STREAM INVENTORY REPORT

Conklin Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on Conklin Creek, a stream in the Mattole River drainage. 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 Conklin 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 anadromous salmonids, including steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Conklin Creek is tributary to the Mattole River, tributary to the Pacific Ocean, located in Humboldt County, California (Map 1). Conklin Creek's legal description at the confluence with Mattole River is T02S R02W S12. Its location is 40°18′32″ north latitude and 124°14′10″ west longitude. Conklin Creek is a third order stream and has approximately 8.6 miles of blue line stream according to the USGS Buckeye Mountain 7.5 minute quadrangle. Conklin Creek drains a watershed of approximately 5.4 square miles. Elevations range from about 40 feet at the mouth of the creek to 2,200 feet in the headwater areas. Douglas fir forest and oak grassland dominate the watershed. The watershed is primarily privately owned and is managed for timber production and rangeland. Vehicle access exists via the Mattole Road from Ferndale to Petrolia, turn left before the Mattole River bridge at the Hideway Restaurant onto the Conklin Creek Road. Travel along the Conklin Creek Road approximately 3 miles until you reach Conklin Creek.

METHODS

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

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 Conklin 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 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". Conklin 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 Conklin 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 Conklin 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 Conklin 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 Conklin 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 Conklin Creek fish presence was observed from the stream banks, and one site was electrofished using a 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

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Graphics are produced from the tables using Quattro Pro. Graphics developed for Conklin 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 5, 1999, was conducted by Paul Ferns and Donn Rehburg (AmeriCorps/WSP). The total length of the stream surveyed was 3,163 feet with an additional 33 feet of side channel.

Flows were not measured on Conklin Creek.

Conklin Creek is a C4 channel type for the entire 3,163 feet of stream reach surveyed. C4 channel types are low gradient, meandering, point-bar, riffle/pool gravel alluvial channels with broad, well defined floodplains.

The water temperature taken during the survey period was 63° F. Air temperatures ranged from 65° to 66° F.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 43% riffle units, 33% flatwater units, and 20% pool units (Graph 1). Based on total length of Level II habitat types there were 72% riffle units, 25% flatwater units, and 3% pool units (Graph 2).

Seven Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffle, 43%; run, 33%; and mid channel pool, 7% (Graph 3). Based on percent total length, low gradient riffle made up 72%, run 25%, and mid-channel pool 1%.

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A total of six pools were identified (Table 3). Backwater pools were most frequently encountered at 50% (Graph 4) and comprised 37% 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. Three of the 6 pools (50%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the six pool tail-outs measured, zero had a value of 1 (0%); three had a value of 2 (50%); zero had a value of 3 (0%); zero had a value of 4 (0%) and three had a value of 5 (50%) (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 8, flatwater habitat types had a mean shelter rating of 2, and pool habitats had a mean shelter rating of 6 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 10. Main and backwater pools had a mean shelter rating of 5 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Small woody debris and boulders are the dominant cover type in Conklin Creek Large woody debris is lacking in nearly all habitat types. Graph 7 describes the pool cover in Conklin Creek.

Table 6 summarizes the dominant substrate in pool habitat types. Gravel was the dominant substrate observed in 3 of the 6 pool tail outs measured (50%). Silt/clay was the next most frequently observed dominant substrate type and occurred in 33.3% of the pool tail outs (Graph 8).

The mean percent canopy density for the stream reach surveyed was 26%. The mean percentages of conifer and deciduous trees were 1.0% and 25.0%, respectively. Graph 9 describes the canopy in Conklin Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 42.2%. The mean percent left bank vegetated was 41.7%. The dominant elements composing the structure of the stream banks consisted of 0% bedrock, 0% boulder, 100% cobble/gravel, and 0% sand/silt/clay (Graph 10). Deciduous trees were the dominant bank vegetation type observed in 77.80% of the units surveyed. Additionally, 77.80% of the units surveyed had deciduous trees as the dominant bank vegetation, and 0% had coniferous trees as the dominant bank vegetation, including down trees, logs, and root wads (Graph 11).

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BIOLOGICAL INVENTORY RESULTS

One site was electrofished on September 29, 1999 in Conklin Creek. The sites were sampled by Glenn Yoshioka, Paul Ferns. and Donn Rehberg (CDFG and AmeriCorps/WSP).

The site sampled began at the confluence with the Mattole River and included six mid-channel pools, one low gradient riffle, and one run within the first 3,200 feet above the confluence. The site yielded: 342 steelhead rainbow trout. Based upon visually estimated lengths, the probable breakdown of steelhead age classes was 330 age 0+, 6 age 1+, and 6 age 2+ juveniles. One of the pools, with stagnant water, did not yield any fish.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Conklin Creek.

DISCUSSION

Conklin Creek is a C4 channel type for the entire 3,163 feet of stream surveyed. The suitability of C4 channel types for fish habitat improvement structures is: good for bank-placed boulders and fair for plunge weirs, single and opposing wing-deflectors, channel constrictors, and log cover.

The water temperature recorded on the survey day of August 5, 1999, was 63° F. Air temperatures ranged from 65° to 66° F. This is a fair water temperature range for salmonids. Conklin Creek seems to have temperatures favorable to salmonids. Since there is only one day of temperature data, 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 72%, and pools 3%. The pools are relatively shallow, with only 3 of the 6 (50%) 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 only 1.5% of the total stream length. 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. 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.
None of the 6 (0%) pool tail-outs measured had an embeddedness rating of 1, 50% had a rating of 2, 0% had ratings of 3 or 4, and 50% 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 Conklin 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 6. The shelter rating in the flatwater habitats was lower at 2. A pool shelter rating of approximately 100 is desirable. The relatively small amount of cover that now exists is being provided primarily by small woody debris in most habitat types. Additionally, boulders contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Instream cover created 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.

Three of the 6 (50%) pool tail outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids. However, 33% of pool tail outs had silt/clay as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean percent canopy density for the stream was 26%. This is a low 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 low at 42% and 42%, 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) Conklin 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) Canopy density is very low, with an average of only 26%. Increase the canopy on Conklin 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) There are sections where the stream is being impacted from cattle trampling and/or wild pigs rooting in the riparian zone. Alternatives should be explored with the rancher and developed if possible.

5) 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.

6) 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.

7) Primary pools comprise less than 2% of the 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.

8) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders and small woody debris. 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 Mattole River; the creek is subsurface at the confluence. Channel type is a C4.

305' At 283' into the unit, there is a road crossing through creek.

355' Abundant young-of-the-year (YOY) steelhead, one larger juvenile observed.

573' At 55' into the unit, a barbed wire fence crosses creek.

654' Out of hydrologic influence of the Mattole River. Start 100% occurrence.

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820' Cow droppings, tracks in the riparian zone.

1823' Oily, stagnant appearing water.

1860' At 21' into the unit, a LDA 5' H x 5' L x 70' W. Many cattle hoof-prints.

2827' Group of wild boars, 15-20 along creek.

3163' End survey due to lack of access; landowner refused permission to enter.

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