STREAM INVENTORY REPORT

"Walton Gulch

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on an unnamed tributary to Hare Creek locally known as, and herein after referred to as, Walton Gulch. 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 Walton Gulch. The objective of the biological inventory was to document presence and distribution of juvenile salmonid species. There is no known record of adult spawning surveys having been conducted on Walton Gulch.

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

Walton Gulch is tributary to Hare Creek, tributary to the Pacific Ocean, located in Mendocino County, California (Figure 1). Walton Gulch's legal description at the confluence with Hare Creek is T18N R17W S27. Its location is 39°23′41″ north latitude and 123°44′22″ west longitude. Walton Gulch is an ephemeral stream according to the USGS Noyo Hill 7.5 minute quadrangle. Walton Gulch drains a watershed of approximately 0.46 square miles. Summer base runoff is approximately 0.16 cubic feet per second (cfs) at the mouth. Elevations range from about 165 feet at the mouth of the creek to 640 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is partly located within Jackson Demonstration State Forest and is managed for timber production, the balance being otherwise privately owned. Vehicle access exists via California Department of Forestry and Fire Protection (CDF) Road 400.

METHODS

The habitat inventory conducted in Walton 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). Walton Gulch 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 Walton 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". Walton 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). 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 Walton 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 Walton 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 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 Walton 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 Walton 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 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 Walton 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*.

SUBSTRATE SAMPLING

In Walton Gulch gravel samples were taken using the methodology as described in *Stream Substrate Quality for Salmonids: Guidelines for Sampling, Processing, and Analysis*, Valentine, 1995. Gravel sampling is conducted using a 9 inch diameter standard McNeil gravel sampler. 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).

LARGE WOODY DEBRIS (LWD) STREAM AND RIPARIAN INVENTORY

In Walton Gulch a large woody debris (LWD) stream and riparian inventory was conducted using the methodology as described in the *California Salmonid Stream Habitat Restoration Manual*. Data from the LWD Inventory Form are entered into a dBASE 4.2 data entry program developed by Inland Fisheries Division, California Department of Fish and Game. The Walton Gulch LWD Inventory Report is included in the Hare Creek Stream Inventory Report as Appendix B.

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

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Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Walton 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

The habitat inventory of September 11, 1995, was conducted by Bettina Chimarios and Shelly Dunn (WSP/AmeriCorps). The total length of the stream surveyed was 3,314 feet.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.16 cfs on September 19, 1995.

Walton Gulch is a G4 channel type for the entire 3,314 feet of stream reach surveyed. G4 channels are entrenched, gully-like, step-pool channels with low width/depth ratios on moderate gradients.

Water temperatures ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 66 to 71 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 45% pool units, 34% flatwater units, and 13% riffle units (Graph 1). Based on total **length** of Level II habitat types there were 52% flatwater units, 34% pool units and 9% riffle units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were mid-channel pools 44%, step runs 21%, and low-gradient riffles 11% (Graph 3). Base on percent total **length**, step runs made up 37%, mid-channel pools 32%, and glides 9%.

A total of 58 pools were identified (Table 3). Main channel pools were encountered exclusively (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Fourteen of the 58 pools (24%) had a depth of two feet or greater (Graph 5).

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The depth of cobble embeddedness was estimated at pool tail-outs. Of the 58 pool tail-outs measured, none had a value of 1 (0%); 2 had a value of 2 (3.4%); 23 had a value of 3 (39.7%); and 33 had a value of 4 (56.9%) (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 59, and flatwater habitats had a mean shelter rating of 12 (Table 1).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Walton Gulch. Graph 7 describes the pool cover in Walton Gulch.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in all of the five low-gradient riffles measured (100%)(Graph 8).

The mean percent canopy density for the stream reach surveyed was 99.6%. The mean percentages of deciduous and coniferous trees were 15.3% and 84.7%, respectively. Graph 9 describes the canopy in Walton Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 99%. The mean percent left bank vegetated was 94%. The dominant elements composing the structure of the stream banks consisted of 21% bedrock, 0% boulder, 21% cobble/gravel, and 58% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 55% of the units surveyed. Additionally, 5% of the units surveyed had deciduous trees as the dominant vegetation type, and 16% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on September 19, 1995, in Walton Gulch. The units were sampled by Bettina Chimarios and Shelly Dunn (WSP/AmeriCorps).

The first site sampled included habitat units 14, 15, and 16, a step run/mid-channel pool/low-gradient riffle combination approximately 270 feet from the confluence with Hare Creek. This site had an area of approximately 325 sq ft. The unit yielded four Pacific giant salamanders. One 2+ steelhead was observed but not caught.

The second site was a bedrock sheet/mid-channel pool combination located upstream from the 1995 end of survey. This site had an area of approximately 200 sq ft. No fish were sampled.

GRAVEL SAMPLING RESULTS

McNeil sediment samples in Hare Creek, as well as in South Fork Hare Creek, Bunker Gulch, and Walton Gulch, were taken by Craig Mesman and Heidi Hickethier (CCC) at 30 sites on September 20 through October 2, 1995. The methods used to collect and analyze these samples

and the results obtained are discussed in Appendix A of the Hare Creek Stream Inventory Report.

LARGE WOODY DEBRIS (LWD) STREAM AND RIPARIAN INVENTORY RESULTS

The results of the LWD stream and riparian inventory are discussed in Appendix B of the Hare Creek Stream Inventory Report.

DISCUSSION

Walton Gulch is a G4 channel type for the entire 3,314 feet of stream surveyed. The suitability of G4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for low-stage weirs, opposing wing deflectors, and log cover; and poor for medium-stage weirs, boulder clusters, and single wing deflectors.

The water temperatures recorded on the survey day September 11, 1995, ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 66 to 71 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 52% of the total **length** of this survey, riffles 9%, and pools 34%. The pools are relatively shallow, with 14 of the 58 (24%) 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 increase or deepen pool habitat is recommended.

Fifty-six of the 58 pool tail-outs measured had embeddedness ratings of 3 or 4. None 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 Walton 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 moderate with a rating of 59. The shelter rating in the flatwater habitats was 12. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by small woody debris in all habitat types. Additionally, large woody debris contributes 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.

All of the five 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 99.6%. 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 high at 99% and 94%, respectively.

No fish were sampled in Walton Gulch, although a 2+ steelhead was observed during the survey and during the biological inventory. This suggests that present conditions at the Road 400 culvert near the mouth of the stream may be hindering fish passage.

RECOMMENDATIONS

1) Walton Gulch should be managed as an anadromous, natural production stream.

2) The culvert under Road 400 located 61' from the confluence should be replaced, preferably with a bridge. The combination of a 4' jump into the culvert and the velocity of the water going through the culvert, makes this a probable fish migration barrier under most flows.

3) Due to the high gradient of the stream between the confluence and the road, access for migrating salmonids is an ongoing potential problem. The five straight log weirs designed to improve fish passage through this high gradient reach are probably not functioning properly due to the bank erosion associated with these structures. These structures should either be removed or maintained. Fish passage should be monitored.

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.

5) 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.

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

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.

Walton Gulch

Position (ft):	Comments:
0'	Begin survey at confluence with Hare Creek.
18'	Series of five weirs designed to improve access into Road 400 culvert.
61'	CDF Road 400 culvert. 4' diameter x 60' long with 4' jump at downstream end.
440'	Log and debris accumulation (LDA) 6' high x 6' wide x 8' long retaining gravel and sand 3' deep at base.
456'	LDA 8' high x 10' wide x 13' long retaining gravel and sand 3' deep at base.
548'	LDA 6' high x 10' wide x 20' long retaining gravel, sand, and silt 4' deep at base.
742'	LDA 5' high x 7' wide x 15' long retaining gravel, sand, and silt 3' deep at base.
843'	LDA 6' high x 9' wide x 6' long retaining gravel and sand 1' deep at base.
894'	LDA 5' high x 7' wide x 25' long retaining gravel and sand 4' deep at base.
1006'	LDA 5' high x 10' wide x 6' long retaining sand 3' deep at base.
1789'	LDA 6' high x 12' wide x 10' long retaining gravel 4' deep at base.
2602'	LDA 7' high x 10' wide x 15' long. Possible barrier.
2666'	7.5' high jump over bedrock sheet.
3314'	End of survey due to diminished habitat.

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

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