STREAM INVENTORY REPORT

Dobbyn Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Dobbyn 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 Dobbyn Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species.

There is no known record of adult spawning surveys having been conducted on Dobbyn Creek. However, landowners have reported recent observations of chinook salmon spawning in the lower reaches of the stream. 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

Dobbyn Creek is tributary to the Eel River, located in Humboldt County, California. Dobbyn Creek's legal description at the confluence with the Eel River is T03S R05E S06. Its location is 40°13'48" north latitude and 123°39'48" west longitude. Dobbyn Creek is a fourth order stream and has approximately 56 miles of blue line stream in its drainage, according to the USGS Alderpoint and Fort Seward 7.5 minute quadrangles. Dobbyn Creek drains a watershed of approximately 73.6 square miles. Summer base runoff is approximately 1.5 cubic feet per second (cfs) at the mouth, but over 1500 cfs is not unusual during winter storms. Elevations range from about 240 feet at the mouth of the creek to 1,600 feet in the headwater areas. Oak-grasslands and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for timber production, rangeland, and rural residence. Vehicle access exists via the Alderpoint - Blocksburg Road to the Fort Seward Road to a bridge across Dobbyn Creek approximately 1.5 miles above the confluence with the Eel River.

METHODS

The habitat inventory conducted in Dobbyn Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The Pacific Fish, Wildlife and Wetlands Restoration Association (PCFWWA) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Dobbyn Creek personnel were trained in May, 1995, by Scott Downie and Ruth Goodfield. 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 Dobbyn 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. Additionally, a recording thermograph was deployed in Dobbyn Creek from July 31 to August 10 to record temperatures on a 24 hour basis. The instrument sampled mixed flowing water one foot below the surface on an hourly basis.

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". Dobbyn 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 Dobbyn 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), 76 - 100% (value 4). Additionally, a rating of "not suitable" (NS) 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 Dobbyn 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.

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*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Dobbyn 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 Dobbyn Creek, the dominant composition type (options 1-4) and the dominant vegetation type (options 5-9) 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 Dobbyn Creek fish presence was observed from the stream banks, and one site was electrofished using a single Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

SUBSTRATE SAMPLING

Gravel sampling is conducted using a 9 inch diameter standard McNeil gravel sampler. Sample sites are identified numerically beginning at the most upstream site in the stream. Gravel samples are separated and measured to determine respective percent volume using five sieve sizes (25.4, 12.5, 4.7, 2.37, and 0.85 mm)(Valentine, 1995).

DATA ANALYSIS

Data from the habitat inventory form are entered into *Habitat7.3*, 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

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Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Dobbyn 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 July 31 to August 2, 1995, was conducted by Dylan Brown and Ray Bevitori (PCFWWRA). The total length of the stream surveyed was 20,125 feet with an additional 3,085 feet of side channel.

Flows were not measured on Dobbyn Creek.

Dobbyn Creek is a C4 channel type for the entire 20,125 feet of stream reach surveyed. C4 channels are low gradient, meandering, point-bar, riffle/pool, alluvial channels with a broad, well-defined floodplain and predominantly gravel channel.

Water temperatures taken during the survey period ranged from 68 to 84 degrees Fahrenheit. Air temperatures ranged from 69 to 94 degrees Fahrenheit. Hourly water temperature samples taken with a recording thermograph deployed from July 31 to August 10, 1995, ranged from 56° to 76° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 47% riffle units, 34% pool units, and 19% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 52%

riffle units, 25% pool units, and 23% flatwater units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low gradient riffles, 46%; mid-channel pools, 28%; and runs, 19% (Graph 3). Based on percent total **length**, low gradient riffles made up 52%, runs 23%, and mid-channel pools 20%.

A total of forty-nine pools were identified (Table 3). Main channel pools were most frequently encountered at 92% and comprised 92% 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. Forty-eight of the 49 pools (99%) had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 18 pool tail-outs measured, none had a value of 1; 2 had a value of 2 (11%); 11 had a value of 3 (61%); and 5 had a value of 4 (28%) (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. Pool habitat types had a mean shelter rating of 28, and riffle habitats had a mean shelter rating of 18 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 30. Main channel pools had a mean shelter rating of 28 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel and large cobble were the dominant substrate observed in 6 of the 9 low gradient riffles measured (66%). Boulder was the next most frequently observed dominant substrate type and occurred in 22% of the low gradient riffles (Graph 8).
The mean percent canopy density for the stream reach surveyed was 43%. The mean percentages of deciduous and coniferous trees were

30% and 12%, respectively. Graph 9 describes the canopy in Dobbyn Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 26%. The mean percent left bank vegetated was 37%. The dominant elements composing the structure of the stream banks consisted of 14.6% bedrock, 10.4% boulder, and 75% cobble/gravel (Graph 10). No vegetation was the dominant vegetation type observed in 52% of the units surveyed, since floodplain gravel bars were the most common streambanks. Additionally, 33% of the units surveyed had deciduous trees as the dominant vegetation type, and 2% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on August 24, 1995, in Dobbyn Creek. The site was sampled by Ray Bevitori, Dylan Brown, and Ruth Goodfield (PCFWWRA and DFG).

The site sampled included habitat units 042-043, a riffle/run sequence, approximately 8,100 feet from the confluence with the Eel River. This site had an area of 4,800 sq ft and a volume of 3,868 cu ft. The site yielded two suckers, both 50mm; and 13 steelhead/rainbow trout, ranging from 60mm to 130mm fl.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Dobbyn Creek.

DISCUSSION

Dobbyn Creek is a C4 channel type for the entire 20,125 feet of stream surveyed. The suitability of C4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulder and log cover structures; and fair for low-stage weirs, single and opposing wing-deflectors, and channel constrictors.

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The water temperatures recorded on the survey days July 31 - August 2, 1995, ranged from 68 to 84 degrees Fahrenheit. Air temperatures ranged from 69 to 94 degrees Fahrenheit. Further samples from a recording thermograph deployed during August 1995, near the Fort Seward Road bridge measured water temperatures from 56° to 76° Fahrenheit. This is a warm water temperature range for salmonids. These warmer temperatures, if sustained, are at the threshold stress level for salmonids.

Flatwater habitat types comprised 23% of the total **length** of this survey, riffles 52%, and pools 25%. The pools are relatively deep, with 48 of the 49 (99%) pools having a maximum depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width.

Sixteen of the 18 pool tail-outs measured had embeddedness ratings of 3 or 4. None 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 Dobbyn 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 28. The shelter rating in the flatwater habitats was slightly lower at 10. 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, aquatic vegetation 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.

Five of the nine low gradient riffles had large cobble or boulders as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean percent canopy density for the stream was 43%. This is a relatively low percentage of canopy. In general, re-vegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 26% and 37%, 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) Dobbyn Creek should be managed as an anadromous, natural production stream.

2) 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 locally available.

3) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 8839', should then be treated to reduce the amount of fine sediments entering the stream.

4) Increase the canopy on Dobbyn 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.

5) The limited water temperature data available suggest that maximum temperatures are above 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.

6) There are at least two sections where the stream is being

impacted from cattle trampling the riparian zone and defecating in the water. Alternatives should be explored with the grazier and developed if possible.

7) 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.

8) 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.

PROBLEM SITES 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 Eel River. Channel type is C4 for entire length of survey.
1470'	Slide on right bank (RB) - approximately 40' high X 30' wide.
2985'	Slide on left bank (LB) - approximately 50' high X 60' wide.
4300'	Small, man-made dammed pool used for swimming.
6901'	Confluence with Conley Creek. Water in Conley Creek is 66°F.
8100'	Biological inventory site #1.
8103'	Fort Seward Road bridge crosses creek.
8141'	Sacramento squawfish and/or California roach juveniles

observed in side-channel.

8839' Lateral erosion on RB, approximately 210' long X 20' high.

11575' Evidence of cattle grazing and defecating in the stream channel.

14086' Spring on RB - 70°F.

14358' Slide on LB - approximately 100' long x 100' high.

17897' Spring on RB - 69°F.

20125' Confluence of North and South Dobbyn Creeks. End of survey for mainstem Dobbyn Creek.

References

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department

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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.

Valentine, B. 1995. Stream substrate quality for salmonids: guidelines for sampling, processing, and analysis, unpublished manuscript. California Department of Forestry and Fire Prote

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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