STREAM INVENTORY REPORT

TOM LONG CREEK

INTRODUCTION

A stream inventory was conducted during the fall of 1993 on Tom Long 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 Tom Long Creek. The objective of the biological inventory was to document the salmonid species present and their distribution. After analysis of the information and data gathered, stream restoration and enhancement recommendations are presented.

There is no known record of adult spawning surveys having been conducted on Tom Long 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

Tom Long Creek is tributary to the East Branch South Fork Eel River, tributary to the South Fork Eel River, located in Humboldt County, California. Tom Long Creek's legal description at the confluence with the East Branch South Fork Eel River is T5S R4E S14. Its location is 40°01'41" N. latitude and 123°41'52" W. longitude. Tom Long Creek is a second order stream and has approximately 9.2 miles of blue line stream, according to the USGS Harris, Jewett Rock, and Bell Springs 7.5 minute quadrangles. Tom Long Creek drains a watershed of approximately 13.6 square miles. Summer base runoff is approximately .75 cfs at the mouth. Elevations range from about 680 feet at the mouth of the creek to 2,800 feet in the headwater areas. Grass, oak and Douglas fir forest dominate the watershed. The watershed is privately owned and is managed for timber, livestock, and subdivision. Vehicle access exists via a private road on Reed Mountain to East Branch. The confluence of Tom Long Creek is located approximately .25 miles down East Branch.

METHODS

The habitat inventory conducted in Tom Long Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991). The contract seasonals that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Tom Long Creek personnel were trained in June, 1993, by Gary Flosi and Scott Downie. This

inventory was conducted by a two person team.

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 Tom Long 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. Flows should also be measured or estimated at major tributary confluences.

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 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 measured and recorded at 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". Tom Long 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. Pool tail crest depth at each pool unit was measured in 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 Tom Long 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 Tom Long 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 Tom Long Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of each unit. The area of canopy was further analyzed to estimate its percentages of coniferous or deciduous trees, and the results recorded.

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 Tom Long 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 Tom Long Creek to document the fish species composition and distribution. Four sites were electrofished in Tom Long Creek using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, measured, and returned to the stream.

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 0.85mm).

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat Runtime, a dBASE 4.1 data entry program developed by the 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 Lotus 1,2,3. Graphics developed for Tom Long 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 REPORT *

The habitat inventory of September 20-23, and 27-29, 1993, was conducted by Warren Mitchell and Ruth Goodfield (contract seasonals). The total length of the stream surveyed was 21,631 feet, with an additional 322 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at .75 cfs on Sept. 20, 1993.

Tom Long is a C1 channel for the first 1,665 feet; an A1 for the next 651 feet, a B1 for the next 5,306; a B2 for the next 5,747 feet; and back to a B1 for the last 8,259 feet. C1 channel types are gentle gradient (1.0-1.5%), slightly confined streams, with cobble beds. A1 channels are steep (4-10%), highly confined and very stable. B1 types are moderate gradient (1.5-2.5%), stable streams, with small boulder/ large cobble substrate. B2 streams are moderate gradient (1-2.5%), stable, large cobble and coarse gravel channels.

Water temperatures ranged from 54 to 69 degrees fahrenheit. Air temperatures ranged from 51 to 80 degrees fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, flatwater types made up 34.7%, riffles 32.6%, and pools 30.6% (Graph 1). Flatwater habitat types made up 53.1% of the total survey **length**, riffles 23.1%, and pools 20.4% (Graph 2).

Eighteen Level IV habitat types were identified. The data are summarized in Table 2. The most frequent habitat types by percent **occurrence** were low gradient riffles, 20.8%; step runs 20.1%; and runs, 14.1% (Graph 3). By percent total **length**, step runs made up 40.8%, low gradient riffles 17.0%, and runs 12.0%.

One-hundred-thirty-two pools were identified (Table 3). Main channel pools were most often encountered at 54.6%, and comprised 57.5% of the total length of pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat type. Depth is an indicator of pool quality. One-hundred-seven of the

132 pools (81%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 118 pool tail-outs measured, none had a value of 1; 19 had a value of 2 (16.1%); 83 had a value of 3 (70.3%); and 16 had a value of 4 (13.6%). 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. Riffle habitat types had the highest shelter rating at 13.7. Pool habitats followed with a rating of 11.8 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 12.7, and main-channel pools rated 11.5 (Table 3).

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

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 63 of the 90 low gradient riffles (70.0%). Small cobble was the next most frequently observed dominant substrate type, and occurred in 24.4% of the low gradient riffles (Graph 8).

Fifty-four percent of the survey reach lacked shade canopy. Of the 46% of the stream covered with canopy, 59% was composed of deciduous trees, and 41% was composed of coniferous trees. Graph 9 describes the canopy in Tom Long 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 25.6%. The mean percent left bank vegetated was 30.6%. The dominant elements composing the structure of the stream banks consisted of 27.3% bedrock, 20.7% boulder, 17.1% cobble/gravel, 16.3% bare soil, 8.6% grass, 3.5% brush. Additionally, 5.2% of the banks were covered with deciduous trees, and 0.9% with coniferous trees, including downed trees, logs, and root wads (Graph 10).

BIOLOGICAL INVENTORY RESULTS

Four sites were electrofished on Sept. 29 and 30, 1993 in Tom Long Creek. The units were sampled by Warren Mitchell and Ruth Goodfield (contract seasonals). All measurements are fork lengths unless noted otherwise.

The first site sampled was habitat unit 29, a lateral scour bedrock pool, approximately 1,374 feet from the confluence with the East Branch South Fork Eel River. This site had an area of 935 sq ft, and a volume of 1,029 cu ft. The unit yielded 65 steelhead, ranging from 53 to 86mm FL.

The second site was habitat unit 73, a mid-channel pool, approximately 2,931 feet above the creek mouth. This site had an area of 480 sq ft, and a volume of 624 cu ft. Three steelhead were sampled. They ranged from 81 to 178mm FL.

The third site sampled was habitat unit 347, a step run, located approximately 18,482 feet above the creek mouth. The site had an area of 450sq ft, and a volume of 450cu ft. Four steelhead were sampled, ranging from 83 to 138mm FL.

The fourth site was habitat unit 429, a plunge pool, locate at the top end of the survey reach and 21,611 feet from the confluence with the East Branch South Fork Eel River. No fish were observed at this site.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Tom Long Creek.

DISCUSSION

Tom Long Creek has four channel types: C1, A1, B1, and B2. The low gradient but moderately stable banks of a C-1 channel type are ideal for many habitat improvement structures, such as bank placed boulders and submerged shelters in straight reaches. There are 1,665 feet of this channel type in Tom Long Creek.

A1 channel types are generally not suitable for fish habitat improvement structures.

B1 and B2 channel types are excellent for many types of low stage plunge weirs, in-channel and bank boulder placement, single and double wing deflectors, channel constrictors, and bank cover to name only a few. In Tom Long Creek there are 19,314 feet of this channel type.

The water temperatures recorded on the survey days September 20-23 and 27-29, 1993 ranged from 54° F to 69° F. Air temperatures ranged from 51° F to 80° F. This is a fair water temperature regime for salmonids. However, 69° F, if sustained, is above the

threshold stress level for salmonids. This does not seem to be the case here, and Tom Long Creek seems to have temperatures

tolerable to salmonids. 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 53.1% of the total **length** of this survey, riffles 23.1%, and pools 20.4%. The pools are relatively deep with 107 of the 132 pools having a maximum depth greater than 2 feet. In coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total 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. Therefore, installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not threaten any unstable stream banks.

Ninety-nine of the 118 pool tail-outs measured had embeddedness ratings of 3 or 4. None had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In Tom Long 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 11.8. The shelter rating in the flatwater habitats was slightly less at 11.0. A pool shelter rating of approximately 100 is desirable. The small amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, white water 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.

Eighty-five of the 90 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 46%. This is a moderate percentage of canopy, since 80 percent is generally considered optimum in this region of north coast streams. In areas of stream bank erosion, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

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RECOMMENDATIONS

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

2) 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.

3) Inventory and map sources of stream bank erosion, and prioritize them according to present and potential sediment yield. Identified sites, like the site at 15,000', should then be treated to reduce the amount of fine sediments entering the stream.

4) Water temperatures in Tom Long Creek should be monitored to determine if they are having a deleterious effect upon juvenile salmonids. To achieve this, additional biological sampling is also required.

5) Increase the canopy on Tom Long Creek by planting willow, alder, and Douglas fir along the stream where shade canopy is not at acceptable levels. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

6) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. Acceptable 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.

7) 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. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

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PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All the distances are approximate and taken from the beginning of the survey reach.

0'	Begin survey at confluence with the East Branch South Fork Eel River. Reach one channel type is a C1.
300'	Stream flows through a very large (800' long) left bank rotational slide feature. This slide laked the creek in 1972. It is not currently active and is well beyond the range of treatable size.
1551'	Small log debris accumulation (LDA) spanning channel, retaining silt and gravel.
1665'	Spring entering from left bank. Gradient increases to approximately 11% for the next 650 feet. Reach two channel type changes from a C1 to an A1
2316'	Reach three channel type changes from an A1 to a B1.
3718'	Two large boulders in center of channel are retaining several logs and accumulating fines. Side channel forming.
5276'	Small spring enters from left bank.
5491'	Right bank erosion 150' long x 30' wide encroaching on channel, causing flow to go sub-surface.
5543'	Left bank erosion 75' long x 100' high, contributing fines.
5831'	Dry tributary from right bank.
6095'	Right bank erosion extending over habitat units 146-148.
6283'	Right bank erosion 100' long x 60' high, contributing fines and gravel.
6565'	Left bank erosion 30' long x 40' high, contributing fines.
7623'	Reach four channel type changes from a B1 to a B2.
10118'	Small tributary entering from right bank.

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13371' Reach five channel type changes from a B2 to a B1.

13714' Several small springs enter from left bank. Right bank slide 150' long x 35' high, contributing fines.

15000' Right bank slide 100' long x 60' high, contributing fines. Left bank erosion 50' long x 30' high.

15097' Rapid increase in gradient over next five units.

15175' Massive right bank slide 500' long x 200' long, contributing large amounts of debris.

15320' 5" steelhead observed.

16108' Left bank slide 110' long x 75' wide.

16143' Right bank slide 150' high x 100' wide, partially revegetated.

17707' Small tributary entering from left bank.

18046' Several large boulders constricting channel and retaining debris.

18245' Nine foot waterfall over boulders, possible barrier.

18353' Right bank slide 90' wide x 45' high.

18867' Dry tributary from left bank. Detour around closed access property.

19850' Distance estimated. Small tributary entering from left bank. Gradient increases to approximately 7% over the next 10 habitat units.

20228' Active left bank slide contributing fines. Slide extends over the next seven habitat units.

20556' Detour around closed access property.

21000' Distance estimated. Small tributary entering from right bank.

21063' Gradient increases to 7% for next four units.

21631' Flow becomes intermittent, no fish observed. End of survey.

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