SALMON AND STEELHEAD RESTORATION AND ENHANCEMENT PROGRAM

NORTH COAST

WATERSHED PLANNING and COORDINATION PROJECT

STREAM INVENTORY REPORT

LITTLE BURR CREEK, EEL RIVER, 2000

CALIFORNIA DEPARTMENT OF FISH AND GAME

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NORTH COAST WATERSHED PLANNING and COORDINATION PROJECT

The North Coast Watershed Planning and Coordination Project (NCWPCP), formerly the Basin Planning Project (BPP), was begun in 1991 to develop salmon and steelhead restoration and enhancement programs in North Coast watersheds for the Department of Fish and Game (DFG). The objectives of the project conform with the goals of California's Salmon and Steelhead Restoration and Enhancement Program of 1988. The Restoration Program strives to enhance the status of anadromous salmonid populations and improve the fishing experience for Californians. The program intends to achieve a doubling of the population of salmon and steelhead by the year 2000. The project is supported by the Sport Fish Restoration Act, which uses sport fishermen's funds to improve sport fisheries.

The NCWPCP conducts stream and habitat inventories according to the standard methodologies discussed in the *California Salmonid Stream Habitat Restoration Manual,* (Flosi et.al., 1998). Biological sampling is conducted using electrofishing and direct observation to determine species presence and distribution; selected streams are electrofished for population estimates. Some streams are also sampled for sediment composition. Collected information is used for base-line data, public cooperation development, restoration program planning, specific project design and implementation, and for project evaluation.

The Eel River system was identified as the initial basin for project planning activities. Most anadromous tributaries to the Van Duzen, South Fork Eel, Mainstem Eel, Middle Fork Eel, and the North Fork Eel rivers have been inventoried since 1991. Initial field inventory of the Eel River system should be essentially complete in 1996. NCWPCP personnel have also worked in cooperation with the DFG Salmon Restoration Project's staff to inventory streams on the Mattole River, Mendocino Coast, and Humboldt Bay.

STREAM INVENTORY REPORT

Little Burr Creek, Mainstem Eel River

INTRODUCTION

A stream inventory was conducted during the summer of 2000 on Little Burr 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 Little Burr 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

Little Burr Creek is tributary to Burr Creek, tributary to Larabee Creek, tributary to the Mainstem Eel River, tributary to the Pacific Ocean, located in Humboldt County, California (Map 1). Little Burr Creek's legal description at the confluence with Burr Creek is T01N R04E S30. Its location is 40°25′54″ north latitude and 123°46′13″ west longitude. Little Burr Creek is a second order stream and has approximately 2.31 miles of blue line stream according to the USGS Bridgeville and Larabee Valley 7.5 minute quadrangles . Little Burr Creek drains a watershed of approximately 1.62 square miles. Elevations range from about 1190 feet at the mouth of the creek to 3000 feet in the headwater areas. Douglas fir, grass, and, mixed hardwood forest dominate the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland . Vehicle access exists from U.S. Highway 101 via Highway 36. Follow Highway 36 east to Bridgeville, at Bridgeville turn right onto Alderpoint Road. Follow Alderpoint Road and turn onto Chalk Mountain Ranch Road. From Chalk Mountain Ranch Road turn left onto a private logging road. Follow this logging road to Burr Creek, and parallels the creek. Follow this private road to the confluence of Burr Creek and Little Burr Creek.

METHODS

The habitat inventory conducted in Little Burr Creek follows the methodology presented

in the *California Salmonid Stream Habitat Restoration Manual* (Flosi, et. al.,1998). The AmeriCorps Watershed Stewards Project (WSP) 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 Little Burr Creek to record measurements and observations. There are nine components to the inventory form. For specific information on the methods used see the Burr Creek report.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. In Little Burr 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

Little Burr Creek

- 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 Little Burr 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 the pool tail outs
- Mean 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 8, 2000, was conducted by C. Glenney and G. Johnson (WSP). The total length of the stream surveyed was 1,282 feet.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.13 cfs on August 7, 2000.

Little Burr Creek is a B3 channel type for the entire 1,282 feet of stream reach surveyed.
B3 channel types are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools; very stable plan and profile; stable banks; cobble channel.

Water temperatures taken during the survey period ranged from 56° to 59° F. Air temperatures ranged from 61° to 72° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on

frequency of **occurrence** there were 33% riffle units, 50% flatwater units, and 17% pool units (Graph 1). Based on total **length** of Level II habitat types there were 30% riffle units, 63% flatwater units, and 7% pool units (Graph 2).

Eight Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were step runs, 30%; low gradient riffle, 20%; and runs, 20% (Graph 3). Based on percent total **length**, step runs made up 53%; low gradient riffle, 21%; and runs, 10%.

A total of five pools were identified (Table 3). Main channel pools were most frequently encountered at 60% and comprised 61% 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. Five of the five pools (100%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the five pool tail-outs measured, two had a value of 1 (40%); two had a value of 2 (40%); one had a value of 3 (20%); zero had a value of 4 (0%) and zero had a value of 5 (zero%) (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 5, flatwater habitat types had a mean shelter rating of 5, 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 Little Burr Creek and are extensive. Large woody debris is lacking in nearly all habitat types. Graph 7 describes the pool cover in Little Burr Creek.

Table 6 summarizes the dominant substrate by habitat types. Small cobble and large cobble was the dominant substrates each observed in two of the four pool tail outs measured (40%). Gravel was the next most frequently observed dominant substrate type and occurred in 20% of the pool tail-outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 85%. The mean percentages of conifer and deciduous trees were 4% and 96%, respectively. Graph 9 describes the canopy in Little Burr Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 78.3%. The mean percent left bank vegetated was 81.7%. The dominant elements composing

the structure of the stream banks consisted of 5.6% bedrock, 5.6% boulder, 11.1% cobble/gravel, and 77.8% sand/silt/clay (Graph 10). Deciduous trees were the dominant bank vegetation type observed in 88.9% of the units surveyed. Additionally, 5.6% of the units surveyed had brush as the dominant bank vegetation, and 5.6% had grass as the dominant bank vegetation, (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on October 23, 2000 in Little Burr Creek. The site was sampled by Glenn Yoshioka (DFG), Gordon Johnson, Ben Beaver, and Kirsten Williams (WSP).
The site sampled began at the confluence with Burr Creek; it included habitat units 001, 002, and 004. These three units consisted of a run, low gradient riffle, lateral scour pool-log enhanced, mid-channel pool, lateral scour pool-boulder formed, and a lateral scour pool-rootwad enhanced. This site yielded 17 juvenile steelhead trout. Based on visually estimated length, the distribution of age classes for steelhead are 13 age 0+, 3 age 1+, and 1 age 2+.

DISCUSSION

Little Burr Creek is a B3 channel type for the entire 1,282 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is excellent for plunge weirs; boulder clusters and bank placed boulder; single and opposing wing-deflectors; log cover.

The water temperatures recorded on the survey days August 8, 2000, ranged from 56° to 59° F. Air temperatures ranged from 61° to 72° F. This is an 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 63% of the total length of this survey, riffles 30%, and pools 7%. The pools are relatively deep, with all five pools having a maximum depth greater than 2 feet. 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. Primary pool habitat comprised only 7% of the total length of the habitat surveyed, in general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. Installing structure that will increase or deepen pool habitat is recommended.

Two of the five (40%) pool tail-outs measured had an embeddedness rating of 1, 40% had a rating of 2, 20% had a rating of 3, and none had a rating of 4. None of the pool tail-outs had a rating of 5 or were considered unsuitable for spawning.

The mean shelter rating for pools was 12. The shelter rating in the flatwater habitats was 5. 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. Additionally, root masses contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Instream cover created by small and large woody debris provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Three of the five (60%) 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 85%. This is a relatively high percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80% or when coniferous trees are lacking.

The percentage of right and left bank covered with vegetation was 78.3% and 81.7%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting native species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Little Burr 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. However, 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) Primary pools comprise 7% of the total length of the habitat surveyed. 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) Increase the riparian canopy by planting native conifers such as redwood, and Douglas fir along the stream where this component of riparian tress is lacking.

6) Due to the high gradient of the stream, access for migrating salmonids appears to be a problem. Little Burr Creek and particularly the rusted culvert at Alderpoint Road should be further evaluated to determine if there are significant barriers. The creek upstream from the culvert under Alderpoint Road should be surveyed to determine to the quality and quantity of anadromous fish habitat. If good water temperature and flow regimes exist in the stream, fish passage should be improved if possible.

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 the confluence with Burr Creek.

981' Three foot plunge. Seven foot drop over the length of the cascade.

1,013' Three foot plunge.

1,023' Five foot plunge.

1,282' End of survey. The number of fish observed decreased greatly after this habitat unit. The stream was walked for another 325' upstream. The habitat types were mostly cascades, high gradient riffles, step runs, and pools with a dominate substrate of bedrock and boulders.

1,607' Ten foot corrugated metal pipe (CMP) culvert. The culvert is perched with a 6' plunge to the pool below. The culvert is rusted through in many places with the flow under cutting the culvert. This culvert may be the current end of anadromy and should be further evaluated in terms of fish passage and also for the potential for culvert failure.

REFERENCES

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins.1998. *California Salmonid Stream Habitat Restoration Manual*, 3nd 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]	

Backwater Pool - Log Formed	[BPL]	6.3	6.4
Dammed Pool		[DPL]	
		6.5	