STREAM INVENTORY REPORT

COLEMAN CREEK

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on Coleman Creek, a tributary to the mainstem Eel River. 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 Coleman Creek. The objective of a biological inventory is to document the presence and distribution of juvenile salmonids.

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

Coleman Creek is tributary to the mainstem Eel River in Humboldt County, California (Map 1). Coleman Creek's legal description at the confluence with the mainstem Eel River is T2S R4E S16. Its location is 40°17′39″ North latitude and 123°43′42″ West longitude. Coleman Creek is a second order stream and has approximately 4 miles of blue line stream according to the USGS Blocksburg 7.5 minute quadrangle. Coleman Creek drains a watershed of approximately 6.0 square miles. Elevations range from about 120 feet at the mouth of the creek to 1800 feet in the headwater areas. Douglas fir forest and oak grasslands dominate the watershed. The watershed is entirely privately owned and is managed for timber production and rangeland. Vehicle access exists via Eel Rock Road and then a ford across the Eel River upstream of the town of Eel Rock. After crossing the Eel River, walk dowmstream to the mouth of Coleman Creek. An ATV road provides access to the creek upstream of the mouth.

METHODS

The habitat inventory conducted in Coleman Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al., 1998). The AmeriCorps Watershed Stewards Project (AmeriCorps/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.

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SAMPLING STRATEGY

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach (Hopelain, 1995). 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 methodology and data sheet have been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This protocol was used in Coleman Creek to record measurements and observations. There are nine components to the inventory data sheet.

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.

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". Coleman 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 Coleman Creek, embeddedness was determined by ocular estimate. 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, 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 Coleman 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 Coleman 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 Coleman 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 was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. The only biological sampling to date on Coleman Creek are streambank observations made during this stream habitat survey. This sampling technique is discussed in the *California Salmonid Stream Habitat Restoration Manual*.

SUBSTRATE SAMPLING

Substrate samples were not collected on Coleman Creek.

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

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Graphics are produced from the tables using Quattro Pro. Graphics developed for Coleman 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
- Percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

<u>HABITAT INVENTORY RESULTS</u>

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

The habitat inventory of July 14-15 and August 3, 1999, was conducted by Michelle Anderson and Greg Larson (AmeriCorps/WSP). The total length of the stream surveyed was 9104 feet with an additional 293 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.6 cfs on July 16, 1999.

Coleman Creek is a B2 channel type for the first 2649 feet, then a F3 channel for 3574 feet, and a F1 channel for the remaining 2881 feet of stream surveyed.

Water temperatures taken during the survey period ranged from 58° to 71° F. Air temperatures ranged from 57° to 76° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 33% riffle units, 29% flatwater units, 38% pool units, and <1% dry units (Graph 1). Based on total length of Level II habitat types there were 30% riffle units, 47% flatwater units, 22% pool units, and 1% dry units (Graph 2).

Fifteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were mid-channel pools, 31%; low gradient riffles, 26%; and runs, 22% (Graph 3). Based on percent total length, runs made up 29%, low gradient riffles 21%, mid-channel pools 18%, and step runs 18% (Table 2).

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A total of 63 pools were identified (Table 3). Main channel pools were most frequently encountered Level III pool types at 86% (Graph 4) and comprised 89% of the total length of all pools (Table 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Fifty-six of the sixty-three pools (89%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the sixty pool tail-outs measured, none had a value of 1 (00.0%); 9 had a value of 2 (15%); 21 had a value of 3 (35%); 3 had a value of 4 (5%) and 27 had a value of 5 (45%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail-out is not suitable for spawning.

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 61, flatwater habitat types had a mean shelter rating of 48, and pool habitats had a mean shelter rating of 57 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 64, backwater pools had a mean shelter rating of 52, and scour pools had a mean shelter rating of 44 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Coleman Creek and are extensive. Large woody debris is lacking in most habitat types. Small woody debris is found in a number of habitat types but is not abundant. Graph 7 describes the pool cover in Coleman Creek.

Table 6 summarizes the dominant substrate in pool habitat types. Gravel was the dominant substrate observed in 28 of the 60 pool tail outs measured (46.7%). Boulders were the next most frequently observed dominant substrate type and occurred in 26.7% of the pool tail outs while bedrock was the third most common at 18.3% (Graph 8).

The mean percent canopy density for the stream reach surveyed was 68%. The mean percentages of deciduous and coniferous trees were 13% and 87%, respectively. Graph 9 describes the canopy in Coleman Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 78%. The mean percent left bank vegetated was 82%. The dominant elements composing the structure of the stream banks consisted of 25% bedrock, 3.1% boulder, 14.6% cobble/gravel, and 57.3% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 52% of the units surveyed. Additionally, 52.1% of the units surveyed had deciduous trees as the dominant vegetation type, and 5.2% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

No spawner surveys or electrofishing surveys were conducted for this stream. The persons conducted the stream habitat inventory survey reported seeing juvenile salmonids based on streambank observations.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Coleman Creek.

DISCUSSION

Coleman Creek is a B2 channel type for the first 2649 feet of stream surveyed, a F3 type for the next 3574 feet, and a F1 type for the next 2881 feet. The suitability of B2, F3, and F1 channel types for fish habitat improvement structures are as follows: B2 channels are excellent for plunge weirs, single and opposing wing-deflectors, and log cover; F3 channels are good for bank-placed boulders, and single and opposing wing-deflectors and are fair for plunge weirs, boulder clusters, channel constrictors, and log cover; and F1 good for bank-placed boulders, fair for single wing-deflectors and log cover, and poor for plunge weirs, boulder clusters, and opposing wing deflectors.

The water temperatures recorded on the survey days, July 14-15 and August 3, 1999, ranged from 58° to 71° F. Air temperatures ranged from 57° to 76° F. This is probably an adequate water temperature range for steelhead. However, 71° F, if sustained, is above the threshold stress level for salmonids. Coleman Creek appears to have temperatures that would support steelhead but would be stressful to coho. 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 47% of the total length of this survey, riffles 30%, and pools 22%. The pools are relatively deep, with 89% of 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. Primary pools comprise 20% of the total length of the stream. 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 any needed modification of log debris accumulations (LDA's) in the stream. The LDA's in the system may be retaining needed gravel.

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Any necessary modifications to them should be done with the intent of metering the gravel out to downstream reaches that will trap the gravel for future spawning use. Therefore, gravel retention features may need to be developed prior to any LDA modification.

Fifty-five percent of pool tail outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

None of the 60 (0%) pool tail-outs measured had an embeddedness rating of 1, 15% had a value of 2, 40% had a ratings of 3 or 4, and 45% had a rating of 5 and 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 Coleman 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 57. The shelter rating in the flatwater habitats was slightly lower at 48. A pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by boulders in most habitat types. Additionally, bedrock, white water, and terrestrial vegetation contribute to cover. Log and root wad cover structures in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Instream cover produced 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.

The mean percent canopy density for the stream was 68%. This is a relatively moderate percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 78% and 82%, 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) Coleman Creek should be managed as an anadromous, natural production stream.

2) The limited water temperature data available suggest that maximum temperatures may exceed the optimum 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.

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3) Increase the canopy on Coleman 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) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites should then be treated to reduce the amount of fine sediments entering the stream.

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.

6) Primary pools comprise 20% of total stream length. 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.

7) 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.

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 mainstem Eel River, no thermometer. Channel type is a B2.

48' No flow. YOY (species not specified) was observed.

338' Left bank erosion, 15'L x 20'H x 10'W.

442' Left bank erosion starting 24' into unit extending upstream 52', so 52'L x 15'H x 5'W.

681' Out of the influence of the receiving stream. Begin 100% occurrence. Juvenile salmonid observed.

1255' Potential channel type change, more boulders and steeper. Begin 100% occurrence.

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2572' Side channel runs into the top of this unit. Plunge drop is 8 feet.

2649' Channel type changes from a B2 to a F3.

2899' Begin 100% occurrence.

2964' Road crosses this unit 50 feet into the unit. Evidence of 4 wheel drive and ATV use.

3326' Right bank tributary enters 76' into the unit. 10 feet into unit, revegetation is occurring along the right bank on a slide that is 20'H x 5'W.

4044' Left bank tributary enters at the beginning of the unit, temperature is 58 degrees. 144' into unit, stream is cutting into left bank for 75' in length.

5777' Right bank tributary enters 102' into the unit.

6223' Channel type changes from a F3 to a F1. Bedrock dominated.

6691' Dry tributary on left bank at 115 feet into unit.

6971' YOY and larger salmonids observed.

7392' Right bank tributary at top of unit, dry.

7787' Begin 100% occurrence. Bedrock more dominant, more sinuosity, gradient is on the rise. More incised channel.

8274' Run sections are slow moving, almost pool like.

8492' Steep walls.

8835' Gradient begins to increase rapidly for 2 units.

8851' Possible channel type change, increase in gradient, more huge boulders.

9104' END OF SURVEY. +2 fish, large pool with bedrock sides. Above this pool there is a series of pools in the bedrock channel with steep drops around 10' at summer base flow. We could only see 2 pools above unit #162, but the channel bends away beyond view and continues to steepen. No fish were observed in the pools above unit #162. Further passage by habitat typing crews is not possible due to the steep bedrock walls unless an alternate route to the section is found. Channel type seems to be changing to an A2, but the length of stream surveyed is not large enough to break out as a separate reach.

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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.

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**