STREAM INVENTORY REPORT

Rancheria Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on Rancheria 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 Rancheria Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

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

Rancheria Creek is a tributary to the Navarro River, located in Mendocino County, California (Map 1). Rancheria Creek's legal description at the confluence with Anderson Creek to form the Navarro River is T14N R14W S19. Its location is 39°03′28″ north latitude and 123°26′29″ west longitude. Rancheria Creek is a third order stream and has approximately 37.6 miles of blue line stream according to the USGS Philo, Cold Spring, Zeni Ridge, Ornbaun Valley, Yorkville, Gube Mountain, and Big Foot Mountain 7.5 minute quadrangles. Rancheria Creek drains a watershed of approximately 92.5 square miles and the system has approximately 90.0 miles of blue line stream. Elevations range from about 180 feet at the mouth of the creek to 1,600 feet in the headwater areas. A redwood and Douglas fir mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production and recreation. Vehicle access exists from State Highway 128 near Boonville, via various gated private and logging roads.

METHODS

The habitat inventory conducted in Rancheria 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 the AmeriCorps Watershed Stewards Project (WSP/AmeriCorps) Members who conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by two-person teams.

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 Rancheria 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". Rancheria Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. Channel dimensions were measured using hip chains, range finders, tape

measures, and stadia rods. All units were measured for mean length; additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were sampled for all features on the sampling form (Hopelain, 1995). Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were 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 Rancheria 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) and 76 - 100% (value 4). Additionally, a value of 5 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 Rancheria 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*. Canopy density relates to the amount of stream shaded from the sun. In Rancheria 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 Rancheria Creek, the dominant composition type and the dominant vegetation type 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. Fish presence was observed from the stream banks in Rancheria Creek, and four sites were electrofished using a 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 Quattro Pro. Graphics developed for Rancheria 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 habitat inventory of October 2-29, 1996, was conducted by Andrew MacMillan and Dale Melton (WSP\AmeriCorps) and Ann Huber, Toni Ouradnik, and David Jones (CCC). The total length of the stream surveyed was 58,260 feet with an additional 519 feet of side channel.

A flow of 4.91 cfs was measured on September 9, 1996, approximately 4,341' above confluence with a Marsh-McBirney Model 2000 flowmeter. A flow of 0.65 cfs was measured on September 13, 1996, approximately 51,625' above the confluence.

This section of Rancheria Creek has two channel types: from the confluence upstream 30,572' the channel type is a B1. The next 27,688' is a B4 channel type. B1 channels are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently spaced pools, very stable plan and profile, stable banks, and a bedrock channel. B4 channels are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently spaced pools, very stable plan and profile, stable banks, and a gravel channel.

Water temperatures taken during the survey period ranged from 50 to 79 degrees Fahrenheit. Air temperatures ranged from 50 to 75 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 15% riffle units, 42% flatwater units, and 44% pool units (Graph 1). Based on total **length** of Level II habitat types there were 9% riffle units, 59% flatwater units, and 33% pool units (Graph 2).

Seventeen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were lateral scour pools - bedrock formed, 18%; step runs, 15%; mid-channel pools, 14%; runs, 14%; and glides, 13% (Graph 3). Based on percent total **length**, step runs made up 34%, lateral scour pools - bedrock formed, 14%; mid-channel pools, 13%; glides, 13%; and runs, 11%.

A total of 187 pools were identified (Table 3). Scour pools were most frequently encountered at 64% and comprised 59% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. One-hundred-twenty-nine of the 187 pools (69%) had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 187 pool tail-outs measured, 21 (11.3%) had a value of 1, 22 (11.8%) had a value of 2, 73 (39.2%) had a value of 3, 45 (24.2%) had a value of 4, and 25 (13.5%) had a value of 5 or were unsuitable for spawning (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. Riffle habitat types had a mean shelter rating of 29, pools had a mean shelter rating of 22, and flatwater habitats had a mean shelter

rating of 16 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 40, main channel pools rated 28, and scour pools had a mean shelter rating of 14 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel and small cobble was the dominant substrate observed in the three low gradient riffles measured (Graph 8).

The mean percent canopy density for the first stream reach surveyed was 51% and the second reach was 34%. The mean percentages of deciduous and coniferous trees for the first reach were 50% and 50%, respectively, while the second reach had 42% coniferous and 58% deciduous. Graph 9 describes the canopy in Rancheria Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 42%. The mean percent left bank vegetated was 41.9%. The dominant elements composing the structure of the stream banks consisted of 27.1% bedrock, 20.7% boulder, 46.4% cobble/gravel, and 5.7% sand/silt/clay (Graph 10). Additionally, 50% of the units surveyed had deciduous trees as the dominant vegetation type, and 2.9% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Four sites were electrofished on October 1, 1996. The sites were sampled by Andrew MacMillan, Dale Melton, David Jones, and Ann Huber.

The first site sampled was habitat units 001 through 005, which included a low gradient riffle, a glide and a lateral scour pool - bedrock formed. This site started at the confluence with the Navarro River and continued upstream 325 feet. The site yielded three steelhead, 41 roach, three sculpin, one stickleback, and one Pacific lamprey ammocete.

The second sample site was habitat units 290 through 292, included a step run and a high gradient riffle, starting at the confluence with Dago Creek, and continuing 394 feet upstream. The sample included eight steelhead, 31 roach, and one stickleback.

The third site was habitat units 370 through 373, including lateral scour pool - bedrock formed, a lateral scour pool - boulder formed, a low gradient riffle, and a run. This site begins at the confluence with Horse Creek and continues upstream 415 feet. Included in the sample were eleven steelhead, two sculpin, 43 roach, and two stickleback.

The fourth site was habitat units 421 through 425, which included a run, a step run, a low gradient riffle, and a lateral scour pool - bedrock formed. This site started approximately 500 feet downstream from the Mountain View Road Bridge crossing. The sample yielded ten

steelhead, 28 roach, three sculpin, and one stickleback.

DISCUSSION

The reach of Rancheria Creek surveyed consists of 30,572 feet of a B1 channel type and 27,688 feet of a B4 channel type. The fish habitat improvement structure suitability for B1 channel types is a follows: excellent for bank placed boulders and bank cover logs, good for log cover, and poor low staged weirs, single and opposing wing deflectors, and boulder clusters. The B4 channel types are excellent for low staged plunge weirs, boulder clusters, bank placed boulders, single and opposing wing deflectors and log cover, and good for medium staged weirs.

The water temperatures recorded on the survey days October 1 to 29, 1996 ranged from 50 to 79 degrees Fahrenheit. Air temperatures ranged from 50 to 75 degrees Fahrenheit. The warmer water and air temperatures were recorded in the lower areas of the first reach. These warmer temperatures, if sustained, are above the threshold stress level for salmonids. To make any further conclusions, temperatures need to be monitored for a longer period of time throughout the critical summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 59% of the total length of this survey, riffles 9%, and pools 33%. The pools are relatively deep, with 129 of the 187 pools (69%) 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 and fourth 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 but suitable locations are limited on Rancheria Creek due to the size of the stream.

Twenty-one of the pool tail-outs had embeddedness value of 1. Seventy-seven percent of the pool tail-outs measured had embeddedness ratings of 3, 4 or 5. 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 Rancheria 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 22. A pool shelter rating of approximately 100 is desirable. The shelter in the flatwater and riffle habitats was low as well with ratings of 16 and 29, respectively. The relatively small amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, terrestrial vegetation and bedrock ledges contribute a small amount. Large organic debris such as log and root wad cover structure in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat. Log cover structures provide rearing fry with protection from predation, rest from water velocity, and divide territorial units to reduce density related competition.

All of the low gradient riffles measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

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The mean percent canopy density for the survey reach was 43%. In general, revegetation projects are considered when canopy density is less than 80%. The large trees required to contribute shade to the wide channel typical of these reaches would also eventually contribute a long term source of large wood needed for instream structure.

The percentages of the right and left banks covered with vegetation was low at 42.0% and 41.9%, 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) Rancheria Creek should be managed as an anadromous, natural production stream.

2) The limited water temperature data available suggest that maximum temperatures are above 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) Increase the canopy on Rancheria Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is effected from upstream.

4) 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 combination cover/scour structures could be effective.

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

COMMENTS 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 the confluence with the Navarro River. Rancheria Creek and Anderson Creek come together to form the Navarro River. Channel type is B1.
2,597'	Small left bank tributary, 0.01 cfs. Not accessible to fish.

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4,343'	Flow estimated at 4.91 cfs.
9,143'	Ham Canyon Creek enters from the right bank.
16,992'	Old logging haul road crossing.
17,657'	Township Gulch enters from the right bank.
20,558'	Small right bank tributary, 0.01 cfs.
30,572’	Channel changes to B4.
34,435'	Cold Springs Creek enters from the left bank.
36,248'	Small tributary enters from the right bank.
41,104'	Left bank erosion, 80' long x 20' high, contributing fines, gravel and boulders.
41,204'	One steelhead approximately 14" long observed along with several young-of-the-year steelhead.
44,701'	Right bank spring, 0.01 cfs.
46,397'	Horse Creek enters from the left bank.
46,618'	Unnamed right bank tributary enters. Accessible to fish.
51,563'	Flow estimated at 0.65 cfs.
51,583'	Bear Trap Creek enters from the right bank.
55,340'	Bear Wallow Creek enters from the right bank. Water temperature was 54 degrees Fahrenheit. Accessible to fish.
55,664'	Mountain View Road Bridge crossing. Survey ended here due to lack of time and because the landowners had not been contacted to secure access permission. This is not the end of the anadromous reach. The remainder of Rancheria Creek should be surveyed in the future.

REFERENCES

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department of Fish and Game, Sacramento, California.

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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