STREAM INVENTORY REPORT

POISON OAK CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1993 on Poison Oak 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 Poison Oak 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 Poison Oak 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

Poison Oak Creek is tributary to the Eel River, located in Humboldt County, California. Poison Oak Creek's legal description at the confluence with the Eel River is T1S R2E S36. Its location is 40°20'23" N. latitude and 123°52'54" W. longitude. Poison Oak Creek is a first order stream and has approximately 2.5 miles of blue line stream, according to the USGS Weott 7.5 minute quadrangle. Poison Oak Creek drains a watershed of approximately 1.5 square miles. Summer base runoff is approximately 0.78 cfs at the mouth. Elevations range from about 160 feet at the mouth of the creek to 1,800 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 just north of Weott, via Dyerville Road to Camp Grant.

METHODS

The habitat inventory conducted in Poison Oak 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). Poison Oak 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 Poison Oak 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 measured and recorded at 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". Poison Oak 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. 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 Poison Oak 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 Poison Oak 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 Poison Oak 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 Poison Oak 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 Poison Oak Creek to document the fish species composition and distribution. Four sites were electrofished in Poison Oak 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
- Mean percent shelter by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Poison Oak 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 June 28 and 30, 1993, was conducted by Chris Coyle and Craig Mesman (CCC). The total length of the stream surveyed was 9,285 feet, with an additional 91 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.78 cfs on July 12, 1993.

Poison Oak Creek has three channel types: from the mouth to 5,776 feet an F3, next 2,437 feet a C3, and the upper 1,072 feet a B3. F3 channels are flat gradient (<1%), totally confined, with gravel beds. C3 channels have low gradient (0.5-1.0%), slightly confined, meandering gravel bed channels. B3 channels are moderate gradient (1.5-4.0%), well confined, with cobble/gravel beds.

Water temperatures ranged from 58 to 63 degrees fahrenheit. Air temperatures ranged from 63 to 74 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent occurrence, riffles made up 43.6%, pools 33.3%, and flatwater 22.2% (Graph 1). Riffle habitat types made up 41.7% of the total survey length, flatwater 13.6%, and pools 8.7%. Thirty-six percent of the channel length surveyed was dry (Graph 2).

Fifteen 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, 39.7%; and runs, 13.5% (Graph 3). By percent total length, low gradient riffles made up 39.4%, and step runs 5.4%.

Forty-two pools were identified (Table 3). Scour pools were most often encountered at 64.3%, and comprised 66.6% 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-three of the 42 pools (79%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 42 pool tail-outs measured, zero had a value of 1 (0.0%); 11 had a value of 2 (26.2%); 28 had a value of 3 (66.7%); and 3 had a value of 4 (7.1%). 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 40.0. Flatwater habitats followed with a rating of 18.2 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 49.3, main channel pools had a rating of 24.6, and backwater pools rated 15.0 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Poison Oak Creek. Small woody debris and root wads are the next most common cover types (Graph 7).

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 48 of the 50 low gradient riffles (96.0%). Graph 8 describes the substrates in Poison Oak Creek.

Thirty-three percent of the survey reach lacked shade canopy. Of the 67% of the stream covered with canopy, 62% was composed of deciduous trees, and 38% was composed of coniferous trees. Graph 9 describes the canopy in Poison Oak 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 75.6%. The mean percent left bank vegetated was 79.0%. The dominant elements composing the structure of the stream banks consisted of 7.1% bedrock, 2.4% cobble/gravel, 1.6% bare soil, 7.9% grass, 25.4 brush. Additionally, 30.6% of the banks were covered with deciduous trees, and 25.0 with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Four sites were electrofished on July 12, 1993 in Poison Oak Creek. The units were sampled by Chris Coyle and Craig Mesman (CCC). All measurements are fork lengths (FL) unless noted otherwise.

The first site sampled included habitat units 026 and 027, a low gradient riffle and mid channel pool, approximately 4,563 feet from the confluence with the Eel River. This site had an area of 756 sq ft, and a volume of 467 cu ft. The unit yielded three steelhead, 58, 113, and 160mm FL; one squawfish, 53mm FL; and two California roach, 36 and 40mm FL.

The second site included habitat units 078-080, a combination low gradient riffle, run, and plunge pool, located approximately 7,470 feet above the creek mouth. This site had an area of 232 sq ft, and a volume of 182 cu ft. Three steelhead were sampled, 56, 82, and 155mm FL.

The third site sampled included habitat units 090 and 091, a low gradient riffle and mid-channel pool, located approximately 7,868 feet above the creek mouth. The site had an area of 2,415 sq ft, and a volume of 521 cu ft. One steelhead was sampled, 136mm FL.

The fourth site included units 096 and 097, a step run and plunge pool, located approximately 8,456 feet above the confluence with the Eel River. This site had an area of 473 sq ft, and a volume of 264 cu ft. No fish were sampled or observed.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Poison Oak Creek.

DISCUSSION

Poison Oak Creek has three channel types: B3, C3, and F3. The B3 channel type is generally unsuitable for instream enhancement structures. B3 types are moderate gradient channels with unstable stream banks. The F3 channels also have unstable stream banks which make them unsuitable for fish enhancement structures.

The middle 2,437' of the survey reach is a C3 channel. C3 channels are meandering stream types on noncohesive gravel beds which have poorly consolidated and unstable stream banks. They are generally not suitable for instream enhancement structures. However, bank placed boulders, bank cover, overhead log cover and shelter structures in straight reaches are often appropriate. Any work considered will require careful design, placement, and construction that must include protection for the unstable banks.

The water temperatures recorded on the survey days June 28 and 30, 1993 ranged from 58° F to 63° F. Air temperatures ranged from 63° F to 74° F. This is a good water temperature regime for salmonids. However, 63° F, if sustained, is near 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.

Riffle habitat types comprised 41.7% of the total length of this survey, flatwater 45.5%, and pools 8.7%. The pools are relatively shallow with only 9 of the 42 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, cause streambank erosion, or conflict with the modification of the several log debris accumulations (LDA's) in the stream. The LDA's in the system are retaining needed gravels. Any necessary modifications to them should be done with the intent of metering the gravels 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.

Thirty-one of the 42 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 Poison Oak 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 40.0. The shelter rating in the flatwater habitats was lower at 18.2. However, a pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, small woody debris and root wads contribute a moderate amount. Log and root wad cover structures in the 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.

Forty-eight of the 50 low gradient riffles had gravel as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy for the stream was 67%. 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) Poison Oak 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.

3) 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 and in some areas the material is at hand.

4) 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.

5) 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.

6) There are several log debris accumulations present on Poison Oak Creek that are retaining 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.

7) Due to the channel being dry for the first 3,376' at the time of the survey, and the series of four culvert systems, 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 the Eel River. First 3376' of the channel is dry. Gravel bar 196' wide between mouth of the creek and wetted Eel River channel. Channel is highly aggraded. Reach #1 is an F3 channel type.
719'	Tributary enters from the left bank; not flowing.
2577'	Flat car bridge 10' wide x 40' long x 8' high.
2781'	Road in the channel for the next 319'.
3771'	Young-of-the-year (YOY) salmonids observed.
3826'	Arch culvert 13' wide x 20' long with 8.5' clearance and concrete bottom.
4688'	Dual concrete pipe culverts 3' diameter x 24' long, no impaction.
5717'	Dyerville Road crosses the channel. Culvert 7' diameter x 70' long, with 2.5' clearance; 80% impacted.
5776'	Concrete arch culvert 6' diameter x 45' long under railroad. Culvert is heavily impacted with 1.5' clearance. Channel type changes to a C3 (reach #2).
7539'	Right bank slide 300' high x 200' long, mostly revegetated, depositing debris in the channel.
7572'	Log and debris accumulation (LDA) 10' wide x 5' long x 2' high; possible low flow barrier.
7585'	Resident steelhead rainbow trout observed.
8195'	Tributary enters from the left bank; no value for anadromous fish.
8213'	LDA 30' wide x 80' long x 12' high, retaining gravel 10' high x 30' wide at the base. Complete barrier. Channel type changes to a B3 (reach #3).
8942'	LDA 30' wide x 5' long x 5' high, retaining gravel 5' high x 30' wide at the base. Downstream channel is cutting to bedrock, probable velocity barrier.
9010'	LDA 30' wide x 10' long x 6' high, retaining gravel 6' high x 30' wide at the base.
9285'	End of survey; beyond anadromous reach.

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