STREAM INVENTORY REPORT

WEST FORK PANTHER CREEK, 1991

INTRODUCTION

A stream inventory was conducted during the summer of 1991 on West Fork Panther 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 West Fork Panther 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 restoration and enhancement recommendations are presented.

There is no known record of adult spawning surveys having been conducted on West Fork Panther 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

West Fork Panther Creek is tributary to Panther Creek, tributary to Bull Creek, tributary to the South Fork Eel River, tributary to the Eel River, located in Humboldt County, California (Figure 1). West Fork Panther Creek's legal description at the confluence with Bull Creek is T02S R01E S24. Its location is 40°17'24" latitude and 124°00'32" longitude. West Fork Panther Creek is a first order stream and has approximately 1.4 miles of blue line stream, according to the USGS Bull Creek 7.5 minute quadrangle. West Fork Panther Creek drains a watershed of approximately 1.64 square miles. Elevations range from about 920 feet at the mouth of the creek to 2,600 feet in the headwater areas. Douglas fir and hardwood forest dominates the watershed. The watershed is owned by the State of California and is managed by Humboldt Redwoods State Parks. Vehicle access exists from Highway 101 at Dyerville, via the Bull Creek-Mattole Road. From it, Kemp Road provides access to the mouth of West Fork Panther Creek. The access roads have locked gates controlled by the park.

METHODS

The habitat inventory conducted in West Fork Panther Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) Technical Advisors that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). West Fork Panther Creek personnel

were trained in May and June, 1991, by Gary Flosi and Scott Downie. 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 West Fork Panther 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 by David Rosgen (1985). 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 four measured parameters used to determine channel type: 1) water slope gradient, 2) channel confinement, 3) width/depth ratio, 4) substrate composition.

3. Temperatures:

Both water and air temperatures are taken and recorded each tenth unit typed. The time of the measurement is also recorded. Both temperatures are taken in 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". West Fork Panther 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. Unit measurements included mean length, mean width, mean depth, and maximum depth. Depth of the pool tail crest at each pool habitat unit was measured at 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 West Fork Panther 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).

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 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 West Fork Panther 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 habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

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 West Fork Panther Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results recorded.

9. Bank Composition:

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 West Fork Panther Creek, the dominant composition type in both the right and left banks was selected from a list of eight options on 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, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

Biological inventory was conducted in West Fork Panther Creek to document the fish species composition and distribution. Three sites were electrofished in West Fork Panther Creek using one Smith Root Model 12 electrofisher. Each site was end-blocked with nets to contain the fish within the sample reach. Fish from each site were counted by species, measured, and returned to the stream.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat Runtime, a dBASE 4.1 data entry program developed by the California Department of Fish and Game (DFG). This program also processes and summarizes the data.

The Habitat Runtime program produces the following 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 West Fork Panther 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

HABITAT INVENTORY RESULTS:

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

The habitat inventory of October 29, November 15, 18, 20, and 21, 1991, was conducted by Brian Humphrey and Erick Elliot (CCC). The total length of the stream surveyed was 7,525 feet, with an additional 218 feet of side channel.

Flow was not measured on West Fork Panther Creek.

West Fork Panther Creek is an A3 channel type for the entire 7,525 feet of stream reach surveyed. A3 channels are steep (4-10% gradient), very well confined streams, with unstable stream banks.

Water temperatures ranged from 45 to 50 degrees fahrenheit. Air temperatures ranged from 43 to 55 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 40.6%; pools were 31.7%; and flatwater types 27.7% (Graph 1). Riffles made up 51.7% of the total survey **length**, flatwater types were 34.1%, and pools 14.2% (Graph 2).

Fourteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were high gradient riffles, 29.9%, step runs, 22.8%, and mid-channel pools, 15.6% (Graph 3). By percent total **length**, high gradient riffles made up 42.6%, step runs 31.6%, and mid-channel pools 6.7% (Table 2).

Seventy-one pools were identified (Table 3). Main channel pools were most often encountered at 57.8%, and comprised 63.0% 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. Fifty-five of the 71 pools (77.5%) had a depth of less than two (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 64 pool tail-outs measured, zero had a value of 1; 10 had a value of 2 (15.6%); 32 had a value of 3

(50.0%); and 22 had a value of 4 (34.3%). On this scale, a value of one 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 56.3. Flatwater habitats followed with a rating of 36.1 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 59.2, and main-channel pools rated 54.2 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in West Fork Panther Creek and are extensive. Graph 7 describes the pool cover in West Fork Panther Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 7 of the 14 low gradient riffles (50.0%). Boulder was the next most frequently observed dominant substrate type, and occurred in 35.7% of the low gradient riffles (Graph 8).

Nearly 52% of the survey reach lacked shade canopy. Of the 48% of the stream covered with canopy, 98% was composed of deciduous trees, and 2% was composed of coniferous trees. Graph 9 describes the canopy in West Fork Panther Creek.

Table 2 summarizes the mean percentage of the right and left stream banks covered with vegetation by habitat type. For the stream reach surveyed, the mean percent right bank vegetated was 49.9%. The mean percent left bank vegetated was 46.7%. The dominant elements composing the structure of the stream banks consisted of 2.2% bedrock, 40.9% boulder, 2.2% cobble/gravel, 8.9% bare soil, 6.7% grass, 2.7% brush. Additionally, 34.7% of the banks were covered with deciduous trees, and 1.8% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three electrofishing sites were sampled on West Fork Panther Creek. The units were sampled on July 9, 1992, by Shea Monroe and Russ Irvin (CCC). Three passes were conducted at each site, fork lengths (FL) measured and recorded, and the fish returned to the stream.

The first site sampled was a riffle/run, approximately 95 feet from the confluence with

Panther Creek. The site yielded six steelhead, ranging from 38 to 122mm.

The second site was a mid-channel pool, located 991 feet above the confluence. This site had an area of 180 sq ft, and a volume of 540 cu ft. Fifteen steelhead were sampled. They ranged from 38 to 155 mm.

The third site sampled was a step pool and riffle, located approximately 5,530 feet above the creek mouth. The site had an area of 425 sq ft, and a volume of 265 cu ft. No fish were found.

DISCUSSION

The A3 channel type is generally not suitable for fish habitat improvement structures. A3 channels are found in high energy, steep gradient stream reaches. They have channels dominated by small boulders, cobble, coarse gravel and some sands. Therefore, do not retain gravels very well, and have unstable stream banks. Usually within the A3 channel there are zones of lower gradient where structures designed to trap gravels can be constructed. This seems to be the case in West Fork Panther Creek, but any structure sites must be selected with care because of the high stream energy which can create problems with stream bank erosion and structure stability.

The water temperatures recorded on the survey days ranged from 45° F to 50° F. Air temperatures ranged from 43° F to 55° F. This would be a very good water temperature regime for salmonids. However, the survey was conducted in late October and November; therefore, the temperatures do not reflect the summer thermal regimes. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling conducted.

Riffle habitat types comprised 51.7% of the total **length** of this survey, flatwater types 34.1%, and pools 14.2%. The pools are relatively shallow with only 16 of the 71 pools having a maximum depth greater than 2 feet. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat. Therefore, 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 unstable stream banks of the A3 channel type.

Fifty-four of the 64 pool tail-outs measured had embeddedness ratings of 3 or 4. Zero had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In West Fork Panther Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures

taken.

The mean shelter rating for pools was moderate with a rating of 56.3. The shelter rating in the flatwater habitats was lower at 36.1. However, a pool shelter rating of approximately 100 is desirable. The moderate amount of cover that now exists is being provided primarily by boulders in all habitat types. Log and root wad cover structures are needed in the flatwater habitats 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.

Seven of the 14 low gradient riffles had small cobble as the dominant substrate. This is generally considered fair for spawning salmonids.

The mean percent canopy for the stream was 43%. This is a relatively low percentage of canopy, since 80 percent is generally considered desirable. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) West Fork Panther Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Increase the canopy on West Fork Panther 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. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

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.

5) Increase woody cover in the flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable.

6) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Fish passage should be monitored, and improved where possible.

PROBLEM SITES AND LANDMARKS

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

0' Begin survey at confluence with Bull Creek. Channel type is an A3 for the entire survey reach.

161' Right bank slide, 20' high x 30 wide, partially re-vegetated but still contributing fines. Young-of- the-year steelhead (YOY) observed.

605' Massive right bank slide, 80' high x 150' wide, contributing fines and gravels.

802' South Fork Panther enters from the right bank.

889' ATV trail crosses the channel.

966' Left bank slide, 60' high x 65' wide.

1186' Left bank erosion covered with black tarp and boulders to hinder further erosion.

1329' Left and right bank stabilization work retaining fines from stream. YOY observed.

1416' Left bank slide stabilization work retaining most sediment contributions.

1492' Left bank erosion, 15' high x 35' wide.

1969' Left bank slide, 30' high x 50' wide, re-vegetation in process. Left bank protected by boulder and log work.

2056' Left bank erosion, 30' high x 15' wide, clumps of brush separate erosion.

2098' Massive left bank slide.

2154' Right bank erosion, 15' high x 20' wide, re-vegetation occurring.

2263' Tributary enters from the right bank.

2362' Left bank erosion, 20' high x 30' wide, previous bank protection work retaining sediment from stream.

2446' Massive left bank slide, 50' high x 375' wide, contributing fines and gravel. Patches of vegetation remain while re-vegetation occurs in others.

2874' Left bank slide.

3223' Right bank erosion, 9' high x 35' wide, behind boulder and log debris accumulation.

3495' Right bank erosion, 35' high continues into next unit.

3933' Massive Left bank slide, 75' high x 115' wide. Previous bank protection has been overwhelmed, fines have piled up and spilled over log and boulder retainers.

4228' Massive right bank erosion, 40'- 150' high x 240' wide.

4241' Left bank slide, 35' high x 226' wide.

4653' Tributary runs parallel to stream for 100' before entering from right bank.

4875' Overflow channel runs parallel to stream for 85'.

5094' Left bank erosion, 65' high x 70' wide., bank protected with boulders and logs.

5310' Massive right bank erosion, 30' high x 208' wide, contributing sediments in some patches. Re-vegetation occurring.

5705' Right bank erosion, 20' high x 65' wide, bank protected with boulders and logs.

5817' Left bank erosion, 25' high x 30' long, beginning to re-vegetate.

5916' Massive left bank erosion, 20' high x 185' wide.

6170' Left bank erosion, 15' high x 15' wide.

6422' Left bank erosion, 20' high x 40' wide, contributing fines.

6496' Gradient becoming increasingly steeper and plunges greater than 6' becoming numerous in the units upstream.

6914' Right bank erosion, 25' high x 50' long, contributing fines. Massive left bank erosion, 150' high x 200' wide, contributing fines.

7166' Massive left bank slide, 100'-120' high x 320' wide.

7470' Left bank erosion 40' high x 80' wide.

7525' Above this unit, both banks become more unstable, gradient becomes steeper, and massive slides contribute a great deal of fines; also, a series of 5'-7' high cascades and a log debris accumulation create a probable fish barrier. End of survey.