STREAM INVENTORY REPORT

Taylor Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1997 on Taylor 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 Taylor 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

Taylor Creek is tributary to the South Fork Eel River, tributary to the Eel River, tributary to the Pacific Ocean, located in Mendocino County, California (Map 1). Taylor Creek's legal description at the confluence with South Fork Eel River is T21N R16W S25. Its location is 39°38′31″ north latitude and 123°36′8″ west longitude. Taylor Creek is a first order stream and has approximately 1.4 miles of blue line stream according to the USGS Cahto Peak 7.5 minute quadrangle. Taylor Creek drains a watershed of approximately 0.7 square miles. Elevations range from about 1,600 feet at the mouth of the creek to 2,160 feet in the headwater areas. Redwood forest dominates the watershed. The watershed is entirely privately owned and is managed for timber production. Vehicle access exists via Bransom Road to Admiral Standley State Recreation Area.

METHODS

The habitat inventory conducted in Taylor 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 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 Taylor 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". Taylor 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.

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 Taylor 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 unsuited 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 Taylor 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 densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy

density relates to the amount of stream shaded from the sun. In Taylor 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 Taylor 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.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in Taylor Creek. In addition, one sites were 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
- 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 Taylor Creek include:

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- 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

* ALL TABLES AND GRAPHS ARE LOCATED AT THE END OF THE REPORT *

The habitat inventory of July 21 and 22, 1997, was conducted by Allan Renger (CCC) and Jessie Robertson(WSP). The total length of the stream surveyed was 5,068 feet.

Flow was measured during the survey with a Marsh-McBirney Model 2000 flowmeter at 0.085 cfs on July 21, 1997.

Taylor Creek is an B4 channel type for the entire 5,068 feet of stream reach surveyed. B4 stream channels are moderately entrenched, moderate gradient, riffle dominated gravel channels with infrequently spaced pools; very stable plan and profile, and stable banks.

Water temperatures taken during the survey period ranged from 57° to 63° F. Air temperatures ranged from 58° to 83° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 26% riffle units, 28% flatwater units, 40% pool units, 4% dry units, and 2% culvert (Graph 1). Based on total **length** of Level II habitat types there were 27% riffle units, 55% flatwater units, 12% pool units, 1% dry units, and 5% culvert (Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were main channel pools, 37%; step runs, 23%, and low gradient riffles, 22% (Graph 3). Based on percent total **length**, step runs made up 51%, low gradient riffles 24%, and main channel pools 11%.

A total of forty pools were identified (Table 3). Main channel pools were most frequently encountered at 93% and comprised 93% of the total length of all pools (Graph 4).

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Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Thirteen of the 40 pools (32.5%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 40 pool tail-outs measured, 4 had a value of 1 (10%); 18 had a value of 2 (45%); 16 had a value of 3 (40%); 2 had a value of 4 (5%) and none had a value of 5 (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 16, flatwater habitat types had a mean shelter rating of 23, and pool habitats had a mean shelter rating of 44 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 51. Scour pools had a mean shelter rating of 20 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Taylor Creek. Graph 7 describes the pool cover in Taylor Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 27 of the 40 pool tail-outs measured (68%). Gravel was the next most frequently observed dominant substrate type and occurred in 33% of the pool tail-outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 87%. The mean percentages of deciduous and coniferous trees were 27% and 73%, respectively. Graph 9 describes the canopy composition in Taylor Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 79.4%. The mean percent left bank vegetated was 82.9%. The dominant elements composing the structure of the stream banks consisted of 2.9% bedrock, 11.8% boulder, 26.5% cobble/gravel, and 58.8% sand/silt/clay (Graph 10). Coniferous trees were the dominant vegetation type observed in 50% of the units surveyed. Additionally, 14.7% of the units surveyed had deciduous trees as the dominant vegetation type, 26.5% had brush as the dominant vegetation, and 8.8% had grass as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on July 21, 1997, in Taylor Creek. The site was sampled by Allan Renger (CCC) and Jessie Robertson (WSP).

The site sampled included habitat units 31-33, approximately 1,785 feet from the confluence with the South Fork Eel River. This site had an area of 384 sq ft and a volume of 153.6 cu ft.

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The site yielded 2 Pacific giant salamander and 10 steelhead/rainbow trout.

DISCUSSION

Taylor Creek is a B4 channel type for the entire 5,068 feet of stream surveyed. The suitability of B4 channel types for fish habitat improvement structures is as follows: excellent for plunge weirs; boulder clusters; bank placed boulders; single and opposing wing deflectors; and log cover.

The water temperatures recorded on the survey days July 21 and 22, 1997, ranged from 57° to 63° F. Air temperatures ranged from 58° to 83° F. This is a 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 55% of the total **length** of this survey, riffles 27%, pools 12%, dry 1%, and culvert 5%. The pools are relatively shallow, with only 13 of the 40 (32.5%) pools having a maximum depth greater than 2 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. Installing structures that will increase or deepen pool habitat is recommended.

Four of the forty pool tail-outs measured had an embeddedness rating of 1. Eighteen of the 40 pool tail-outs had embeddedness ratings of 3 or 4. None of the pool tail-outs had a rating of 5 or were considered unsuitable 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. In Taylor 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 44. The shelter rating in the flatwater habitats was 23. 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, large woody debris and root mass 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.

All of the pool tail-outs measured had gravel or small cobble as the dominant substrate. This is good for spawning salmonids.

The mean percent canopy density for the stream was 87%. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was 79.4% and 82.9%, 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) Taylor 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.

3) 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) 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.

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 confluence with the South Fork Eel River. Channel type is B4.

125' Round culvert with baffles approximately 7' long.

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409' Failed Humboldt crossing acts as log debris accumulation.

612' Log debris accumulation approximately 32' long.

1,785' Electrofishing site.

1,827' Log debris accumulation.

1,990' Spring enters. Plunge from culvert 4 foot drop to pool.

2,021' Round culvert under road crossing.

2,436' Slide on left bank, 12' high x 25' long.

2,774' Log debris accumulation, possible fish barrier.

3,313' Four foot drop.

4,078' Spring enters.

5,068' End of survey due to end of anadromy.

REFERENCES

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 1998. *California Salmonid Stream Habitat Restoration Manual, 3rd 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]	6.3
Backwater Pool - Log Formed	[BPL]	6.4