STREAM INVENTORY REPORT

Poison Oak Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1998 on Poison Oak. 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 presence and distribution of juvenile salmonid species.

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. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Poison Oak Creek is tributary to the mainstem Eel River, located in Humboldt County, California (Map 1). Poison Oak Creek's legal description at the confluence with the Eel River is T01S R02E S36. Its location is 40°20′23″ North latitude and 123°52′54″ West 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. Elevations range from about 160 feet at the mouth of the creek to 1,800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists 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 et.al., 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) Members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). This inventory was conducted by a two-person team.

SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach (Hopelain, 1995). All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth,

depth of pool tail crest, dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are further measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

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.

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 every tenth habitat unit. 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". 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. 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 sampled for all features on the sampling form (Hopelain, 1995). Pool tail crest depth at each pool unit was

measured in the thalweg. All measurements were 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) and 76 - 100% (value 4). Additionally, a value of 5 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 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 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. In addition the dominant substrate composing the pool tail outs is recorded for each pool.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Poison Oak 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. In addition, the area of canopy was estimated ocularly into percentages of coniferous or deciduous trees.

9. Bank Composition and Vegetation:

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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 and the dominant vegetation type 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. In Poison Oak Creek fish presence was observed from the stream banks. 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)(Valentine, 1995).

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, 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. 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

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- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in the pool tail outs
- 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 July 1, 1998, was conducted by Stu McMorrow and Caroline Jezierski (WSP). The total length of the stream surveyed was 8,175 feet with no additional feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.8 cfs on July 1, 1998.

Poison Oak Creek is an F3 channel type for the entire 8,175 feet of stream reach surveyed. F3 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and cobble-dominant substrates.

Water temperatures taken during the survey period ranged from 56 to 57° F. Air temperatures ranged from 63 to 68° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 33% riffle units, 26% flatwater units, 38% pool units, 1% dry units, and 3% culvert units (Graph 1). Based on total length of Level II habitat types there were 18% riffle units, 28% flatwater units, 7% pool units, 46% dry units, and 1% culvert units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles 29%; mid-channel pools, 25%; and runs, 14% (Graph 3). Based on percent total length, dry units made up 46%, low gradient riffles 17%, and runs 14%.

A total of thirty pools were identified (Table 3). Main channel pools were most frequently encountered at 67% and comprised 71% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Eight of the thirty pools (27%) had a depth of 2' or greater (Graph 5). The depth of cobble embeddedness was estimated at pool tail-outs. Of the twenty-nine pool tail-outs measured, one had a value of 1 (3.5%); none had a value of 2 (0%); twenty had a value of 3

(69%); seven had a value of 4 (24%) and one had a value of 5 (3.5%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail-out is not suitable for spawning.

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. Riffle habitat types had a mean shelter rating of 5, flatwater habitat types had a mean shelter rating of 15, and pool habitats had a mean shelter rating of 9 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 24. Main channel pools had a mean shelter rating of 5 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris is the dominant cover type in Poison Oak Creek and is extensive. Graph 7 describes the pool cover in Poison Oak Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 21 of the 29 pool tail outs measured (72%). Small cobble was the next most frequently observed dominant substrate type and occurred in 24% of the pool tail outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 72%. The mean percentages of deciduous and coniferous trees were 60% and 40%, respectively. Graph 9 describes the canopy in Poison Oak Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 38%. The mean percent left bank vegetated was 37%. The dominant elements composing the structure of the stream banks consisted of 5.6% bedrock, 0% boulder, 25.0% cobble/gravel, and 69.4% sand/silt/clay (Graph 10). Brush was the dominant vegetation type observed in 44% of the units surveyed. Additionally, 30.6% of the units surveyed had deciduous trees as the dominant vegetation type, and 11.1% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

No sites were electrofished during the 1998 stream inventory in Oak Creek.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Poison Oak Creek.

DISCUSSION

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Poison Oak Creek is an F3 channel type for the entire 8,175 feet of stream surveyed. The suitability of F3 channel types for fish habitat improvement structures is good for bank-placed boulders, single and opposing wing-deflectors; and fair for plunge weirs, boulder clusters, channel constrictors, and log cover.

The water temperatures recorded on the survey day July 1, 1998, ranged from 56 to 57 degrees Fahrenheit. Air temperatures ranged from 63 to 68° F. This is a fair water temperature range for salmonids. However, 68° F, if sustained, is near the threshold stress level for salmonids. This does not seem to be the case here, and Poison Oak Creek seems to have temperatures favorable to 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 28% of the total length of this survey, riffles 18%, and pools 7%. The pools are relatively shallow, with only eight of the thirty (26%) pools having a maximum depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream 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. Many of 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.

One of the twenty-nine pool tail-outs measured had an embeddedness rating of 1. Twenty-seven of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5 or was considered unsuitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In Poison Oak 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 9. The shelter rating in the flatwater habitats was slightly better at 15. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by large woody debris in all habitat types. Additionally, rootwads 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.

Twenty-eight of the twenty-nine pool tail outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

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The mean percent canopy density for the stream was 72%. This is a relatively acceptable percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 38% and 36%, 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) Poison Oak 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) 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.

4) The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

5) 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.

6) Increase the canopy on Poison Oak 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.

7) There are several log debris accumulations present on Poison Oak 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.

COMMENTS AND LANDMARKS

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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 the Eel River. The channel is dry here.

780' A dry tributary enters on the left bank.

2000' Large debris accumulation (LDA) in stream channel, 30 feet long x 40 feet wide x 6 feet high. It is not a barrier to fish migration.

2497' Railroad flatcar bridge, 40 feet long x 10 feet wide by 8 feet high.

2701' Dirt road crosses the channel.

2850' Slide on the left bank with large woody debris on the slope; 150' L x 45' H.

3650' Metal arch culvert over the channel, 20' L x 8' W x 12' H.

4220' Tributary enters creek from left bank (LB).

4365' Double concrete culverts under road. Each culvert is 24' L x ‘ W x 3' H.

5294' Dyerville loop road crossing at metal culvert, which is heavily impacted. The road crossing is 70' L x 6' W.

5431' Concrete arch culvert under railroad, 45' L x 6' W. It is heavily impacted with 1.5' of clearance.

5446' Dry tributary enters LB.

5833' LDA over pool; not a barrier.

6481' Channel is highly aggraded.

7140' LDA; 50' L x 20' W x 6' H.

7159' LDA; 30' L x 20' W x 8' H, with a 3' drop in elevation; retaining gravel.

7262' Right bank (RB) slide; 30' H x 100' W.

7301' LDA; 10' L x 20' W x 3' H.

7910' LDA; 80' L x 30' W x 14' H. It is retaining gravel with a bedrock cascade. It seems to be a complete barrier.

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8081' LDA; 15' L x 10' W x 6' H. Retaining gravel, but probably not a barrier.

8110' High gradient bedrock sheet. Possible velocity barrier.

8153' Plunge pool fed by bedrock cascade with an LDA; 60' L x 10' W x 15' H. There is a 16' drop over logs and bedrock sheets.

8175' Stream gradient climbs to approximately 75%. 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		
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