STREAM INVENTORY REPORT

Honeydew Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Honeydew Creek. 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 Honeydew Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species. There is no known record of adult spawning surveys having been conducted on Honeydew 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. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Honeydew Creek is tributary to the Mattole River, located in Humboldt County, California. Honeydew Creek's legal description at the confluence with the Mattole River is T03S R01E S06. Its location is 40°14'11" North latitude and 124°06'57" West longitude. Honeydew Creek is a third order stream and has approximately 14.7 miles of blue line stream according to the USGS Honeydew and Shubrick Peak 7.5 minute quadrangles. Honeydew Creek drains a watershed of approximately 17.2 square miles. Summer base flow is approximately six cubic feet per second (cfs) at the mouth, but over 30 cfs is not unusual during winter storms. Elevations range from about 350 feet at the mouth of the creek to

2,100 feet in the headwater areas. Mixed conifer forest dominates the watershed. The watershed is primarily Bureau of Land Management property and is managed for diverse recreation. Vehicle access exists via Wilder Ridge Road. Drive approximately 0.8 miles south from the town of Honeydew. The mouth of Honeydew Creek can be seen on the east side of the road.

METHODS

The habitat inventory conducted in Honeydew Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The Pacific Coast Fisheries, Wildlife, and Wetlands Restoration Association (PCFWWRA) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Honeydew Creek personnel were trained in May, 1996, by Scott Downie and Ruth Goodfield. 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, 1994). 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. 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 Honeydew 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:

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". Honeydew 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 Honeydew 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). Additionally, a rating of "not suitable" (value 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 Honeydew 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.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Honeydew 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:

Honeydew Creek

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 Honeydew Creek, the dominant composition type (options 1-4) and the dominant vegetation type (options 5-9) 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 Honeydew Creek fish presence was observed from the stream banks, and one site was electrofished using one 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

Honeydew Creek

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 Honeydew 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
- Bank vegetation by vegetation type

Honeydew Creek

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 22 to 29, 1996, was conducted by Dave Smith and Ray Bevitori (PCFWWRA). The total length of the stream surveyed was 23,178 feet with an additional 1,784 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 8.0 cfs on September 17, 1996.

Honeydew Creek is an F4 channel type for the first 13,505 feet of stream reach surveyed, an F3 for the next 5,877 feet, and a B2 for the final 3,796 feet of stream surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates. An F3 channel is similar to an F4, but with cobble-dominant substrates. B2 channel types are moderately entrenched, moderate gradient streams, with stable banks and a predominantly boulder substrate.

Water temperatures taken during the survey period ranged from 58 to 73 degrees Fahrenheit. Air temperatures ranged from 64 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 51% riffle units, 30% flatwater units, and 18% pool units (Graph 1). Based on total **length** of Level II habitat types there were 53% riffle units, 26% flatwater units, 16% pool units, and 6% of the stream for which access was denied by a landowner (Graph 2).

Honeydew Creek

Twelve Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low gradient riffles, 46%; runs, 29%; and mid-channel pools, 9% (Graph 3). Based on percent total **length**, low gradient riffles made up 50%, runs 25%, and mid-channel pools 8%.

A total of forty-seven pools were identified (Table 3). Main channel pools were most frequently encountered at 67% and comprised 61% 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. Forty-six of the 47 pools (98%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 46 pool tail-outs measured, none had a value of 1 (0%); 15 had a value of 2 (33%); 30 had a value of 3 (65%); none had a value of 4 (0%), and one had a value of 5 (2%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

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. Pool habitat types had a mean shelter rating of 68, and flatwater habitats had a mean shelter rating of 29 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 74. Scour pools had a mean shelter rating of 55 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Honeydew Creek and are extensive. Large and small woody debris are lacking in

nearly all habitat types. Graph 7 describes the pool cover in Honeydew Creek.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was the dominant substrate observed in four of the 10 low gradient riffles measured (40%). Large cobble was the next most frequently observed dominant substrate type and occurred in 30% of the low gradient riffles (Graph 8).

The mean percent canopy density for the stream reach surveyed was 55%. The mean percentages of deciduous and coniferous trees were 88% and 12%, respectively. Graph 9 describes the canopy in Honeydew Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 60%. The mean percent left bank vegetated was 51%. The dominant elements composing the structure of the stream banks consisted of 17.2% bedrock, 1.6% boulder, 64.8% cobble/gravel, and 16.4% sand/silt/clay (Graph 10). Grass was the dominant vegetation type observed in 8% of the units surveyed. Additionally, 79.5% of the units surveyed had deciduous trees as the dominant vegetation type, and 8.2% had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on September 17, 1996, in Honeydew Creek. The site was sampled by Ruth Goodfield (DFG) and Dale Melton (WSP/AmeriCorps).

The site sampled included habitat units 0022-0023, a riffle/run sequence approximately 2,510 feet from the confluence with the Mattole River. This site had an area of 700 sq ft

and a volume of 692 cu ft. The site yielded four young-of-the-year (YOY) steelhead rainbow trout, two 1+ steelhead rainbow trout, and one sculpin.

GRAVEL SAMPLING RESULTS

No gravel samples were taken on Honeydew Creek.

DISCUSSION

Honeydew Creek is an F4 channel type for the first 13,505 feet of stream surveyed, an F3 for the next 5,877 feet, and a B2 for the remaining 3,796 feet. The suitability of F4 and F3 channel types for fish habitat improvement structures is described as good for bank-placed boulders; fair for low-stage weirs, boulder clusters, and channel constrictors, and poor for medium-stage weirs. The suitability of B2 channel types for fish habitat improvement structures is excellent for low and medium-stage plunge weirs, single and opposing wing-deflectors, and bank cover.

The water temperatures recorded on the survey days July 22 to 29, 1996, ranged from 58 to 73 degrees Fahrenheit. Air temperatures ranged from 59 to 82 degrees Fahrenheit. This is a moderate water temperature range for salmonids. Temperatures in excess of 68° F, if sustained, are near the threshold stress level for salmonids. Honeydew Creek seems to have temperatures above optimum 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.

Honeydew Creek

Flatwater habitat types comprised 26% of the total length of this survey, riffles 53%, pools 16%, and unsurveyed 6%. The pools are relatively deep, with 46 of the 47 (98%) pools having a maximum depth greater than 3 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In third and fourth order streams, a primary pool is defined to have a maximum depth of at least three 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 the numerous log debris accumulations (LDA's) in the stream.

Thirty of the 46 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 to indicate good quality spawning substrate for salmon and steelhead. In Honeydew 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 68. The shelter rating in the flatwater habitats was slightly lower at 29. 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, 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.

Honeydew Creek

Six of the ten low gradient riffles measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 55%. This is a relatively moderate percentage of canopy. In general, re-vegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 60% and 51%, 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) Honeydew 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 locally available.

4) Inventory and map sources of stream bank erosion and prioritize them according to present and potential sediment yield. Identified sites, like the site at 14765', should then be treated to reduce the amount of fine sediments entering the stream.

5) The limited water temperature data available suggest that maximum temperatures are above the optimum 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.

6) Increase the canopy on Honeydew Creek by planting willow, alder, 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.

PROBLEM SITES 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. Channel type is an F4 for the first 13505' of stream surveyed.

1394' Road ford crosses stream. Rock spillway in channel; 2' high.

2510' Bioinventory site; YOY steelhead rainbow trout and sculpin were identified.

Honeydew Creek

4169' Man-made spillway in stream channel; looks like it will wash-out during winter flows.

7576' Access to the following 1425' of stream denied by landowner. Surveyors stated that the channel appeared very similar upstream to what they had seen downstream. We will assume an F4 channel type for this stream length.

12080' Surveyors resume stream survey on Honeydew Creek.

12339' East Fork of Honeydew Creek enters from the right bank (RB).

13506' Channel type changes from an F4 to an F3 (reach #2) for the next 5877' of stream surveyed.

13804' Spring on RB; temperature is 60°F.

14765' Very large landslide on the RB; approximately 800' long x 500' high.

15401' Spring on left bank (LB); temperature is 61°F.

18012' West Fork of Honeydew Creek enters from the LB.

19417' Channel type changes from an F3 to a B2 (reach #3) for the remaining 3796' of stream surveyed.

20335' Upper East Fork of Honeydew Creek enters from the RB.

Honeydew Creek

22516' Lateral bank erosion on both banks for approximately 100'.

23178' There is an increase in stream channel gradient; less and less fish habitat to be seen. End of survey.

References

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd 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
Backwater Pool - Log Formed	[BPL]	6.4
Dammed Pool	[DPL]	6.5