channel with 1.5' clearance.

12409' Three foot diameter log spans channel with 2' clearance.

12445' Three foot diameter log spans channel with 1.5' clearance.

12900' LDA, 6' high x 40' wide x 50' long. NBNG.

13253' Right bank tributary. Estimated flow <0.1 cfs. NAF.

13500' Left bank tributary enters through side channel. Estimated flow 0.1 cfs. Accessible to fish, but none observed.

13569' Six foot diameter x 50' long log with root mass lying perpendicular in channel diverting flow around either end.

13897' Barbed wire fence crosses channel. Upstream side shows evidence of grazing.

16283' Left bank tributary. Estimated flow 0.1-0.2 cfs. Young-of-the-year salmonids were observed in this tributary upstream of the State Route 1 culvert.

18176' Channel type changes to G4.

18716' Channel type changes to F4.

20544' Channel type changes to D4. A small woody debris jam 526 feet upstream of this point is retaining sediment and diverting the majority of the flow into a side channel which rejoins the main channel here. The side channel is undergoing severe head-cutting which, if left uncorrected, will probably result in the stream eventually abandoning the historic channel. The channel through this section is highly braided and shallow. Many young-of-the-year fish were observed in the side channels, and these run a high risk of being stranded as summer flows continue to diminish.

20907' Cattle crossing with barbed wire fencing on up- and downstream sides.

20932' Left bank 1.5' diameter PVC culvert. No discharge.

21070' Small woody debris jam.

22764' Channel type changes to B4. Barbed wire fence crosses channel.

22824' State Route 1 bridge 52' long x 70' wide x 4' clearance.

22932' Barbed wire fence crosses channel. Retaining debris.

24847' Right bank tributary. Estimated flow <0.1 cfs. NAF.

25186' Right bank tributary enters through 3' diameter culvert with 5' plunge. Estimated flow <0.1 cfs. NAF.

25723' Left bank erosion 25' high x 50' long contributing fines and gravel.

26002' Right bank erosion 15' high x 10' long contributing gravel and fines.

27081' Left bank seep.

27749' Right bank 2' diameter culvert.

28212' Middle Fork Cottaneva Creek enters left bank (see separate report).

28956' Bridge 17' long x 20' wide x 6' clearance.

29201' Right bank tributary enters through 2' diameter culvert. Estimated flow <0.1 cfs. NAF.

30305' Log and debris accumulation (LDA) 6' high x 30' wide x 30' long retaining gravel 4' deep at base. Not a barrier.

30528' Left bank tributary. Estimated flow <0.1 cfs.

31947' Right bank tributary.

32432' End of survey at confluence of North Fork Cottaneva Creek and Dunn Creek.

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