STREAM INVENTORY REPORT

HOAGLAND CREEK, 1991

INTRODUCTION

A stream inventory was conducted during the summer of 1991 on Hoagland Creek to assess habitat conditions for anadromous salmonids. 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 Hoagland Creek. The objective of the biological inventory was to document the salmonid species present and their distribution in the stream. After analysis of the information and data gathered, stream restoration and enhancement recommendations are presented.

There is no known record of adult spawning surveys being conducted on Hoagland 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.

WATERSHED OVERVIEW

Hoagland Creek is tributary to the Van Duzen River, tributary to the Eel River, located in Humboldt County, California (Figure 1). The legal description at the confluence with the Van Duzen River is T1N R3E S14. Its location is 40°28'00" N. latitude and 123°48'15" W. longitude. Hoagland Creek is a second order stream. The total length of blue line stream, according to the USGS Bridgeville quadrangle is 2.6 miles.

Hoagland Creek drains a watershed of approximately 4.45 square miles. Elevations range from about 580 feet at the mouth of the creek to 2,000 feet in the headwater areas. Grass, oak and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for rangeland. Vehicle access exists via a private road at mile marker 45.17 on the Bridgeville-Alderpoint Road. Foot access is available from State Highway 36 approximately one mile west of Bridgeville, by crossing the Van Duzen River to the mouth of Hoagland Creek.

METHODS

The habitat inventory conducted in Hoagland Creek follows the

methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The California Conservation Corps (CCC) Technical Advisors that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Hoagland Creek personnel, John Crittenden and Shea Monroe, were trained in May and June, 1991, by Gary Flosi and Scott Downie.

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 Hoagland Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Discharge is measured in cubic feet per second using a current flow meter. Measurements are taken at the downstream end of the stream or reach being inventoried. Flows should also be measured at major tributary confluences. Flow was not measured in Hoagland Creek.

2. Channel Type:

Channel typing is conducted according to the classification system developed by David Rosgen (1985). This methodology is described in the California Salmonid Stream Habitat Restoration Manual. Channel typing is conducted simultaneously with habitat typing operations and follows a standard form to record measurements and observations. There are four measured parameters used to determine channel type: 1) water slope gradient, 2) channel confinement, 3) width/depth ratio, 4) substrate composition.

3. Temperatures:

Both water and air temperatures are taken and recorded each tenth unit typed. The time of the measurement is also recorded. Both temperatures are taken in 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". Hoagland 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. Unit measurements included mean length, mean width, mean depth, and maximum depth. Depth of the pool tail crest at each pool habitat unit was measured at the thalweg. All measurements were taken 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 Hoagland 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).

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 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 Hoagland 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 habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

8. Canopy:

Stream canopy is estimated using handheld spherical densiometers and is a measure of the water surface shaded during periods of high sun. In Hoagland Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The percentage of the total canopy area was then further analyzed and recorded according to whether it was composed of either coniferous or deciduous trees.

9. Bank Composition:

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 Hoagland Creek, the dominant composition type in both the right and left banks was selected from a list of eight options on 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. Biological inventory is conducted using one or more of three basic methods: 1) stream bank observation, 2) underwater observation, 3) electrofishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual.

Biological inventory was conducted in Hoagland Creek to document the salmonid species composition and distribution. Three sites were electrofished in Hoagland Creek using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, measured, and returned to the stream.

DATA ANALYSIS:

Data from the habitat inventory form is entered into Habtype, a dBASE 3+ data entry program developed by the Department and Fish and Game. From Habtype, the data is summarized by Habtabs, a

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dBASE 4.1 program in development by DFG.

The Habtabs program produces the following summary 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 Hoagland 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

HABITAT INVENTORY RESULTS:

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

The habitat inventory of August 13, 15, and 16, 1991, was conducted by Shea Monroe and Steve Crittenden (CCC). The total length of the stream surveyed was 6,211 feet, with an additional 275 feet of side channel.

Hoagland Creek is an A2 channel type for the entire 6,221 feet of stream reach surveyed. A2 channels are steep (4-10% gradient), very well confined streams, with stable stream banks.

Water temperatures ranged from 54 to 65 degrees Fahrenheit. Air temperatures ranged from 58 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool

habitat types. By percent **occurrence**, riffles made up 29%; flatwater types were also 29%; and pools 42% (Graph 1). Flatwater habitat types made up 46.8% of the total survey **length**, riffles were 27.5%, and pools 25.7% (Graph 2).

Thirteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were mid-channel pools, 28.1%, low gradient riffles, 21.9%, and step runs, 20.3% (Graph 3). By percent total **length**, step runs made up 33.4%, low gradient riffles 20.3%, and mid-channel pools 14.8% (Table 2).

Fifty-four pools were identified (Table 3). Main channel pools were most often encountered at 75.9%, and comprised 77.3% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Twenty of the 54 pools (37%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 48 pool tail-outs measured, One, or 2.1% had a value of 1; 26, or 54.2% had a value of 2; 15, or 31.3% had a value of 3; and 6, or 12.5% had a value of 4. On this scale, a value of one is the best for fisheries (Graph 6).

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. Flatwater habitat types had the highest shelter rating at 25.8. Pool habitats followed with a rating of 25.6 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 34.2, and main-channel pools rated 22.9 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in 12 of the 28 low gradient riffles (42.8%). Gravel was the next most frequently observed dominant substrate type, and occurred in 35.7% of the

low gradient riffles (Graph 8).

Twenty-seven percent of the survey reach lacked shade canopy. Of the 73% of the stream covered with canopy, 95% was composed of deciduous trees, and 5% was composed of coniferous trees.
Graph 9 describes the canopy in Hoagland Creek.

Table 2 summarizes the mean percentage of the right and left stream banks covered with vegetation by habitat type. For the stream reach surveyed, the mean percent right bank vegetated was 71.8%. The mean percent left bank vegetated was 74.0%. The elements composing the structure of the stream banks consisted of 7.8% bedrock, 22.7% boulder, 0.8% cobble/gravel, 1.6% bare soil, 10.2% grass, 10.9% brush. Additionally, 44.5% of the banks were covered with deciduous trees, and 1.6% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Three electrofishing sites were sampled on Hoagland Creek. The objective was to identify fish species and distribution. The units were sampled on September 17, 1991 by Erick Elliot, Brian Humphrey, and Shea Monroe (CCC). Each unit was end-blocked with nets to contain the fish within the sample reach. Two passes were conducted at each site, fork lengths measured and recorded, and the fish returned to the stream.

The first unit sampled was habitat unit 002, a mid-channel pool, approximately 220 feet from the confluence with the Van Duzen River. This site had an area of 126 sq ft, and a volume of 101 cubic feet. The unit yielded 32 steelhead, ranging from 36 to 116 mm FL.

The second sample unit was habitat unit 046, a mid-channel pool, located below a cattle crossing approximately 2000 feet above the creek mouth. This site had an area of 224 sq ft, and a volume of 157 cu ft. Nineteen steelhead were sampled. They ranged from 51 to 147 mm FL.

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The third unit sampled was habitat unit 106, a corner pool, located approximately 5600 feet above the creek mouth. This unit is 200 feet from the Alderpoint Road. The site had an area of 522 sq ft, and a volume of 522 cu ft. Eleven steelhead were sampled, ranging from 52 to 79 mm FL.

DISCUSSION

The A2 channel type is generally not suitable for fish habitat improvement structures. A2 channels are found in high energy, steep gradient stream reaches. They have channels dominated by boulders, do not retain gravels very well, but do have stable stream banks. Usually within the A2 channel there are zones of lower gradient where structures designed to trap gravels can be constructed. This seems to be the case in Hoagland Creek, but any structure sites must be selected with care because of the high stream energy which can create problems with stream bank erosion and structure stability.

The water temperatures recorded on the survey days ranged from 54 F to 65 F. Air temperatures ranged from 58 F to 82 F. This is a very good temperature regime for salmonids. However, 65 F, if sustained, is near the threshold stress level for salmonids. This does not seem to be the case here, and Hoagland Creek seems to have a very favorable temperature regime. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling conducted.

Flatwater habitat types comprised 46.8% of the total **length** of this survey, riffles 27.5%, and pools 25.7%. The pools are relatively shallow with only 18 of the 54 pools having a maximum depth greater than 2 feet. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat. Therefore, 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 the modification of the numerous log debris accumulations (LDA's) in the stream. The LDA's in the system are retaining needed gravels. Any necessary modifications

to them should be done with the intent of metering the gravels 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.

Twenty-one of the 48 pool tail-outs measured had embeddedness ratings of 3 or 4. Only one had a 1 rating. Embeddedness in excess of 26%, a rating of 2 or more, is considered poor quality for fish habitat. In Hoagland Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean shelter rating for pools was low with a rating of 25.6. The shelter rating in the flatwater habitats was slightly better at 25.8. However, 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 and small woody debris 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.

Twenty-two of the 38 low gradient riffles had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy for the stream was 73%. This is a relatively high percentage of canopy, since 80 percent is generally considered desirable. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) Hoagland Creek should be managed as an anadromous, natural production stream.

2) 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.

3) 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 at hand.

4) There are several log debris accumulations present on Hoagland Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done in a manner that will not release an overabundance of fine sediment into the system.

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 6221', 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) 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.

8) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored, and improved where possible.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted.

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All the distances are approximate and taken from the beginning of the survey reach.

0'	Begin survey at confluence with Van Duzen River. Braided, high gradient mouth. Not a barrier.
521	Small log debris accumulation (LDA) on right bank (RB) is moving channel into left bank (LB). Retaining gravel and small cobble 15' wide x 20' long x 4' high. Small amount of LB erosion.
533	Right bank has a slide 30' high x 15' wide. Contributing fines and gravels.
891	Bedrock cascade has an 8' vertical drop, 7' wide sill.
900	2' bedrock plunge.
916	Bluegoo slump/earthflow on RB contributing fines. Channel braids through boulder roughs with 5' high jumps, 25% gradient.
1011	Dry tributaries RB & LB. Earth flows on RB contributing fine sediments. Gradient > 25% in boulder roughs, 5' cascades, young-of-the-year steelhead (YOY) observed above this rough!
1252	Earthflow/slump on LB contributing fines.
1307	High gradient resumes (> 30%), 6' cascades through boulder roughs.
1368	Gradient levels to < 4%, good spawning reach. No YOY, but one 5" steelhead/rainbow trout (SHRB) observed.
1731	Dry tributary from LB.
1788	Small slump from LB.
1847	Good spawning gravel, 3 YOY observed.
1893	This section has a lot of cattle trampling the stream

and stream banks. Significant resultant erosion.

2046 Small LDA retaining gravel: 10' wide x 15' long x 3' high. Boulder associated scour on RB.

2726 Dry tributary from LB, YOY observed in this section.

2754 Jeep trail crosses stream.

2816 Dry tributary from LB.

2893 This section has a lot of cattle trampling the stream and stream banks. Some non-point source pollution.

2987 Old Humboldt crossing; debris in stream.

3005 LDA 30' wide x 15' long x 6' high retaining gravel.

3203 Sheer cliff 40' high on RB.

3251 Large LDA positioned by two large boulders is diverting the stream into the LB. Extensive gravel retention: 40' wide x 250' long x 15' deep. YOY observed above.

3517 Many SHRT 1+ and YOY observed.

3617 Three 4' diameter logs span the stream, 5' above flow.

3847 Downed fir 3' diameter x 40' spans stream, 5' above water surface.

4232 Good gravel in this spawning reach. YOY present.

4291 RB slump 80' long contributing fines.

4846 Large logs in stream; no barrier.

5064 Steep, stable RB.

5656 Small LDA 15' wide x 10' long x 5' high retaining gravel. Possible barrier to passage.

5986 Small LDA.

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6005 Major slump 65' high x 200' high on LB contributing fines.

6132 Steep bedrock outcrop on LB.

6221 Large LDA 30' wide x 20' long x 10' high positioned by a mid-channel boulder. End of survey reach.

6226 Steep boulder cascade section: 30' vertical in 45' length of obstruction. No YOY, but one 8" SHRT observed 500' above the cascade. Above survey reach.