STREAM INVENTORY REPORT

PANTHER CREEK (S.F. EEL)

INTRODUCTION

A stream inventory was conducted during the summer of 1991 on 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 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 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

Panther Creek is tributary to Bull Creek, tributary to the South Fork Eel River, tributary to the Eel River, located in Humboldt County, California. Panther Creek's legal description at the confluence with Bull Creek is T02S R01E S24. Its location is 40°17'24" N. latitude and 124°00'33" W. longitude. Panther Creek is a second order stream and has approximately 1.6 miles of blue line stream according to the USGS Bull Creek 7.5 minute quadrangle. Panther Creek drains a watershed of approximately 3.2 square miles. Elevations range from about 910 feet at the mouth of the creek to 2800 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 via Highway 101 at Dyerville, via Bull Creek-Mattole Road.

METHODS

The habitat inventory conducted in Panther 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 that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). 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 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 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". 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. 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 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). 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 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.

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

Panther Creek

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 Panther 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 standard 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 Habitat7.1, 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 4. Graphics developed for 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
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

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

The habitat inventory of October 29, November 4, 6, 8, 13, and 14, 1991, was conducted by Erick Elliot, Shea Monroe, and Brian Humphrey (CCC). The total length of the stream surveyed was 8,164 feet with an additional 227 feet of side channel.

Flows were not measured on Panther Creek.

Panther Creek is an A3 channel type for the entire 8,164 feet of stream reach surveyed. A3 channels are steep (4-10% gradient), very well confined streams, with stable stream banks.

Water temperatures ranged from 44° to 53° Fahrenheit. Air temperatures ranged from 45° to 68° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, flatwater made up 34%, pool types 33%, and riffles 33% (Graph 1). Flatwater habitat types made up 57% of the total survey **length**, riffles 28%, and pools 15% (Graph 2).

Seventeen Level IV habitat types were identified. These data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were step runs, 29%; high gradient riffles, 15%; and mid channel pools and low gradient riffles both made up 14% (Graph 3). By percent total **length**, step runs made up 54%, high gradient riffles 17%, and low gradient riffles 9%.

Seventy-three pools were identified (Table 3). Main channel

pools were most often encountered at 59% and comprised 64% 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. Eight of the 73 pools (9%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 59 pool tail-outs measured, 1 had a value of 1 (2%); 14 had a value of 2 (24%); 26 had a value of 3 (44%); and 18 had a value of 4 (31%). 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 best shelter rating at 29. Flatwater habitats followed with a rating of 17 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 32, and main pools rated 26 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Boulder was the dominant substrate observed in 10 of the 30 low gradient riffles measured (33%). Gravel and small cobble were the next most frequently observed dominant substrate types and each occurred in 27% of the low gradient riffles (Graph 8).

The mean percent canopy for the stream reach surveyed was 69%. The mean percentages of deciduous and coniferous trees were 62% and 9%, respectively (Graph 9).

BIOLOGICAL INVENTORY RESULTS

One electrofishing site was sampled on Panther Creek. The unit was sampled on July 9, 1992 by Shea Monroe and Russ Irvine (CCC). Three passes were conducted at each site, fork lengths measured and recorded, and the fish returned to the stream.

The site sampled was a riffle/run, approximately 95 feet from the confluence with Bull Creek. The site yielded six steelhead, ranging from 38 to 122mm.

GRAVEL SAMPLING RESULTS

Panther Creek

No gravel samples were taken on Panther Creek.

DISCUSSION

Panther Creek is an A3 channel type for the entire 8,164 feet of stream surveyed. The suitability of A3 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for low-stage weirs, opposing wing-deflectors, and log cover; and poor for medium-stage weirs, boulder clusters, single wing-deflectors, and log cover.

The water temperatures recorded on the survey days October 29, November 4,6,8, 13, and 14, 1991 ranged from 44 to 53° Fahrenheit. Air temperatures ranged from 45 to 68° Fahrenheit. This is an excellent water temperature range for salmonids. However, these temperatures were taken in late fall. 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 57% of the total **length** of this survey, riffles 28%, and pools 15%. The pools are relatively shallow, with only eight of the 73 pools having a maximum depth greater than 2 feet. 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. In coastal coho and steelhead streams, when pool habitat is less than 40% of total habitat, pool enhancement is usually recommended. 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.

Forty-four of the 59 pool tail-outs measured had embeddedness ratings of 3 or 4. Only one 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 Panther 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 29. The shelter rating in the flatwater habitats was slightly lower at 17. 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, bedrock ledges 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.

Sixteen of the 30 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 69%. This is a relatively moderate percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

RECOMMENDATIONS

1) 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, like the site at 6206', should then be treated to reduce the amount of fine sediments entering the stream.

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) Temperatures in this section of Panther Creek, as well as upstream, should be monitored to determine if they are having a deleterious effect upon juvenile salmonids.

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) Increase the canopy on 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.

8) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved where possible.

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.

0' Begin survey at confluence with Bull Creek. Reach 1 is an A3 channel type.

161' Slide on the right bank (RB), 20'H X 30'L. Revegetation is occurring.

605' Slide on the RB, 80'H. It continues for the next 150'.

803' Unnamed tributary enters from the RB.

1114' Old Humboldt crossing.

1126' YOY.

1792' The left bank (LB) needs revegetating due to bulldozing. Fines are running into the stream.

2030' 4' plunge.

2119' Erosion on the LB, 35'H x 300'L.

2294' LWD creating a 4' plunge.

2548' Slide on the left bank, 50'h x 225'.

Panther Creek

3039'Slide on the RB, 60'H.

3188'Slide on both banks, 50'H. LB slide continues for 80'.

3559'An unnamed tributary enters from the LB.

3745'Erosion on both banks. The road is 15' above the stream.

3884'The RB is eroding into the stream, 50'H slide.

4188'Slide on the LB, 40'H.

4225'Slide on the LB, 20'H.

4574'Slide on the RB, 60'H x 70'L.

4630'A dry tributary enters from the LB.

4929'LWD on the LB.

4994'Slide on the LB, 50'H.

5109' Slide on the LB, 40'H.

5365'LWD along both banks, 3' plunge.

5610'LWD scattered throughout the unit.

5679'Slide on the LB, 12'H x 7'L. LWD accumulating along the RB.

5778'Slide on the RB, 40'H. YOY.

6197'Slide on the LB, 25'H x 60'L. LWD present.

6206'Massive erosion on both banks, continues for 150'.

6729'Small amount of erosion on the RB. YOY.

7363'Slide on the LB, 100'H.

7495'Slide on the RB, 70'H X 120'L.

7817'Slide on the LB, 80'H X 100'L. Slide on the RB, 60'H X 120'L.

7836'Slide on the RB, 80'H, continues for the next 300'.

7962' A dry tributary enters from the LB.

Panther Creek

8110' Slide on the LB, 80'H X 60'L.

8136' 6' plunge.

8164' End of survey. 6' plunge. Access is extremely difficult due to gradient and plunges.

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

Panther Creek

Dammed Pool	[DPL]	6.5