STREAM INVENTORY REPORT

Parlin Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on Parlin Creek. 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.

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

Parlin Creek is a tributary to the South Fork of the Noyo River, a tributary to the Noyo River, a tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Parlin Creek's legal description at the confluence with the South Fork of the Noyo River is T17N R16W S04. Its location is 39°22′10″ north latitude and 123°39′29″ west longitude. Parlin Creek is a first 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. Elevations range from about 170 feet at the mouth of the creek to 1,200 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely owned by the California Department of Forestry and California Department of Corrections and is managed for timber production. Vehicle access exists via Highway 20 to Parlin Fork Conservation Camp road.

METHODS

The habitat inventory conducted in Parlin Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al 1998). The 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 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 a Marsh-McBirney Model 200 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*. 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". 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. All measurements are in feet to the nearest tenth. Habitat characteristics were 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 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) 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, 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. 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 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 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 rootwads) 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 Parlin Creek. No sites were electrofished during the stream inventory period.

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 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 the pool tail-outs
- Mean Percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

The habitat inventory of September 3, 13, and 14, 1999, was conducted by Chris Ramsey and Toni Beaumont (WSP\AmeriCorps). The total length of the stream surveyed was 16,786 feet.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.5 cfs on September 3, 1999.

Parlin Creek is an F4 channel type for the entire 16,786 feet of stream reach surveyed. F4 channels are entrenched, meandering, riffle/pool channels with low gradients, high width/depth

ratios, and gravel-dominant substrates.

Water temperatures taken during the survey period ranged from 54 to 58 degrees Fahrenheit. Air temperatures ranged from 55 to 67 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 27% riffle units, 23% flatwater units, and 49% pool units (Graph 1). Based on total length of Level II habitat types there were 19% riffle units, 24% flatwater units, and 57% pool units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 26%; runs and lateral scour pools-log enhanced, 22% each; and lateral scour pools-bedrock formed, 12% (Graph 3). Based on percent total length, runs made up 23%, lateral scour pools-log enhanced 21%, and low gradient riffles 19%.

A total of 187 pools were identified (Table 3). Scour pools were most frequently encountered at 88% and comprised 79% 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. Ninety-one of the 187 pools (49%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 187 pool tail-outs measured, 2 had a value of 1 (1.1%); 55 had a value of 2 (29.4%); 54 had a value of 3 (28.9%); 7 had a value of 4 (3.7%) and 69 had a value of 5 (36.8%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate. The breakdown of dominant substrate composition for the 69 pool tail-outs that had embeddedness values of 5 were as follows: 61% gravel, 20% bedrock, 13% boulder, and 6% sand.

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 9, and pool habitats had a mean shelter rating of 17 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 18. Main channel pools had a mean shelter rating of 13 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris and undercut banks are the dominant cover types in Parlin Creek. Graph 7 describes the pool cover in Parlin Creek. Large woody debris is the dominant pool cover type followed by bedrock ledges.

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 65% of pool tail-outs while small cobble was the next most frequently observed substrate type, at 20%.

The mean percent canopy density for the stream reach surveyed was 93%. The mean percentages of deciduous and coniferous trees were 4% and 96%, respectively. Graph 9 describes the mean percent canopy in Parlin Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 86%. The mean percent left bank vegetated was 85%. The dominant elements composing the structure of the stream banks consisted of 1.1% bedrock, 5.4% cobble/gravel, and 93.5% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 98% of the units surveyed while 2.2% of the units surveyed had deciduous trees as the dominant vegetation type (Graph 11).

DISCUSSION

Parlin Creek is an F4 channel type for the entire 16,786 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: Good for bank-placed boulders; fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover; and poor for boulder clusters.

The water temperatures recorded on the survey days of September 3, 13, and 14, 1999, ranged from 54 to 58 degrees Fahrenheit. Air temperatures ranged from 55 to 67 degrees Fahrenheit. This is a good 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 24% of the total length of this survey, riffles 19%, and pools 57%. Ninety-one of the 187 (48.6%) pools had 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.

Two of the 187 pool tail-outs measured had embeddedness ratings of 1, 55 had embeddedness ratings of 2, 54 had embeddedness ratings of 3, 7 had embeddedness ratings of 4, and 69 had embeddedness ratings of 5, which is considered unsuitable for spawning. Four of the 69 pool tail-outs with embeddedness ratings of 5 were unsuitable for spawning due to the dominant substrate being sand. Forty-two of the pool tail-outs with embeddedness ratings of 5 had small gravel as the dominant substrate. The remainder of pool tails valued at 5 were dominated by boulder or bedrock. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. Sediment sources in Parlin Creek should be mapped and rated according to their potential sediment yields and control measures should be taken.

Eighty-five percent of the pool tail-outs measured had gravel or small cobble as the dominant substrate. Forty-two of the 122 (34%) gravel pool tail-outs were composed of gravel too small to be suitable for spawning salmonids.

The mean shelter rating in the flatwater habitats was 9. The mean shelter rating for pools was 17. A pool shelter rating of approximately 100 is desirable. The pool cover that now exists is

being provided primarily by large woody debris and bedrock ledges. Log and root wad complex cover structure 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 93%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was high, at 86% and 85%, 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) Parlin 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 large wood component instream in the pools and flatwater habitat units. Most of the existing cover is from small woody debris, undercut banks, large woody debris, and bedrock ledges. Additional high quality complexity with woody cover is desirable.

4) 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.

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.

Position (ft):	Comments:
0'	Begin survey at the confluence with the South Fork of the Noyo River. Channel type is F4.
233'	Bridge, 11.7' high x 15' wide x 15' long
289'	Pipe suspended 20' above creek.

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463'	Ephemeral right bank tributary, high gradient
739'	Seasonal dam, 9' high x 15' wide x 14' long, forming plunge.
2,378'	Flag on left bank, “CDFG STA 10+00'”
2,621'	Left bank tributary/spring enters
3,393'	Five piece log structure (possibly old bridge) in channel
3,422'	Left bank flag, “CDFG STA 20+00'”
3,515'	Large tree with root wad and boulders blocking channel, retaining 2' of sediment, channel aggradation.
3,674'	Six piece log debris accumulation, 6' high x 15' wide x 40' long
3,723'	Four piece log debris accumulation, 6' high x 12' wide x 6' long
3,901'	Log debris accumulation, 7' high x 15' wide x 10' long, retaining 6' of sediment and causing subsurface stream flow.
3,907'	Flag, “CDFG STA 25+00"
3,934'	Channel aggradation: small gravel and fine sediment
4,874'	Right bank tributary, 57 degrees Fahrenheit water temperature
4,930'	Three pieces of large wood, 4' high x 15' wide x 4' long, not retaining sediment.
4,963'	Five pieces of large wood, 5' high x 10' wide x 5' long
5,944'	Old bridge supports on both banks. Left bank cement pad 3' above creek. Three large logs, 7' high x 12' long, eight feet up on bank. Right bank cement pad 3' above creek. One large log, 12' long, 8' above creek on bank.
6,007'	Three foot diameter log crosses creek, retaining 2' of sediment, with water going underneath. Channel aggradation: sand and gravel
6,211'	Left bank tributary, 57 degrees Fahrenheit water temperature
6,859'	Flag on left bank, 1997 Habitat Unit #118
7,044'	Seven piece log debris accumulation, 5' high x 10' wide x 5' long, one log identified as DFG log 5,732.

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7,083'	Channel widens to double previous width and is filled with small gravel.
7,272'	Ten piece log debris accumulation, 5' high x 12' wide x 9' long
7,430'	Three large pieces of wood in channel
7,827'	Six piece log debris accumulation, 5' high x 12' wide x 5' long
7,921'	Three pieces of wood in channel
8,050'	Four large logs in channel
8,411'	Three logs in channel
8,466'	Four logs in channel
8,617'	Log marked “CDFG LOG 7167"
8,655'	Five piece log debris accumulation, 4' high x 5' long x 15' wide
8,832'	Six piece log debris accumulation, 6' high x 12' long x 10' wide
8,854'	Ephemeral right bank tributary.
8,857'	Log debris accumulation, 5' high x 5' wide x 40' long, on right bank.
9,023'	Three logs in channel
9,060'	Five logs across creek
9,188'	Five piece log debris accumulation, 5' high x 10' wide x 5' long
9,265'	Three piece log debris accumulation, 6' high x 10' wide x 50' long
9,331'	Channel aggradation: small gravel and fine sediment
9,502'	Four fallen logs across creek
9,624'	Channel aggradation (gravel) and pools filled with fine sediment.
9,663'	Flag on left bank, “DFG HU# 183 - 1997"
9,984'	Five piece log debris accumulation, 10' high x 15' wide x 15' long, previously flagged

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10,156’	Fifteen piece log debris accumulation, 10' high x 25' wide x 25' long, retaining 5' of sediment, with subsurface stream flow.
10,192’	Channel aggradation: small gravel and fine sediment
10,388’	Right bank covered with 4 stacked logs, 6' high x 70' long.
10,595’	Four piece log debris accumulation, 6' high x 15' wide x 25' long
10,711’	Pool formed by fallen tree.
11,028’	Pool filled in with fine sediment.
11,081’	Four logs in channel
11,341’	Old bridge supports, 8' up left bank
11,542’	Right bank tributary, low stream flow, 57 degrees Fahrenheit water temperature
11,658’	Ninety-five percent of pool covered with debris.
11,745’	Six piece log debris accumulation, 5' high x 15' wide x 30' long
11,903’	Three large pieces of wood in channel
12,008’	Three pieces of wood in pool
12,219’	Eight piece log debris accumulation, 6' high x 15' wide x 15' long
12,508’	Remnants of old wood bridge, 12' high x 25' wide x 20' long
12,815’	Old log posts in center of creek, old bridge supports in channel
13,223’	Ephemeral right bank tributary
13,251’	Log debris accumulation, 6' high x 10' wide x 12' long, retaining 2' of sediment. Channel aggradation
13,408’	Right bank tributary, 56 degrees Fahrenheit water temperature
13,486’	Flag, “1997 end of survey #273"
14,098’	Fifteen piece log debris accumulation, 10' high x 15' wide x 40' long, retaining sediment.
14,136’	Channel aggradation: fine sediment and gravel

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14,387’	Six piece log debris accumulation, 4' high x 15' wide x 5' long, retaining 3' of sediment.
14,414’	Channel aggradation: small gravel and fine sediment
14,470’	Six piece log debris accumulation, 6' high x 15' wide x 30' long
14,635’	Railroad bridge on right bank
14,724’	Bridge enters creek then exits bank at 14,752'.
15,144’	Twenty piece log debris accumulation, 15' long x 25' wide x 8' high, retaining 2' of sediment.
15,260’	Ephemeral right bank tributary
15,377	Five piece log debris accumulation, 4' high x 15' wide x 10' long
15,605’	Railroad bridge crosses creek
15,723’	Eight piece log debris accumulation, 10' high x 30' wide x 20' long, retaining 3' of sediment.
15,768’	Ephemeral left bank tributary
16,097’	Log debris accumulation, 10' high x 20' wide x 10' long, retaining 5' of sediment. Channel aggradation: gravel and wood
16,118’	Creek completely covered by 3 foot thick layer of large wood.
16,233’	Six large pieces of wood in channel
16,312’	Thirty piece log debris accumulation, 8' high x 20' wide x 20' long
16,397’	Ten piece log debris accumulation, 5' high x 10' wide x 25' long, over pool
16,488’	Right bank failure, 10' high x 70' long
16,507’	Log debris accumulation, 7' high x 20' wide x 15' long
16,526’	Sixteen piece log debris accumulation, 6' high x 20' wide x 45' long
16,658’	Two large logs on right bank
16,786’	End of survey.

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. Change this to new format

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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]	