STREAM INVENTORY REPORT

Matilla Gulch

INTRODUCTION

A stream inventory was conducted during the summer of 1994 on Matilla Gulch to assess habitat conditions for anadromous salmonids. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Matilla Gulch. 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 Matilla Gulch. 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

Matilla Gulch is tributary to John Smith Creek, tributary to the North Branch North Fork Navarro River, located in Mendocino County, California. Matilla Gulch's legal description at the confluence with John Smith Creek is T16N R15W S16. Its location is 39°14'21" North latitude and 123°32'10" West longitude. Matilla Gulch is a first order stream and is shown as ephemeral on the USGS Navarro 7.5 minute quadrangle. Matilla Gulch drains a watershed of approximately 0.7 square miles. Elevations range from about 490 feet at the mouth of the creek to 1200 feet in the headwater areas. Redwood and fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Vehicle access exists via the Masonite Road.

METHODS

The habitat inventory conducted in Matilla Gulch follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi and Reynolds, 1991 rev. 1994). 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). Matilla Gulch personnel were trained in June, 1994, 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 Matilla Gulch 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 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 each tenth unit typed. 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". Matilla Gulch 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 Matilla Gulch, 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 Matilla Gulch, 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 and recorded as a one and two respectively.

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 Matilla Gulch, 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 were recorded.

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 Matilla Gulch, the dominant composition type and the dominant vegetation type of both the right and left banks were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

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 Lotus 1,2,3. Graphics developed for Matilla Gulch 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
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

The habitat inventory of June 17, 1994, was conducted by Jeff Strayer and Chris Bysshe (CCC). The total length of the stream surveyed was 1,526 feet.

Flows were not measured on Matilla Gulch.

Matilla Gulch is a B3 channel type for the entire 1,526 feet of stream reach surveyed. B3 channels are moderate gradient, moderately entrenched, riffle-dominated channels with infrequently spaced pools, very stable plan and profile, and stable banks

Water temperatures ranged from 53 to 55 degrees Fahrenheit. Air temperatures ranged from 61 to 69 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. By percent **occurrence**, pools made up 38%, flatwater types 38%, and riffles 24% (Graph 1). Flatwater habitat types made up 52% of the total survey **length**, pools 34%, and riffles 14% (Graph 2).

Five 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, 38%; low gradient riffles, 24%; and runs, 20% (Graph 3). By percent total **length**, step runs made up 38%, mid-channel pools 34%, and low gradient riffles 14%.

Seventeen pools were identified (Table 3). Main channel pools exclusively were encountered (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Ten of the 17 pools (59%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 16 pool tail-outs measured, 7 had a value of 1 (44%); 6 had a value of 2 (37%); 3 had a value of 3 (19%); and none had a value of 4 (0%). 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 126. Flatwater habitats followed with a rating of 120 (Table 1). The mean shelter rating for pools was 66 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Aquatic vegetation is the dominant cover type in Matilla Gulch. Large and small woody debris are lacking in nearly all habitat types. Graph 7 describes the pool cover in Matilla Gulch.

Table 6 summarizes the dominant substrate by habitat type. Sand was the dominant substrates observed in 3 of the 11 low gradient riffles (27%). Silt/clay was observed in an additional 27% of the low gradient riffles (Graph 8).

Twenty-two percent of the survey reach lacked shade canopy. Of the 78% of the stream covered with canopy, 45% was composed of deciduous trees, and 55% was composed of coniferous trees. Graph 9 describes the canopy in Matilla Gulch.

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%. The mean percent left bank vegetated was 76%. The dominant elements composing the structure of the stream banks consisted of 7% bedrock, 0% boulder, 1% cobble/gravel, and 92% sand/silt/clay (Graph 10). Coniferous trees, including down trees, logs, and root wads, were the dominant vegetation type observed in 49% of the units surveyed. Additionally, 48% of the units surveyed had deciduous trees as the dominant vegetation type (Graph 11).

DISCUSSION

Matilla Gulch is a B3 channel type for the entire stream reach surveyed. The B3 channel type is considered excellent for low-stage weirs, random boulder placement, bank-placed boulders, single and opposing wing deflectors, channel constrictors, bank cover, and log cover structures; and good for medium-stage weirs.

The water temperatures recorded on the survey day June 17, 1994, ranged from 53 to 55° Fahrenheit. Air temperatures ranged from 61 to 69° Fahrenheit. This is a very good water temperature range for salmonids. 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 52% of the total **length** of this survey, riffles 14%, and pools 34%. The pools are relatively deep, with 10 of the 17 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. 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 log debris accumulations (LDA's) in the stream. The LDA's in the system are 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.

Only 3 of the 16 pool tail-outs measured had embeddedness ratings of 3 or 4. Seven 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 Matilla Gulch, 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 moderate with a rating of 66. The shelter rating in the flatwater habitats was better at 120. A pool shelter rating of approximately 100 is desirable. The cover that now exists is being provided primarily by aquatic vegetation in all habitat types. Additionally, undercut banks 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.

Six of the 11 low gradient riffles had silt or sand as the dominant substrate. This is generally considered unsuitable for spawning salmonids.

The mean percent canopy for the stream was 78%. This is a relatively high percentage of canopy, since 80 percent is generally considered optimum in these north coast streams.

The percentage of right and left bank covered with vegetation was high at 71% and 76%, 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) Matilla Gulch should be managed as an anadromous, natural production stream.

2) Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from aquatic vegetation. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

3) 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.

4) 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.

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.

Position (ft):	Comments:
0'	Begin survey at confluence with John Smith Creek. Channel type is B3.
786'	Log jam of unspecified dimensions.
854'	Log jam of unspecified dimensions. Possible barrier.
1150'	Log jam of unspecified dimensions.
1163'	Dry right bank tributary.
1303'	Log jam of unspecified dimensions. Not a barrier.
1526'	Log jam of unspecified dimensions. End of survey due to lack of habitat.

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