SALMON AND STEELHEAD RESTORATION AND ENHANCEMENT PROGRAM

NORTH COAST

WATERSHED PLANNING and COORDINATION PROJECT

STREAM INVENTORY REPORT

SOUTH FORK BIG FINLEY CREEK, MATTOLE RIVER, 1998

CALIFORNIA DEPARTMENT OF FISH AND GAME

SPORT FISH RESTORATION ACT

1998

North Coast Watershed Planning and Coordination Project

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INTRODUCTION

A stream inventory was conducted during the summer of 1998 on South Fork Big Finley 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 Big Finley 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 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 Big Finley Creek is tributary to Big Finley Creek, tributary to the Mattole River, located in Humboldt County, California (Map 1). South Fork Big Finley Creek's legal description at the confluence with Big Finley Creek is T04S R01E S25. Its location is 40°15′19″ north latitude and 124°00′46″ west longitude. South Fork Big Finley Creek is a second order stream and has approximately 2.8 miles of blue line stream according to the USGS Briceland and Shelter Cove 7.5 minute quadrangles. South Fork Big Finley Creek drains a watershed of approximately 1.3 square miles. Elevations range from about 900 feet at the mouth of the creek to 1,800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily privately owned and is managed for rural residence and dispersed recreation. Vehicle access exists via the Briceland/Shelter Cove Road, west from Redway to the Whitethorn Junction. Continue approximately 0.2 miles to an unpaved road that follows the north bank of the Mattole River. Continue on this road for about 3.5 miles to the mouth of Big Finley Creek. Walk upstream approximately 4,600 feet to the mouth of South Fork Big Finley Creek.

METHODS

The habitat inventory conducted in South Fork Big Finley 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 AmeriCorps Watershed Stewards Project (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). 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. 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, depth of pool tail crest, dominant substrate composing the pool tail crest, and embeddedness. 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 Big Finley 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 Big Finley 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 South Fork Big Finley 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 South Fork Big Finley 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. In addition the dominant substrate composing the pool tail outs is recorded for each pool.

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 South Fork Big Finley 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 Big Finley 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. In South Fork Big Finley Creek fish presence was observed from the stream. 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 South Fork Big Finley 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 the pool tail outs
- Percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

South Fork Big Finley Creek, Mattole River

HABITAT INVENTORY RESULTS

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of October 1, 1998, was conducted by Caroline Jezierski and Stewart McMorrow (WSP). The total length of the stream surveyed was 6,654 feet with an additional 154 feet of side channel.

Flows were not measured on South Fork Big Finley Creek.

South Fork Big Finley Creek is a B3 channel type for the entire 6,654 feet of stream reach surveyed. B3 channels are moderately entrenched, meandering, riffle/pool channels on 2-4% gradients with moderate width/depth ratios and cobble-dominant substrates.

Water temperatures taken during the survey period were sustained at 56°F. Air temperatures ranged from 56° to 60°F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 41% riffle units, 29% flatwater units, 29% pool units, and 1% dry units (Graph 1). Based on total length of Level II habitat types there were 60% riffle units, 28% flatwater units, 9% pool units, and 3% dry units. (Graph 2).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 32%; mid-channel pools, 29%; and runs, 16% (Graph 3). Based on percent total length, low gradient riffles made up 45%, step runs 16%, and high gradient riffles, 15%.

A total of thirty-five pools were identified (Table 3). Main channel pools were encountered at 100% and comprised 100% 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. Seventeen of the thirty-five pools (49%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the thirty-five pool tail-outs measured, none had a value of 1 (0%); fourteen had a value of 2 (40%); seventeen had a value of 3 (49%); none had a value of 4 (0%) and four had a value of 5 (11%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail-out is not suitable for spawning. In South Fork Big Finley Creek, all of the four pool tail-outs valued at 5 were unsuitable for spawning due to the tail-outs being comprised of bedrock.

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 32, flatwater habitat types had a mean shelter rating of 19, and pool habitats had a mean

shelter rating of 26 (Table 1). Of the pool types, the main channel pools had a mean shelter rating of 26 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 22 of the 35 pool tail outs measured (62%). Small cobble was the next most frequently observed dominant substrate type and occurred in 17% of the pool tail outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 61%. The mean percentages of deciduous and coniferous trees were 91% and 9%, respectively. Graph 9 describes the canopy in South Fork Big Finley Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 93%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 84.4% bedrock, 0.0% boulder, 6.3% cobble/gravel, and 9.4% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 78.1% of the units surveyed. Additionally, 78.1% of the units surveyed had deciduous trees as the dominant vegetation type, and 12.5% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

DISCUSSION

South Fork Big Finley Creek is a B3 channel type for the entire 6,654 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is excellent for plunge-weirs, boulder clusters, bank-placed boulders, single and opposing wing-deflectors, and log cover.

The water temperatures recorded on the survey day October 1, 1998, was 56°F. Air temperatures ranged from 56° to 60°F. 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 28% of the total length of this survey, riffles 60%, and pools 9%. The pools are relatively deep, with seventeen of the thirty-five (48.6%) 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.

None of the thirty-five pool tail-outs measured had an embeddedness rating of 1. Seventeen of the pool tail-outs had embeddedness ratings of 3 or 4. Four of the pool tail-outs had a rating of 5 or were considered unsuitable for spawning. 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 South Fork Big Finley 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 26. The shelter rating in the flatwater habitats was 19. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, whitewater contributes a small amount. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Twenty-eight of the thirty-five pool tail outs 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 61%. In general, revegetation projects are considered when canopy density is less than 80%. Although in South Fork Big Finley Creek 84.4% of the stream bank is composed of bedrock. This will limit the areas available for tree planting. The percentage of right and left bank covered with vegetation was 93% and 94%, respectively.

RECOMMENDATIONS

1) South Fork Big Finley 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) 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.

4) 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.

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.

0' Begin survey at confluence with Big Finley Creek. Channel type is a B3 for the entire 6,654' of stream surveyed.

1,321' Small tributary enters from left bank.

1,635' Log debris accumulation (LDA) in stream channel. Not a barrier to fish migration.

2,259' Old failure on right bank.

3,086' Stream forks into tributaries of even flows. Survey continues up east branch.

4,152' Boulder roughs with gradient of 20% for approximately 250'.

4,254' Old slide on left bank.

4,338' LDA in stream channel; possible fish barrier.

4,666' Stream enters marshy area; flow is subsurface.

5,335' Small tributary enters from left bank.

6,341' Spring on left bank.

6,619' Dry tributary enters from right bank.

6,654' End of survey. Creek is dry.

REFERENCES

Flosi, G., S. Downie, J. Hopelain, M Bird, R. Coey, and B. Collins. 1998. California salmonid stream habitat restoration manual, 3rd edition. California Department of Fish and Game, 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