

STREAM INVENTORY REPORT

“Waldo Gulch”

INTRODUCTION

A stream inventory was conducted on October 4, 1995 on an unnamed tributary to Parlin Creek locally known as, and herein after, referred to as Waldo Gulch. The survey began at the confluence with Parlin Creek and extended upstream 0.2 miles.

The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Sample Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Waldo Gulch, is tributary to Parlin Creek, a tributary to the South Fork Noyo River, located in Mendocino County, California (Figure 1). Waldo Gulch's legal description at the confluence with Parlin Creek is T18N R16W S33. Its location is 39°22'44" north latitude and 123°38'48" west longitude. Waldo Gulch is an intermittent stream according to the USGS Noyo Hill 7.5 minute quadrangle. Waldo Gulch drains a watershed of approximately 0.3 square miles. Summer base runoff is approximately 0.03 cubic feet per second (cfs) at the mouth. Elevations range from about 210 feet at the mouth of the creek to 800 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. Foot access exists by crossing Parlin Creek from California Department of Forestry and Fire Protection (CDF) Road 340 to the mouth of Waldo Gulch.

METHODS

The habitat inventory conducted in Waldo Gulch 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). Waldo Gulch personnel were trained in May, 1995, by Gary Flosi. This inventory was conducted by a two-person team.

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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 Waldo Gulch 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". Waldo Gulch 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).

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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 Waldo Gulch, 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 Waldo Gulch, 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Waldo Gulch, 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 Waldo Gulch, 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

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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 Waldo Gulch fish presence was observed from the stream banks, and two 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 Waldo Gulch 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 AND DISCUSSION

The habitat inventory of October 4, 1995, was conducted by Kyle Young and Jeffrey Jahn (WSP/AmeriCorps). The total length of the stream surveyed was 1,064 feet.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.03 cfs on October 4, 1995.

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Waldo Gulch is an F4 channel type for the entire 1,064 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 low-stage weirs, single and opposing wing deflectors, channel constrictors, and log cover; and poor for medium-stage weirs and boulder clusters.

The water temperature recorded on the survey day October 4, 1995, was 53 degrees Fahrenheit. Air temperatures ranged from 48 to 54 degrees Fahrenheit. This is a very good water temperature for salmonids, but water temperature data for the warm summer months are lacking. For a more complete and accurate water temperature profile 24-hour temperatures would need to be monitored throughout the warm summer months.

Based on the total length of this survey, Level II habitat units consisted of 18% flatwater units, 20% riffle units, and 52% pool units. The pools are relatively shallow, with only 6 of the 34 pools having a maximum depth greater than 2 feet.

Six of the 19 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 2 had a 1 rating. Cobble embeddedness of 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In Waldo Gulch, 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 38. The shelter rating in the flatwater habitats was 5. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by large and small woody debris and undercut banks 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.

Three of the four low gradient riffles measured had gravel as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 96%. 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 65% and 76%, 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 fish were observed or sampled upstream of unit 69, 869' above the confluence with Parlin Creek, where a log and debris accumulation (LDA) appears to impede further passage.

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BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on October 3, 1995, in Waldo Gulch. The units were sampled by Kyle Young and Jeffrey Jahn (WSP/AmeriCorps).

The first site sampled included habitat units 1-10, a series of pools, runs, riffles, and a bedrock sheet extending 104 feet from the confluence with Parlin Creek. The site yielded three 0+ steelhead and one 0+ coho.

The second site included habitat unit 72 to beyond the end of the surveyed reach, a series of alternating riffle/pools and dry units located approximately 902 feet above the creek mouth. This site had a length of approximately 310 feet. No fish were sampled.

RECOMMENDATIONS

- 1) Waldo Gulch 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 locally available.
- 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.

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 confluence with Parlin Creek. Channel type is an F4.
686'	LDA 5' high x 10' wide x 11' long retaining sediment.
869'	LDA retaining silt. Probable present end of anadromous fish access.
1064'	End of survey due to absence of fish and lack of suitable habitat.

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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.

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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