

STREAM INVENTORY REPORT

Bearskin Canyon Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1997 on Bearskin Canyon Creek. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Bearskin Canyon Creek.

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

Bearskin Canyon Creek is a tributary to Tomki Creek, a tributary to the Eel River, which drains to the Pacific Ocean. It is located in Mendocino County, California. Bearskin Canyon Creek's legal description at the confluence with Tomki Creek is T18N R12W S15. Its location is 39.4156 degrees north latitude and 123.1678 degrees west longitude. Bearskin Canyon Creek is a first order stream and has approximately 328 feet of blue line stream according to the USGS Foster Mountain 7.5 minute quadrangle. Bearskin Canyon Creek drains a watershed of approximately 0.6 square miles. Elevations range from about 1,510 feet at the mouth of the creek to 2,600 feet in the headwater areas. Mixed hardwood forest and conifer forest dominate the watershed. The watershed is entirely privately owned and is managed for timber production, rangeland, and recreation. Vehicle access exists via Highway 101 south to Highway 20, east to Potter Valley Road, left on Gibson Lane, follow Busch Creek through the Potter Valley Indian Reservation and then Long Branch Creek north approximately two miles. Turn right toward Bearskin Canyon Creek, turn right at the four-way intersection and follow road to Bearskin Canyon Creek Creek.

METHODS

The habitat inventory conducted in Bearskin Canyon Creek 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

Bearskin Canyon Creek

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 Bearskin Canyon 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 2000 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*. 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. 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". Bearskin Canyon 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 are measured using a clinometer, hip chain, and stadia rod.

Bearskin Canyon Creek

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 Bearskin Canyon 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 not suitable for spawning due to inappropriate substrate particle size, bedrock, 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 Bearskin Canyon 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In Bearskin Canyon 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 Bearskin Canyon 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.

Bearskin Canyon Creek

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 Bearskin Canyon 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
- Mean percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

The habitat inventory of June 4, 1997 was conducted by T. Schaible and J. Robertson (WSP/AmeriCorps). The total length of the stream surveyed was 328 feet.

Flow was not measured on Bearskin Canyon Creek.

Bearskin Canyon Creek is an A2 channel type for the entire 328 feet of stream reach surveyed. A2 channel types are steep, narrow, cascading, step-pool streams; high energy/debris transport associated with depositional soils and a boulder substrate dominant.

The water temperature taken during the survey period was 55 degrees Fahrenheit. The air temperature was 67 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 70% riffle units and 30% pool units (Graph 1). Based on total length of Level II habitat types there were 91% riffle units and 9% pool units (Graph 2).

Bearskin Canyon Creek

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were high gradient riffles, 30%; cascades, 30%; and plunge pools, 20% (Graph 3). Based on percent total length, cascades made up 52%, high gradient riffles 33%, and plunge pools 7%.

A total of three pools were identified (Table 3). Scour pools were most frequently encountered at 67% and comprised 74% 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. One of the three pools (33%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the three pool tail-outs measured, one had a value of 3 (33%); one had a value of 4 (33%) and one had a value of 5 (33%); (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.

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, and pool habitats had a mean shelter rating of 12 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 15. Main channel pools had a mean shelter rating of 5 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Bearskin Canyon Creek. Terrestrial vegetation is lacking in all habitat types. Graph 7 describes the pool cover in Bearskin Canyon Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the substrate observed in one of the three pool tail-outs measured (33%). Small cobble and boulders were the dominant substrate types in other two pool tail-outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 98%. The mean percentages of deciduous and coniferous trees were 79% and 21%, respectively. Graph 9 describes the canopy in Bearskin Canyon Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 67%. The mean percent left bank vegetated was 47%. The dominant elements composing the structure of the stream banks consisted of 50% boulders, 25% cobble/gravel, 17% bedrock, and 8% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 83% of the units surveyed. Additionally, 8% of the units surveyed had no vegetation as the dominant vegetation type, and 8% had brush as the dominant vegetation (Graph 11).

Bearskin Canyon Creek

DISCUSSION

Bearskin Canyon Creek is an A2 channel type for the entire 328 feet of stream surveyed. A2 channel types are generally not suitable for fish habitat improvement projects.

The water temperature recorded on the survey day June 4, 1997 was 55 degrees Fahrenheit. The air temperature was 67 degrees Fahrenheit. This is a good water temperature range for salmonids. To make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Riffle habitat types comprised 91% of the total length of this survey and pools 9%. The pools are relatively shallow, with only one of the three (33%) pools having a maximum depth greater than two 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 three pool tail-outs measured had an embeddedness rating of 1 or 2. Two of the pool tail-outs had embeddedness ratings of 3 or 4. One of the pool tail-outs had a rating of 5, which is considered not suitable for spawning. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead.

The mean shelter rating for pools was 12. A pool shelter rating of approximately 100 is desirable. The relatively large amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, brush contributed 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 structures provide rearing fry with protection from predation, rest from water velocity, and also divide territorial units to reduce density related competition.

Two of the three 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 98%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 67% and 47%, respectively. In areas of stream bank erosion or where bank vegetation is at unacceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

Bearskin Canyon Creek

RECOMMENDATIONS

- 1) Bearskin Canyon 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.

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 Comments:
(ft):

- | | |
|------|--|
| 0' | Start of survey at confluence with Tomki Creek. Channel type is A3. |
| 56' | Road enters on the left bank. |
| 165' | Eight foot high waterfall. |
| 328' | Survey ended due to a seven foot high water fall that marked the end of the possible anadromous reach. No fish observed during the 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.

Bearskin Canyon Creek

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