STREAM INVENTORY REPORT

OLDS CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 2000 on Olds Creek and three unnamed tributaries. The survey began at the confluence with the Noyo River and extended upstream 4.17 miles.

The Olds Creek 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 Olds 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 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

Olds Creek is a tributary to the Noyo River, a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Olds Creek's legal description at the confluence with the Noyo River is T18N R15W S14. Its location is 39°25′13″ north latitude and 123°30′9″ west longitude. Olds Creek is a second order stream and has approximately 3.0 miles of blue line stream according to the USGS Burbeck and Northspur 7.5 minute quadrangles. Olds Creek drains a watershed of approximately 5.4 square miles. Elevations range from about 600 feet at the mouth of the creek to 2,000 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 20 to Irmulco Road.

METHODS

The habitat inventory conducted in Olds 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. 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 (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are 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 Olds 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 a Marsh-McBirney Model 2000 flow meter.

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. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

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". Olds 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. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Olds 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, bedrock, 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 Olds 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 Olds 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:

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 Olds 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 (including downed trees, logs, and root wads) was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Olds Creek. In addition, two sites were electrofished using a Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

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 Olds 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
- Mean 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 June 12-14, 19-22, 26-28 and July 10-12, 2000, was conducted by Ethan Jankowski, Rhonda Weidenbeck, and Kasey Sirkin (WSP). The total length of the stream surveyed was 22,039 feet with an additional 336 feet of side channel.

Stream flow was measured at the bottom of the survey reach with a Marsh-McBirney 2000 Flowmeter at 0.53 cfs on June 15, 2000.

Olds Creek is a F4 channel type for the first 12,710 feet surveyed, and a G4 channel type for the remaining 9,329' of stream surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. G4 channels are entrenched "gully" step pools and low width/depth ratios on moderate gradients.

Water temperatures taken during the survey period ranged from 58 to 68 degrees Fahrenheit. Air temperatures ranged from 56 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 21% riffle units, 33% flatwater units, and 46% pool units (Graph 1). Based on total **length** of Level II habitat types there were 16% riffle units, 59% flatwater units, and 25% pool units (Graph 2).

Fourteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were runs, 27%; mid-channel pools, 22%; and riffles, 18% (Graph 3). Based on percent total **length**, runs made up 47%, low gradient riffles 13%, and step runs 13%.

A total of 182 pools were identified (Table 3). Scour pools were the most frequently encountered, at 52%, and comprised 51% 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. One-hundred-nineteen of the 182 pools (65%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the pool tail-outs measured, 15 had a value of 1 (8.0%); 109 had a value of 2 (60%); 46 had a value of 3 (25%); 2 had a value of 4 (1.0%); and 10 had a value of 5 (6.0%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. The breakdown of dominant substrate composition for the 10 pool tail-outs that had a embeddedness value of 5 were as follows: 60% bedrock, 30% boulder, and 10% silt/clay.

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 6, flatwater habitat types had a mean shelter rating of 15, and pool habitats had a mean

shelter rating of 56 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 57. Mid-channel pools had a mean shelter rating of 54 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Undercut banks are the dominant cover types in Olds Creek. Graph 7 describes the pool cover in Olds Creek. Undercut banks are the dominant pool cover type followed by small woody debris.

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 67% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 20%.

The mean percent canopy density for the surveyed length of Olds Creek was 84%. The mean percentages of deciduous and coniferous trees were 51% and 33%, respectively. Graph 9 describes the mean percent canopy in Olds Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 74%. The mean percent left bank vegetated was 75%. The dominant elements composing the structure of the stream banks consisted of 13.5% bedrock, 10.8% boulder, 42.6% cobble/gravel, and 33% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 56% of the units surveyed. Additionally, 25% of the units surveyed had coniferous trees as the dominant vegetation type, and 9.5% had brush as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished for species composition and distribution in Olds Creek on July 19, 2000. The sites were sampled by the Mendocino Redwood Company.

The first site sampled included habitat units 027-030, approximately 1,150 feet from the confluence with the Noyo River. The site yielded five young-of-the-year steelhead, and one Pacific giant salamander.

The second site included habitat units 256-258, located approximately 14,520 feet above the creek mouth. The site yielded seven young-of-the-year steelhead, and seven Pacific giant salamanders.

The following chart displays the information yielded from these sites:

The site numbers noted below are according to the Mendocino Redwood Company data and correspond to the habitat unit numbers listed below.

Date	Site #	Approx. Dist. from mouth (ft.)	Hab. Unit #	Hab. Type	Reach #	Channel type	Steelhead YOY	1+	2+
7-19-2000	70-38	1,150	027-030	5.1, 1.1, 5.1, 3.3	2	F3	5	0	0
7-19-2000	70-41	14,520'	256-258	3.3, 1.1, 3.3	2	F3	7	0	0

DISCUSSION

Olds Creek is a F4 channel type for the first 12,710 feet of stream surveyed and a G4 channel type for the remaining 9,329 feet. The suitability of F4 channel types for fish habitat improvement structures is as follows: F4 channel types are good for bank-placed boulders; fair for plunge weirs, single and opposing wing deflectores, channel constrictors and log cover; and poor for boulder clusters. G4 channel types are good for bank-placed boulders; fair for plunge weirs, opposing wing-deflectors, and log cover; and poor for boulder clusters and single wing-deflectors.

The water temperatures recorded on the survey days June 12-14, 19-22, 26-28 and July 10-12, 2000 ranged from 58 to 68 degrees Fahrenheit. Air temperatures ranged from 56 to 82 degrees Fahrenheit. This is a suitable water temperature range for 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 59% of the total **length** of this survey, riffles 16%, and pools 25%. The pools are relatively deep, with 119 of the 182 (65%) pools having a maximum depth greater than 2 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.

One-hundred-twenty-four of the 182 pool tail-outs measured had embeddedness ratings of 1 or 2. Forty-eight of the pool tail-outs had embeddedness ratings of 3 or 4. Ten of the pool tail-outs had a rating of 5, which is considered unsuitable for spawning. One of the 10 were unsuitable for spawning due to the dominant substrate being silt/clay. The remainder of pool tails valued at 5 were dominated by bedrock or boulders. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

One-hundred-twenty-four of the 182 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 56. The shelter rating in the flatwater habitats was 15. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by undercut banks in all habitat types. Additionally, small woody debris contributes a small amount. Log and root wad cover structures in the pool and flatwater habitats would enhance 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.

The mean percent canopy density for the stream was 84%. Reach 1 had a canopy density of 86% while Reach 2 had a canopy density of 82%. This is a relatively high percentage of canopy. In general, re-vegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high at 74% and 75%, 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) Olds Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from undercut bank. Adding high quality complexity with woody cover is desirable.

COMMENTS 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 Noyo River. Channel type is F4.
398'	Downstream migrant trap.
620'	Concrete structure acting as a dam retaining gravel and sediment, 4' long x 11' wide x 3' high.

885'	Log debris accumulation (LDA), 25' long x 8' wide x 8' high.
1,150'	First electrofishing site.
2,580'	LDA, 15' long x 15' wide x 6' high.
3,008'	Bridge of main hauling road across creek, 11' long x 25' wide x 8' high.
3,197'	Channel type taken.
3,712'	Right bank tributary. Water temperature 57° F at the time of the survey.
4,809'	Left bank tributary. Water temperature 58° F at the time of the survey.
4,819'	Culvert under main haul road.
5,437'	Channel type taken.
7,420'	Road on left bank approximately 15' above creek.
7,911'	LDA, 15' long x 30' wide x 6' high, not retaining sediment.
8,071'	Old road crossing.
8,541'	Right bank tributary. Water temperature 60° F at the time of the survey.
8,818'	Left bank tributary.
9,668'	LDA, 12' long x 30' wide x 6' high, not retaining sediment.
10,284'	LDA, 10' long x 15' wide x 7' high, not retaining sediment.
11,405'	Left bank tributary.
12,611'	Right bank tributary #5. See subsection report. Channel type taken on Olds Creek. Channel type is G4.
13,088'	LDA, 7' long x 20' wide x 4' high, not retaining sediment.
13,244'	Left bank tributary. Water temperature 56°F at time of survey.
14,286'	LDA on right bank, 10' long x 7' wide x 3' high, not retaining sediment.
14,337'	LDA on right bank, 4' long x 8' wide x 4' high, not retaining sediment.

14,520' Second electrofishing site.

16,361' Bridge crosses creek, 12' long x 30' wide x 7' high.

16,783' LDA, 10' long x 20' wide x 3' high, not retaining sediment.

17,176' Left bank tributary #5. Water temperature 58°F at time of the survey. See subsection report.

18,184' Road crossing. Connects Irmulco Road before and after bridge.

18,238' Bridge crosses creek, 10' long x 30' wide x 9' high. Irmulco Road.

18,817' Bridge crossing, 12' long x 30' wide x13' high. Road off of Irmulco Road.

19,234' LDA, 26' long x 32' wide x 5' high.

19,597' Right bank tributary #6. See subsection report.

19,918' Left bank tributary. Water temperature 59°F at the time of the survey.

20,387' LDA, 10' long x 10' wide x 10' high.

20,533' LDA, 18' long x 15' wide x 6' high.

20,834' LDA, 18' long x 15' wide x 4' high.

21,023' LDA, 40' long x 15' wide x 6' high, not retaining flow or sediment.

21,302' LDA, 15' long x 20' wide x 8' high.

21,612' LDA, 8' long x 19' wide x 19' high.

21,673' LDA, 18' long x 16' wide x 14' high.

21,866' LDA, 15' long x 25' wide x 12' high.

22,039' End of survey. Bedrock and boulder chute 32' long with a 32% slope. Plunge pool at bottom of chute. Fish not observed above.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1}
High Gradient Riffle	(HGR)	[1.2]	{ 2}
CASCADE			
Cascade	(CAS)	[2.1]	{ 3}
Bedrock Sheet	(BRS)	[2.2]	{24}
FLATWATER			
Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8}
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9}
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4}
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5}
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6}
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7}
Dammed Pool	(DPL)	[6.5]	{13}
ADDITIONAL UNIT DESIGNATIONS			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	