STREAM INVENTORY REPORT

TWIN ROCKS CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1993 on Twin Rocks 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 Twin Rocks 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 Twin Rocks 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

Twin Rocks Creek is tributary to Rattlesnake Creek, tributary to the South Fork Eel River, tributary to the Eel River, located in Mendocino County, California. Twin Rocks Creek's legal description at the confluence with Rattlesnake Creek is T23N R15W S20. Its location is 39°49'24" N. latitude and 123°34'21" W. longitude. Twin Rocks Creek is a first order stream and has approximately 2.4 miles of blue line stream, according to the USGS Tan Oak Park and Iron Peak 7.5 minute quadrangles. Twin Rocks Creek drains a watershed of approximately 5.5 square miles. Summer base runoff is approximately 3.4 cfs at the mouth. Elevations range from about 1,420 feet at the mouth of the creek to 3,600 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists from U.S. Highway 101, approximately 4.2 miles southeast of Cummings.

METHODS

The habitat inventory conducted in Twin Rocks 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). Twin Rocks Creek personnel were trained in May, 1993, 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 Twin Rocks Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the Rattlesnake Creek report.

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 Twin Rocks Creek to document the fish species composition and distribution. Two sites were electrofished in Twin Rocks 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.

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 0.85mm).

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. 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

Twin Rocks Creek

- Mean percent shelter by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Twin Rocks 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 REPORT *

The habitat inventory of July 21, 22, and 27, 1993, was conducted by Warren Mitchell and Ruth Goodfield (contract seasonal and CCC). The total length of the stream surveyed was 10,693 feet, with an additional 149 feet of side channel.

Flow was measured 300 feet upstream from the confluence of Rattlesnake Creek with a Marsh-McBirney Model 2000 flowmeter at 3.4 cfs on July 15, 1993.

Twin Rocks Creek is an F3 channel type for the first 1,918 feet of stream reach surveyed, It then changes to a B2 channel for the next 7,148 feet, and then changes to an A3 channel for the remaining 1,627 feet of the survey reach. F3 types are low gradient (less than 1%), totally confined channels, with cobble/gravel stream beds. B2 channels are moderate gradient (1.0-2.5%), moderately confined streams, with cobble/gravel stream beds. A3 channels are steep (4-10% gradient), well confined, coarse-grained streams, with unstable stream banks.

Water temperatures ranged from 55 to 65 degrees Fahrenheit. Air temperatures ranged from 60 to 79 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, riffles made up 38%, pools 33%, and flatwater 29% (Graph 1). Flatwater habitat types made up 39% of the total survey **length**, riffles 37%, and pools 24% (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 low gradient riffles, 32%; step runs 17%; and mid-channel pools 16% (Graph 3). By percent total **length**, low gradient riffles made up 32%, step runs 27%, and runs 12%.

Fifty-six pools were identified (Table 3). Main channel pools were most often encountered at 71%, and comprised 82% 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. Thirty-eight of the 56 pools (68%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 46 pool tail-outs measured, zero had a value of 1 (0.0%); 11 had a value of 2 (23.9%); 26 had a value of 3 (56.5%); and 9 had a value of 4 (19.6%). 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 12.3. Riffle habitats followed with a rating of 10.5 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 50.0, scour pools had a rating of 14.6, and main channel pools rated 9.6 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 39 of the 55 low gradient riffles (70.9%). Small cobble was the next most frequently observed dominant substrate type, and occurred in 29% of the low gradient riffles (Graph 8).

Twenty-nine percent of the survey reach lacked shade canopy. Of the 71% of the stream covered with canopy, 96% was composed of deciduous trees, and 4% was composed of coniferous trees. Graph 9 describes the canopy in Twin Rocks 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 49.2%. The mean percent left bank vegetated was 53.9%. The dominant elements composing the structure of the stream banks consisted of 12.4% bedrock, 0.6% boulder, 9.1% cobble/gravel, 3.8% bare soil, 4.7% grass, 1.7% brush. Additionally, 67.6% of the banks were covered with deciduous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on July 27, 1993 in Twin Rocks Creek. The units were sampled by Ruth Goodfield and Warren Mitchell (CCC). All measurements are fork lengths (FL) unless noted otherwise.

The first site sampled was habitat unit 119, a run, approximately 7,586 feet from the confluence with Rattlesnake Creek. This site had an area of 600 sq ft, and a volume of 480 cu ft. The unit yielded 27 steelhead, ranging from 37 to 133mm FL.

The second site was habitat unit 010, a run, located approximately 913 feet above the creek mouth. This site had an area of 135 sq ft, and a volume of 108 cu ft. Seven steelhead were sampled. They ranged from 42 to 53mm FL.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Twin Rocks Creek.

DISCUSSION

Twin Rocks Creek has three channel types: A3, B2, and F3. The high energy and steep gradient of the A3 channel type is generally not suitable for instream enhancement structures. The F3 channel type is also not suitable for enhancement structures due to its unstable stream banks. The B2 channel type is excellent for many types of low and medium stage instream enhancement structures. There are 7,148 feet of this type of channel in Twin Rocks Creek. Many site specific projects can be designed within this channel type, especially to increase pool frequency, volume and pool cover.

The water temperatures recorded on the survey days July 21-27,

1993 ranged from 55° F to 65° F. Air temperatures ranged from 60° F to 79° F. This is a fair water temperature regime for salmonids. However, 65° F, if sustained, is above the threshold stress level for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling conducted.

Flatwater habitat types comprised 38.9% of the total **length** of this survey, riffles 36.8%, and pools 24.3%. The pools are relatively deep with 38 of the 56 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. 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. 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 cause streambank erosion.

Thirty-five of the 46 pool tail-outs measured had embeddedness ratings of 3 or 4. Zero 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 Twin Rocks 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 low with a rating of 12.3. The shelter rating in the flatwater habitats was lower at 9.0. However, 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.

All 55 of the low gradient riffles 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 71%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.
In areas of stream bank erosion, planting endemic species of

coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Twin Rocks Creek should be managed as an anadromous, natural production stream.

2) 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.

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 Rattlesnake Creek. Small rock dam at the confluence. Reach #1 is an F3 channel type.

94' Culvert under Highway 101 bridge with pool at the upstream end.

1918' Channel changes to a B2 channel type (reach #2).

2137' Cable foot bridge crosses creek to a residence.

4444' Tributary enters from the right bank. Old hatchery site.

Twin Rocks Creek

6699'Left bank (LB) slide 100' high x 40' wide, with a seep 2/3 of the way up. Slide is contributing silt, gravel, and cobble into the channel. Fallen log in the channel is retaining slide deposits 75' wide x 50' long x 6' high.

7084'Plunge 5' high over bedrock.

8785'Plunge 5' high over boulders.

8934'Gradient is increasing. Young-of-the-year steelhead (YOY) observed. Tributary enters from the LB.

9030'Small tributary enters from the LB.

9066'Channel changes to an A3 channel type (reach #3).

9734'Step pools with plunge 11' high over boulders. Gradient continues to increase, with YOY still observed.

10349'Debris flow on LB; 15' high x 35' long, contributing fines into the channel.

10456'Creek forks. LB tributary turns into a waterfall; survey continues on the right bank (RB) tributary (north fork).

10693'End survey at pool at the base of boulders 5' diameter. Survey crew continued walking upstream: gradient increases with falls and cascades, no fish observed.

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