STREAM INVENTORY REPORT

Bull Team Gulch

INTRODUCTION

A stream inventory was conducted during the summer of 1998 on Bull Team 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 Bull Team Gulch. 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

Bull Team Gulch is tributary to the South Fork Albion River, tributary to the Albion River, located in Mendocino County, California (Map 1). Bull Team Gulch's legal description at the confluence with South Fork Albion River is T16N R16W. Its location is 39°14′20.2' north latitude and 123°36′53.4″ west longitude. Bull Team Gulch is a first order stream and has approximately 1.0 mile of blue line stream according to the USGS Navarro, Elk and Mathison Peak Quadrangles. Bull Team Gulch drains a watershed of approximately 0.66 square miles. Elevations range from about 300 feet at the mouth of the creek to 800 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Highway 128 to Flynn Creek Road to Keene Summit to a locked gate.

METHODS

The habitat inventory conducted in Bull Team Gulch 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, dominant substrate composing the pool tail crest, and embeddedness. 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 Bull Team 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". Bull Team 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. Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were 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 Bull Team 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) 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, 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 Bull Team 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. 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 Bull Team 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 Bull Team Gulch, 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 was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. In Bull Team Gulch fish presence was observed from the stream banks, and one site was 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 Bull Team 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 the pool tail-outs
- 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 July 16, 1998, was conducted by Kevin McKernan and Lisa Campbell (CCC). The total length of the stream surveyed was 3,886 feet.

Flows were not measured on Bull Team Gulch.

Channel type was not taken on Bull Team Gulch.

Water temperatures taken during the survey period ranged from 58 to 61 degrees Fahrenheit. Air temperatures ranged from 61 to 77 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 25% riffle units, 37% flatwater units, 30% pool units, and 8% dry units (Graph 1). Based on total length of Level II habitat types there were 10% riffle units, 52% flatwater units, 23% pool units and 15% dry units (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were runs, 29%; mid-channel pools, 25%; and low gradient riffles, 21% (Graph 3). Based on percent total length, runs made up 37%, mid-channel pool 20%, and step run and dry both made up 15%.

A total of 33 pools were identified (Table 3). Main channel pools were most frequently encountered at 82% and comprised 86% 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. Thirty-one of the 33 pools (94%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at the pool tail-outs. Of the 33 pool tail-outs measured, 0 had a value of 1 (0.0%); 7 had a value of 2 (21.2%); 5 had a value of 3 (15.2%); 12 had a value of 4 (36.4%) and 9 had a value of 5 (27.3%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail-out is not suitable for spawning. In Bull Team Gulch, 8 of the 9 pool tail-outs which were valued at 5 had silt/clay/sand too small to be suitable for spawning as the substrate. The other tail-outs were unsuitable for spawning due to the tail-outs being comprised of bedrock.

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 16, flatwater habitat types had a mean shelter rating of 50, 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 62. Main channel pools had a mean shelter rating of 52 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris is the dominant cover type in Bull Team Gulch. Large and small woody debris are lacking in nearly all habitat types. Graph 7 describes the pool cover in Bull Team Gulch.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 23 of the 33 pool tail-outs measured (70%). Silt/clay was the next most frequently observed dominant substrate type and occurred in 24% of the pool tail outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 94%. The mean percentages of deciduous and coniferous trees were 16% and 84%, respectively. Graph 9 describes the canopy in Bull Team Gulch.

For the stream reach surveyed, the mean percent right bank vegetated was 91%. The mean percent left bank vegetated was 88%. The dominant elements composing the structure of the stream banks consisted of 11.8% bedrock, 0% boulder, 0% cobble/gravel, and 88% sand/silt/clay (Graph 10). Coniferous trees, including down trees, logs, and root wads was the dominant vegetation type observed in 61.8% of the units surveyed. Additionally, 20.6% of the units surveyed had grass as the dominant vegetation type, and 11.8% had deciduous trees as the dominant vegetation, (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on July 16, 1998, in Bull Team Gulch. The site was sampled by Kevin McKernan and Lisa Campbell (CCC).

The site sampled included habitat units 6-7, a step run and lateral scour pool - root formed, approximately 115 feet from the confluence with South Fork Albion River. This site had an area of 1,148 sq ft and a volume of 2,296 cu ft. The site yielded 5 steelhead.

DISCUSSION

No channel type was taken on Bull Team Gulch.

The water temperatures recorded on the survey day July 16, 1998, ranged from 58 to 61 degrees Fahrenheit. Air temperatures ranged from 61 to 77 degrees Fahrenheit. This is a moderate 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 10%, pools 23%, and 15% dry. The pools are relatively deep, with 30 of the 33 (90.9%) 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.

None of the 33 pool tail-outs measured had an embeddedness rating of 1. Twenty-four of the pool tail-outs had embeddedness ratings of 2, 3 or 4. Nine of the pool tail-outs had a rating of 5 or were considered unsuitable for spawning. Eight of the 33 were unsuitable for spawning due to the dominant substrate being silt/sand/clay. 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 Bull Team 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 56. The shelter rating in the flatwater habitats was 50. A pool shelter rating of approximately 100 is desirable. The moderate amount of cover that now exists is being provided primarily by small woody debris in all habitat types. Additionally, large woody debris contribute 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.

Twenty-four of the 33 pool tail outs 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 94%. 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 91% and 88%, respectively.

RECOMMENDATIONS

1) Bull Team Gulch 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 small woody debris. Adding 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 comments were noted. All distances are approximate and taken from the beginning of the survey reach.

0' Begin survey at confluence with South Fork Albion River.

21' Old railroad crossing, no bridge left.
115' Electrofishing site.

899' Log debris accumulation, 10' long x 12' wide x 4' high, not a barrier, steelhead observed above.

1,238' Left bank tributary not accessible to anadromous fish; flow estimated at less than 0.01

cfs; and 57 degrees Fahrenheit.

1,500' Two foot jump.

1,766' Right bank dry tributary enters.

2,631' Three foot jump.

2,811' Left bank ravine.

3,444' Left bank tributary enters.

3,886' End of survey. Only residual pools with long dry units in between. Last fish observed below the three foot jump at 2,631'.

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 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