

STREAM INVENTORY REPORT

UNNAMED SOUTH FORK BEAR RIVER TRIBUTARY (MOUNTAIN VIEW CREEK)

INTRODUCTION

A stream inventory was conducted during the summer of 1996 on an unnamed South Fork Bear River tributary locally known as Mountain View 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 Mountain View 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 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

Mountain View Creek is tributary to the South Fork Bear River, tributary to Bear River, tributary to the Pacific Ocean, located in Humboldt County, California (Figure 1). Mountain View Creek's legal description at the confluence with South Fork Bear River is T01N R02W S28. Its location is 40°26'03" north latitude and 124°17'50" west longitude. Mountain View Creek is a second order stream and has approximately 1.4 miles of blue line stream according to the USGS Capetown 7.5 minute quadrangle. Mountain View Creek drains a watershed of approximately 2.6 square miles. Elevations range from about 390 feet at the mouth of the creek to 1380 feet in the headwater areas. Deciduous trees dominate the watershed. The watershed is entirely privately owned and is managed for rangeland and timber production.

METHODS

The habitat inventory conducted in Mountain View 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 the AmeriCorps Watershed Stewards Project (WSP\AmeriCorps) Members who 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 (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 Mountain View 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.

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". Mountain View 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 (Hopelain, 1995). 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 Mountain View 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, 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 Mountain View 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*. Canopy density relates to the amount of stream shaded from the sun. In Mountain View Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the end of approximately every third unit in addition to every fully-described unit, giving approximately a 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 Mountain View 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 was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. In Mountain View Creek 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 Mountain View 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

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

The habitat inventory of August 23, 1996 was conducted by Bill Malinowski (WSP\AmeriCorps) and Craig Mesman (CCC). The total length of the stream surveyed was 2,062 feet with an additional 424 feet of side channel.

Flow was measured approximately 300 feet from the confluence with South Fork Bear River with a Marsh-McBirney Model 2000 flowmeter at 0.36 cfs on August 27, 1996.

Mountain View Creek is a B2 channel type for the entire 2,062 feet of stream reach surveyed. B2 channels are moderately entrenched, moderate gradient, riffle dominated channels, with infrequently placed pools, very stable plan and profile, stable banks and a boulder channel.

Water temperatures taken during the survey period ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 51 to 71 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 34% riffle units, 27% flatwater units, and 37% pool units (Graph 1). Based on total **length** of Level II habitat types there were 20% riffle units, 59% flatwater units, and 19% pool units (Graph 2).

Eleven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were step runs, 26%; mid-channel pools, 20.0%; and high gradient riffles, 13.0% (Graph 3). Based on percent total **length**, step runs made up 58%, mid-channel pools 9%, and high gradient riffles 8.0%.

A total of twenty-six pools were identified (Table 3). Main channel pools were most frequently encountered at 58.0% and comprised 59.0% 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. Seven of the 26 pools (26.9%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 26 pool tail-outs measured, 5 had a value of 1 (19.2%); 6 had a value of 2 (23.0%); 3 had a value of 3 (11.6%); 3 had a value of 4 (11.6%); and 9 had a value of 5 (34.6%) (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. Riffle habitat types had a mean shelter rating of 23, flatwater habitats had a mean shelter rating of 16, and pools had a mean shelter rating of 26 (Table 1). Of the pool types, the scour pools had a mean shelter rating of 18, main channel pools had a mean shelter rating of 27, and backwater pools a mean shelter rating of 35 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Mountain View and are extensive. Large and small woody debris are lacking in nearly all habitat types. Graph 7 describes the pool cover in Mountain View Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in the one low gradient riffles measured (graph 8). Of the four step runs measured, gravel, small cobble, large cobble and boulder were each the dominant substrate in one of the units.

The mean percent canopy density for the stream reach surveyed was 60.0%. The mean percentages of deciduous and coniferous trees were 85% and 15%, respectively. Graph 9 describes the canopy in Mountain View Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 79.7%. The mean percent left bank vegetated was 76.7%. The dominant elements composing the structure of the stream banks consisted of 2.78% bedrock, 50.0% boulder, 38.89% cobble/gravel, and 8.33% sand/silt/clay (Graph 10). Deciduous trees was the dominant vegetation type observed in 38.39% of the units surveyed and 11.11% had coniferous trees as the dominant vegetation, including downed trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on August 27, 1996, in Mountain View Creek. The site was sampled by Bill Malinowski and Craig Mesman.

The site sampled was habitat unit #18, a plunge pool approximately 518 feet from the confluence with South Fork Bear River. This site had an area of 184 sq ft and a volume of 405 cu ft. The site yielded 57 steelhead, one yellow-legged frog and one Pacific giant salamander.

DISCUSSION

Mountain View Creek is a B2 channel type for the entire 2,062 feet of stream surveyed. The suitability of B2 channel types for fish habitat improvement structures is as follows: excellent for low-and medium stage plunge weirs, single and opposing wing deflectors and bank cover.

The water temperatures recorded on the survey day, August 23, 1996, ranged from 56 to 58 degrees Fahrenheit. Air temperatures ranged from 51 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 59.0% of the total **length** of this survey, riffles 20.0%, and pools 19.0%. The pools are relatively shallow with only 7 of the 26 (26.9%) 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. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy.

Fifteen of the 26 (57.75) pool tail-outs measured had embeddedness ratings of 3, 4 or 5. Five 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 Mountain View 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 26. The shelter rating in the flatwater habitats was slightly lower at 16. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by boulders 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 structures provide rearing fry with protection from predation, rest from water velocity, and divides territorial units to reduce density related competition.

The one low gradient riffle measured had gravel as the dominant substrate. Of the four step runs measured, one had gravel (0.08" to 2.5") as the dominant substrate, one small cobble (2.5" to 5"), one large cobble (5" to 10") and one had boulder (> 10") as the dominant substrate. Gravel and small cobble are the preferred substrate for spawning for steelhead and coho salmon. Suitable spawning substrate is limited in Mountain View Creek.

The mean percent canopy density for the stream was 60.0%. This is a relatively moderate percent 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 76.7% and 79.7%, 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) Mountain View 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) Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.
- 4) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable.
- 5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.
- 6) Increase the canopy on Mountain View Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels. The reaches above this survey section should be inventoried and treated as well, since the water flowing here is effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.
- 7) Suitable spawning substrate on Mountain View Creek is limited to relatively few reaches. Projects should be designed at suitable sites to trap and sort spawning gravel in order to expand redd site distribution in the stream.

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.

- 0' Begin survey at confluence with South Fork Bear River. Channel type is B2.
- 238' Right bank slide, "blue goo", 45' long x 20' high.
- 321' Ten foot high jump, channel obstructed by logs.
- 414' Ten foot high cascade, splashes onto logs. Log debris accumulation (LDA) 14' high x 60' wide. Possible barrier.
- 507' Left bank, dry tributary.
- 518' Electrofishing site.
- 1,035' Left bank erosion, "blue goo", 90' long x 20' high.
- 1,482' Left bank erosion, 250' long x 40' high.

- 1,512' LDA, 9' high x 40' wide x 10' long.
- 1,646' LDA, 12' high x 30' wide x 20' long.
- 1,635' Slides on both banks constricting channel.
- 1,677' Right bank erosion, 40' high x 85' long.
- 1,758' Large maple across channel causing a barrier, 6' high jump.
- 1,795' LDA, 25' wide x 15' long x 8' high.
- 2,062' End of survey. No fish observed since the LDA at 1,512. Step run and pool habitat continues above end of survey.

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.

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