STREAM INVENTORY REPORT

PARLIN CREEK

INTRODUCTION

A stream inventory was conducted during the fall of 1995 on Parlin Creek. In addition three unnamed tributaries to Parlin Creek were also inventoried. 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 Parlin Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species. There is no known record of adult spawning surveys having been conducted on Parlin Creek or its tributaries.

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

Parlin Creek is tributary to the South Fork Noyo River, tributary to the Noyo River, located in Mendocino County, California (Figure 1). Parlin Creek's legal description at the confluence with South Fork Noyo River is T17N R16W S04. Its location is 39°22′10″ north latitude and 123°39′29″ west longitude. Parlin Creek is a second order stream and has approximately 2.8 miles of blue line stream according to the USGS Mathison Peak, Noyo Hill, Northspur, and Comptche 7.5 minute quadrangles. Parlin Creek drains a watershed of approximately 4.3 square miles. Summer base runoff is approximately 0.2 cubic feet per second (cfs) at the mouth. Elevations range from about 170 feet at the mouth of the creek to 1200 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is located within Jackson Demonstration State Forest and is managed for timber production. Vehicle access exists via California Department of Forestry and Fire Protection (CDF) Road 340 out of Parlin Fork Conservation Camp. The confluence of Parlin Creek with the South Fork Noyo River is upstream of the Department of Fish and Game egg taking station on the South Fork Noyo River.

METHODS

The habitat inventory conducted in Parlin 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 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). Parlin Creek personnel were trained in May, 1995, by Gary Flosi. 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, 1994). 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. 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 Parlin 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. Additionally, in Parlin Creek three recording thermographs were deployed from June 30 to October 11 to record temperatures on a 24 hour basis during warm summer months.

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". Parlin 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 (*Sampling Levels for Fish Habitat Inventory*, Hopelain, 1995). 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 Parlin 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 Parlin 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.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Parlin 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 Parlin 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. In Parlin Creek fish presence was observed from the stream banks, and five sites were electrofished using one 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 Lotus 1,2,3. Graphics developed for Parlin 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

The following results and discussion are for main stem Parlin Creek. Results and discussion for the three unnamed tributaries are presented as subsections following the main body of this report.

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

The habitat inventory of September 18 through 27, 1995, was conducted by Kyle Young (WSP/AmeriCorps) and Chris Coyle (CCC). The total length of the stream surveyed was 20,736 feet with an additional 557 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.2 cfs on September 26, 1995.

Parlin Creek is an F4 channel type for the first 18,942 feet of stream surveyed and a DA4 channel type for the remaining 1,794 feet. F4 channels are entrenched, meandering, riffle-pool channels on low gradients with high width/depth ratios and gravel substrates. DA4 channels are "braided" channels with narrow and deep channels; expansive, well-vegetated floodplains and associated wetlands; very gentle relief with highly variable sinuosities; stable stream banks, and gravel-dominant substrates.

Water temperatures ranged from 51 to 70 degrees Fahrenheit. Air temperatures ranged from 55 to 80 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 42% pool units, 31% flatwater units, and 25% riffle units (Graph 1). Based on total **length** of Level II habitat types there were 45% pool units, 31% flatwater units, and 21% riffle units (Graph 2).

Sixteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were mid-channel pools, 27%; low-gradient riffles, 25%; and glides, 19% (Graph 3). Based on percent total **length**, mid-channel pools made up 28%, low-gradient riffles 21%, and glides 19%.

A total of 341 pools were identified (Table 3). Main channel pools were most frequently encountered at 71% and comprised 71% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat type. Depth is an indicator of pool quality. One hundred thirty-two of the 341 pools (39%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 249 pool tail-outs measured, 40 had a value of 1 (16.1%); 123 had a value of 2 (49.4%); 69 had a value of 3 (27.7%); and 17 had a value of 4 (6.8%) (Graph 6). On this scale, a value of 1 indicates the highest quality of

spawning substrate.

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 a mean shelter rating of 24, and flatwater habitats had a mean shelter a rating of 7 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 30. Scour pools had a mean shelter rating of 15 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 16 of the 23 low gradient riffles measured (70%). Small cobble was the next most frequently observed dominant substrate type and occurred in 26% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 91%. The mean percentages of deciduous and coniferous trees were 5% and 95%, respectively. Graph 9 describes the canopy in Parlin Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 73%. The mean percent left bank vegetated was 70%. The dominant elements composing the structure of the stream banks consisted of 9.9% bedrock, 0% boulder, 50.5% cobble/gravel, and 39.6% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 52% of the units surveyed. Additionally, 43% of the units surveyed had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Five sites were electrofished on September 20 and 26, 1995, in Parlin Creek. The first three sites are within the F4 channel type reach, the remainder being within the DA4 channel type reach. The units were sampled by Kyle Young (WSP/AmeriCorps) and Chris Coyle (CCC).

The first site sampled included habitat units 94-98, a series of pools, runs, and a riffle approximately 3,787 feet from the confluence with South Fork Noyo River. This site had an area of 1125 sq ft and a volume of 550 cu ft. The unit yielded eight 0+ steelhead, three 0+ coho, and two Pacific giant salamanders.

The second site included habitat unit 568, a mid-channel pool located approximately 15,856 feet above the creek mouth. This site had an area of 225 sq ft and a volume of 450 cu ft. The site yielded four 0+ coho and one sculpin.

The third site sampled included habitat units 570-579, a series of pools, runs, and riffles located approximately 15,879 feet above the creek mouth. The site had an area of 1055 sq ft and a volume of 1055 cu ft. The site yielded one 1+ steelhead; in addition, over 20 sculpin were observed.

The fourth site sampled included habitat units 744, 745, and 747, a glide and two mid-channel pools located approximately 19,465 feet above the creek mouth. The site had an area of 112 sq ft and a volume of 112 cu ft. The site yielded two 1+ steelhead.

The fifth site sampled included habitat units 783 and 785, a plunge pool and trench pool located approximately 20,440 feet above the creek mouth. The site had an area of 540 sq ft and a volume of 1,080 cu ft. The site yielded one 1+ steelhead. A 2+ steelhead was also observed.

DISCUSSION

Parlin Creek is an F4 channel type for the first 18,942 feet of stream surveyed and a DA4 for the remaining 1,794 feet. The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for low-stage weirs, single and opposing wing deflectors, channel constrictors, and log cover; and poor for medium-stage weirs and boulder clusters. DA4 channels are considered generally not suitable for instream improvement structures.

The water temperatures recorded on the survey days September 18 through 27, 1995, ranged from 51 to 70 degrees Fahrenheit. Air temperatures ranged from 55 to 80 degrees Fahrenheit. The reading of 70 degrees Fahrenheit probably represents locally isolated conditions, as the next highest reading was only 64 degrees Fahrenheit. Additionally, temperature data collected by CDF from June 30 through October 11 indicated a peak temperature of approximately 64 degrees Fahrenheit during July. The data suggest a fair water temperature range for salmonids. However, 64 degrees Fahrenheit, if sustained, is near the threshold stress level for coho. This does not seem to be the case here, and Parlin Creek seems to have temperatures favorable to salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months over a period of several years, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 31% of the total **length** of this survey, riffles 21%, and pools 45%. The pools are relatively shallow, with only 132 of the 341 (38.7%) 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. Installing structures that will deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy.

Eighty-six of the 249 pool tail-outs measured had embeddedness ratings of 3 or 4. Forty had a 1 rating. 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 Parlin 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 24. The shelter rating in the flatwater habitats

was lower at 7. 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. 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-two of the 23 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 density for the stream was 91%. This is a relatively high 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 moderate at 73% and 70%, 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.

No coho were sampled or observed above unit 568, where a 7 foot high log debris accumulation (LDA) appears to currently stop their passage, 15,856 feet upstream from South Fork Noyo River. Steelhead have access to an additional 2,941 feet of stream, up to unit 718, where there exists a 6 foot jump obstructed by logs and having no landing pool. Based on the number and age class composition of the remaining fish observed, it is likely that the remaining wetted stream is utilized by resident fish.

RECOMMENDATIONS

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

2) Increase woody cover in the pools and flatwater habitat units. Adding high quality complexity with woody cover is desirable and in some areas the material is locally available. In particular, large wood should be placed in a manner to increase backwater areas to produce winter holdover habitat.

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) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 15,171', should then be treated to reduce the amount of fine sediments entering the stream.

6) Where feasible, design and engineer pool enhancement structures to increase the depth of the pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

7) The log debris accumulation at 15,856' should be modified to provide fish passage and prevent further erosion of the right bank. Only the minimum amount of loose debris needed to accomplish the task should be removed to avoid sediment loading in downstream reaches.

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.

00' Begin survey at confluence with South Fork Noyo River. Channel type is F4.

232' Bridge 15' long x 45' wide x 11.5' clearance.

679' Left bank seep.

734' Concrete slot weir forms seasonal impoundment.

1275' Bridge 14' long x 30' wide x 11' clearance.

3176' Relic trestles.

3317' Bedrock notch plugged by woody debris, retaining sediment 5' deep at base. Not a barrier.

4615' Right bank tributary. Accessible to fish, but none observed in first 30'.

5754' Former bridge site.

5899' Unnamed tributary (Waldo Gulch) enters left bank (see subsection).

6391' Right bank seep.

8541' Dry right bank tributary.

9556' Unnamed Tributary A enters right bank (see subsection).

9726' Log and debris accumulation (LDA) 7' high x 30' wide x 22' long. Not a barrier and no gravel retention (NBNG).

9883' Right bank cribbing.

Parlin Creek

11201' Dry left bank draw.

11910' Relic trestle.

12750' Right bank tributary. Accessible to fish. None observed.

13697' Small LDA. Not a barrier.

14817' Relic trestle.

15171' Right bank erosion 15' high x 30' long contributing gravel and fines.

15272' Relic trestle retaining large wood. Not a barrier.

15392' LDA 7' high x 20' wide. NBNG.

15515' Right bank erosion 15' high x 25' long contributing gravel and fines.

15737' LDA. Not a barrier.

15856' LDA 7' high x 20' wide x 15' long retaining sediment 7' deep at base. Right bank erosion 20' high x 25' long contributing gravel and fines. Present end of access for coho.

15971' Dry left bank ravine.

16658' Unnamed Tributary B enters right bank (see subsection). Two culverts approximately 86' up this tributary have clogged, and the resulting winter surface flow has cut through road 340 making it nearly impassable.

17350' Right bank erosion (road cut failure) 40' high x 66' long contributing fines.

17605' Relic trestle retaining debris. NBNG.

18146' 100' of skid logs in channel.

18319' Large debris piles scattered in channel. Difficult fish passage.

18812' 6' jump obstructed by logs. No landing pool. Probable end of anadromous reach.

18894' Right bank tributary. Accessible to fish. None observed.

18942' Channel type changes to DA4. Marsh habitat characterized by multiple channels, deep

sediment, and abundant cattails and sedges.

20256' LDA 4' high x 15' wide x 15' long. No landing pool.

20356' Debris accumulation.

20736' End of survey. Channel is poorly defined, filled with fine sediment, lacks spawning areas, and consists mainly of isolated, deep trench pools.

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.