STREAM INVENTORY REPORT

SOUTH DOBBYN CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on South 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 South 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 South Dobbyn Creek.

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

South Dobbyn Creek is tributary to Dobbyn Creek, tributary to the Eel River, located in Humboldt County, California. South Dobbyn Creek's legal description at the confluence with Dobbyn Creek is T03S R05E S10. Its location is 40°13'28" north latitude and 123°36'28" west longitude. South Dobbyn Creek is a fourth order stream and has approximately 37 miles of blue line stream according to the USGS Alderpoint, Black Lassic, Blocksburg, Ruth Lake, and Zenia 7.5 minute quadrangles. South Dobbyn Creek drains a watershed of approximately 39.7 square miles. Summer base runoff is approximately 1.0 cubic feet per second (cfs) at the mouth, but over 500 cfs is not unusual during winter storms. Elevations range from about 320 feet at the mouth of the creek to 3,000 feet in the headwater areas. Grass, mixed hardwood, and mixed conifer forest dominate the watershed. Except for the upper 10% of the basin, held by Six Rivers National Forest, the watershed is privately owned and is managed for forestry, rangeland, and rural residence. Access is via the Alderpoint-Blocksburg Road, approximately 3 miles northeast of Alderpoint.

METHODS

The habitat inventory conducted in South Dobbyn Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The Pacific Coast Fish, Wildlife and Wetlands Restoration Association (PCFWWRA) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). South 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 South 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 South Dobbyn Creek from August 14 to October 2, 1995 to record temperatures on an hourly basis. The instrument was placed at a depth of one foot in mixed, flowing water in a lower reach.

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". South 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 South 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 South 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 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*, 1994. Canopy density relates to the amount of stream shaded from the sun. In South 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 South 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 South Dobbyn Creek fish presence was observed from the stream banks, and two sites were electrofished using one 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 *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 Lotus 1,2,3. Graphics developed for South 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 August 2 - 21, 1995, was conducted by Ray Bevitori and Dylan Brown (PCFWWRA). The total length of the

stream surveyed was 49,398 feet with an additional 1,366 feet of side channel.

Flows were not measured on South Dobbyn Creek.

South Dobbyn Creek is a C4 channel type for the first 21,721 feet of stream reach surveyed, and a C2 type for the remaining 27,677 feet of the survey. C4 channels are low gradient, meandering, point-bar, riffle/pool, alluvial channels with a broad, well-defined floodplain and gravel-dominant substrate. C2 channel types follow the above description, but with predominantly boulder substrate.

Water temperatures taken during the survey period ranged from 58 to 84 degrees Fahrenheit. Air temperatures ranged from 59 to 90 degrees Fahrenheit. Water temperatures taken with a recording thermograph deployed from August 14 to October 2, 1995, ranged from 61° to 84° Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 42% pool units, 30% riffle units, and 26% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 41% flatwater units, 30% riffle units, and 28% pool units (Graph 2).

Thirteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were mid-channel pools, 28%; low gradient riffles, 26%; and step runs, 15% (Graph 3). Based on percent total **length**, low gradient riffles made up 27%, step runs 24%, and mid-channel pools 21%.

A total of 266 pools were identified (Table 3). Main channel pools were most frequently encountered at 69% and comprised 81% 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 hundred seventy-seven of the 266 pools (67%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 45 pool tail-outs measured, none had a value of 1; 1 had a value of 2 (2.2%); 29 had a value of 3 (64.4%); and 15 had a value of 4 (33.3%) (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 24, and flatwater habitats had a mean shelter rating of 14 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 29. Main channel pools had a mean shelter rating of 21 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 6 of the 15 low gradient riffles measured (40%). Large cobble and boulders were the next most frequently observed dominant substrate types and each occurred in 27% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 52%. The mean percentages of deciduous and coniferous trees were 46% and 6%, respectively. Graph 9 describes the canopy in South Dobbyn Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 53%. The mean percent left bank vegetated was 55%. The dominant elements composing the structure of the stream banks consisted of 7.5% bedrock, 45.5% boulder, 41.7% cobble/gravel, and 5.3% sand/silt/clay (Graph 10). No vegetation was the dominant vegetation type observed in 20% of the units surveyed. Additionally, 71.2% of the units surveyed had deciduous trees as the dominant vegetation type, and 0.8% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Two sites were electrofished on September 18, 1995, in South Dobbyn Creek. The sites were sampled by Dylan Brown, Ray Bevitori, and Ruth Goodfield (PCFWWRA and DFG).

The first site sampled included habitat units 332-333, a run/riffle sequence, approximately 36,368 feet from the confluence with Dobbyn Creek. This site had an area of 2,484 sq ft and a volume of 1,987 cu ft. The site yielded a total of 75 steelhead ranging in size from 43mm fl to 145mm fl.

The second site included habitat units 506-508, a riffle/run/pool sequence, located approximately 45,870 feet above the creek mouth. This site had an area of 1,100 sq ft and a volume of 770 cu ft. The site yielded a total of 63

steelhead, ranging in size from 42mm fl to 153mm fl.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on South Dobbyn Creek.

DISCUSSION

South Dobbyn Creek is a C4 channel type for the first 21,721 feet of stream surveyed and a C2 for the remaining 27,677 feet. The suitability of C4 channel types for fish habitat improvement structures is good for bank-placed boulders and log cover structures. The suitability of C2 channel types is good for low-stage weirs, single and opposing wing-deflectors, channel constrictors, and log cover structures.

The water temperatures recorded on the survey days August 2-21, 1995, ranged from 58 to 84 degrees Fahrenheit. Air temperatures ranged from 59 to 90 degrees Fahrenheit. Further samples from a recording thermograph deployed during the summer of 1995 recorded a range of water temperatures from 59° to 84° Fahrenheit. This is a relatively warm water temperature range for salmonids. These warmer temperatures, if sustained, are within the threshold stress level for salmonids.

Flatwater habitat types comprised 41% of the total **length** of this survey, riffles 30%, and pools 28%. The pools are relatively deep, with 126 of the 266 (47.4%) 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.

Forty-four of the 45 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 South Dobbyn 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 24. The shelter rating in the flatwater habitats was slightly lower at 14. 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, bedrock ledges 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.

Eight of the 15 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 52%. This is only a moderate 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 moderate at 53% and 55%, 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) South Dobbyn Creek should be managed as an anadromous, natural production stream.

2) 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.

3) Increase the canopy on South 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.

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 and in some areas the material is locally available.

5) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment

yield. Identified sites, like the site at 22875', should then be treated to reduce the amount of fine sediments entering the stream.

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.

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 Dobbyn Creek. Channel type is C4.
3411'	Dry spring bed on left bank (LB).
3767'	Small slide on LB approximately 25' high X 75' long.
4369'	Evidence of cattle grazing and defecating in the creek.
5124'	Slide on LB approximately 50' high X 100' long.
5570'	Slide on right bank (RB) approximately 50' high X 100' long.
9094'	Lateral erosion on LB approximately 15' high X 150' long causing trees to fall into creek.
10897'	Slide on RB approximately 20' high X 200' long.
10995'	Small spring on LB, 58°F water temperature.
13268'	Large slide on LB approximately 150' high X 300' long.
14384'	Alderpoint Road Bridge crosses creek.
14410'	Evidence of cattle trampling riparian vegetation.
18853'	Slide on RB approximately 70' high X 70' long.

18980' Large slide on LB approximately 600' high X 300' long, appears to be older and healing.

21721' Channel type changes to a C2 for remaining 27677' of stream surveyed.

21857' Slide on LB approximately 35' high X 150' long.

22347' Spring on LB 59°F water temperature.

22592' Small spring on LB.

22875' Slide on RB approximately 75' high X 250' long.

23176' Zenia Road Bridge crosses creek.

23223' Spring on LB 56°F water temperature.

25716' Slide on LB approximately 150' high X 100' long.

26169' Spring on RB 64°F water temperature at 9:30 AM!

26515' Slide on LB approximately 30' high X 150' long.

27459' Juvenile Sacramento squawfish and/or California roach observed in pool.

28696' Spring on LB 58°F water temperature.

29863' RB erosion 25' high X 300' long.

32375' Slide on LB approximately 50' high X 150' long.

32543' Spring on LB 57°F water temperature.

32903' Slide on LB 100' high X 150' long.

33871' Recording thermograph site #1.

34261' Large slide on LB approximately 800' high X 400' long.

35944' Confluence with Mud Creek on RB. on Mud Creek.

36768' Bioinventory site #1.

38039' Spring on LB 58°F water temperature.

39254' Large slide on RB approximately 200' high X 150' long.

41085' Confluence with Hembrey Creek on RB. Hembrey Creek appears to be an A channel type for at least 300 yards.

42384' Spring on LB 58°F water temperature.

44346' Spring on RB 56°F water temperature.
44735' Slide on LB approximately 30' high X 70' long.

45237' Slide on LB approximately 50' high X 80' long.

45831' Confluence with Line Gulch on RB, 61°F water temperature.

45870' Bioinventory site #2.

46738' Spring on LB 58°F water temperature.

47106' Slide on RB approximately 100' high X 100' long.

47650' Waterfall caused by boulder in stream, 7' plunge. Possible fish barrier.

49301' Slides on both banks: RB - 200' high X 150' long; LB - 100' high X 100' long.

49398' Loss of flow, no fish observed: 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.

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