STREAM INVENTORY REPORT

North Fork Yager Creek, 2003

INTRODUCTION

A stream inventory was conducted in two phases during the summer and fall of 2003 on North Fork Yager Creek. The survey began at the confluence with Middle Fork Yager Creek and extended upstream 8.4 miles. Stream inventories and reports were completed for Dairy Creek and Grouse Creek; subsections to this report were also completed for three small tributaries to North Fork Yager Creek (Butte Creek, Salmon Creek and Lonestar Creek).

The North Fork Yager Creek 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 North Fork Yager. 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 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

North Fork Yager Creek is a tributary to Yager Creek, tributary to the Van Duzen River, tributary to the Eel River, located in Humboldt County, California (Map 1). North Fork Yager Creek's legal description at the confluence with Middle Fork Yager is Township 02N, Range 02E, Section 02. Its location is 40˚34.35 north latitude and 123°55.43 west longitude. North Fork Yager Creek is a third order stream and has approximately 12.1 miles of blue line stream according to the Owl Creek and Yager Junction 7.5 minute USGS Quadrangles. North Fork Yager Creek drains a watershed of approximately 50.1 square miles. Elevations range from about 700 feet at the mouth of the creek to 2,800 feet in the headwater areas. Grass and mixed hardwood forests dominate the watershed. The watershed is privately owned and is managed for rangeland and timber production. Vehicle access to lower N.F. Yager Creek exists along the private Pacific Lumber Company Yager Creek Road from Highway 36 at Carlotta. Access to upper N.F. Yager is from the county Kneeland – Bridgeville Road as well as Showers Pass Road.

METHODS

The habitat inventory conducted in North Fork Yager Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al, 1998). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) 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. 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 (measured in the thalweg), dominant substrate composing the pool tail crest, and embeddedness. Habitat unit types encountered for the first time are 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. All pools are fully sampled.

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 North Fork Yager to record measurements and observations. There are eleven 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 a Marsh-McBirney Model 2000 flow meter.

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. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

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". North Fork Yager 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. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In North Fork Yager, 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 like bedrock, log sills, boulders, etc.

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 North Fork Yager, 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 North Fork Yager, 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 North Fork Yager, 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 (including downed trees, logs, and rootwads) was estimated and recorded.

10. Large Woody Debris Count:

Large woody debris (LWD) is an important component of fish habitat and an element in channel forming processes. In each habitat unit all pieces of LWD partially or entirely below the elevation of bankfull discharge are counted and recorded. The minimum size to be considered is twelve inches in diameter and six feet in length. The LWD count is presented by reach and is expressed as an average per 100 feet.

11. Average Bankfull Width:

Bankfull width can vary greatly in the course of a channel type stream reach. This is especially true in very long reaches. Bankfull width can be a factor in habitat components like canopy density, water temperature, and pool depths. Frequent measurements taken at riffle crests (velocity crossovers) are needed to accurately describe reach widths. At the first appropriate velocity crossover that occurs after the beginning of a new stream survey page (ten habitat units), bankfull width is measured and recorded in the appropriate header block of the page. These widths are presented as an average for the channel type reach.

BIOLOGICAL INVENTORY

Biological sampling during the stream inventory is used to determine fish species and their distribution in the stream. Fish presence was observed from the stream banks in North Fork Yager Creek. In addition, underwater observations were made at sixteen sites using sampling techniques discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Stream Habitat 1.30, a visual basic data entry program developed by Karen Wilson, Coastal Watershed Assessment Program, California Department of Fish and Game. This program processes and summarizes the data, and produces the following ten tables:

- Riffle, Flatwater, and Pool Habitat Types
- Habitat Types and Measured Parameters
- Pool Types
- Maximum Pool Depths by Habitat Types
- Mean Percent Cover by Habitat Type
- Dominant Substrates by Habitat Type

- Mean Percent Vegetative Cover for Entire Stream
- Fish Habitat Inventory Data Summary by Stream Reach (Table 8)
- Mean Percent Dominant Substrate / Dominant Vegetation Type for Entire Stream
- Mean Percent Shelter Cover Types for Entire Stream

Graphics are produced from the tables using Microsoft Excel. Graphics developed for North Fork Yager Creek include:

- Riffle, Flatwater, Pool Habitat Types by Percent Occurrence
- Riffle, Flatwater, Pool Habitat Types by Total Length
- Total Habitat Types by Percent Occurrence
- Pool Types by Percent Occurrence
- Maximum Depth in Pools
- Percent Embeddedness
- Mean Percent Cover Types in Pools
- Substrate Composition in Pool Tail-outs
- Mean Percent Canopy
- Dominant Bank Composition by Composition Type
- Dominant Bank Vegetation by Vegetation Type

HABITAT INVENTORY RESULTS

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

The habitat inventory was conducted by Dan Resnik (CCC) and Shaunna Bradshaw (WSP) and was broken into two survey periods due to access timing issues. The first survey period, from July 24 – August 13, 2003, began at 16,804 feet and ended at 44,198 feet. This upper survey section included the upper part of reach 3 as well as reaches 4 through 7 and was 27,611 feet long. The second survey period, from October 15 - October 27, 2003, began at 0 feet and ended at 16,804 and included reaches 1, 2 and the lower portion of reach 3. The total length of the main channel surveyed was 44,198 feet with an additional 1,884 feet of side channel.

A stream flow of 1.54 cfs was measured on August 6, 2003 in reach five at 27,058 feet, approximately 72 feet below the mouth of Grouse Creek with a Marsh-McBirney Model 2000 flowmeter.

North Fork Yager is a B3 channel type for the first 6,008 feet of the stream surveyed. B3 channels are moderately entrenched riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks; and cobble dominated channel. From 6,008 to 12,440 feet of the survey the channel type changes to F2. F2 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and boulder dominated

channel. From 12,440 to 22,908 feet of the survey the channel type changes to B4. B4 channels are moderately entrenched, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks on moderate gradients with low width /depth ratios and gravel dominant substrates. From 22,908 to 24,492 feet of the survey the channel type changes to B2. B2 channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools, very stable plan and profile, stable banks and boulder dominant channel. From 24,492 to 32,929 feet of the survey the channel type changes back to a B3 (see above). From 32,929 to 40,984 feet of the survey the channel type changes to A2. A2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel dominant substrates. From 40,984 feet to the end of survey channel type changes back to a B4 (see above).

Water temperatures taken during the July survey period ranged from 57 to 77 degrees Fahrenheit. Air temperatures ranged from 62 to 98 degrees Fahrenheit. Water temperatures taken during the October survey period ranged from 52 to 60 degrees Fahrenheit. Air temperatures ranged from 50 to 82 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 34.5% riffle units, 35.4% flatwater units, and 29.9% pool units (Graph 1). Based on total length of Level II habitat types there were 26.6% riffle units, 42.5% flatwater units, and 29.8% pool units (Graph 2).

Eleven level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were runs, 33%; mid channel pools, 27%; and low gradient riffles, 29% (Graph 3). Based on percent total length, runs made up 39%, mid-channel pools, 26%, and low gradient riffles, 23%.

A total of 156 pools were identified (Table 3). Main channel pools were the most frequently encountered at 96%, and comprised 96% 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. Ninety-one of the 153 pools (59%) that were fully measured had a depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 153 pool tail-outs measured, 18 had a value of 1 (11.72%); 45 had a value of 2 (29.66%); 40 had a value of 3 (26.2%); 13 had a value of 4 (8.3%); and 37 had a value of 5 (24%) (Graph 6). On this scale, a value of 1 indicates the best spawning conditions and a value of 4 the worst. Additionally, a value of 5 was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate like bedrock, log sills, boulders, etc.

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 10, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 20 (Table 1). Of the pool types, the scour pools had the highest mean shelter rating at 34. Main pools had a mean shelter rating of 19 (Table 3).

Table 5 summarizes mean percent escape/ambush cover by habitat type. Boulder is the dominant cover element in 12 of the 14 habitat types in North Fork Yager Creek. Specifically, pool cover is dominated by boulder followed by bedrock ledges. Graph 7 describes the pool cover in North Fork Yager Creek.

Table 6 summarizes the dominant substrate by habitat type. Boulder and large cobble dominate the substrate composition in all three level two habitat types (riffle, run, pool).

Graph 8 depicts the dominant substrate observed in pool tail-outs. Gravel was the dominant substrate observed in 44% of pool tail-outs while boulders were the next most frequently observed substrate type at 22%.

The mean percent canopy density for the surveyed length of North Fork Yager Creek was 54%. The mean percentages of deciduous and coniferous trees were 72% and 28%, respectively. Graph 9 describes the mean percent canopy in North Fork Yager Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 62.2%. The mean percent left bank vegetated was 62.2%. The dominant elements composing the structure of the stream banks consisted of 11.6% bedrock, 38.4% boulder, 40% cobble/gravel, and 10% sand/silt/clay (Graph 10). Additionally, 51% of the units surveyed had deciduous trees as the dominant vegetation type, and 49% had coniferous trees as the dominant vegetation (Graph 11).

BIOLOGICAL INVENTORY RESULTS

Sixteen sites in reaches 3, 4, and 5 were snorkeled for fishery species composition and distribution in N.F. Yager Creek on October 16 and 17, 2004. The results of a November 4, 2003 dive were not included in the dataset because poor water clarity and ambient light levels resulted in unreliable observation conditions. No sites were sampled in reaches 1,2,6 and 7.

Water temperatures taken during the dive period ranged from 48 to 54 degrees Fahrenheit. Air temperatures ranged from 62 to 68 degrees Fahrenheit. The sites were sampled by Shauna Bradshaw (WSP) and Allan Renger (DFG).

In reach three, one site was sampled (habitat unit #202), 2,359 feet above the confluence of Middle Fork Yager. The site yielded 5 young-of-year steelhead and 3 age 1+ steelhead.

In reach four, five sites were sampled between habitat units 210 and 229, a distance of 1,028 ft. The reach sites yielded 53 young-of-year steelhead, 6 age 1+ steelhead.

In reach five, 10 sites were sampled between habitat units 239 and 306, a distance of 6,830 ft. The sites yielded 164 young-of-year steelhead, 104 age 1+ steelhead and 13 age 2+ steelhead.

Figure 1. 2003 N.F.Yager dive observations

Date	Site #	Habitat. Unit #	Habitat. Type	Approx. Dist. from mouth (ft.)	Steelhead YOY	1+	2+
Reach 3			B4 channel type				
10/17/03	1	202	4.2	22359	5	3	0
Reach 4			B2 channel type				
10/17/03	2	210	4.2	23323	0	1	0
10/17/03	3	221	4.2	23904	3	2	0
10/17/03	4	222	4.2	23984	15	0	0
10/17/03	5	226	4.2	24140	15	0	0
10/17/03	6	229	4.2	24351	20	3	0
Reach 5			B3 channel type				
10/16/03	7	239	4.2	25309	5	2	2
10/16/03	8	247	4.2	26742	20	15	2
10/16/03	9	259	4.2	27671	0	10	2
10/16/03	10	269	4.2	28619	10	1	0
10/16/03	11	272	4.2	29096	35	0	0
10/16/03	12	285	4.2	30383	20	8	1
10/16/03	13	289	4.2	30693	10	10	2
10/16/03	14	298	4.2	31195	12	8	2
10/16/03	15	302	4.2	31614	37	10	2
10/16/03	16	306	4.2	32139	15	40	0

Juvenile cyprinids, either California roach or Sacramento pike minnow, as well as Sacramento

suckers were observed throughout the biological survey reaches.

DISCUSSION

North Fork Yager Creek is a B3 channel type for the first 6,008 feet of the stream surveyed, a F2 channel type for the next 6,432 feet, a B4 channel type for the next 10,468 feet, a B2 channel type for the next 1,584 feet, a B3 channel type for the next 8,437 feet, a A2 channel type for the next 8,055 feet, and a B4 channel for the next 3,214 feet.

The suitability of B3 channel types for fish habitat improvement structures is as follows: excellent for plunge weirs; boulder clusters and bank place boulder; single and opposing wing-deflectors; log cover.

The suitability of F2 channel types for fish habitat improvement structures is fair for plunge weirs; single and opposing wing deflectors; log cover.

The suitability of B4 channel types for fish habitat improvement structures is excellent for low-stage plunge weirs; boulder clusters; bank placed boulder; single and opposing wing deflectors; log cover.

The suitability of B2 channel types for fish habitat improvement structures is excellent for plunge weirs; single and opposing wing deflectors; log cover.

A2 channel types are generally not suitable for fish habitat improvement structures.

During the July survey period water temperatures ranged from 57-77 degrees Fahrenheit. Air temperatures ranged from 62-98 degrees Fahrenheit. The water temperatures recorded in the October survey period ranged from 52-60 degrees Fahrenheit. Air temperatures ranged from 50-82 degrees Fahrenheit. 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 42.5% of the total length of this survey, riffles 27%, and pools 29%. The pools are relatively deep, with 91 of the 153 (59%) pools that were fully measured 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 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 the numerous log debris accumulations (LDA's) in the stream.

Sixty-three of the 153 pool tail-outs measured had embeddedness ratings of 1 or 2. Fifty-three of the pool tail-outs had embeddedness ratings of 3 or 4. Thirty-seven of the pool tail-outs had a rating of 5, which describes substrate impossible 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. Sediment sources in North Fork Yager Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-six of the 153 pool tail-outs measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean shelter rating for pools was 20. The shelter rating in the flatwater habitats was 8. A pool shelter rating of approximately 100 is desirable. The amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, bedrock ledges contribute a small amount. Log and root wad cover structures in the pool and flatwater habitats would enhance 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.

The mean percent canopy density for the stream was 54%. In general, revegetation projects are considered when canopy density is less than 80%.

Figure 2. 2003 N.F. Yager canopy density observations by reach

Reach number	1	2	3	4	5	6	7
% Canopy Density	49	44	64	46	62	47	72

The percentage of right and left bank covered with vegetation was moderate at 62.2% and 62.2%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1) North Fork Yager Creek should be managed as an anadromous, natural production stream.

2) The limited water temperature data available for the July survey period suggest that maximum temperatures are above 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) Increase the canopy on North Fork Yager Creek by planting appropriate native vegetation, like 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 affected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.

4) 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.

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) 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) Due to the high gradient of the stream, access for migrating salmonids is an ongoing potential problem. N.F. Yager Creek has suitable flow regimes and somewhat suitable water temperatures, and it offers overall suitable conditions for rearing anadromous fish like steelhead. Fish passage should be monitored and improved where possible.

COMMENTS AND LANDMARKS

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

Position (ft.)	**Habitat Unit #**	**Comments:**
0	0001	Start of North Fork Yager survey at Middle Fork Yager bifurcation. The lower reaches survey period began October 15 and extended through October 27, 2003.
2329	0029	Structures: Spraddle legged bridge. PALCO haul road bridge.

Position (ft.)	Habitat Unit #	Comments:
3293	0034	Erosion Site: (Bank) Right bank erosion 200'L 50'H 10'D.
4351	0045	Erosion Site: (Bank) Right bank erosion 340'L 35'H 10'D.
4978	0050	Tributaries: Right bank tributary #1. 56°F. No fish observed.
5130	0051	Erosion Site: (Bank) Right bank erosion 260'L 20'H 10'D.
6172	0061	Erosion Site: (Bank) Right bank erosion 10'L 45'H 15'D.
6287	0063	Erosion Site: (Bank) Left bank erosion 250'L 110'H 45'D.
6856	0070	Erosion Site: (Bank) Left bank erosion 140'L 15'H 5'D.
7726	0079	Tributaries: Right bank tributary # 2 56°F.
9354	0095	General Comment: Large debris accumulation (15'H 25'W 10'L) Six pieces of large woody debris.
9911	0103	Erosion Site: (Bank) Right bank erosion 330'L 10'H 5'D.
11788	0120	Erosion Site: (Bank) Left bank erosion 600'L 10'H 5'D..
11943	0122	General Comment: Left bank spring 144' into unit.
13339	0132	General Comment: Left bank spring.
13339	0132	Erosion Site: (Bank) Left bank erosion 250'L 100'H 25'D.
14624	0139	Tributaries: Left bank tributary # 3. 56° F, not accessible to fish.
14736	0141	General Comment: Left bank spring.
14793	0142	General Comment: Left bank spring.
16804	0161	End of October survey period.
16804	0161	Start of July survey period: Left bank tributary # 4. Accessible to fish although no fish were observed. 62°F. 5% slope.
17413	0167	General Comment: Left bank spring 154 feet into unit.
18879	0177	General Comment: Right bank spring.
20388	0186	Tributaries: Right bank tributary #5, Accessible to fish, 62°F.
21098	0191	Tributaries: Right bank tributary #6, 74 feet from start of unit. Temp 61°F, Slope 32%.
21098	0191	Erosion Site: (Bank) Right bank erosion 19'H 90'L 6'D.
21767	0196	Erosion Site: (Bank) Right bank erosion 25'H 120'L 10'D.

Position (ft.)	Habitat Unit #	Comments:
23865	0220	Erosion Site: (Bank) Old erosion site. 70'H 150'L 15'D
24086	0224	General Comment: A 6' plunge with a 4' pool.
27058	0250	Tributaries: Right bank tributary #7. Grouse Creek surveyed 7/15/2003.
27149	0251	Erosion Site: (Bank) Right bank old erosion. Plants re-establishing 100'H 180'L 25'D.
29096	0272	Erosion Site: (Bank) Left bank erosion 30'L 15'H 5'D.
29260	0275	Erosion Site: (Bank) Left bank erosion 75'L 40'H 20'D Left bank erosion (slumping) 16'L 15'H 3'D.
29767	0279	Erosion Site: (Bank) Left bank erosion 50'H 70'L 20'D.
30855	0291	Erosion Site: (Bank) Right bank erosion 20' H 100' L 10' D.
31614	0302	Erosion Site: (Bank) Unstable left bank 125' L 300' H. Left bank erosion 10' H 15' L 5' D. Multiple trees in creek spanning channel.
31799	0303	Tributaries: Left bank tributary #8. Temp: 58°F. 12% slope. Accessible to fish.
31989	0304	Tributaries: Left bank tributary #9. Accessible to fish, 58° F.
32733	0310	Erosion Site: (Bank) Left bank erosion (old) 210'L 40'H 15'D.
32929	0311	General Comment: 3' plunge with a 1.8' pool depth.
33056	0312	Erosion Site: (Bank) Left bank erosion 30' L 40' W 15'D.
34809	0336	Tributaries: Right bank tributary #10. Salmon Creek. Water temperature 60°F. Accessible to fish. Habitat survey conducted August 12, 2003.
35156	0339	Erosion Site: (Bank) Right bank erosion 100' L 40' H 15' D.
35337	0344	Erosion Site: (Bank) Left bank erosion 180' L 20' H 10' D.
35802	0352	Erosion Site: (Bank) Left bank erosion 100' L 15'H 10' D.
36742	0366	General Comment: 5' plunge with a 4' jump pool.
37220	0373	Erosion Site: (Bank) Right bank erosion 65' L 35' H 15' D.
37470	0377	General Comment: 15% slope.
37655	0381	General Comment: 5' plunge no jump pool.
37674	0382	General Comment: 5' plunge with a 4' jump pool.

Position (ft.)	Habitat Unit #	Comments:
37729	0383	General Comment: Left bank spring.
37729	0383	Erosion Site: (Bank) Left bank erosion 250' L 25' H 10' D.
38089	0388	General Comment: 24% channel slope. 6' plunge with a 4' jump pool.
38089	0388	Erosion Site: (Bank) Right bank erosion 75' L 50' H 15' D
38119	0389	General Comment: 12' plunge; no jump pool.
38226	0392	Tributaries: Right bank tributary #11, Iaqua Creek. Surveyed August 11, 2003. 130% channel slope from the confluence with North Fork Yager upstream 190 ft. Both banks eroded with zero canopy cover. The stream bed was covered with algae in the first unit. Remainder of 500 feet of survey was greater than 17% slope. No fish observed. Water temperature 75°; air temperature 76°F.
38378	0394	General Comment: 15' subsurface flow.
40580	0436	Erosion Site: (Bank) Left bank erosion 120' L 15' H 10' D
40755	0441	General Comment: Possible barrier to fish. 12' plunge with 2' jump pool. Water goes subsurface 10' after plunge. Bedrock/boulder formed.
40946	0445	Tributaries: Right bank tributary #12. Water temp. 64°F, 20% channel slope. Not accessible to fish
41346	0452	General Comment: Kneeland - Bridgeville Rd bridge.
42782	0471	Tributaries: Right bank tributary #13. Dairy Creek surveyed in 08/11/03.Water temp. 57°F, accessible to fish.
44198	0492	End of Survey: End of survey due to lack of access permission.

REFERENCES

Flosi, G., Downie, S., Hopelain, J., Bird, M., Coey, R., and Collins, B. 1998. *California Salmonid Stream Habitat Restoration Manual*, 3rd edition. California Department of Fish and Game, Sacramento, California.

LEVEL III and LEVEL IV HABITAT TYPES

RIFFLE			
Low Gradient Riffle	(LGR)	[1.1]	{ 1}
High Gradient Riffle	(HGR)	[1.2]	{ 2}
CASCADE			
Cascade	(CAS)	[2.1]	{ 3}
Bedrock Sheet	(BRS)	[2.2]	{24}
FLATWATER			
Pocket Water	(POW)	[3.1]	{21}
Glide	(GLD)	[3.2]	{14}
Run	(RUN)	[3.3]	{15}
Step Run	(SRN)	[3.4]	{16}
Edgewater	(EDW)	[3.5]	{18}
MAIN CHANNEL POOLS			
Trench Pool	(TRP)	[4.1]	{ 8 }
Mid-Channel Pool	(MCP)	[4.2]	{17}
Channel Confluence Pool	(CCP)	[4.3]	{19}
Step Pool	(STP)	[4.4]	{23}
SCOUR POOLS			
Corner Pool	(CRP)	[5.1]	{22}
Lateral Scour Pool - Log Enhanced	(LSL)	[5.2]	{10}
Lateral Scour Pool - Root Wad Enhanced	(LSR)	[5.3]	{11}
Lateral Scour Pool - Bedrock Formed	(LSBk)	[5.4]	{12}
Lateral Scour Pool - Boulder Formed	(LSBo)	[5.5]	{20}
Plunge Pool	(PLP)	[5.6]	{ 9 }
BACKWATER POOLS			
Secondary Channel Pool	(SCP)	[6.1]	{ 4 }
Backwater Pool - Boulder Formed	(BPB)	[6.2]	{ 5 }
Backwater Pool - Root Wad Formed	(BPR)	[6.3]	{ 6 }
Backwater Pool - Log Formed	(BPL)	[6.4]	{ 7 }
Dammed Pool	(DPL)	[6.5]	{13}
ADDITIONAL UNIT DESIGNATIONS			
Dry	(DRY)	[7.0]	
Culvert	(CUL)	[8.0]	
Not Surveyed	(NS)	[9.0]	
Not Surveyed due to a marsh	(MAR)	[9.1]	