STREAM INVENTORY REPORT

Rockport Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Rockport Creek and one of its unnamed tributaries. 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 Rockport 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 Rockport 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

Rockport Creek is tributary to South Fork Cottaneva Creek, tributary to Cottaneva Creek, located in Mendocino County, California (Figure 1). Rockport Creek's legal description at the confluence with South Fork Cottaneva Creek is T22N R18W S25. Its location is 39°44′13″ north latitude and 123°48′39″ west longitude. Rockport Creek is a second order stream and has approximately 1.1 miles of blue line stream according to the USGS Westport 7.5 minute quadrangle. Rockport Creek drains a watershed of approximately 1.2 square miles. Summer base runoff is approximately 0.6 cubic feet per second (cfs) at the mouth. Elevations range from about 30 feet at the mouth of the creek to 1200 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 Rockport 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). Rockport 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 Rockport 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". Rockport 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 Rockport 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 Rockport 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 Rockport 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 Rockport 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 Rockport 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*.

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 Rockport 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

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HABITAT INVENTORY RESULTS

The following results and discussion are for mainstem Rockport Creek. Results and discussion for Unnamed Rockport Creek Tributary follow the main body of this report as a subsection.

The habitat inventory of June 7, 1995, was conducted by Chris Coyle (CCC) and Kyle Young (WSP/AmeriCorps). The total length of the stream surveyed was 6,061 feet with an additional 50 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.6 cfs on August 2, 1995.

Rockport Creek is an F4 channel type for the entire 6,061 feet of stream reach surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 55 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 41% riffle units, 38% pool units, and 21% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 56% riffle units, 24% pool units, and 19% flatwater units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low-gradient riffles, 38%; runs, 12%; and plunge pools, 11% (Graph 3). Based on percent total **length**, low-gradient riffles made up 51%, step runs 10%, and runs 9%.

A total of 99 pools were identified (Table 3). Scour pools were most frequently encountered at 57% and comprised 51% 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 99 pools (20%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 90 pool tail-outs measured, 14 had a value of 1 (15.6%); 36 had a value of 2 (40.0%); 38 had a value of 3 (42.2%); and 2 had a value of 4 (2.2%) (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 48, and riffle habitats had a mean shelter rating of 19 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 65. Scour pools had a mean shelter rating of 49 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 8 of the 11 low-gradient riffles measured (73%). Small cobble was the next most frequently observed dominant substrate type and occurred in 27% of the low-gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 91%. The mean percentages of deciduous and coniferous trees were 84% and 16%, respectively. Graph 9 describes the canopy in Rockport Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 95%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 1% bedrock, 1% boulder, 46% cobble/gravel, and 51% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 41% of the units surveyed. Additionally, 23% of the units surveyed had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on August 2, 1995, in Rockport Creek. The site was sampled by Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps).

The site sampled included habitat units 106-111, a series of runs, riffles, and a plunge pool approximately 1,856 feet from the confluence with South Fork Cottaneva Creek. This site had a length of 243 feet. The site yielded thirty 0+ steelhead, three 1+ steelhead, and five Pacific giant salamanders.

DISCUSSION

Rockport Creek is an F4 channel type for the entire 6,061 feet of stream surveyed. 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.

The water temperatures recorded on the survey days June 7, 1995, ranged from 53 to 56 degrees Fahrenheit. Air temperatures ranged from 55 to 69 degrees Fahrenheit. This is a good 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 19% of the total **length** of this survey, riffles 56%, and pools 24%. The pools are relatively shallow, with only 20 of the 99 (20%) 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.

Forty of the 90 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 14 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 Rockport 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 moderate with a rating of 48. The shelter rating in the flatwater habitats was lower at 10. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by small woody debris in all habitat types. Additionally, large woody debris contributes a small amount. Additional 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 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 91%. 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 95% and 94%, respectively.

RECOMMENDATIONS

1) Rockport 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. Most of the existing cover is from small woody debris. Adding high quality complexity with woody cover is desirable and in some areas the material is locally available.

4) 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.

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.

Position (ft):	Comments:
0'	Begin survey at confluence with South Fork Cottaneva Creek. Channel type is F4.
176'	Six foot diameter x 16' long corrugated metal pipe culvert under haul road. No baffles. Downstream end is approximately 50% impacted.
910'	Utility line crosses creek.
1502'	Cascade over root masses. Four foot jump with awkward jump angle. Possible barrier.
1544'	Series of 3-4' jumps through log debris accumulation (LDA).
1650'	Left bank tributary. Estimated flow one gallon per minute. Not accessible to fish.
1920'	Unnamed Rockport Creek Tributary enters left bank (see subsection).
3831'	Series of 2-3' jumps. Possible barrier.
4475'	Left bank tributary. Estimated flow 0.1 cfs. Accessible to fish.
5624'	Dry right bank tributary.
5912'	High-gradient bedrock sheet. Possible barrier.
5973'	High-gradient bedrock sheet. Possible barrier.
6061'	End of survey due to diminished habitat.

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.

STREAM INVENTORY REPORT

Unnamed Tributary to Rockport Creek

WATERSHED OVERVIEW

The unnamed tributary is a tributary to Rockport Creek, a tributary to South Fork Cottaneva Creek, located in Mendocino County, California (Figure 1). The unnamed tributary's legal description at the confluence with Rockport Creek is T22N R13W S25. Its location is 39°44′02″ north latitude and 123°48′24″ west longitude. The unnamed tributary is a first order stream and has approximately 0.5 miles of blue line stream according to the USGS Westport 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 0.4 square miles. Summer base runoff is approximately 0.12 cubic feet per second (cfs) at the mouth. Elevations range from about 100 feet at the mouth of the creek to 1000 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Foot access exists via an abandoned private road.

HABITAT INVENTORY RESULTS AND DISCUSSION

The habitat inventory of June 8, 1995, was conducted by Chris Coyle (CCC) and Kyle Young (WSP\AmeriCorps). The total length of the stream surveyed was 2,111 feet with an additional 10 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.12 cfs on August 2, 1995.

The unnamed tributary is an E4 channel type for the first 274 feet of stream surveyed, a G4 for the next 534 feet, and a B4 for the remaining 1,303 feet of stream surveyed. The suitability of E4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for opposing wing deflectors; poor for medium-stage weirs, boulder clusters, and single wing deflectors. 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. 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 day June 8, 1995, ranged from 51 to 54 degrees Fahrenheit. Air temperatures ranged from 54 to 62 degrees Fahrenheit. This is a very good water temperature range for salmonids, but water temperature data for the warm summer months are lacking. For a more complete and accurate water temperature profile, 24-hour temperatures would need to be monitored throughout the warm summer months.

Based on the total **length** of this survey, Level II habitat units consisted of 45% riffle units, 27% flatwater units, and 27% pool units. The pools are relatively shallow, with only 2 of the 34 (6%)

pools having a maximum depth greater than 2 feet.

Fifteen of the 34 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 5 had a 1 rating. Cobble embeddedness of 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In the unnamed tributary, 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 19. The shelter rating in the flatwater habitats was 15. A pool shelter rating of approximately 100 is desirable. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat.

All of the 8 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 94% and 95%, respectively.

BIOLOGICAL INVENTORY RESULTS

Four sites were electrofished on August 2, 1995 in the unnamed tributary. The units were sampled by Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps).

The first site sampled included habitat units 10-14, two corner pools, two riffles, and a run approximately 116 feet from the confluence with Rockport Creek. This site had an approximate length of 54 feet. The site yielded fifteen 0+ steelhead and one Pacific giant salamander.

The second site included habitat units 22-30, a series of pools, runs, and riffles 286 feet above the creek mouth. This site had a length of approximately 141 feet. Eleven 0+ steelhead and two Pacific giant salamanders were sampled.

The third site included habitat units 60-75, a series of pools, runs, and riffles 1,087 feet above the creek mouth and upstream of the culvert at 808'. This site had an approximate length of 180 feet. One 0+ steelhead, one 1+ steelhead, and six Pacific giant salamanders were sampled.

The fourth site included habitat units 80-87, a series of runs, riffles, and step pools 1,321 feet above the creek mouth and 42 feet above a suspected barrier. This site had an approximate length of 114 feet. No fish were sampled.

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RECOMMENDATIONS

1) The unnamed tributary should be managed as an anadromous, natural production stream.

2) 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.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from terrestrial vegetation. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

4) 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.

5) The limited water temperature available suggest that the 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.

Position (ft):	Comments:
0'	Begin survey at confluence with Rockport Creek. Channel type is E4.
274'	Channel type changes to G4.
808'	Four foot diameter x 40' long corrugated metal pipe culvert. No baffles. Channel type changes to B4.
1050'	Right bank tributary. No surface flow.
1267'	Embedded log acting as "flume", 3.5' jump with no jump pool. Probable velocity barrier.
1511'	Log debris accumulation (LDA) 4' high x 10' wide x 3' long retaining gravel 4' deep at base. Possible barrier. Left bank erosion 10' high x 20' long contributing fines. Right bank tributary. Estimated flow 2 gallons per minute.

2111'	LDA 5' high x 10' wide x 15' long. 3.5' jump with no jump pool. Jump is blocked by debris. Channel above this point is clogged with debris and retaining large amounts of fine sediment. End of survey.

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