STREAM INVENTORY REPORT

Brian's Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1992 on Brian's Creek to assess habitat conditions for anadromous salmonids. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Brian's Creek. After analysis of the information and data gathered, stream restoration and enhancement recommendations are presented.

There is no known record of adult spawning surveys having been conducted on Brian's 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.

WATERSHED OVERVIEW

Brian's Creek is a tributary to Bull Creek, a tributary to the South Fork Eel River, a tributary to the Eel River, which drains to the Pacific Ocean. It is located in Humboldt County, California (Figure 1). Brian's Creek's legal description at the confluence with Bull Creek is T02S R01E S13. Its location is 40.3028 degrees north latitude and 124.0261 degrees west longitude. Brian's Creek is a first order stream and has approximately 0.9 miles of blue line stream, according to the USGS Bull Creek 7.5 minute quadrangle. Brian's Creek drains a watershed of approximately 0.7 square miles. Summer base runoff is approximately 0.5 cfs at the mouth. Elevations range from about 750 feet at the mouth of the creek to 2,400 feet in the headwater areas. Redwood forest and hardwood forest dominate the watershed. The watershed is owned by the State of California and is managed by Humboldt Redwoods State Parks. Vehicle access exists from U.S. Highway 101 at Dyerville, via Bull Creek Road to the upper Bull Creek road. The road to upper Bull Creek has a locked gate, which is controlled by Humboldt Redwoods State Parks. Foot access is available by crossing Bull Creek to the mouth of Brian's Creek.

METHODS

The habitat inventory conducted in Brian's Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) and contract seasonal Technical Advisors that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Brian's Creek personnel were trained in May and June, 1992, by Gary Flosi and Scott Downie. This inventory was conducted by two person teams.

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 Brian's Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the Upper Bull Creek Report.

DATA ANALYSIS:

Data from the habitat inventory form are entered into Runtime, a dBASE 4.1 data entry program developed by the Department of Fish and Game. This program processes and summarizes the data.

The Runtime program produces the following summary 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 Brian's 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

HABITAT INVENTORY RESULTS:

The habitat inventory of May 27 to June 2, 1992 was conducted by Brian Humphrey and Judah Sanders (CCC and contract seasonal). The total length of the stream surveyed was 3,352 feet, with an additional 172 feet of side channel.

Flow was measured 125 feet above the confluence with a Marsh-McBirney Model 2000 flowmeter at 4.1 cfs on June 6, 1992.

Brian's Creek is an A3 channel type for the entire 3,352 feet of stream reach surveyed. A3 channels are steep (4-10% gradient), very well confined streams, with unstable stream banks.

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Water temperatures ranged from 55 to 58 degrees Fahrenheit. Air temperatures ranged from 66 to 70 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent occurrence, riffles made up 53%, pools 33%, and flatwater 14% (Graph 1). Riffles made up 76% of the total survey length, pools 16%, and flatwater 8% (Graph 2).

Twelve Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent occurrence were high gradient riffles, 39%; cascades, 13%; and step pools, 11% (Graph 3). By percent total length, high gradient riffles made up 50%, cascades 25%, and step pools 9% (Table 2).

Thirty pools were identified (Table 3). Main channel pools were most often encountered at 53%, and comprised 70% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Twenty-four of the 30 pools (80%) had a depth of less than two feet (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, seven had a value of 2 (39%); nine had a value of 3 (50%); and two had a value of 4 (11%). On this scale, a value of one is the best for fisheries (Graph 6).

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 habitats had the highest shelter rating at 25. Riffles followed with a rating of 22 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 33. Main channel pools had a shelter rating of 18 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. There was only one low gradient riffle in the reach surveyed and it had gravel as its dominant substrate.

Twenty-three percent of the survey reach lacked shade canopy. Of the 77% of the stream covered with canopy, 79% was composed of deciduous trees, and 21% was composed of coniferous trees. Graph 9 describes the canopy in Brian's Creek.

Table 2 summarizes the mean percentage of the right and left stream banks covered with vegetation by habitat type. For the stream reach surveyed, the mean percent right bank vegetated was 61%. The mean percent left bank vegetated was 65%. The dominant elements composing the structure of the stream banks consisted of 15% grass, 15% brush, 5% boulders, and 4% bare soil. Additionally, 45% of the banks were covered with deciduous trees, and 15% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

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DISCUSSION

The A3 channel type is generally not suitable for fish habitat improvement structures. A3 channels are found in high energy, steep gradient stream reaches and have unstable stream banks.

The water temperatures recorded on the survey days May 27 to June 2, 1992 ranged from 55 to 58 degrees Fahrenheit. Air temperatures ranged from 66 to 70 degrees Fahrenheit. This is a very good water temperature regime for salmonids. However, to make any further conclusions, temperatures need to be monitored throughout the warm summer months, and more extensive biological sampling needs to be conducted.

Flatwater habitat types comprised 8% of the total length of this survey, riffles 76%, and pools 16%. The pools are relatively shallow with only six of the 30 pools having a maximum depth of two feet or greater. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total 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. Therefore, installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not be threatened by high stream energy, or where their installation will not conflict with the unstable stream banks of the A3 channel type.

Eleven of the 18 pool tail-outs measured had embeddedness ratings of 3 or 4. None had an embeddedness rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Brian's Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for pools was low with a rating of 25. The shelter rating in the flatwater habitats was slightly lower at 20. However, 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 also divide territorial units to reduce density related competition.

There was only one low gradient riffle present in the reach surveyed. This is generally considered poor for spawning salmonids.

The mean percent canopy for the stream was 77%. This is a high percentage of canopy, since 80% is generally considered optimum in these north coast streams. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

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RECOMMENDATIONS

1) Brian's Creek should be managed as an anadromous, natural production stream.

2) 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.

3) 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 and in some areas the material is at hand.

4) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Fish passage should be monitored, and improved where possible.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All the distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Comments:
0'	Start of survey at confluence with Bull Creek. Channel type is an A3 for the entire survey reach. Left cut bank 25' high.
341'	Right cut bank measures 15' high x 45' long.
450'	Right cut bank 20' high.
1052'	Channel is braided.
1213'	4' diameter log across the channel with water percolating under it.
1410'	Vertical right bank of bare soil measures 25' high x 40' long.
1936'	Steep gradient (>20%) for the next 100' with logs across the channel.
2059'	2' diameter log across the channel, causing gravel retention 3' long.
2078'	3' high plunge over log.
2410'	Left bank erosion site measures 15-20' high.
2690'	4.5' high plunge over boulder outcropping with no jump pool below it.

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2885' Tributary enters from the right bank, 20% gradient.

3249' Log debris accumulation (LDA) measures 7' high; 20% gradient.

3282' Right bank erosion site is depositing fine sediment into the channel.

3352' 10' diameter root wad in the middle of the channel. Gradient increases to greater than 40%. End of survey reach.

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