STREAM INVENTORY REPORT

South Branch West Fork Bridge Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on South Branch West Fork Bridge Creek to assess habitat conditions for anadromous salmonids. 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 Branch West Fork Bridge Creek. The objective of the biological inventory was to document the salmonid species present and their distribution. After analysis of the information and data gathered, stream habitat improvement recommendations are presented.

There is no known record of adult spawning surveys having been conducted on South Branch West Fork Bridge 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.

WATERSHED OVERVIEW

South Branch West Fork Bridge Creek is tributary to West Fork Bridge Creek, tributary to Bridge Creek, tributary to the Mattole River, located in Humboldt County, California. South Branch West Fork Bridge Creek's legal description at the confluence with the Mattole River is T05S R02E S00. Its location is 40°02'30" N. latitude and 123°59'29" W. longitude. South Branch West Fork Bridge Creek is a first order stream and has approximately 1.3 miles of blue line stream according to the USGS Briceland and Shelter Cove 7.5 minute quadrangles. The stream drains a watershed of approximately 1.1 square miles. Summer base flow is approximately 0.2 cubic feet per second (cfs) at the mouth, but over 10 cfs is not unusual during winter storms. Elevations range from about 1,080 feet at the mouth of the creek to 1,600 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for rural residence subdivision. Vehicle access exists from Redway via the Briceland/Shelter Cove Road to an unimproved road 1.7 miles west of Thorn Junction. Turn left on this road and continue to the mouth of South Branch West Fork Bridge Creek.

METHODS

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The habitat inventory conducted in South Branch West Fork Bridge Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1994). The Pacific Coast Fisheries, Wildlife, and Wetlands Restoration Association (PCFWWRA) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). South Branch West Fork Bridge Creek personnel were trained in May, 1996, by Scott Downie and Ruth Goodfield. This inventory was conducted by a two-person team.

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 Branch West Fork Bridge 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. Flows should also be measured or estimated at major tributary confluences.

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 each tenth unit typed. 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 Branch West Fork Bridge 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 measured for mean width, mean depth, and maximum depth (*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 South Branch West Fork Bridge 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 5 or "not suitable" (NS) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the

percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In South Branch West Fork Bridge 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 is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In South Branch West Fork Bridge 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. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results were recorded.

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 Branch West Fork Bridge 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. Biological inventory is conducted using one or more of three basic methods:

1) stream bank observation, 2) underwater observation, or 3) electrofishing. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

SUBSTRATE SAMPLING

Gravel sampling is conducted using a 9 inch diameter McNeil gravel sampler. Sample sites are identified numerically beginning at the most upstream site in the stream. Gravel samples are separated and measured to determine respective percent volume using five sieve sizes: 25.4, 12.5, 4.7, 2.37, and 0.85 mm (*Stream Substrate Quality for Salmonids: Guidelines for Sampling, Processing, and Analysis*, Valentine, 1995).

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat7.2, a DBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following six tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for South Branch West Fork Bridge 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

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- 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 25, 26, and 27, 1996, was conducted by Dave Smith and Ray Bevitori (PCFWWRA). The total length of the stream surveyed was 7,456 feet with no additional feet of side channel.

Flow was estimated to be 0.4 cfs during the survey period.

South Branch West Fork Bridge Creek is an F4 channel type for the entire 7,456 feet of stream reach surveyed. F4 channels are low gradient (<2%), entrenched, meandering streams with a gravel-dominant substrate.

Water temperatures ranged from 53 to 60° Fahrenheit. Air temperatures ranged from 53 to 64° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, pools made up 38%, riffle types 35%, and flatwater 28% (Graph 1). Flatwater habitat types made up 54% of the total survey **length**, riffles 28%, and pools 18% (Graph 2).

Nine Level IV habitat types were identified. These data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles, 33%; mid-channel pools, 25%; and step runs, 18% (Graph 3). By percent total **length**, step runs made up 48%, low gradient riffles 27%, and mid-channel pools 12%.

Forty-nine pools were identified (Table 3). Main channel pools were most often encountered at 73% and comprised 72% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Twenty-five of the 49 pools (51%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 49 pool tail-outs measured, none had a value of 1;

five had a value of 2 (10%); 34 had a value of 3 (69%); none had a value of 4; and 10 (21%) had a value of 5. On this scale, a value of 1 is the best for fisheries (Graph 6).

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 the highest shelter rating at 58. Riffle habitats followed with a rating of 15 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 70, and main channel pools rated 54 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large and small woody debris are the dominant cover type in South Branch West Fork Bridge Creek and are extensive. Graph 7 describes the pool cover in South Branch West Fork Bridge Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in two of the three low gradient riffles measured (67%). Small cobble was the next most frequently observed dominant substrate type and occurred in 33% of the low gradient riffles (Graph 8).

The mean percent canopy for the stream reach surveyed was 73%. The mean percentages of deciduous and coniferous trees were 79% and 21%, respectively. Graph 9 describes the canopy in South Branch West Fork Bridge Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 74%. The mean percent left bank vegetated was 80%. The dominant elements composing the structure of the stream banks consisted of 26.5% bedrock, 8.8% cobble/gravel, and 64.7% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 15% of the units surveyed. Additionally, 70.6% of the units surveyed had deciduous trees as the dominant vegetation type, and 11.8% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

The presence of young-of-the-year (YOY) salmonids was noted from streambank observations by the survey crew on South Branch West Fork Bridge Creek.

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GRAVEL SAMPLING RESULTS

No gravel samples were taken on South Branch West Fork Bridge Creek.

DISCUSSION

South Branch West Fork Bridge Creek is an F4 channel type for the entire 7,456 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is good for bank-placed boulders, fair for low-stage weirs and log cover structures, and poor for boulder clusters.

The water temperatures recorded on the survey days June 25-27, 1996, ranged from 53 to 60° Fahrenheit. Air temperatures ranged from 53 to 64° Fahrenheit. This is an acceptable 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 54% of the total **length** of this survey, riffles 28%, and pools 18%. The pools are relatively deep, with 25 of the 49 pools having a maximum depth greater than 2 feet. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total 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 for locations where their installation will not be threatened by high stream

energy, or where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream.

The LDA's in the system are retaining needed gravel. Any necessary modifications to them should be done with the intent of metering the gravel out to downstream reaches that will trap the gravel for future spawning use. Therefore, gravel retention features may need to be developed prior to any LDA modification.

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Thirty-four of the 49 pool tail-outs measured had embeddedness ratings of 3 or 4. None had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In South Branch West Fork Bridge 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 58. The shelter rating in the flatwater habitats was slightly lower at 38. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by woody debris in all habitat types. Additionally, boulders 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 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 for the stream was 73%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

The percentage of right and left bank covered with vegetation was high at 74% and 80%, 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)South Branch West Fork Bridge Creek should be managed as an anadromous, natural production stream.

2)There are several log debris accumulations present on South Branch West Fork Bridge Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading

in downstream reaches.

3) 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.

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 in some areas the material is at hand.

5)Inventory and map sources of stream bank erosion, and prioritize them according to present and potential sediment yield. Identified sites 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) Temperatures in this section of South Branch West Fork Bridge Creek, as well as upstream, should be monitored to determine if they are having a deleterious effect upon juvenile salmonids. To achieve this, biological sampling is also required.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and measured from the beginning of the survey reach.

0' Begin survey at confluence with West Fork Bridge Creek. Channel type is an F4 for entire length of stream surveyed.

237' Large debris accumulation (LDA) directing stream flow into right bank (RB). Looks like a good place for a relatively simple and easy modification project. Access to stream is good.

943' Large LDA (60'L x 25'W x 8'H) across stream channel is

blocking channel and retaining gravel. Possible barrier to anadromous fish.

1856' Wooden bridge crosses stream. Good access to creek.

2204' Small tributary enters from the RB. Temperature is 53°F.

2465' Spring on LB - 57°F.

2769' Man-made log structure in stream. Appears to be intact and working.

3298' Extensive LDA (80'L x 40'W) appears to have been modified. Not a barrier for fish.

4266' Spring on RB - 53°F.

6717' Stream channel has lost integrity - intermittent flow. Exposed gravel, cobble substrate.

7456' LDA's are extensive to the end of stream. Sub-surface flow. No fish observed. End of survey.

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.

Valentine, B. 1995. Stream substrate quality for salmonids: guidelines for sampling, processing, and analysis, unpublished manuscript. California Department of Forestry and Fire Protection, Santa Rosa, 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		

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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