

**CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT**

Crocker Creek

Report Revised April 14, 2006

Report Completed 2000

Assessment Completed 1998

INTRODUCTION

A stream inventory was conducted during the summer of 1998 on Crocker Creek. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the amount and condition of available habitat to fish, and other aquatic species with an emphasis on anadromous salmonids in Crocker Creek. The objective of the biological inventory was to document the salmonid and other aquatic species present and their distribution.

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

Crocker Creek is a tributary of the Russian River, located in Sonoma County, California (see Crocker Creek map, page 2). The legal description at the confluence with the Russian River is T10N, R10W, S17. Its location is 38°46'05" N. latitude and 122°58'21" W. longitude. Year round vehicle access exists from Highway 101 near Cloverdale, via Crocker Road.

Crocker Creek and its tributaries drain a basin of approximately 3.3 square miles. Crocker Creek is a second order stream and has approximately 12.25 miles of blue line stream, according to the USGS Asti 7.5 minute quadrangle. Two unnamed tributaries were also habitat typed and are included in this report. They are referred to as Unnamed Tributary #1 and #2 in respect to their relative location from the mouth of Crocker Creek. Summer flow was measured as approximately .54 cfs at habitat unit #007. Elevations range from about 240 feet at the mouth of the creek to 1260 feet in the headwaters. The stream flows through incised V-shaped canyons in the headwaters into an open lens shape at the mouth. Most of the land surrounding the upper areas of the creek is managed as open grassland for livestock and recreational use has been developed approximately ½ mile upstream from the Russian River. The predominant vegetation throughout the drainage consists of annual grasses, dogwood, buckeye, willows, live oak, California laurels, madrone, firs, and a few redwood trees. The watershed is entirely privately owned. The Foothill yellow-legged frog (*Rana boylii*) is listed with a federal status of species of concern in the DFG's Natural Diversity Database for occurring within the Crocker Creek watershed.

METHODS

The habitat inventory conducted in Crocker Creek follows the methodology presented in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1998). The AmeriCorps Volunteers 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 and was supervised by Bob Coey, Russian River Basin Planner (DFG).

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 Crocker Creek to record measurements and observations. There are nine components to the inventory form: flow, channel type, temperatures, habitat type, embeddedness, shelter rating, substrate composition, canopy, and bank composition.

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 were also 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:

Water and air temperatures, and time, are measured by crew members with hand held thermometers and recorded at each tenth unit typed. Temperatures are measured in Fahrenheit at the middle of the habitat unit and within one foot of the water surface. Temperatures are also recorded using remote Temperature recorders which log temperature every two hours, 24 hours/day.

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". Crocker 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 unit lengths were measured, additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were completely sampled (length, mean width, mean depth, maximum depth and pool tail crest depth). 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 Crocker 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) or "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. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All shelter is then classified according to a list of nine shelter types. In Crocker Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the shelter. The shelter rating is calculated for each habitat unit by multiplying shelter value and percent covered. 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 measured habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densimeters as described in the California Salmonid Stream Habitat Restoration Manual, 1998. Canopy density relates to the amount of stream shaded from the sun. In Crocker 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 visually into percentages of evergreen or deciduous trees.

9. Bank Composition:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Crocker Creek, the dominant composition type and the dominant vegetation type of both the right and left banks for each fully measured 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. 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.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE IV data entry program developed CDFG. This program processes and summarizes the data, and produces the following tables and appendices:

- . Riffle, flatwater, and pool habitat types
- . Habitat types and measured parameters
- . Pool types
- . Maximum pool depths by habitat types
- . Shelter by habitat types
- . Dominant substrates by habitat types
- . Vegetative cover and dominant bank composition
- . Fish habitat elements by stream reach

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Crocker Creek include:

- . Level II Habitat Types by % Occurrence and % Total Length
- . Level IV Habitat Types by % Occurrence
- . Pool Habitat Types by % Occurrence
- . Maximum Depth in Pools
- . Pool Shelter Types by % Area
- . Substrate Composition in Low Gradient Riffles
- . Percent Cobble Embeddedness by Reach
- . Mean Percent Canopy

- Mean Percent Canopy by Reach
- Percent Bank Composition and Bank Vegetation

HISTORICAL STREAM SURVEYS:

The Department of Fish and Game conducted surveys of Crocker Creek on August 19, 1974 and September 1 and 6, 1977. The survey conducted on August 19, 1974 was a partial survey that started approximately 2.2 miles from the mouth and continued for 2.2 miles upstream. The flow was intermittent throughout the survey area and no flow exceeded 0.2 cfs. The water temperatures ranged from 60°F to 67°F and the air temperatures ranged from 80°F to 86°F.

The substrate in pools consisted of 40% cobble, 10% rocks, 5% boulders, 10% bedrock, 5% gravel, 10% sand, 10% detritus, and 10% silt. The substrate in the riffles consisted of 65% cobble, 5% silt, 10% rocks, 5% bedrock, 10% sand, and 5% gravel. Little potential suitable spawning gravel was present in the system. The most potential sites were located just upstream and downstream from the confluence of the westernmost unnamed tributary and Crocker Creek. Pools made up 50% of the total watered area in the surveyed region. The creek was characterized by small flows of water between semi-isolated pools. The shelter available was provided by terrestrial vegetation. Possible pollution existed from the KOA campground and numerous homes in the lower drainage.

The survey conducted on September 1 and 6, 1997 was a complete survey that started at the mouth and ended at the headwaters. Flows were intermittent on Crocker Creek throughout the survey and no flow exceeded .05 cfs. The water temperatures ranged from 61°F to 76°F and the air temperatures ranged from 78°F to 92°F.

The substrate consisted on average of 5% bedrock, 10% boulders, 30% cobble, 40% gravel, and 15% sand and mud. Spawning habitat was generally poor. Much of the streambed had gravel which was overlain with sand and fine gravel. Pool development in the lower mile was good, but few pools were observed elsewhere. The shelter available was provided primarily by boulders. Pollution consisted of horse waste material and domestic garbage such as cans and paper products.

HABITAT INVENTORY RESULTS

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

The habitat inventory of Crocker Creek was conducted from June 30, 1998 to July 9, 1998 by Shamli Tarbell and Dez Mikkelsen (AmeriCorps) with supervision and analysis by CDFG. The survey began at the confluence with the Russian River and extended up Crocker Creek to the end of anadromous fish passage. The total length of the stream surveyed was 14491 feet, with an additional 239 feet of side channel.

A flow of .54 cfs was measured July 1, 1998 at habitat unit #007 (downstream of River Road

crossing) with a Marsh-McBirney Model 2000 flowmeter.

This section of Crocker Creek has 5 channel types: from the mouth to 2890 feet an F4; next 1864 feet an F6; next 1136 feet a B5; next 1399 feet an A2 and the upper 7202 feet a B2.

F4 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly gravel substrate. F6 channel types are similar but with a predominantly silt/clay substrate.

B5 channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, stable banks and have a predominantly sand substrate. B2 channel types are similar but with a predominantly boulder substrate.

A2 channel types are steep (4-10%), narrow, cascading, step-pool streams with a high energy/debris transport associated with depositional soils and a predominantly boulder substrate.

Water temperatures ranged from 61°F to 71°F. Air temperatures ranged from 60°F to 81°F. Summer temperatures were also measured using remote temperature recorders placed in pools (see Temperature Summary graphs at end of report). A recorder located approximately at habitat unit #075 (Reach 5) logged temperatures every 2 hours from July 10 - October 6, 1998. The highest temperature recorded was 75°F in July and the lowest was 55°F in October.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of occurrence there were 47% pool units, 42% riffle units and 11% flatwater units. Based on total length there were 58% riffle units, 31% pool units, and 11% flatwater units (Graph 1).

One hundred thirty-two habitat units were measured and 35% were completely sampled. Fifteen Level IV habitat types were identified. The data is summarized in Table 2. The most frequent habitat types by percent occurrence were low gradient riffles at 35%, step pools 15%, boulder scour pools 8% and mid-channel pools 7% (Graph 2). By percent total length, low gradient riffles made up 51%, step pools 22%, high gradient riffles 7%, and step runs 6%.

Sixty-two pools were identified (Table 3). Scour pools were most often encountered at 52%, and comprised 18% of the total length of pools (Graph 3).

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. 16 of the 62 pools (26%) had a depth of two feet or greater (Graph 4). These deeper pools comprised 20% of the total length of stream habitat.

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 types had the highest shelter rating at 37. Riffle had the lowest rating with 15 and flatwater rated 28 (Table 1). Of the pool types,

the main channel pools had the highest mean shelter rating at 43 and scour pools rated 31 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were boulders at 37%, white water 32%, large woody debris 9%, and small woody debris 8%. Graph 5 describes the pool shelter in Crocker Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 10 of the 11 low gradient riffles measured (Graph 6).

No mechanical gravel sampling was conducted in 1998 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 57 pool tail-outs measured, 1 had a value of 1 (2%); 21 had a value of 2 (37%); 23 had a value of 3 (40%); and 7 had a value of 4 (12%). Five (9%) riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries. Gravel was the dominant substrate observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 53%. The mean percentages of deciduous and evergreen trees were 59% and 41%, respectively. Graph 8 describes the canopy for the entire survey and graph 9 describes the canopy by reach.

For the entire stream reach surveyed, the mean percent right bank vegetated was 59% and the mean percent left bank vegetated was 56%. For the habitat units measured, the dominant vegetation types for the stream banks were: 56% deciduous trees, 21% grass, 18% evergreen trees and 5% brush. The dominant substrate for the stream banks were: 68% silt/clay/sand, 18% cobble/gravel, 9% bedrock and 6% boulder (Graph 10).

HABITAT INVENTORY RESULTS FOR UNNAMED TRIBUTARY #1

The habitat inventory of Unnamed Tributary #1 was conducted on July 8, 1998 by Simone Watts, Paula Perrety, and Shamli Tarbell (AmeriCorps) with supervision and analysis by CDFG. The survey began at the confluence with Crocker Creek and extended up the tributary 1283 feet.

This section of the tributary has 1 channel type: from the mouth to 1283 feet an F3. F3 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly cobble substrate. Water temperature was 64 °F and the air temperature was 69 °F.

Based on frequency of occurrence there were 50% riffle units and 50% pool units. Based on total length there were 60% pool units and 40% riffle units.

Three Level IV habitat types were identified. The most frequent habitat types by percent

occurrence were step pools at 50%, low gradient riffles 40%, high gradient and riffles 10%. By percent total length, step pools made up 60%, low gradient riffles 33%, and high gradient riffles 7%. One of the 5 pools (20%) had a depth of two feet or greater. These deeper pools comprised 5% of the total length of stream habitat.

Pool types had the highest shelter rating at 93 and riffles rated 40. Main channel pools were the only pool type and had a mean shelter rating at 93. By percent area, the dominant pool shelter types were small woody debris at 26%, boulders 21%, aquatic vegetation 18%, and large woody debris 17%. Gravel was the dominant substrate observed in the 1 low gradient riffle measured. Of the 5 pool tail-outs measured, all 5 had a value of 3 (100%). On this scale, a value of one is best for fisheries. Gravel was the dominant substrate observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 55% (deciduous and evergreen trees were 68% and 33%). The mean percent right bank vegetated was 56% and the mean percent left bank vegetated was 38% (dominant vegetation types for the stream banks were: 38% deciduous trees, 38% evergreen trees, 13% grass, and 13% brush; dominant substrate for the stream banks were: 63% silt/clay/sand, and 38% bedrock).

HABITAT INVENTORY RESULTS FOR UNNAMED TRIBUTARY #2

The habitat inventory of Unnamed Tributary #2 was conducted on July 19, 1998 by Dez Mikkelsen and Shamli Tarbell (AmeriCorps) with supervision and analysis by CDFG. The survey began at the confluence with Crocker Creek and extended up the tributary to the end of anadromous fish passage at a rock falls. The total length of the stream surveyed was 1461 feet. Flows were not measured on Unnamed Tributary #2.

This section of the tributary has 1 channel type: from the mouth to 1461 feet an F5. F5 channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio and a predominantly sand substrate. Water temperatures ranged from 68 °F to 70 °F and air temperatures ranged from 74 °F to 75 °F.

Based on frequency of occurrence there were 55% pool units and 45% riffle units. Based on total length there were 63% riffle units and 37% pool units.

The most frequent habitat types by percent occurrence were step pools at 40%, low gradient riffles 35%, high gradient riffles 10% and boulder scour pools 10%. By percent total length, low gradient riffles made up 35%, step pools 32%, high gradient riffles 28%, and boulder scour pools 3%.

Eleven pools were identified. Main Channel pools were most often encountered at 73%, and comprised 88% of the total length of pools. Five of the 11 pools (45%) had a depth of two feet or greater. These deeper pools comprised 19% of the total length of stream habitat. Pool types had the highest shelter rating at 67 and riffles rated 8. Of the pool types, the scour pools had the highest mean shelter rating at 120 and main channel pools rated 44. By percent area, the

dominant pool shelter types were aquatic vegetation at 46%, boulders 23%, large woody debris 14%, and white water 7%.

Gravel was the dominant substrate observed in 1 of the 2 low gradient riffles measured. Of the 11 pool tail-outs measured, none had a value of 1 (0%); 8 had a value of 2 (73%); 2 had a value of 3 (18%); and 1 had a value of 4 (9%). Gravel was the dominant substrate observed at pool tail-outs.

The mean percent canopy density for the stream reach surveyed was 60% (deciduous and evergreen trees were 77% and 23%). The mean percent right bank vegetated was 91% and the mean percent left bank vegetated was 74% (dominant vegetation types for the stream banks were: 71% grass, 14% evergreen trees, 7% brush, and 7% deciduous trees; dominant substrate for the stream banks were: 86% silt/clay/sand, 7% boulder, and 7% cobble/gravel).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In the August 1974 survey, roach were abundant below the KOA impoundment, but no salmonids were observed above the impoundment. Newts, frogs, and snakes were also observed during the survey.

In the September 1977 survey, suckers and roach were observed in some of the pools below the dam. The lake formed by the dam contained bluegill and a bluegill was also seen downstream of the dam. No salmonids were observed upstream of the dam. Newts, rattlesnakes, deer, and frogs were also observed during the survey.

On October 6, 1998, a biological inventory was conducted in three sites of Crocker Creek to document the fish species composition and distribution. Each site was single pass electrofished using one Smith Root Model 12 electrofisher. Fish from each site were counted by species, and returned to the stream. The water temperatures ranged from 58°F to 62°F and the air temperatures ranged from 68°F to 81°F. The observers were Simone Watts, Dez Mikkelsen (AmeriCorps), and Bob Coey (DFG).

The inventory of Reach 2 started 150' downstream of the KOA dam (unit #038) and continued downstream for approximately 1456 feet. In pool, run, and riffle habitat types, 65 0+, 21 1+, and 6 2+ steelhead were observed along with many pike minnow, 1 sculpin, 8 roach, 10 Sacramento sucker, and 2 yellow-legged frogs.

The inventory of Reach 3 started 100 feet upstream of the KOA dam (unit # 053) and continued for approximately 1001 feet upstream. In pool, run, and riffle habitat types, 7 pike minnow, 32 roach, 8 yellow-legged frogs, and many California newts were observed. A boulder cascade located in this survey section was determined to be a partial barrier. No steelhead were observed above the KOA dam or above the cascade.

The inventory of Reach 5 started 200 feet downstream of Unnamed Tributary #1 and continued for approximately 550 feet upstream. In pool habitat types, 8 yellow-legged frogs and many giant pacific salamanders and California newts were observed. No steelhead were observed. This survey section was above the dam, but below the section where livestock have free-roam.

On October 6, 1998, a biological inventory was conducted in one site of Unnamed Tributary #1. The water temperature was 62 °F. The observers were Simone Watts, Dez Mikkelsen (AmeriCorps), and Bob Coey (DFG). The inventory started at the confluence with Crocker Creek and continued for approximately 155 feet upstream. In pool habitat types, 3 yellow-legged frogs and many giant pacific salamanders and California newts were observed. No steelhead were observed.

During the habitat inventory, no salmonids were visually observed upstream of habitat unit #036 on Crocker Creek, where the KOA impedes further passage.

A summary of historical and recent data collected appears in the table below.

Table 1. Species Observed in Historical and Recent Surveys			
YEARS	SPECIES	SOURCE	Native/Introduced
1998	Steelhead	DFG	N
1998	Pike Minnow	DFG	N
1998	Sculpin	DFG	N
1974, 1977, 1998	Roach	DFG	N
1977, 1998	Sacramento Sucker	DFG	N
1998	Pacific Giant Salamander	DFG	N
1998	California Newt	DFG	N
1998	Yellow-legged Frog	DFG	N
1977	Bluegill	DFG	I

Historical records reflect that no hatchery stocking, transfers, or rescues have occurred in the watershed. However, it was noted in the August 1974 survey that possible stocking of the KOA

impoundment may have occurred in the past.

ADULT SURVEYS:

During the August 1974 survey, numerous barriers were observed. An earthen/concrete dam near the KOA campground was completely blocking the creek 0.6 miles upstream of the mouth. Repairs were being made on the outlet channel at the time of the survey. However, the outlet channel appeared to be fairly steep and the channel did not appear to have fish passage specifications. A boulder cascade noted above the dam site could also possibly hinder fish passage. A log jam was noted in Unnamed Tributary #1 and a six foot rock fall was noted in Unnamed Tributary #2, both of which could be possible fish barriers. There was one diversion noted during the survey that consisted of a hose running from a pump house into a spring immediately adjacent to the creek.

During the September 1977 survey, numerous barriers to fish included a 50' high dam 0.6 miles upstream movement were noted. In addition to the above barriers numerous small log jams were observed on Unnamed Tributary #1 and on Crocker Creek just upstream of Unnamed Tributary #1. None of the log jams created falls greater than six feet. Unnamed Tributary #2 had two boulder falls within 0.1 mile of its mouth. No diversions were noted during the survey.

No spawning/carcass survey was conducted in 1998/1999 due to inadequate staffing levels.

DISCUSSION

Crocker Creek has 5 channel types: F4 (2890 ft.), F6 (1864 ft.), B5 (1136 ft.), A2 (1399 ft.) and B2 (7202 ft.).

There are 2890 feet of F4 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F4 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

There are 1894 feet of F6 channel type in Reach 2. According to the DFG Salmonid Stream Habitat Restoration Manual, F6 channel types are good for bank-placed boulders and fair for low-stage weirs, boulder clusters, single and opposing wing deflectors and log cover.

There are 1136 feet of B5 channel type in Reach 3. According to the DFG Salmonid Stream Habitat Restoration Manual, B5 channel types are excellent for bank-placed boulders and log cover. They are also good for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover.

There are 1399 feet of A2 channel type in Reach 4. According to the DFG Salmonid Stream Habitat Restoration Manual, the high energy, steep gradient A1/2 channel types have stable stream banks and poor gravel retention capabilities and are generally not suitable for

instream enhancement structures.

There are 7202 feet of B2 channel type in Reach 5. According to the DFG Salmonid Stream Habitat Restoration Manual, B2 channel types are excellent for low and medium-stage plunge weirs, single and opposing wing deflectors and bank cover.

Many site specific projects can be designed within B and F channel types, especially to increase pool frequency, volume and shelter.

The water temperatures recorded on the survey days June 30 - July 9, 1998 ranged from 61°F to 71°F. Air temperatures ranged from 60°F to 81°F. The warmer water temperatures were recorded in Reach 1. These temperatures, if sustained, are above the threshold stress level (65°F) for salmonids.

Summer temperatures measured using a remote temperature recorder placed in a pool ranged from 55° to 75°F near habitat unit #075 (Reach 5). The Temperature Summary graph shows that for much of the summer (July through August) the upper watershed exhibited temperatures above the optimal for salmonids.

Pools comprised 31% of the total length of this survey. 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. In Crocker Creek, the pools are relatively shallow with 26% having a maximum depth of at least 2 feet. These pools comprised 20% of the total length of stream habitat. However, in coastal coho and steelhead streams, it is generally desirable to have primary pools comprise approximately 50% of total habitat length.

The mean shelter rating for pools was 37. However, a pool shelter rating of approximately 80 is desirable. The relatively small amount of pool shelter that now exists is being provided primarily by boulders (37%), white water (32%), large woody debris (9%), and small woody debris (8%). Log and root wad cover in the pool and flatwater habitats would improve both summer and winter salmonid habitat. Log cover provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Ten of the 11 low gradient riffles measured (91%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Fifty-three of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 2% had a rating of 1. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. In a reach comparison, Reaches 2 and 3 had the best ratings and Reaches 1 and 5 had the poorest ratings. Reach 4 is unsuitable for spawning due to the natural geomorphology of the Reach.

The higher the percent of fine sediment, the lower the probability that eggs will survive to hatch. This is due to the reduced quantity of oxygenated water able to percolate through the gravel, or because of fine sediment capping the redd and preventing fry emergence. Though Reaches 2 and 3 had better ratings than Reaches 1 and 5 in Crocker Creek, Reaches 1, 2, 3, and 5, sediment sources should be mapped and rated according to their potential sediment yields, and control measures taken.

The mean percent canopy for the survey was 53%. This is a very low percentage of canopy, since 80 percent is generally considered desirable. Cooler water temperatures are desirable in Crocker Creek. Elevated water temperatures could be reduced by increasing stream canopy. The large trees required for adequate stream canopy would also eventually provide a long term source of large woody debris needed for instream shelter and bank stability. However, the riparian buffer is thin or nearly absent in areas with livestock development. Intensive grazing within the riparian corridor leads to less stream canopy and channel incision causing bank erosion and higher water temperatures.

DISCUSSION FOR UNNAMED TRIBUTARY #1

Unnamed Tributary #1 has 1 channel type: F3 (1283 ft.). There are 1283 feet of F3 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F3 channel types are good for bank-placed boulders as well as single and opposing wing-deflectors. They are fair for low-stage weirs, boulder clusters, channel constrictors and log cover. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

The water temperature recorded on the survey day 07/08/98 was 64 °F and the air temperature was 69 °F. This temperature regime is favorable to salmonids.

100% of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered best for the needs of salmon and steelhead. The mean percent canopy for the survey was 55%.

DISCUSSION FOR UNNAMED TRIBUTARY #2

Unnamed Tributary #2 has 1 channel type: F5 (1461 ft.). There are 1461 feet of F5 channel type in Reach 1. According to the DFG Salmonid Stream Habitat Restoration Manual, F5 channel types are good for bank-placed boulders and fair for low-stage weirs, single and opposing wing-deflectors, channel constrictors and log cover. Any work considered will require careful design, placement, and construction that must include protection for any unstable banks.

The water temperatures recorded on the survey day 07/10/98 ranged from 68 °F to 70 °F. Air temperatures ranged from 74 °F to 75 °F. These temperatures, if sustained, are above the threshold stress level (65 °F) for salmonids.

One of the 2 low gradient riffles measured (50%) had either gravel or small cobble as the dominant substrate. This is generally considered fair for spawning salmonids.

27% of the pool tail-outs measured had embeddedness ratings of either 3 or 4. None had a rating of 1. The mean percent canopy for the survey was 60%.

SUMMARY

Biological surveys were conducted to document fish distribution and are not necessarily representative of population information. Steelhead were documented consistently during each past survey year below the KOA dam, but never above. The dam has been in existence since 1904, and has likely been a barrier since that time. Over time, aggregate built up behind the dam causing a concurrent drop in the channel bottom below. In 1995, the dam failed and the trapped aggregate buried the channel in reach 1 below. The level of the stream has raised such that many of the alders have died. The channel has been dredged several times since 1995. Overall, fair numbers of steelhead were observed during the 1998 survey below the dam. The 1998 surveys documented many 0+ fish indicating successful spawning in the lower reaches of Crocker Creek. Few 1+ fish were observed indicating good rearing conditions there too. Habitat conditions upstream of the dam are fair. Overall, habitat conditions for steelhead have declined over time.

Immediately upstream of the failed dam backwatering of sediment and flows resulted in streambank erosion and loss of mature riparian. Little riffle habitat exists for spawning, and what does exist is unsuitable for spawning due to high gravel embeddedness. The unstable banks and effects of backwatering in these reaches limits instream habitat improvement alternatives, although some opportunity exists. Any work considered in these reaches will require careful design, placement, and construction that must include protection for the unstable banks and high stream velocities.

In Reaches 3 and 4, spawning and rearing habitat exists, canopy shading is higher, although instream shelter is still lacking and stream bank erosion is prevalent. However, fish access is limited by the failed dam below, so these resources are not currently utilized.

In Reach 5 spawning and rearing habitat quality diminishes due to the effects of eroding stream banks, lack of riparian habitat, and increased temperatures and nutrient runoff from agriculture and livestock. Additionally, these upstream effects seriously impact resources downstream (in Reaches 3 and 4) especially during the warmer months when stream temperature rises, algae blooms and demand for oxygen and other resources increases. Sediment transported downstream from Reach 5 in the winter also impacts fair quality spawning gravel downstream. Bank protection, riparian planting and exclusionary fencing for livestock is recommended in Reach 5.

GENERAL MANAGEMENT RECOMMENDATIONS

Crocker Creek should be returned to an anadromous, natural production stream.

Winter storms often bring down large trees and other woody debris into the stream, which increases the number and quality of pools. This woody debris, if left undisturbed, will provide fish shelter and rearing habitat, and offset channel incision. Landowners should be sensitive about the natural and positive role woody debris plays in the system, and encouraged not to remove woody debris from the stream, except under extreme buildup and only under guidance by a fishery professional.

PRIORITY FISHERY ENHANCEMENT OPPORTUNITIES

- 1) Access for migrating salmonids has been eliminated in Reach 2, until recently when the dam failed. Fish passage should now be improved where possible. Jump pools could be constructed below the grade stabilization structure. Design should include improved passage of gravel as a second priority and fish passage first. Rearing conditions upstream appear adequate at this time to justify providing passage. There is one log debris accumulation present on Crocker Creek that has the potential for causing bank erosion (Unnamed Tributary #1). The modification of this debris accumulation is recommended at this time and it must be done carefully to preserve existing habitat provided by the woody debris.
- 2) Reach 3 (within the old impoundment area) and in the un-named tributaries would benefit from the utilizing bio-technical vegetative techniques to re-establish floodplain benches and a defined low flow channel. This would discourage lateral migration of the base flow channel and decrease bank erosion.
- 3) There is at least one section (Reach 5) where the stream is being impacted from livestock in the riparian zone. Livestock in streams generally inhibit the growth of new trees, exasperate erosion, and reduce summertime survival of juvenile fish by defecating in the water. Alternatives to limit cattle access, control erosion and increase canopy, should be explored with the landowner, and developed if possible.
- 4) Increase the canopy on Crocker Creek by planting willow, alder, oaks, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reaches 1, 2 and 5). The non-anadromous reach above the survey section should be assessed for planting and treated as well, since water temperatures throughout are effected from upstream. In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.
- 5) In Crocker Creek, active and potential sediment sources related to the road system need to be mapped, and treated according to their potential for sediment yield to the

stream and its tributaries. Map sources of upslope and in-channel 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. Near-stream riparian planting along any portion of the stream should be encouraged to provide bank stability and a buffering against agricultural, grazing and urban runoff.

- 6) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing >shelter is from vegetation and undercut banks. Adding high quality complexity with larger woody cover is desirable. Combination cover/scour structures constructed with boulders and woody debris would be effective in many flatwater and pool locations in the upper reaches. This must be done where the banks are stable (Reaches 3 & 4) or in conjunction with stream bank armor to prevent erosion (Reach 1). In some areas the material is at hand.

PROBLEM SITES AND LANDMARKS - CROCKER CREEK SURVEY COMMENTS

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

HABITAT UNIT#	STREAM LEN(FT)	COMMENTS
1.00	347	CONFLUENCE WITH RUSSIAN RIVER MEETS SIDE-CHANNEL OF RUSSIAN AND GOES SUB-TERRAIN 100' DOWNSTREAM OF CONFLUENCE.
3.00	621	LEVEE BEGINS @ MID. UNIT, LB.
13.00	1368	BOX CULVERT #1 @26' (END OF UNIT), GOES UNDER ROAD.
14.00	1404	LEVEE ENDS
16.00	1530	MANY ROACH
18.00	1600	DOWNCUTTING, APPROX. 8'
19.00	1877	100'S OF DEAD TREES, COVERED IN 10' +/- OF SILT AND GRAVEL
21.00	2643	100'S OF DEAD TREES 10' +/- OF SILT/GRAVEL WASHED DOWN FROM BUSTED DAM
22.00	2677	MINOR SPRING, RB
32.00	3157	WET TRIB RB. TRIB TEMP 65°F, CROCKER TEMP 70°F. DEAD TREES CONTINUE
36.00	3458	DRY TRIB. @ BEGINNING OF UNIT. HUGE CONCRETE DEBRIS FROM BUSTED DAM. CHANNEL SPLITS INTO 3 CHANNELS BELOW DAM
36.10	3458	TOP OF UNIT has, TWO HUGE DROPS AT BASE OF BUSTED DAM.

39.00	3503 DAM #1- ACCESS FROM KOA Rd.
41.00	3606 ACCESS BY RD OUT OF KOA @ 28' RB WET TRIB #2 CULVERT 1.5' DIA.; TRIB TEMP 61°F
43.00	3863 RB EROSION, 100'L X 30'H X 15'D
49.00	4253 Channel width about 75', Banks: 20', Continuous for about 200' of stream
53.00	4583 Large cement blocks:1.5' X 2' X 3' in creekbed, about 60 blocks.
54.00	4607 Dry trib. #2 RB.
58.00	4776 channel change to B5
59.00	4919 newts
61.00	5055 At 90' wet trib #3 on LB. Water Temp. 59°F
66.00	5484 Dry side-channel re-enters main channel
67.00	5568 DRY SIDE CHANNEL
69.00	5890 Spring at 246'. Dry side channel
70.00	6071 Boulders, very steep and narrow.
71.00	7289 Spring LB at 212' into unit. 2.5' DIA culvert at 690'
74.00	7337 Channel change from A2 to B2
76.00	7527 Western Toads
77.00	7620 Active erosion LB:8'L X 20'H X 15'D
78.00	7688 House-sized boulders.
80.00	7790 Erosion LB: 50'L X 20'H X 20'D. Black tarp and pipe in stream.
84.00	8421 Erosion RB:50'L X 50'H X 30'D
86.00	8497 Steep erosion LB. Pacific Tree Frog.
87.00	8605 RB Erosion: 50'L X 60'H X 25'D
92.00	9878 Unnamed Tributary #1, RB. Temp:68°F, Crocker:68°F
94.00	10064 Vegetation change: from redwoods to oak savanna
95.00	10109 Unnamed Tributary #2: 63°F, Crocker: 61°F.Debris Accumulation#2
96.00	10298 Erosion spots at beginning of unit: 35'H X 15'W X 5'D
100.00	10597 Erosion LB: 70'H X 50'W X 10'D
101.00	10726 Erosion both banks in several spots, average amount: 20'H X 15'W X 5'D
104.00	10962 Major Erosion RB. 150'H X 300'W X 10'D
105.00	11106 Jam #3 at beginning of unit.

		erosion 100'H X 100'W X 20'D
111.00	11797	Debris Jam #4 at beginning of unit. Family of turkeys. Dry trib RB at beginning of unit. Wet trib, blow-out. Trib temp.: 58°F, Crocker 62°F. Major downcutting, with 10' pile of gravel at mouth.
112.00	12105	Usually one newt per unit from unit #93; Jam #5 and #6
113.00	12129	erosion
119.00	12415	Dry trib LB (major downcutting)
121.00	12614	Dry trib RB
123.00	13106	Evidence of cows throughout unit 126 and on. 2 debris Jams #7 and 8. Many large erosion spots, bigger than 30'H X 30'W. Hillside is slipping into creek (LB). Many 4'DIA trees leaning dramatically.
125.00	13615	NO more newts
127.00	13749	Cows spotted (patties); algae
129.00	14000	Culvert #2. Wet trib RB @70' temp:70°F, Crocker temp:70°F
130.00	14016	Wet trib RB temp: 70°F
131.00	14469	Jam #9. Small wet trib RB temp: 72°F. Bullfrog and polliwogs present.
132.00	14491	stream becomes small
		*** END OF SURVEY ***

PROBLEM SITES AND LANDMARKS- UNNAMED TRIBUTARY #1 SURVEY COMMENTS

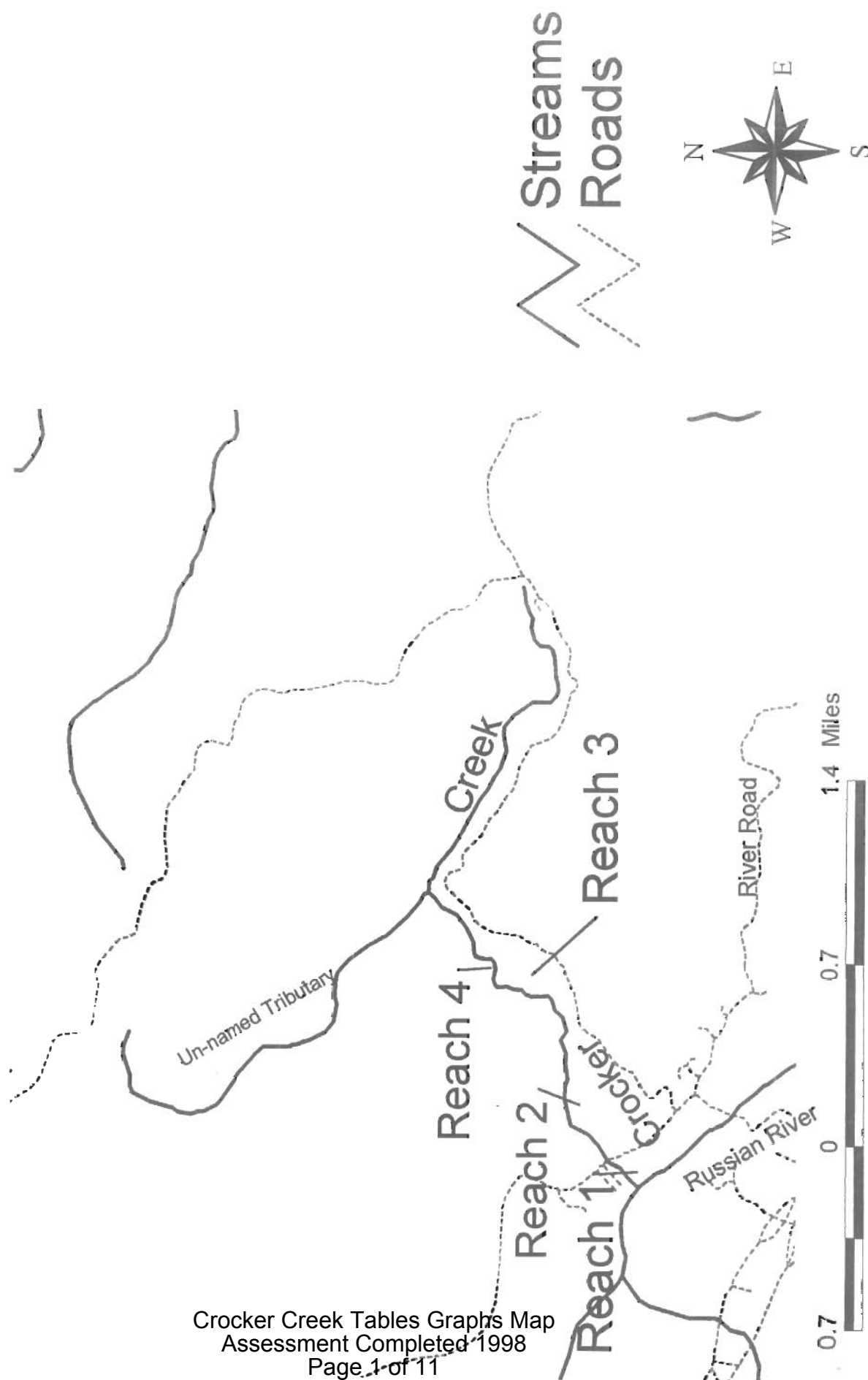
HABITAT UNIT#	STREAM LEN(FT)	COMMENTS
1.00	163	Erosion 100'H X 100'W X 10'D. Dense algae growth.
2.00	256	Mass wasting/Erosion 100'H X 100'W X 30' D
4.00	466	RB erosion LB gully
5.00	594	Huge Log jam #2; Erosion RB 75'H X 40'W X 10'D.
6.00	695	Burn scars on trees (beginning at unit 2)
7.00	811	Erosion LB 30'H X 30'W X 10'D
9.00	1168	Dry trib LB @149'

10.00 1283 Erosion LB 40'H X 40'W X 10'D (@
top of unit). Dry spring RB @
beginning of unit. Stream became
unsafe to type and it will be dry
soon. Not worth the effort.
END OF SURVEY

PROBLEM SITES AND LANDMARKS- UNNAMED TRIBUTARY #2 SURVEY COMMENTS

HABITAT UNIT#	STREAM LEN(FT)	COMMENTS
4.00	312	Possible barrier at top of unit. Rockface waterfall 5' high. Pool below is 2.5' deep.
7.00	480	Small dry trib RB above log jam.
11.00	754	Aquatic veg. is algae
13.00	844	algae
17.00	1306	Debris jam; newts
20.00	1461	Western toad; Wet trib. LB (steep) Possible barrier 7' fall, no pool below. ***END OF SURVEY***

Crocker Creek Habitat Inventory



Crocker Creek

Drainage: Russian River

Table 1 - SUMMARY OF RIPPLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI

LEGAL DESCRIPTION: T10N21W517 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	ESTIMATED TOTAL AREA (sq.ft.)	MEAN VOLUME (cu.ft.)	ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
55	16	RIPPLE	42	157	8614	58	8.7	0.5	938	51587	460	25279	0	15
14	6	FLATWATER	11	111	1558	11	8.9	0.5	263	13480	517	7239	0	28
62	24	POOL	47	73	4532	31	9.0	0.9	553	34286	512	31720	347	37
1	0	CULVERT	1	26	26	0	0.0	0.0	0	0	0	0	0	0
TOTAL UNITS	TOTAL UNITS			TOTAL LENGTH (ft.)		TOTAL LENGTH (ft.)			TOTAL AREA (sq. ft.)		TOTAL VOL. (cu. ft.)			
132	46			14730		14730			99353		64238			

Crocketer Creek

Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI LEGAL DESCRIPTION: T10N10W317 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	MEAN LENGTH	TOTAL LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL EST.	MEAN POOL VOL EST.	MEAN SHELTER RATING	MEAN CANOPY
#			%	ft.	ft.	ft.	ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.		%
46	10	LGR	35	162	7443	51	8	0.4	1.2	786	36169	337	15519	0	3	49		
8	5	HGR	6	124	990	7	10	0.5	1.3	1153	9226	576	4606	0	16	64		
1	1	CAS	1	181	181	1	13	0.8	2.2	1530	1530	1224	1224	0	150	95		
6	1	GLD	5	74	441	3	12	0.5	1.2	1085	6510	471	2828	0	3	33		
3	2	RUN	2	66	199	1	10	0.6	1.1	692	2076	415	1246	0	13	50		
5	3	SRN	4	184	918	6	6	0.5	1.4	1062	5310	616	3078	0	55	83		
9	5	MCP	7	47	427	3	8	0.9	3.6	364	3279	388	3491	271	8	49		
1	0	CCP	1	36	36	0	8	0.8	1.3	288	288	230	230	115	0	0		
20	5	STP	15	163	3253	22	8	0.8	3.0	1153	23062	1024	20483	796	61	64		
1	1	CRP	1	22	22	0	5	0.4	1.5	110	110	44	44	22	0	25		
1	1	LSL	1	49	49	0	8	1.0	1.5	368	368	368	368	221	5	5		
4	2	LSR	3	26	104	1	7	0.9	1.7	179	715	167	667	87	61	25		
9	3	LSBK	7	30	268	2	7	0.8	2.9	206	1857	176	1588	109	4	57		
11	6	LSBO	8	26	287	2	10	0.9	4.0	249	2743	244	2688	170	22	64		
6	1	PLP	5	14	86	1	18	0.9	3.5	311	1865	316	1895	172	78	49		
1	0	CUL	1	26	26	0	0	0.0	0.0	0	0	0	0	0	0	0		
TOTAL UNITS	TOTAL UNITS			LENGTH (ft.)	AREA (sq.ft.)	TOTAL VOL. (cu.ft.)												
132	46			14730	95107	59952												

Crocketer Creek

Drainage: Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI LEGAL DESCRIPTION: T10N10W1517 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	TOTAL LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL EST.	MEAN SHELTER EST.	MEAN CANOPY
#			%	ft.	ft.	ft.	ft.	ft.	sq.ft.	sq.ft.	cu.ft.	cu.ft.	cu.ft.	cu.ft.	%
46	10	LGR	35	162	7443	51	0.4	1.2	786	36169	337	15519	0	3	49
8	5	HGR	6	124	990	7	0.5	1.3	1153	9226	576	4606	0	16	64
1	1	CAS	1	181	181	1	0.8	2.2	1530	1530	1224	1224	0	150	95
6	1	GLD	5	74	441	3	0.5	1.2	1085	6510	471	2828	0	3	33
3	2	RUN	2	66	199	1	0.6	1.1	692	2076	415	1246	0	13	50
5	3	SRN	4	184	918	6	0.5	1.4	1062	5310	616	3078	0	55	83
9	5	MCP	7	47	427	3	0.9	3.6	364	3279	388	3491	271	8	49
1	0	CCP	1	36	36	0	0.8	1.3	288	288	230	230	115	0	0
20	5	STP	15	163	3253	22	0.8	3.0	1153	23062	1024	20483	796	61	64
1	1	CRP	1	22	22	0	0.4	1.5	110	110	44	44	22	0	25
1	1	LSL	1	49	49	0	1.0	1.5	368	368	368	368	221	5	5
4	2	LSR	3	26	104	1	0.9	1.7	179	715	167	667	87	61	25
9	3	LSBK	7	30	268	2	0.8	2.9	206	1857	176	1588	109	4	57
11	6	LSBO	8	26	287	2	0.9	4.0	249	2743	244	2688	170	22	64
6	1	PLP	5	14	86	1	0.9	3.5	311	1865	316	1895	172	78	49
1	0	CUL	1	26	26	0	0.0	0.0	0	0	0	0	0	0	0
TOTAL UNITS	TOTAL UNITS			LENGTH (ft.)					AREA (sq.ft.)		TOTAL VOL. (cu.ft.)				
132	46			14730					95107		59952				

Crocker Creek

Drainage: Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI

LEGAL DESCRIPTION: T10N R10W S17 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL PERCENT LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
30	10	MAIN	48	124	3716	82	8.0	888	26629	807	24204	588	43
32	14	SCOUR	52	26	816	18	9.9	239	7657	226	7230	138	31
TOTAL UNITS	TOTAL UNITS			TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOLUME (cu.ft.)			
62	24			4532				34286		31434			

Crocket Creek

Drainage: Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI LEGAL DESCRIPTION: T10N R10W S17 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

UNITS MAX DPTH MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT MAXIMUM DEPTH OCCURRENCE	<1 FOOT PERCENT OCCURRENCE	1-<2 FT. MAXIMUM DEPTH OCCURRENCE	1-<2 FOOT PERCENT OCCURRENCE	2-<3 FT. MAXIMUM DEPTH OCCURRENCE	2-<3 FOOT PERCENT OCCURRENCE	3-<4 FT. MAXIMUM DEPTH OCCURRENCE	3-<4 FOOT PERCENT OCCURRENCE	>=4 FEET MAXIMUM DEPTH OCCURRENCE	>=4 FEET PERCENT OCCURRENCE
9	MCP	15	0	0	6	67	2	22	1	11	0	0
1	CCP	2	0	0	1	100	0	0	0	0	0	0
20	STP	32	1	5	12	60	6	30	1	5	0	0
1	CBP	2	0	0	1	100	0	0	0	0	0	0
1	LSL	2	0	0	1	100	0	0	0	0	0	0
4	LSR	6	0	0	4	100	0	0	0	0	0	0
9	LSBK	15	0	0	7	78	2	22	0	0	0	0
10	LSBO	16	0	0	7	70	2	20	0	0	1	10
6	PLP	10	0	0	5	83	0	0	1	17	0	0

TOTAL

UNITS

61

Crocket Creek

Drainage: Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI LEGAL DESCRIPTION: T10N10W1S17 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

UNITS MEASURED	UNITS SHELTER MEASURED	HABITAT TYPE	% TOTAL UNDERCUT BANKS	% TOTAL SND	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL VEGETATION	% TOTAL TERR.	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
46	12	LGR	0	11	0	0	51	0	0	22	16	0
8	5	HGR	0	45	0	4	8	0	0	26	18	0
1	1	CAS	0	0	0	0	0	0	0	45	55	0
6	2	GLD	0	100	0	0	0	0	0	0	0	0
3	2	RUN	0	0	7	36	28	0	0	29	0	0
5	3	SRN	0	37	25	9	9	0	0	9	12	0
9	9	MCP	49	16	0	25	0	0	0	5	4	0
1	1	CCP	0	0	0	0	0	0	0	0	0	0
20	20	STP	1	8	10	7	3	0	0	33	38	0
1	1	CRP	0	0	0	0	0	0	0	0	0	0
1	1	LSL	0	0	100	0	0	0	0	0	0	0
4	4	LSR	0	29	19	52	0	0	0	0	0	0
9	9	LSEK	0	0	0	0	0	0	0	64	23	13
11	10	LSBO	0	6	16	22	11	0	0	12	27	5
6	6	PLP	0	4	1	0	0	0	0	48	46	2
1	0	CUL	0	0	0	0	0	0	0	0	0	0
ALL	132	86	1	10	8	7	4	0	0	33	36	1
HABITAT TYPES												
POOLS	62	61	2	8	9	8	3	0	0	32	37	1
ONLY												

Crocketer Creek

Drainage: Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 06/30/98 to 07/09/98

Confluence Location: QUAD: ASTI LEGAL DESCRIPTION: T10N R10W S17 LATITUDE: 38°46'5" LONGITUDE: 122°58'21"

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL		% TOTAL		% TOTAL		% TOTAL		% TOTAL		% TOTAL	
			SILT/CLAY DOMINANT	SAND DOMINANT	GRAVEL DOMINANT	SM COBBLE DOMINANT	LG COBBLE DOMINANT	BOULDER DOMINANT	BEDROCK DOMINANT					
46	11	LGR	9	0	91	0	0	0	0	0	0	0	0	
8	5	HGR	0	20	40	40	0	0	0	0	0	0	0	
1	1	CAS	0	0	100	0	0	0	0	0	0	0	0	
6	2	GLD	100	0	0	0	0	0	0	0	0	0	0	
3	2	RUN	50	0	50	0	0	0	0	0	0	0	0	
5	3	SRN	0	67	33	0	0	0	0	0	0	0	0	
9	5	MCP	60	20	20	0	0	0	0	0	0	0	0	
1	1	CCP	100	0	0	0	0	0	0	0	0	0	0	
20	5	STP	20	0	80	0	0	0	0	0	0	0	0	
1	1	CRP	0	100	0	0	0	0	0	0	0	0	0	
1	1	LSL	100	0	0	0	0	0	0	0	0	0	0	
4	3	LSR	33	67	0	0	0	0	0	0	0	0	0	
9	4	LSBK	50	50	0	0	0	0	0	0	0	0	0	
11	6	LSBO	50	33	0	17	0	0	0	0	0	0	0	
6	2	PLP	0	0	100	0	0	0	0	0	0	0	0	
1	0	CUL	0	0	0	0	0	0	0	0	0	0	0	

Crocker Creek Tables Graphs M

Crocker Creek

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
52.77	41.09	58.91	58.94	56.04

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	2	8	9.26
Boulder	4	2	5.56
Cobble/Gravel	8	11	17.59
Silt/clay	40	33	67.59

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	13	10	21.30
Brush	2	3	4.63
Deciduous Trees	31	30	56.48
Evergreen Trees	8	11	17.59
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Crocker Creek
 SAMPLE DATES: 06/30/98 to 07/09/98
 SURVEY LENGTH:

MAIN CHANNEL: 14491 ft.
 LOCATION OF STREAM MOUTH:

USGS Quad Map: ASTI
 Legal Description: T10NR10WS17

SIDE CHANNEL: 239 ft.

Latitude: 38°46'5"
 Longitude: 122°58'21"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-28)

Channel Type: F4
 Main Channel Length: 2890 ft.
 Side Channel Length: 0 ft.
 Riffle/Flatwater Mean Width: 7.4 ft.
 Pool Mean Depth: 1.1 ft.
 Base Flow: 0.5 cfs
 Water: 63-71°F Air: 68-76°F
 Dom. Bank Veg.: Deciduous Trees
 Bank Vegetative Cover: 46%
 Dom. Bank Substrate: Silt/Clay/Sand
 Embeddness Value: 1. 0% 2. 22% 3. 56% 4. 22% 5. 0%

Mean Canopy Density: 37%
 Evergreen Component: 44%
 Deciduous Component: 56%
 Pools by Stream Length: 11%
 Pools >=2 ft. Deep: 0%
 Pools >=3 ft. Deep: 0%
 Mean Pool Shelter Rtn: 13
 Dom. Shelter: Small Woody Debris
 Occurrence of LOD: 75%
 Dry Channel: 0 ft.

STREAM REACH 2 (Units 29-57)

Channel Type: F6
 Main Channel Length: 1864 ft.
 Side Channel Length: 76 ft.
 Riffle/Flatwater Mean Width: 8.8 ft.
 Pool Mean Depth: 1.0 ft.
 Base Flow: 0.5 cfs
 Water: 64-71°F Air: 67-81°F
 Dom. Bank Veg.: Deciduous Trees
 Bank Vegetative Cover: 50%
 Dom. Bank Substrate: Silt/Clay/Sand
 Embeddness Value: 1. 0% 2. 36% 3. 55% 4. 0% 5. 9%

Mean Canopy Density: 22%
 Evergreen Component: 54%
 Deciduous Component: 46%
 Pools by Stream Length: 31%
 Pools >=2 ft. Deep: 23%
 Pools >=3 ft. Deep: 8%
 Mean Pool Shelter Rtn: 47
 Dom. Shelter: Whitewater
 Occurrence of LOD: 0%
 Dry Channel: 0 ft.

STREAM REACH 3 (Units 58-69)

Channel Type: B5
 Main Channel Length: 1136 ft.
 Side Channel Length: 0 ft.
 Riffle/Flatwater Mean Width: 13.3 ft.
 Pool Mean Depth: 1.0 ft.
 Base Flow: 0.5 cfs
 Water: 64-64°F Air: 78-80°F
 Dom. Bank Veg.: Deciduous Trees
 Bank Vegetative Cover: 84%
 Dom. Bank Substrate: Silt/Clay/Sand
 Embeddness Value: 1. 0% 2. 67% 3. 33% 4. 0% 5. 0%

Mean Canopy Density: 79%
 Evergreen Component: 41%
 Deciduous Component: 59%
 Pools by Stream Length: 18%
 Pools >=2 ft. Deep: 50%
 Pools >=3 ft. Deep: 17%
 Mean Pool Shelter Rtn: 44
 Dom. Shelter: Whitewater
 Occurrence of LOD: 35%
 Dry Channel: 0 ft.

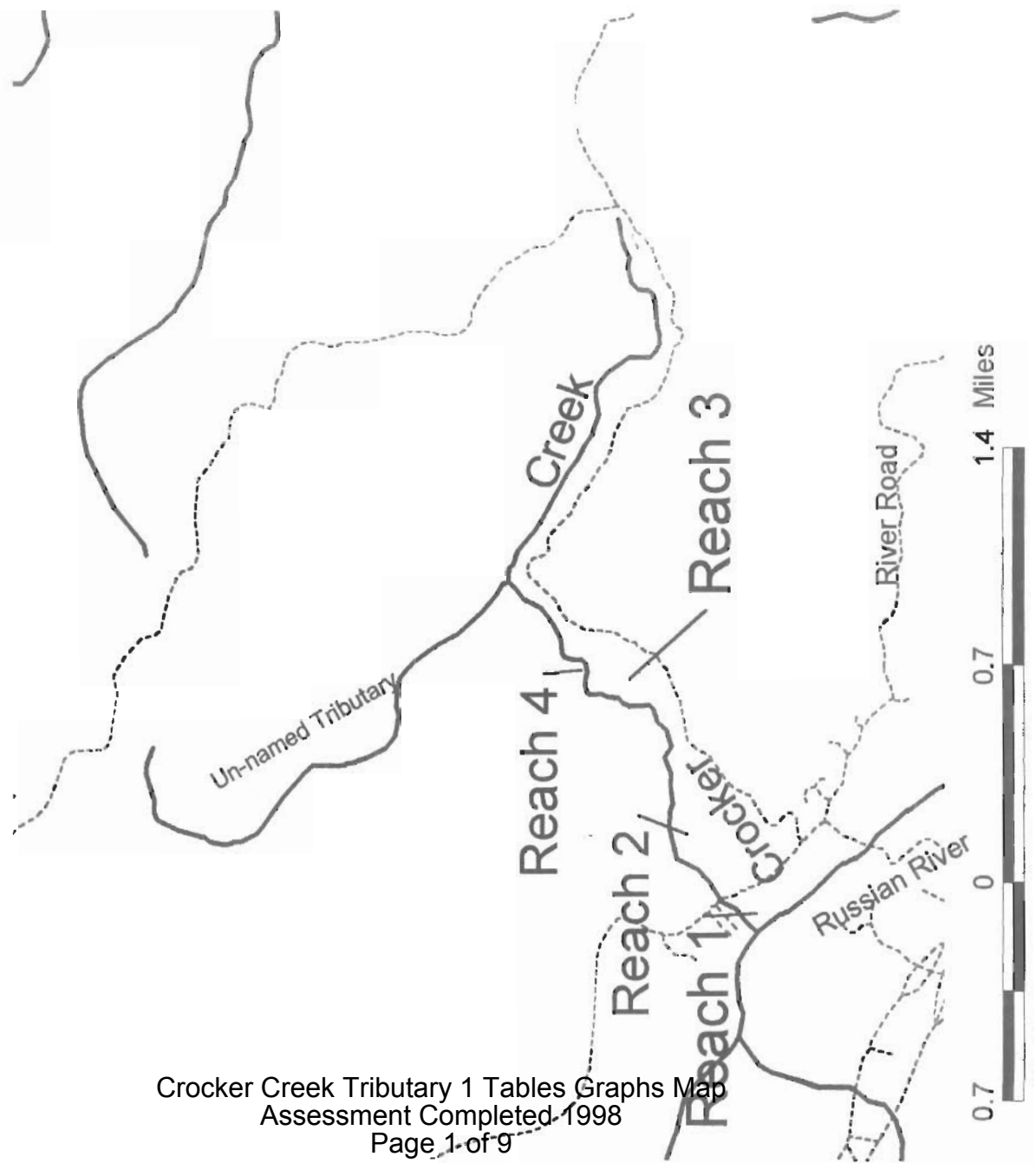
STREAM REACH 4 (Units 70-71)

Channel Type: A2	Mean Canopy Density: 80%
Main Channel Length: 1399 ft.	Evergreen Component: 25%
Side Channel Length: 98 ft.	Deciduous Component: 75%
Riffle/Flatwater Mean Width: 13.0 ft.	Pools by Stream Length: 87%
Pool Mean Depth: 0.8 ft.	Pools >=2 ft. Deep: 100%
Base Flow: 0.5 cfs	Pools >=3 ft. Deep: 0%
Water: 62-62°F Air: 68-68°F	Mean Pool Shelter Rtn: 90
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 64%	Occurrence of LOD: 5%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 0% 3. 50% 4. 0% 5. 50%	

STREAM REACH 5 (Units 74-132)

Channel Type: B2	Mean Canopy Density: 70%
Main Channel Length: 7202 ft.	Evergreen Component: 35%
Side Channel Length: 65 ft.	Deciduous Component: 65%
Riffle/Flatwater Mean Width: 6.8 ft.	Pools by Stream Length: 29%
Pool Mean Depth: 0.7 ft.	Pools >=2 ft. Deep: 27%
Base Flow: 0.5 cfs	Pools >=3 ft. Deep: 7%
Water: 61-68°F Air: 60-78°F	Mean Pool Shelter Rtn: 33
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 58%	Occurrence of LOD: 26%
Dom. Bank Substrate: Silt/Clay/Sand	Dry Channel: 0 ft.
Embeddness Value: 1. 3% 2. 38% 3. 31% 4. 17% 5. 10%	

Crocker Creek Habitat Inventory



Crocker Creek - 1st Trib

Drainage: Crocker Creek, Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES

Survey Dates: 07/08/98

Confluence Location: QUAD: Astf LEGAL DESCRIPTION: T11NR10WS22 LATITUDE: 38°46'51" LONGITUDE: 122°57'8"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	MEAN ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
5	1	RIFFLE	50	103	513	40	0.3	738	3692	177	885	0	40
5	2	POOL	50	154	770	60	0.6	902	4508	536	2678	337	93
TOTAL UNITS	TOTAL UNITS			TOTAL LENGTH (ft.)				TOTAL LENGTH (ft.)	TOTAL AREA (sq. ft.)		TOTAL VOL. (cu. ft.)		
10	3			1283				1283	8200		3562		

Drainage: Crocker Creek, Russian River

Survey Dates: 07/08/98

LONGITUDE: 122°57'8"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE	MEAN LENGTH	%	ft.	TOTAL LENGTH	%	ft.	MEAN DEPTH	ft.	MEAN MAXIMUM DEPTH	MEAN AREA	TOTAL AREA	MEAN VOLUME	TOTAL VOLUME	MEAN RESIDUAL	MEAN SHELTER RATING	MEAN CANOPY
4	1	LGR	40	105	40	33	420	4	0.3	0.6	584	2336	175	701	0	10	13		
1	0	HGR	10	93	7	12	93	0.2	0.9	893	893	179	179	0	70	0			
5	2	STP	50	154	60	770	770	6	0.6	2.4	902	4508	536	2678	337	93	68		
TOTAL UNITS	TOTAL UNITS						1283						AREA (sq.ft)	TOTAL VOL. (cu.ft)					
10	3												7736	3557					

Crocker Creek - 1st Trib

Drainage: Crocker Creek, Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/08/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS22 LATITUDE: 38°46'51" LONGITUDE: 122°57'8"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	MEAN LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
5	2	MAIN	100	154	770	100	0.6	902	4508	536	2678	337	93
TOTAL UNITS	5				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)		
					770				4508		2678		

Crocker Creek - 1st Trip

Drainage: Crocker Creek, Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES SURVEY DATES: 07/08/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS22 LATITUDE: 38°46'51" LONGITUDE: 122°57'8"

UNITS MAX DEPTH MEASURED	HABITAT TYPE	<1 FOOT		1-<2 FT.		2-<3 FT.		3-<4 FT.		4-6 FT.		>=6 FEET	
		PERCENT OCCURRENCE	DEPTH OCCURRENCE	PERCENT OCCURRENCE	DEPTH OCCURRENCE	PERCENT OCCURRENCE	DEPTH OCCURRENCE	PERCENT OCCURRENCE	DEPTH OCCURRENCE	PERCENT OCCURRENCE	DEPTH OCCURRENCE	PERCENT OCCURRENCE	DEPTH OCCURRENCE
5	STP	100	0	0	4	80	1	20	0	0	0	0	0

TOTAL
UNITS
5

Crocker Creek - 1st Trib

Drainage: Crocker Creek, Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/08/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS22 LATITUDE: 38°46'51" LONGITUDE: 122°57'18"

UNITS MEASURED	UNITS	HABITAT TYPE	% TOTAL UNDERCUT	% TOTAL SMD	% TOTAL LWD	% TOTAL ROOT MASS	% TOTAL TERR. VEGETATION	% TOTAL AQUATIC VEGETATION	% TOTAL WHITE WATER	% TOTAL BOULDERS	% TOTAL BEDROCK LEDGES
4	1	LGR	0	95	0	0	5	0	0	0	0
1	1	HGR	0	50	50	0	0	0	0	0	0
5	5	STP	0	26	17	4	1	18	13	21	0
10	7		0	33	24	3	1	13	10	15	0
5	5		0	26	17	4	1	18	13	21	0

Crocker Creek - 1st Trib

Drainage: Crocker Creek, Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/08/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS22 LATITUDE: 38°46'51" LONGITUDE: 122°57'8"

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILY/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
4	1	LGR	0	0	100	0	0	0	0
1	1	HGR	0	0	100	0	0	0	0
5	2	STP	0	0	50	0	0	50	0

Crocker Creek - 1st Trib

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
54.50	32.50	67.50	56.25	37.50

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	2	1	37.50
Boulder	0	0	0
Cobble/Gravel	0	0	0
Silt/clay	2	3	62.50

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	0	1	12.50
Brush	1	0	12.50
Deciduous Trees	2	1	37.50
Evergreen Trees	1	2	37.50
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Crocker Creek - 1st Trib

SAMPLE DATES:

SURVEY LENGTH:

MAIN CHANNEL: 1283 ft.

SIDE CHANNEL: 0 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Asti

Latitude: 38°46'51"

Legal Description: T11NR10WS22

Longitude: 122°57'8"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-10)

Channel Type: F3

Mean Canopy Density: 55%

Main Channel Length: 1283 ft.

Evergreen Component: 33%

Side Channel Length: 0 ft.

Deciduous Component: 68%

Riffle/Flatwater Mean Width: 8.0 ft.

Pools by Stream Length: 60%

Pool Mean Depth: 0.6 ft.

Pools >=2 ft. Deep: 20%

Base Flow: 0.0 cfs

Pools >=3 ft. Deep: 0%

Water: 64-64°F Air: 69-69°F

Mean Pool Shelter Rtn: 93

Dom. Bank Veg.: Deciduous Trees

Dom. Shelter: Small Woody Debris

Bank Vegetative Cover: 47%

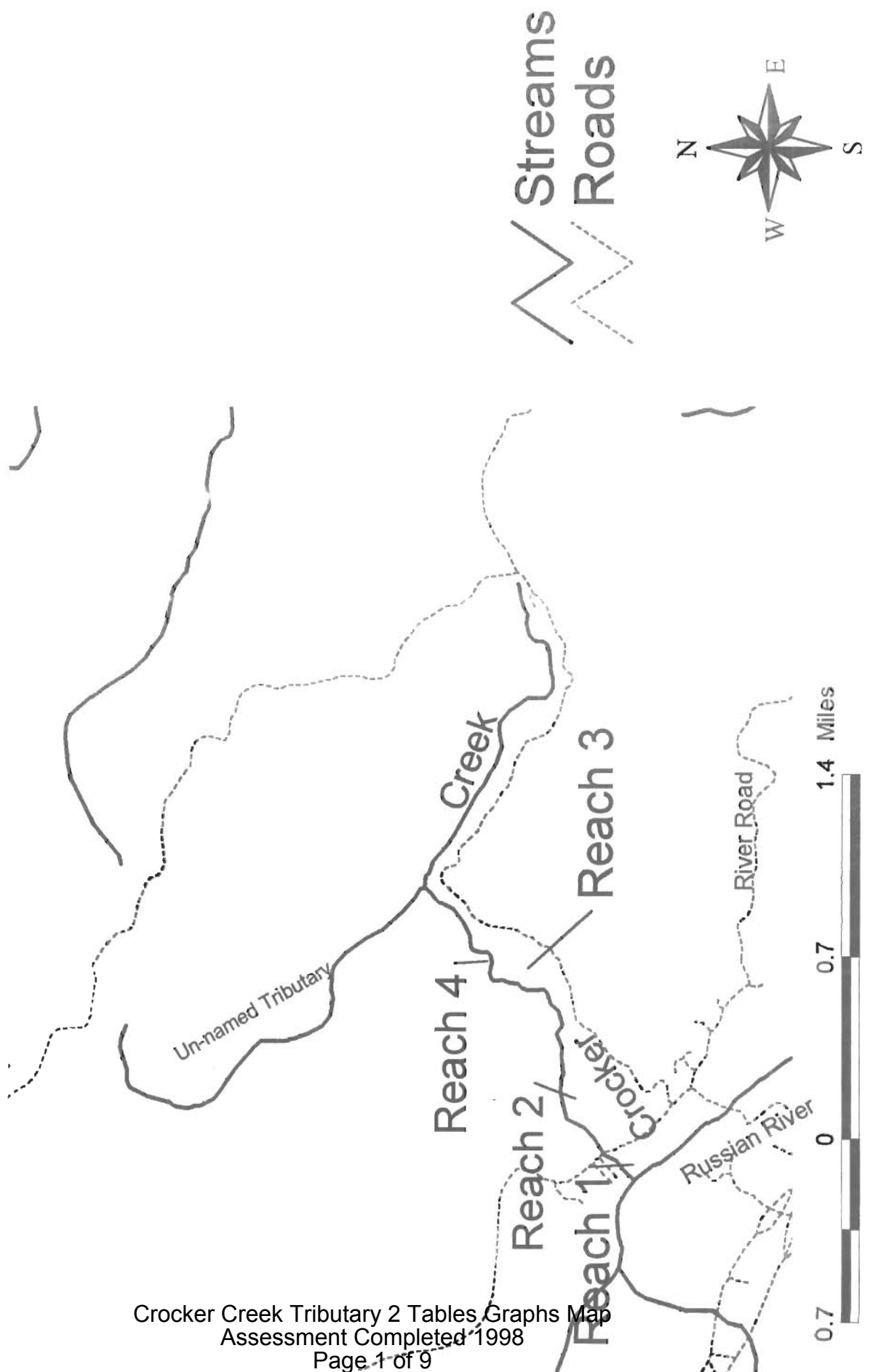
Occurrence of LOD: 31%

Dom. Bank Substrate: Silt/Clay/Sand

Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2. 0% 3. 100% 4. 0% 5. 0%

Crocker Creek Habitat Inventory



Crocker Creek - 2nd Trib

Drainage: Crocker Creek, Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 07/10/98

Confluence Location: quad: Asti LEGAL DESCRIPTION: T11NR10WS23 LATITUDE: 38°46'51" LONGITUDE: 122°57'16"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	MEAN ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
9	3	RIFFLE	45	103	5.3	0.2	451	4059	110	992	0
11	4	POOL	55	49	6.5	0.7	295	3240	218	2402	163
TOTAL	TOTAL			TOTAL LENGTH (ft.)			TOTAL AREA (sq. ft.)		TOTAL VOL. (cu. ft.)		
UNITS	UNITS			1461			7298		3394		
20	7										

Drainage: Crocker Creek, Russian River

Survey Dates: 07/10/98

LONGITUDE: 122°57'6"

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq. ft.)	TOTAL VOL. (cu. ft.)
20	7	1461	7127	3316

Crocker Creek - 2nd Trib

Drainage: Crocker Creek, Russian River

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 07/10/98

Confluence Location: QUAD: Ast1 LEGAL DESCRIPTION: T11NR10WS23 LATITUDE: 38°46'51" LONGITUDE: 122°57'16"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA EST. (sq.ft.)	MEAN VOLUME (cu.ft.)	TOTAL VOLUME EST. (cu.ft.)	MEAN RESIDUAL POOL VOL. (cu.ft.)	MEAN SHELTER RATING
8	2	MAIN	73	59	471	88	5.6	0.7	346	2768	245	180	44
3	2	SCOUR	27	21	63	12	8.7	0.8	175	524	157	122	120
TOTAL UNITS	11				TOTAL LENGTH (ft.) 534				TOTAL AREA (sq.ft.) 3291		TOTAL VOL. (cu.ft.) 2429		

Crocker Creek - 2nd Trib

Drainage: Crocker Creek, Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 07/10/98

Confluence Location: quad: Astf LEGAL DESCRIPTION: T11NR10WS23 LATITUDE: 38°46'51" LONGITUDE: 122°57'16"

UNITS	HABITAT	HABITAT	<1 FOOT	<1 FOOT	1-<2 FT.	1-<2 FOOT	2-<3 FT.	2-<3 FOOT	3-<4 FT.	3-<4 FOOT	>=4 FEET	>=4 FEET
MAX DPTH	TYPE	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT	MAXIMUM	PERCENT
MEASURED		OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE	DEPTH	OCCURRENCE
7	STP	64	0	0	0	3	43	4	57	0	0	0
1	CRP	9	0	0	0	1	100	0	0	0	0	0
2	LSBo	18	0	0	0	1	50	0	0	1	50	0

TOTAL

UNITS

10

Crocker Creek - 2nd Trib

Drainage: Crocker Creek, Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/10/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS23 LATITUDE: 38°46'51" LONGITUDE: 122°57'6"

UNITS MEASURED	SHelter TYPE	HABITAT TYPE	% UNDERCUT	% TOTAL BANKS	% SUD	% LWD	% ROOT MASS	% TERR. VEGETATION	% AQUATIC	% WHITE	% BOULDERS	% BEDROCK LEDGES
7	2	LGR	0	60	0	0	0	40	0	0	0	0
2	1	HGR	0	0	0	0	0	0	0	0	100	0
8	7	STP	0	1	0	0	0	2	54	11	33	0
1	1	CRP	35	0	0	0	0	0	65	0	0	0
2	2	LSBo	0	4	79	4	0	0	0	1	12	0
20	13		5	5	12	1	4	41	6	26	0	0
11	10		6	1	14	1	1	46	7	23	0	0

Crocker Creek - 2nd Trib

Drainage: Crocker Creek, Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 07/10/98

Confluence Location: QUAD: Asti LEGAL DESCRIPTION: T11NR10WS23 LATITUDE: 38°46'51" LONGITUDE: 122°57'6"

TOTAL HABITAT UNITS	UNITS SUBSTRATE MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
7	2	LGR	0	0	50	0	50	0	0
2	1	HGR	0	100	0	0	0	0	0
8	2	STP	50	0	50	0	0	0	0
1	1	CRP	100	0	0	0	0	0	0
2	1	LSBo	0	0	100	0	0	0	0

Crocker Creek - 2nd Trib

APPENDIX A. Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Evergreen	Mean Percent Deciduous	Mean Right bank % Cover	Mean Left Bank % Cover
60.00	22.92	77.08	91.43	73.57

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	0	0	0
Boulder	1	0	7.14
Cobble/Gravel	0	1	7.14
Silt/clay	6	6	85.71

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	4	6	71.43
Brush	1	0	7.14
Deciduous Trees	0	1	7.14
Evergreen Trees	2	0	14.29
No Vegetation	0	0	0

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: Crocker Creek - 2nd Trib

SAMPLE DATES:

SURVEY LENGTH:

MAIN CHANNEL: 1461 ft.

SIDE CHANNEL: 0 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Asti

Latitude: 38°46'51"

Legal Description: T11NR10WS23

Longitude: 122°57'6"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-20)

Channel Type: F5

Mean Canopy Density: 60%

Main Channel Length: 1461 ft.

Evergreen Component: 23%

Side Channel Length: 0 ft.

Deciduous Component: 77%

Riffle/Flatwater Mean Width: 5.3 ft.

Pools by Stream Length: 37%

Pool Mean Depth: 0.7 ft.

Pools >=2 ft. Deep: 45%

Base Flow: 0.0 cfs

Pools >=3 ft. Deep: 9%

Water: 68-70°F Air: 74-75°F

Mean Pool Shelter Rtn: 67

Dom. Bank Veg.: Grass

Dom. Shelter: Boulders

Bank Vegetative Cover: 83%

Occurrence of LOD: 90%

Dom. Bank Substrate: Silt/Clay/Sand

Dry Channel: 0 ft.

Embeddness Value: 1. 0% 2. 73% 3. 18% 4. 9% 5. 0%