STREAM INVENTORY REPORT

Pipe Line Creek

INTRODUCTION

A habitat inventory was conducted during the summer of 1998 on Pipe Line Creek. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Pipe Line 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 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

Pipe Line Creek is a tributary to the mainstem Eel River, located in Humboldt County, California (Map 1). Pipe Line Creek's legal description at the confluence with the mainstem Eel River is T01S R03E S31. Its location is 40°20′25"N latitude and 123°53′21″W longitude. Pipe Line Creek is a first order stream and has approximately 2.32 miles of blue line stream according to the USGS Weott and Myers Flat 7.5 minute quadrangles. Pipe Line Creek drains a watershed of approximately 0.59 square miles. Elevations range from about 160 feet at the mouth of the creek to 2,000 feet in the headwater areas. Redwood and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via Highway 101 south to Founders Grove. At Founders Grove follow the Dyerville Loop Road about 3.3 miles to Camp Grant. From here the mouth of Pipe Line Creek can be accessed by foot by following the railroad south.

METHODS

The habitat inventory conducted in Pipe Line Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The AmeriCorps Watershed Stewards Project (WSP) member that conducted the inventory was 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

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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 Pipe Line 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.

4. Habitat Type:

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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". Pipe Line 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. 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 Pipe Line 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, 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 Pipe Line 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 Pipe Line 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 Pipe Line 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. In Pipe Line Creek fish presence was observed from the stream banks.

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 Pipe Line

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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

HABITAT INVENTORY RESULTS

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

The habitat inventory of August 17, 1998, was conducted by Stu McMorrow (WSP) and Curtis Ihle (Humboldt County RCD). The total length of the stream surveyed was 2,035 feet.

Flows were not measured on Pipe Line Creek.

Pipe Line Creek is an F4 channel type for the entire 2,036 feet surveyed. F4 channel types are entrenched meandering riffle/pool channels on low gradients with high width/depth ratios.

Water temperatures taken during the survey period were 57° F. Air temperatures ranged from 66° to 70° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 27% riffle units, 20% flatwater units, 44% pool units, 7% dry units, and 2% culvert units (Graph 1). Based on total length of Level II habitat types there were 23% riffle units, 25% flatwater units, 18% pool units, 33% dry units, and 1% culvert units (Graph 2).

Ten Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles, 27%; mid-channel pools, 20%; step runs and plunge pools, 13% each (Graph 3). Based on percent total length, dry areas made up 33%, low gradient riffle 23%, and step runs 20%.

A total of twenty pools were identified (Table 3). Scour pools were most frequently encountered

at 50% and comprised 59% 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. Six of the 20 pools (30%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the twenty pool tail-outs measured, zero had a value of 1 (0%); ten had a value of 2 (50%); four had a value of 3 (20%); six had a value of 4 (30%) and zero had a value of 5 (0%) (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 5, flatwater habitat types had a mean shelter rating of 5, and pool habitats had a mean shelter rating of 15 (Table 1). Of the pool types, the backwater pools had the highest mean shelter rating at 20. Scour pools had a mean shelter rating of 16 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Large woody debris and terrestrial vegetation are the dominant cover types in Pipe Line Creek. Graph 7 describes the pool cover in Pipe Line Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 11 of the 20 (55%) pool tail-outs measured. Gravel was the next most frequently observed dominant substrate type and occurred in 45% of the pool tail outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 74%. The mean percentages of deciduous and coniferous trees were 18.5% and 55.5%, respectively. Graph 9 describes the canopy in Pipe Line Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 67.9%. The mean percent left bank vegetated was 77.5%. The dominant elements composing the structure of the stream banks consisted of 36% cobble/gravel, and 64% sand/silt/clay (Graph 10). Deciduous trees was the dominant vegetation type observed in 55% of the units surveyed. (Graph 11).

BIOLOGICAL INVENTORY RESULTS

A biological inventory survey was not conducted on Pipe Line Creek, however unidentified fish were seen from the stream bank during the habitat survey.

DISCUSSION

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Pipe Line Creek is an F4 channel type for the entire 2,035 feet of the stream surveyed. The suitability of F4 channels types for fish habitat improvement structures is good for bank placed boulders; fair for plunge weirs, single and opposing wing deflectors, channel constrictors, and log cover.

The water temperature recorded on the survey day August 17, 1998, was 57° Fahrenheit. Air temperatures ranged from 66° to 70° Fahrenheit. This is a good water temperature for salmonids. However, 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 25% of the total length of this survey, riffles 23%, and pools 18%. Thirty-three percent of the survey length was dry. The pools are relatively shallow, with only 6 of the 20 (30%) 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 pools comprise 13% of the total length of the stream habitat surveyed. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. Installing structures that will increase or deepen pool habitat is recommended.

None of the 20 pool tail-outs measured had an embeddedness rating of 1, 50% had a rating of 2, 20% had a rating of 3, and 30% had a rating of 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 Pipe Line 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 15. The shelter rating in the flatwater habitats was slightly lower at 5. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by terrestrial vegetation in all habitat types. Additionally, large woody debris contributes 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.

The mean percent canopy density for the stream was 74%. 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 68% and 78%, 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) Pipe Line 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) This survey began at the railroad culvert which is approximately 1/4 mile from the confluence of Pipe Line Creek with the Eel River. Try to secure landowner access to complete a survey on the section of the creek running through Camp Grant Flat.

4) The stream crossings located during the survey need to evaluated for fish passage.

5) Primary pools comprise only 13% of the total length of 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.

6) Increase woody cover in the pools and flatwater habitat units. There is limited cover in Pipe Line Creek. Adding high quality complexity with additional woody cover is desirable.

7) 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.

8) There are several log debris accumulations present on Pipe Line Creek that are retaining large quantities of fine sediment. The modification of these LDAs may be desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

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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 near railroad culvert at estimated PALCO property line. Stream is dry at this point.

577' End of dry channel.

593' Three 30' culverts. Two are corrugated metal pipes, 24 inches in diameter. One is completely open, the other is crushed. The other culvert is a concrete box 48 inches square and 90% closed.

749' Unit ends with a 4 foot drop over a log debris accumulation (LDA) approximately, 10' wide x 3' long x 4' high.

1,006' Old road crossing with culvert still buried. The creek is blown out around the culvert on the right bank. The culvert is 24" in diameter.

1,402' Log debris accumulation, 15' wide x 5' long x 2' high.

1,615' Log debris accumulation, 20' wide x 3' long x 4' high, retaining gravel.

1,708' Log debris accumulation, 30' long x 25' wide x 3' high.

1,717' Log debris accumulation, 50' long x 20' wide x 6' high, possible fish barrier.

1,771' Right bank failure, 30' long x 10' high.

1,893' Log debris accumulation, 15' long x 15' wide x 4' high, retaining gravel.

1,960' Log debris accumulation, 10' long x 10' wide x 4' high, retaining gravel. Flow is subsurface above the LDA.

2,035' End of survey at a 10' cascading waterfall. Gradient increases to a bedrock-dominated channel.

REFERENCES

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Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey, and B. Collins. 1998 California salmonid stream habitat restoration manual, Third edition. California Department of Fish and Game, Sacramento, California. 495pp.

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