CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
Squaw Creek
*Report Revised April 14, 2006*
*Report Completed 2005*
*Assessment Completed 2001*

## INTRODUCTION

A stream inventory was conducted during 6/20/2001 to 8/1/2001 on Squaw Creek. The survey began at the confluence with Big Sulphur Creek and extended upstream 6.5 miles.

The Squaw 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 Squaw Creek. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Squaw Creek.

The objective of this report is to document the current habitat conditions and recommend options for the potential enhancement of habitat for Chinook salmon, coho salmon, and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

## WATERSHED OVERVIEW

Squaw Creek is a tributary to Big Sulphur Creek, a tributary to Russian River, a tributary to Pacific Ocean, located in Sonoma/Mendocino County, California (Appendix A). The legal description of Squaw Creek at the confluence with Big Sulphur Creek is T11N R9W S4. Its location is 38.824357947113 N. latitude and 122.877014412042 W. longitude, and LLID number is 1228770388243. Squaw Creek is a third order stream and has approximately 7.46 miles of blue line stream according to the USGS Asti 7.5 minute quadrangle. Squaw Creek drains a watershed of approximately 14.19 square miles. Elevations range from about 876 feet at the mouth of the creek to 3658 feet in the headwater areas. Mixed hardwood forest dominates the watershed. The watershed is primarily privately owned and is managed for timber production. Vehicle access exists via Geysers Road to the south.

**Table A. Sensitive Species in Squaw Creek Watershed**

| Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, February 6, 2005 version) | |
|---|---|
| **Common Name** | **Scientific Name** |
| Foothill yellow-legged frog | *Rana boylii* |
| Colusa layia | *Layia septentrionalis* |
| Konocti manzanita | *Arctostaphylos manzanita ssp. elegans* |
| Steelhead –central California coast esu | *Oncorhynchus mykiss irideus* |

## METHODS

The habitat inventory conducted in Squaw 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 except step-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 Squaw Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated. Flows are 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 (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. Additionally, a recording thermograph was deployed in lower Squaw Creek from 7/10/01to 10/28/01 and on upper Squaw Creek from 7/13/01 to 10/19/01 to record temperatures on a 24 hour basis during warm summer months.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1990). 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". Squaw 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 Squaw 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) 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 or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide juvenile 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 for prey. 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 Squaw Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two, respectively. 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 Squaw Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or hardwood 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 Squaw Creek, 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.

## 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 Squaw Creek. In addition, three sites were electrofished using a Smith-Root Model 12 electrofisher. 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 by 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 Residual 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 Squaw 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 Residual 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 of 6/20/2001 to 8/1/2001, was conducted by Jake Newell, Jewels Willing, Grace Archer, Douglas Mitchel and Mitsuko Terry. The total length of the stream surveyed was 34,485 feet with an additional 1,539 feet of side channel.

Stream flow was not measured on Squaw Creek.

Squaw Creek is a B2 channel type for 7,894 feet of the stream surveyed (Reach 1), a A2 channel type for 404 feet of the stream surveyed (Reach 2), a B2 channel type for 7,243 feet of the stream surveyed (Reach 3), a A1 channel type for 2,917 feet of the stream surveyed (Reach 4), a F3 channel type for 5,154 feet of the stream surveyed (Reach 5), a B2 channel type for 6,225 feet of the stream surveyed (Reach 6), a G1 channel type for 1,634 feet of the stream surveyed (Reach 7), a A3 channel type for 2,555 feet of the stream surveyed (Reach 8), a AA+ channel type for 459 feet of the stream surveyed (Reach 9).

F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

G4 channels are entrenched "gully" step-pool channels on moderate gradients with low width /depth ratios and gravel dominant substrates.

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.

C4 channels are meandering point-bar riffle/pool alluvial channels with broad well defined floodplain on low gradients and gravel dominant substrates.

A2 channels are steep, narrow, cascading, step-pool, high energy debris transporting channels associated with depositional soils, and gravel dominant substrates.

Water temperatures taken during the survey period ranged from 60º to 80º Fahrenheit. Air temperatures ranged from 59º to 93º Fahrenheit. Water temperatures taken with a recording thermograph deployed from 7/10/01 to 10/28/01, every 1.5 hours, ranged from 52.1º to 79.9º Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of *occurrence* there were 38% flatwater units, 31% riffle units, 30% pool units, 1% dry units (Graph 1). Based on total *length* of Level II habitat types there were 62% flatwater units, 25% riffle units, 11% pool units, 1% dry units, (Graph 2).

Eighteen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent *occurrence* were 22% Step Run units, 13% Low Gradient Riffle units, and 12% Run units, (Graph 3).

Based on percent total *length*, 38% Step Run units, 22% Run units, and 13% Low Gradient Riffle units were the dominant habitat types.

A total of 140 pools were identified (Table 3). Scour pools were the most frequently encountered, at 51%, and comprised 47% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum residual pool depths by pool habitat types. Pool quality for salmonids increases with depth. Nineteen of the 134 pools (14%) had a residual depth of three feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 124 pool tail-outs measured, ten had a value of 1 (8.1%); 63 had a value of 2 (50.8%); 27 had a value of 3 (21.8%); one had a value of 4 (0.8%); 23 had a value of 5 (18.5%); (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.

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 11, flatwater habitat types had a mean shelter rating of 8, and pool habitats had a mean shelter rating of 12 (Table 1). Of the pool types, the Scour pools had a mean shelter rating of 12, Backwater pools had a mean shelter rating of 13, Main Channel pools had a mean shelter rating of 13, (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover types in Squaw Creek. Graph 7 describes the pool cover in Squaw Creek. Boulders (51.6%) are the dominant pool cover type followed by bedrock ledges (28.9).

Table 6 summarizes the dominant substrate by habitat type. Graph 8 depicts the dominant substrate observed in pool tail-outs: gravel observed in 42% of pool tail-outs, and small cobble observed in 24% of pool tail-outs.

The mean percent canopy density for the surveyed length of Squaw Creek was 58%. The mean percentages of hardwood and coniferous trees were 34% and 66%, respectively. Forty-two percent of the canopy was open. Graph 9 describes the mean percent canopy in Squaw Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 20%. The mean percent left bank vegetated was 18%. The dominant elements composing the structure of the stream banks consisted of 32% bedrock, 49% boulder, 16% cobble/gravel, 3% sand/silt/clay, (Graph 10). Deciduous trees were the dominant vegetation type observed in 34% of the units surveyed. Additionally, 33.7% of the units surveyed had hardwood trees as the dominant vegetation type, and 27.6% had coniferous trees as the dominant vegetation (Graph 11).

## BIOLOGICAL INVENTORY RESULTS

On 10/15/01 a biological inventory was conducted at three sites on Squaw Creek to document fish species composition and distribution. Site 1 was between Lat. 38°49’25.7”, Long. 122°48’04.1” and Lat. 38°49’22.3”, Long. 122°48’00.2”. Fish from the site were counted by species, and returned to the stream. The air temperature was 74ºF and the water temperature was 58ºF.

The inventory began at 1500 hours in Reach 7 and ended at 1550 hours. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The following table displays the information yielded from this site.

| **Species Observed** | **Numbers Recorded at Site 1** |
|---|---|
| Steelhead YOY | 8 |
| Steelhead Y+ | 9 |
| Steelhead 2+ | 1 |
| Newt | 2 |
| Salamander | 5 |

On 10/23/01 a biological inventory was conducted at site 2 on Squaw Creek to document fish species composition and distribution. The site was between Lat. 38°49'51.7", Long. 122°49'20.9" and Lat. 38°49'47.5", Long. 122°48'12.9". Fish from the site were counted by species, and returned to the stream. The air temperature ranged from 62-64ºF and the water temperature ranged from 55-56ºF.

The inventory began at 1150 hours in Reach 6 and ended at 1322 hours. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The following table displays the information yielded from this site.

| **Species Observed** | **Numbers Recorded at Site 2** |
|---|---|
| Steelhead YOY | 26 |
| Steelhead Y+ | 16 |
| Steelhead 2+ | 2 |
| Newt | 4 |
| Salamander | 3 |

Also noted were a dead yellow-legged frog, a dead salamander and an unidentified snake.

On 10/15/01 a biological inventory was conducted at site 3 on Squaw Creek to document fish species composition and distribution. The site was between Lat. 38°49'27.3", Long. 122°52'36.4" and Lat. 38°49'31.6", Long. 122°52'33.4". Fish from the site were counted by species, and returned to the stream. The air temperature was 84ºF and the water temperature ranged from 62-63ºF.

The inventory began at 1300 hours in Reach 1 and ended at 1400 hours 512' upstream. Habitat types surveyed were lateral scour pool - bedrock formed, mid-channel pools, runs and glides. The following table displays the information yielded from this site.

| **Species Observed** | **Numbers Recorded at Site 3** |
|---|---|
| Steelhead YOY | 12 |
| Steelhead Y+ | 2 |
| Steelhead 2+ | 4 |
| Roach | 23 |
| Sculpin | 18 |
| Sucker | 8 |
| Yellow-legged Frog | 12 |
| Crayfish | 3 |

Also noted were 2 American Dippers and a dead salamander.

Historical records reflect that hatchery raised Steelhead fingerlings were stocked in Squaw Creek in 1982 and 1983. Steelhead fingerlings were transferred to Squaw Creek from Dry Creek in 1959 (Table 1).

**Table 1. Summary of fish stocking/transfers into Squaw Creek**

| YEAR | SOURCE | SPECIES | # | SIZE |
|---|---|---|---|---|
| 1959 | Dry Creek | SH | 22,985 | FING |
| 1982 | Warm Springs | SH | 4,025 | FING |
| 1982 | Warm Springs | SH | 10,560 | FING |

| Table 1. Summary of fish stocking/transfers into Squaw Creek | | | | |
|---|---|---|---|---|
| 1983 | Warm Springs | SH | 18,960 | FING |
| 1983 | Warm Springs | SH | 12,000 | FING |

Warm Springs = Warm Springs Hatchery (Geyserville)
SH = steelhead
FING = fingerling

## DISCUSSION

Squaw Creek is a B2 channel type for 7,894 feet of the stream surveyed (Reach 1), a A2 channel type for 404 feet of the stream surveyed (Reach 2), a B2 channel type for 7,243 feet of the stream surveyed (Reach 3), a A1 channel type for 2,917 feet of the stream surveyed (Reach 4), a F3 channel type for 5,154 feet of the stream surveyed (Reach 5), a B2 channel type for 6,225 feet of the stream surveyed (Reach 6), a G1 channel type for 1,634 feet of the stream surveyed (Reach 7), a A3 channel type for 2,555 feet of the stream surveyed (Reach 8), a AA+ channel type for 459 feet of the stream surveyed (Reach 9).

The suitability of channel types for fish habitat improvement structures is as follows:
B2 channel types are excellent for plunge weirs, single and opposing wing-deflectors and log cover. A2 channel types are generally not suitable for habitat restoration improvement structures. A1 channel types are also not generally suitable for habitat improvement structures. F3 channel types are good for bank-placed boulders and opposing wing-deflectors and fair for plunge weirs, boulder clusters, channel constrictors and log cover. G1 channel types are fair for log cover. A3 channel types are good for bank-placed boulders and fair for plunge weirs, opposing wing-deflectors and log cover.

The water temperatures recorded on the survey days 6/20/2001 to 8/1/2001, ranged from 60º to 80º degrees Fahrenheit. Air temperatures ranged from 59º to 93º degrees Fahrenheit. Additionally, a recording thermograph was deployed in lower Squaw Creek from 7/10/01to 10/28/01 and on upper Squaw Creek from 7/13/01 to 10/19/01 to record temperatures on a 24 hour basis during warm summer months. Water temperatures taken ranged from 52.1º to 79.9º Fahrenheit on the lower section and from 52.5º to 68.4º Fahrenheit on the upper section of Squaw Creek. 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 62% of the total length of this survey, riffles 25%, and pools 11%. The pools are relatively deep, with 72 of the 134 (54%) pools having a maximum residual depth greater than two feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. 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.

Seventy-three of the 124 pool tail-outs measured had embeddedness ratings of 1 or 2. Twenty-eight of the pool tail-outs had embeddedness ratings of 3 or 4. Twenty-three of the pool tail-outs had a rating of 5, which is considered unsuitable 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 Squaw Creek should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Eighty-eight of the 134 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 12. 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 Squaw Creek. Boulders are the dominant cover type in pools followed by bedrock ledges. 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 58%. Reach 1 had a canopy density of 38.0%, Reach 2 had a canopy density of 42.5%, Reach 3 had a canopy density of 44.6%, Reach 4 had a canopy density of 70.8%, Reach 5 had a canopy density of 66.8%, Reach 6 had a canopy density of 82.4%, Reach 7 had a canopy density of 73.6%, Reach 8 had a canopy density of 81.8%, Reach 9 had a canopy density of 80%, . In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was low at 20% and 18%, respectively. In areas of stream bank erosion or where bank vegetation is sparse, planting endemic species of coniferous and hardwood trees, in conjunction with bank stabilization, is recommended.

## GENERAL MANAGEMENT RECOMMENDATIONS

Squaw Creek should be managed as 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.

## RECOMMENDATIONS

1) Due to the high gradient of the stream at Reaches 2, 4, 8 and 9, access for migrating salmonids is an ongoing potential problem. Good water temperature and flow regimes exist in the stream and it offers good conditions for rearing fish. Fish passage should be monitored and improved where possible.

2) Increase the canopy on Squaw Creek by planting appropriate native vegetation like willow, alder, redwood, 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.

3) 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.

4) 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.

5) 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.

6) 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.

7) There are several log debris accumulations present on Squaw Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

8) The limited water temperature data available suggest that maximum temperatures are within/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.

## COMMENTS AND LANDMARKS

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

Squaw Creek

| Position (ft.) | Habitat Unit # | Comments: |
|---|---|---|
| 0 | 0001.00 | Backwater pool formed by gravel bar |
| 282 | 0006.00 | Dead YOY |
| 382 | 0008.00 | Several roach and a few YOY |
| 502 | 0010.00 | No GPS available; it was taken in HU #11 |

| | | |
|---|---|---|
| 585 | 0012.00 | 1+ Salmonid |
| 621 | 0013.00 | Dry Trib RB |
| 722 | 0014.00 | Some YOY |
| 739 | 0015.00 | 1+ SH |
| 929 | 0019.00 | Bank Erosion on LB(upslope)-5' depth x 40' length x 40' width, likely caused by trees cleared for road |
| 1208 | 0027.00 | Salmonids throughout reach-YOY and 2+ |
| 1261 | 0028.00 | Old cabin LB; Dam-1' h x 2'L x 40' w, no flashboards, no downcutting at sill; 0.6' from sill to water level; retaining 1' of gravel |
| 1961 | 0029.00 | No GPS reading possible |
| 2611 | 0034.00 | Begin fewer Salmonids |
| 2854 | 0038.00 | A few YOY observed |
| 3326 | 0043.01 | Alder/sedge on cobble/boulder bar |
| 3326 | 0043.02 | YOY SH |
| 3533 | 0048.00 | One dozen YOY |
| 3737 | 0051.00 | Sulfur smell |
| 3896 | 0056.00 | 1+, 2+, YOY |
| 3936 | 0058.00 | Erosion LB |
| 3958 | 0059.00 | 3' jump |
| 4063 | 0063.00 | Spawner's tail in pool |
| 4106 | 0064.00 | RB steep bedrock cliff; 2'-5' jumps; GPS not available until next unit |

| | | |
|---|---|---|
| 4158 | 0065.00 | Two dozen YOY; LB Erosion(active); 15' depth x 100' length x 200' width; not upslope; High flow influenced and debris influenced; RB bedrock cliff has caused LB scour; No apparent human cause |
| 4299 | 0067.00 | Less entrenched |
| 4399 | 0069.00 | LB Erosion(Active); 15' depth x 100' length x 150' width; not upslope; high flow influenced and debris influenced; influenced by natural factors |
| 4448 | 0070.00 | RB wide floodplain |
| 4485 | 0071.00 | 1+ SH |
| 4551 | 0073.00 | YOY and 1+ present |
| 4913 | 0077.00 | Two dozen 1+ dead |
| 5177 | 0082.00 | Spawner carcass head |
| 5474 | 0087.00 | No passage problem |
| 5488 | 0088.00 | Tadpole and YOY |
| 5660 | 0090.00 | Alder Creek confluence RB - 71° water temp |
| 5712 | 0091.00 | Salmonid carcass |
| 6627 | 0104.00 | Hab. Units # 102, 103, 104 show A2 characteristics |
| 6855 | 0106.00 | Salmonids present |
| 7616 | 0116.00 | Four 1+ SH |
| 7894 | 0121.00 | RB Spring (poss. Unnamed trib) -Channel Type Change to A2 |
| 7942 | 0123.00 | Fresh Mountain Lion kill in creek |
| 7991 | 0124.00 | One dozen @ 2+; 4' jump |
| 8036 | 0125.00 | Start of RB Erosion, which continues until HU#129 |

| | | |
|---|---|---|
| 8148 | 0128.00 | 5' jump |
| 8154 | 0129.00 | Spring RB |
| 8298 | 0131.00 | Channel Type Change to B2 |
| 8816 | 0134.00 | Wet road crossing on Squaw Creek to Hummingbird |
| 9216 | 0135.00 | 61°F at mouth of Hummingbird; 62°F at Confluence |
| 9414 | 0137.00 | LB unnamed Trib 59°F(62°F at confluence) |
| 9840 | 0142.00 | RB Spring |
| 10048 | 0145.00 | RB Erosion(Active)-35' depth x 120' length x 200' width; no upslope; high flow influenced; not debris influenced; This is a natural rock slide |
| 10284 | 0147.00 | Adult trout 1.2' long |
| 10473 | 0152.00 | 2'-4' jumps |
| 10557 | 0155.00 | 8' jump; major rock slides |
| 11071 | 0165.02 | Debris accumulation non-accessible |
| 11144 | 0168.04 | Side channel; No GPS; No Flag |
| 11144 | 0169.00 | 5' jump; passage okay |
| 11160 | 0170.00 | RB Dry Trib |
| 11188 | 0171.00 | 1 dozen YOY; FLAG/GPS |
| 11757 | 0179.00 | More woody debris |
| 12058 | 0183.00 | RB old road; Hundreds of Salmonids (YOY) |
| 12765 | 0190.00 | RB Erosion |
| 12964 | 0193.00 | YOY; 18" x 40' Oak stump |

| | | |
|---|---|---|
| 13140 | 0195.00 | 2' x 10' pine LWD; No scour |
| 13153 | 0196.00 | Side channel - Sedge on gravel bar - not surveyed |
| 13344 | 0198.00 | N38°50'20.8"/W122°50'41.2" |
| 13510 | 0200.00 | RB Erosion(Active) from HU#199-203; (10' depth x 65' length x 250' width); not upsloped, not debris influenced, but it is influenced by High Flow; It is a natural dirt/rock erosion |
| 13647 | 0202.00 | Very large amount of mature sedge in this reach |
| 13727 | 0203.00 | Two small scour pools |
| 13777 | 0204.00 | N38°50'21.2"/W122°50'34.8"; No salmonid habitat; RB unnamed trib(WET) 64°F at conluence |
| 14321 | 0208.00 | Fig tree |
| 14454 | 0209.00 | ALL/O/6; YOY |
| 14479 | 0210.00 | RB: Wildhorse Creek 64°F/ 69°F at confluence |
| 14601 | 0211.00 | Cottonwood |
| 14680 | 0214.00 | N38°50'18.9"/W122°50'32" |
| 15007 | 0218.00 | 3' jump |
| 15033 | 0219.00 | LB small gully |
| 15102 | 0220.00 | Ferns |
| 15306 | 0222.00 | Erosion RB |
| 15484 | 0224.00 | N38°50'15.3"/W122°50'26.2" |
| 15541 | 0226.00 | Channel change to A1 |
| 16247 | 0232.00 | Begin Bedrock substrate |

| | | |
|---|---|---|
| 16297 | 0233.00 | N38°50'09.1"/W122°50'21.7" |
| 17031 | 0241.00 | YOY and 1+ seen infrequently throughout reach |
| 17056 | 0242.00 | No GPS coverage |
| 17439 | 0245.00 | Major rockslide RB(see photo); RB Erosion(Active) - 25' depth x 200' length x 90' width - Upslope; High flow influenced, but not debris influenced; Geyser likely cause upper RB 1-3' boulders spilling into creek very loosely compressed; DEBRIS ACCUMULATION in unit, also: 9' depth x 70' length x 10' width, not retaining gravel; I fish were observed upstream; No scour pool under accumulation and no erosion or downcutting as a result of the accumulation; 1' - 3' boulder accumulation caused by rock slide(see above) |
| 17541 | 0247.00 | 3' - 4' jump |
| 17923 | 0252.00 | LB Spring; No GPS Coverage |
| 17946 | 0253.00 | 4 ft jump |
| 18094 | 0256.00 | 2 ft jumps |
| 18159 | 0257.00 | LB caves - See photo |
| 18187 | 0258.00 | 2' - 3' jumps |
| 18354 | 0261.00 | Pool halfway into unit; 20% gradient |
| 18409 | 0262.00 | N38°50'01.9"/W122°50'02.2" |
| 18438 | 0263.00 | No passage problem; End of bedrock channel |
| 18458 | 0264.00 | CHANNEL CHANGE TO F3 |
| 18988 | 0265.00 | YOY and 1 salmonids |
| 19013 | 0266.00 | More deciduous Oaks |
| 19438 | 0268.00 | Several 1+; Few YOY |
| 19606 | 0272.00 | N38°43'58.8"/W122°49'51.1"; |

| | | |
|---|---|---|
| 19642 | 0273.00 | BRIDGE 9.5' H x 22' W x 60' L; No downcutting or sill; Not retaining gravel; Bridge has natural bottom and culvert arch |
| 21238 | 0275.00 | 2 @ 1+ salmonid observed; HWL 2.0-D/3.0-L |
| 21443 | 0276.00 | Abundance of sedge |
| 21483 | 0277.00 | LB geyser (see photo); RB dry trib |
| 23118 | 0278.00 | Change F 2.5 30 |
| 23612 | 0282.00 | Channel Change to B2 |
| 23768 | 0287.00 | RB LWD |
| 23876 | 0288.00 | N38°49'46.3"/W122°49'04.9" |
| 23914 | 0289.00 | LB Spring - See Photo |
| 24025 | 0291.00 | LIKELY SPAWNING POOL; 9" resident trout; LWD PROTOCOL AL/2.0/30 |
| 24290 | 0295.00 | ALL/1.5/30 |
| 24312 | 0296.00 | RB Gully 5 x 5 x 100 |
| 24367 | 0297.00 | N38°49'45.8"/W122°49'03.7" |
| 24620 | 0302.00 | LWD PROTOCOL: OKL/2.0/30; 1+ salmonid observed |
| 24992 | 0308.00 | LWD Protocol: ALL/2.0/30 |
| 25010 | 0309.00 | Dead 1+ SH - Tissue sample taken + photo – Fork length = 143mm |
| 25650 | 0311.00 | Bear Canyon RB(60°F; 61°F at confluence); 1+ fish in Bear Canyon Creek |
| 25879 | 0315.00 | 5' jump; NO GPS |
| 26195 | 0315.01 | 1+ ; YOY; Roach |

| | | |
|---|---|---|
| 27010 | 0322.00 | 2' jumps (several) |
| 27152 | 0325.00 | N38°49'35.7"/W122°48'39.2" |
| 27199 | 0327.00 | LWD Protocol: CO/3.0/30; 3' jump; DEBRIS ACCUMULATION 6' depth x 20' length x 15' width; not retaining gravel; Fish observed upstream; No scour pool below accumulation; No erosion or downcutting; Partial obstruction: Passable at high flows |
| 27225 | 0328.00 | 1 YOY observed; small gully/Trib RB (dry) |
| 27693 | 0333.00 | 6 @ 1+ salmonids |
| 27714 | 0334.00 | Med dry trib RB |
| 27762 | 0335.00 | N38°49'32.8"/W122°48'32.5" |
| 28032 | 0339.00 | Small gully LB |
| 28207 | 0339.03 | Foothill yellow-legged frog |
| 28207 | 0340.00 | Fairly steep & erosive banks throughout reach |
| 28347 | 0342.00 | N38°49'30.6"/W122°48'26.9" |
| 28422 | 0343.00 | LWD Protocol: CO/2.5/30; DEBRIS ACCUMULATION 7' depth x 10' length x 15' width; not retaining gravel; Fish observed upstream; No scour pool under accumulation; No erosion/downcutting |
| 28497 | 0344.00 | RB dry trib |
| 28632 | 0345.00 | 6 @ 1+ SH |
| 28769 | 0346.00 | LB gully |
| 29074 | 0348.00 | Several 1+ fish |

| | | |
|---|---|---|
| 29087 | 0349.00 | LWD Protocol: CO/2.5/30; Debris accumulation: 6' depth x 10' length x 15' width; Accumulation is retaining 4' of gravel; Fish observed upstream; Scour Pool under accumulation; No erosion/downcutting; Passable at high flows |
| 29280 | 0351.00 | RB California Blackberries |
| 29293 | 0352.00 | NO GPS reading |
| 29568 | 0353.00 | 4" rusted pipe in creek; LB gully |
| 29658 | 0354.00 | Culvert LB: 80'+ length x 1.5' width x 6' height; no downcutting;Height from culvert lip to water level is 6'; Cannot tell if culvert is retaining gravel; No maintenance is required; Water spills onto boulders; No erosion |
| 29701 | 0355.00 | 5/8" steel wire embedded in substrate |
| 29837 | 0356.00 | Boulder/LWD scour; 2 YOY; Channel is becoming bedrock (PHOTO); CHANNEL CHANGE to G1 |
| 29978 | 0360.00 | More wire cable; YOY and 1+; Shallow pool |
| 30122 | 0361.00 | PHOTO: 4' - 5' jumps |
| 30146 | 0362.00 | PHOTO N38°49'27.4"/W122°48'09.0" |
| 30216 | 0363.00 | BRIDGE: 30' H x 60' W x 15' L; downcutting 2'; Height from water to sill is 2'; Not retaining gravel; Natural bottom; Fish passage OK |
| 30275 | 0364.00 | Hobo Temp |
| 30289 | 0365.00 | RB CULVERT: 30+' length x 2' width x 1' height; No downcutting; Height from culvert lip to water level is 4'; Geothermal RB |
| 30510 | 0368.00 | YOY and 1+ SH |
| 30567 | 0371.00 | King Snake; 6" white pipe along side of stream |

| | | |
|---|---|---|
| 30669 | 0372.00 | N38°49'24.4/W122°48'03.6" |
| 30770 | 0375.00 | Large Trib RB; DAM:1.5 H X 1" L x12' W; No flashboards; No downcutting; Not retaining gravel; Steel diversion dam diverting water into 6" pipe that runs downstream into bridge; Dam is at confluence with dry trib |
| 31042 | 0380.00 | N38°49'22.3"/W122°48'00.2" |
| 31058 | 0381.00 | 9' vertical jump/ 9' horiz. Jump PHOTO |
| 31259 | 0385.00 | Passage OK |
| 31310 | 0387.00 | 1+ salmonid |
| 31471 | 0391.00 | YOY SH; Channel Change to A3; Old unused road LB; N38°49'10.7"/W122°48'01.4" |
| 31569 | 0393.00 | RB 2 gullies |
| 31779 | 0394.00 | 2+ salmonid and YOY salmonid; small spring |
| 31792 | 0395.00 | NO FISH ABOVE THIS UNIT |
| 31809 | 0396.00 | LWD Protocol: DF/3.0/30; LB Gully; Debris Accumulation: 7' depth x 15' length x 25' width; Retaining 3' of gravel; No fish observed above |
| 32143 | 0399.00 | LWD Protocol: CO/1.5/30; Debris Accumulation: 5' depth x 8' length x 20' width; Retaining 2' of gravel; although fish were not observed upstream; Scour pool exists under the accumulation No downcutting. |
| 32156 | 0400.00 | LB wet spring; LB gully; RB trib |
| 32874 | 0406.00 | Wet Trib LB: 62°F (64°F at confluence) |
| 33364 | 0410.00 | 10' Vertical jump-N38°49'22.1"/W122°47'37.0" |
| 33417 | 0414.00 | 10' vertical drop |

| | | |
|---|---|---|
| 33427 | 0415.00 | Spring RB |
| 33435 | 0416.00 | Two 4' jumps |
| 33450 | 0417.00 | RB gully; Large amount of LWD across creek, but no scouring |
| 33704 | 0420.00 | Erosion RB; gravel build-up behind boulder accumulation; sub-surface flow |
| 33713 | 0421.00 | N38°49'12.5"/W122°47'34.3" |
| 33959 | 0427.00 | Boulder accumulation causing intermittent flow at end of unit |
| 34026 | 0429.00 | CHANNEL CHANGE TO AA+ |
| 34326 | 0430.00 | Intermittent flow |
| 34392 | 0431.00 | N38°49'8.2"/W122°47'28.0" |
| 34475 | 0435.00 | 8' jump: END OF SURVEY N38°49'7.9"/W122°47'27.5" |

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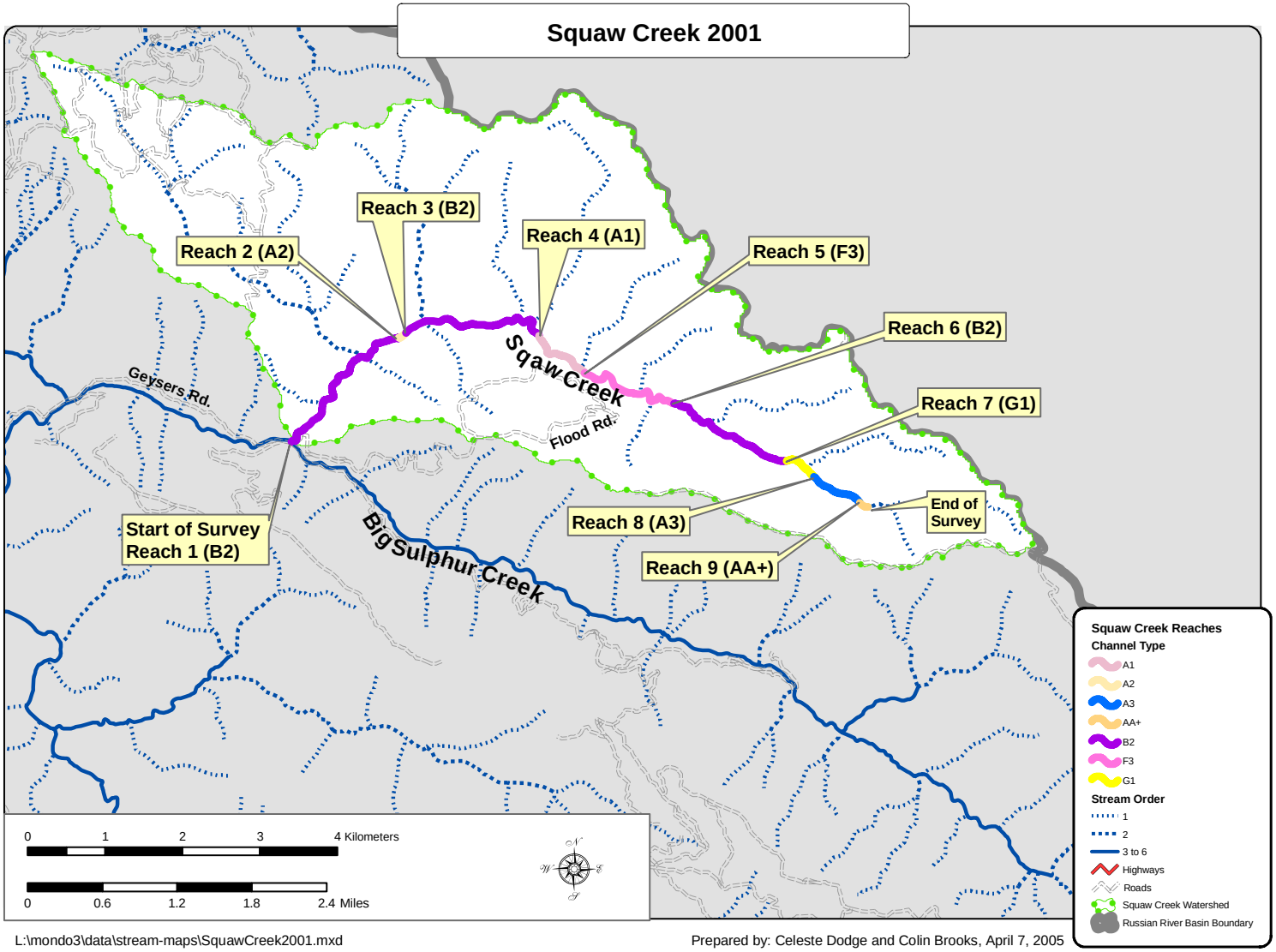
Rosgen, D.L., 1994. A Classification of Natural Rivers. Catena, Vol 22: 169-199, Elsevier Science, B. V. Amsterdam.

# APPENDIX A: MAP

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Prepared by: Celeste Dodge and Colin Brooks, April 7, 2005

# APPENDIX B:TABLES

## Table 1 - Summary of Riffle, Flatwater, and Pool Habitat Types

Stream Name: Squaw Creek

LLID: 1228770388243

Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | Habitat Occurrence (%) | Mean Length (ft.) | Total Length (ft.) | Total Length (%) | Mean Width (ft.) | Mean Depth (ft.) | Mean Max 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 0 | DRY | 1.5 | 70 | 491 | 1.4 | | | | | | | | | |
| 177 | 48 | FLATWATER | 37.7 | 127 | 22467 | 62.4 | 10.4 | 0.9 | 1.2 | 832 | 147255 | 1093 | 189430 | | 8 |
| 1 | 0 | NOSURVEY | 0.2 | 0 | 0 | 0.0 | | | | | | | | | |
| 140 | 138 | POOL | 29.8 | 29 | 4070 | 11.3 | 12.0 | 1.1 | 2.1 | 357 | 50034 | 522 | 68798 | 397 | 12 |
| 145 | 38 | RIFFLE | 30.9 | 62 | 8996 | 25.0 | 9.4 | 0.5 | 1.1 | 306 | 44360 | 222 | 32234 | | 11 |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 470 | 224 | 36024 | 241649 | 290463 |

## Table 2 - Summary of Habitat Types and Measured Parameters

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | Habitat Occurrence (%) | Mean Length (ft.) | Total Length (ft.) | Total Length (%) | Mean Width (ft.) | Mean Depth (ft.) | Max 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 | Mean Canopy (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 10 | LGR | 12.6 | 77 | 4530 | 12.6 | 8 | 0.4 | 1.3 | 346 | 20389 | 158 | 9313 | | 8 | 56 |
| 50 | 16 | HGR | 10.6 | 66 | 3316 | 9.2 | 10 | 0.6 | 1.5 | 347 | 17335 | 332 | 16588 | | 10 | 59 |
| 24 | 7 | CAS | 5.1 | 39 | 930 | 2.6 | 12 | 0.5 | 1.8 | 330 | 7922 | 209 | 5018 | | 14 | 55 |
| 12 | 5 | BRS | 2.6 | 18 | 220 | 0.6 | 7 | 0.3 | 4 | 62 | 749 | 19 | 234 | | 20 | 69 |
| 18 | 9 | GLD | 3.8 | 52 | 943 | 2.6 | 13 | 0.7 | 1.8 | 639 | 11508 | 467 | 8398 | | 9 | 45 |
| 57 | 14 | RUN | 12.1 | 138 | 7889 | 21.9 | 10 | 0.6 | 1.6 | 641 | 36550 | 373 | 21256 | | 5 | 52 |
| 102 | 25 | SRN | 21.7 | 134 | 13635 | 37.8 | 10 | 1.3 | 2.1 | 1008 | 102825 | 1748 | 171162 | | 9 | 60 |
| 43 | 42 | MCP | 9.1 | 23 | 975 | 2.7 | 12 | 1.3 | 4.4 | 281 | 12099 | 503 | 21099 | 413 | 11 | 63 |
| 2 | 2 | CCP | 0.4 | 16 | 33 | 0.1 | 10 | 0.8 | 1.9 | 157 | 314 | 192 | 385 | 122 | 5 | 68 |
| 15 | 14 | STP | 3.2 | 66 | 990 | 2.7 | 14 | 0.9 | 3.6 | 817 | 12259 | 966 | 14489 | 714 | 20 | 56 |
| 1 | 1 | CRP | 0.2 | 39 | 39 | 0.1 | 15 | 1.0 | 1.9 | 556 | 556 | 722 | 722 | 556 | 50 | 45 |
| 7 | 7 | LSR | 1.5 | 25 | 177 | 0.5 | 11 | 1.0 | 2.8 | 262 | 1835 | 343 | 2402 | 288 | 16 | 74 |
| 40 | 40 | LSBk | 8.5 | 30 | 1199 | 3.3 | 11 | 1.1 | 3.9 | 369 | 14774 | 546 | 20733 | 425 | 10 | 56 |
| 19 | 19 | LSBo | 4.0 | 23 | 438 | 1.2 | 13 | 0.7 | 2.6 | 322 | 6116 | 370 | 6658 | 182 | 10 | 65 |
| 5 | 5 | PLP | 1.1 | 16 | 80 | 0.2 | 12 | 1.8 | 3.8 | 208 | 1041 | 452 | 2260 | 401 | 19 | 63 |
| 4 | 4 | SCP | 0.9 | 19 | 76 | 0.2 | 8 | 0.9 | 2.1 | 173 | 690 | 203 | 406 | 153 | 10 | 63 |
| 4 | 4 | BPB | 0.9 | 16 | 63 | 0.2 | 10 | 1.2 | 3 | 183 | 733 | 59 | 117 | 48 | 17 | 58 |
| 7 | 0 | DRY | 1.5 | 70 | 491 | 1.4 | | | | | | | | | | 63 |
| 1 | 0 | NS | 0.2 | 0 | 0 | 0.0 | | | | | | | | | | |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 470 | 224 | 36024 | 247695 | 301240 |

## Table 3 - Summary of Pool Types

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | Habitat Occurrence (%) | Mean Length (ft.) | Total Length (ft.) | Total Length (%) | Mean Width (ft.) | Mean Residual Depth (ft.) | Mean Area (sq.ft.) | Estimated Total Area (sq.ft.) | Mean Residual Pool Vol (cu.ft.) | Estimated Total Resid.Vol. (cu.ft.) | Mean Shelter Rating |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | 58 | MAIN | 43 | 33 | 1998 | 49 | 12.5 | 1.2 | 406 | 24386 | 477 | 28127 | 13 |
| 72 | 72 | SCOUR | 51 | 27 | 1933 | 47 | 12.0 | 1.0 | 338 | 24322 | 348 | 24007 | 12 |
| 8 | 8 | BACKWATER | 6 | 17 | 139 | 3 | 9.4 | 1.0 | 178 | 1423 | 101 | 402 | 13 |

| Total Units | Total Units Fully Measured | Total Length (ft.) | Total Area (sq.ft.) | Total Volume (cu.ft.) |
|---|---|---|---|---|
| 140 | 138 | 4070 | 50132 | 52536 |

## Table 4 - Summary of Maximum Residual Pool Depths By Pool Habitat Types

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Habitat Type | Habitat Occurrence (%) | < 1 Foot Maximum Residual Depth | < 1 Foot Percent Occurrence | 1 < 2 Feet Maximum Residual Depth | 1 < 2 Feet Percent Occurrence | 2 < 3 Feet Maximum Residual Depth | 2 < 3 Feet Percent Occurrence | 3 < 4 Feet Maximum Residual Depth | 3 < 4 Feet Percent Occurrence | >= 4 Feet Maximum Residual Depth | >= 4 Feet Percent Occurrence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | MCP | 32 | 1 | 2 | 18 | 42 | 14 | 33 | 8 | 19 | 2 | 5 |
| 2 | CCP | 1 | 0 | 0 | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | STP | 10 | 0 | 0 | 5 | 36 | 8 | 57 | 1 | 7 | 0 | 0 |
| 1 | CRP | 1 | 0 | 0 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | LSR | 5 | 0 | 0 | 3 | 43 | 4 | 57 | 0 | 0 | 0 | 0 |
| 38 | LSBk | 28 | 1 | 3 | 16 | 42 | 16 | 42 | 5 | 13 | 0 | 0 |
| 19 | LSBo | 14 | 2 | 11 | 11 | 58 | 6 | 32 | 0 | 0 | 0 | 0 |
| 5 | PLP | 4 | 0 | 0 | 1 | 20 | 2 | 40 | 2 | 40 | 0 | 0 |
| 3 | SCP | 2 | 0 | 0 | 1 | 33 | 2 | 67 | 0 | 0 | 0 | 0 |
| 2 | BPB | 1 | 0 | 0 | 0 | 0 | 1 | 50 | 1 | 50 | 0 | 0 |

| Total Units | Total < 1 Foot Max Resid. Depth | Total < 1 Foot % Occurrence | Total 1< 2 Foot Max Resid. Depth | Total 1< 2 Foot % Occurrence | Total 2< 3 Foot Max Resid. Depth | Total 2< 3 Foot % Occurrence | Total 3< 4 Foot Max Resid. Depth | Total 3< 4 Foot % Occurrence | Total >= 4 Foot Max Resid. Depth | Total >= 4 Foot % Occurrence |
|---|---|---|---|---|---|---|---|---|---|---|
| 134 | 4 | 3 | 58 | 43 | 53 | 40 | 17 | 13 | 2 | 1 |

Mean Maximum Residual Pool Depth (ft.): 2.1

## Table 5 - Summary of Mean Percent Cover By Habitat Type

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001 Dry Units: 7

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | Mean % Undercut Banks | Mean % SWD | Mean % LWD | Mean % Root Mass | Mean % Terr. Vegetation | Mean % Aquatic Vegetation | Mean % White Water | Mean % Boulders | Mean % Bedrock Ledges |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 6 | LGR | 0 | 0 | 1 | 0 | 8 | 12 | 0 | 80 | 0 |
| 50 | 10 | HGR | 0 | 0 | 1 | 0 | 6 | 2 | 13 | 72 | 8 |
| 24 | 6 | CAS | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 58 | 27 |
| 12 | 1 | BRS | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 20 | 0 |
| 145 | 23 | TOTAL RIFFLE | 0 | 0 | 0 | 0 | 4 | 4 | 13 | 68 | 10 |
| 18 | 7 | GLD | 0 | 13 | 1 | 0 | 17 | 0 | 3 | 57 | 9 |
| 57 | 12 | RUN | 0 | 0 | 0 | 0 | 17 | 4 | 0 | 70 | 9 |
| 102 | 21 | SRN | 0 | 1 | 2 | 0 | 5 | 4 | 3 | 77 | 9 |
| 177 | 40 | TOTAL FLAT | 0 | 3 | 1 | 0 | 11 | 3 | 2 | 71 | 9 |
| 43 | 41 | MCP | 0 | 5 | 0 | 0 | 4 | 0 | 4 | 48 | 39 |
| 2 | 2 | CCP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 15 | 13 | STP | 1 | 0 | 2 | 2 | 1 | 1 | 18 | 51 | 22 |
| 1 | 1 | CRP | 0 | 85 | 10 | 0 | 0 | 0 | 0 | 0 | 5 |
| 7 | 7 | LSR | 0 | 1 | 0 | 35 | 24 | 0 | 0 | 37 | 4 |
| 40 | 34 | LSBk | 0 | 4 | 0 | 0 | 8 | 0 | 4 | 44 | 37 |
| 19 | 17 | LSBo | 0 | 4 | 0 | 1 | 4 | 0 | 1 | 80 | 9 |

## Table 5 - Summary of Mean Percent Cover By Habitat Type (cont)

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001 Dry Units: 7

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | Mean % Undercut Banks | Mean % SWD | Mean % LWD | Mean % Root Mass | Mean % Terr. Vegetation | Mean % Aquatic Vegetation | Mean % White Water | Mean % Boulders | Mean % Bedrock Ledges |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | PLP | 0 | 1 | 1 | 0 | 0 | 0 | 20 | 36 | 42 |
| 4 | 4 | SCP | 5 | 0 | 0 | 0 | 28 | 0 | 0 | 53 | 15 |
| 4 | 3 | BPB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77 | 23 |
| 140 | 127 | TOTAL POOL | 0 | 4 | 0 | 2 | 6 | 0 | 5 | 52 | 29 |
| 1 | 0 | NS | | | | | | | | | |
| 470 | 190 | TOTAL | 0 | 3 | 1 | 2 | 7 | 1 | 5 | 58 | 22 |

## Table 6 - Summary of Dominant Substrates By Habitat Type

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001 Dry Units: 7

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Habitat Units | Units Fully Measured | Habitat Type | % Total Silt/Clay Dominant | % Total Sand Dominant | % Total Gravel Dominant | % Total Small Cobble Dominant | % Total Large Cobble Dominant | % Total Boulder Dominant | % Total Bedrock Dominant |
|---|---|---|---|---|---|---|---|---|---|
| 59 | 10 | LGR | 0 | 0 | 0 | 30 | 20 | 40 | 10 |
| 50 | 16 | HGR | 0 | 0 | 0 | 13 | 6 | 69 | 13 |
| 24 | 7 | CAS | 0 | 0 | 0 | 0 | 0 | 86 | 14 |
| 12 | 5 | BRS | 0 | 0 | 0 | 0 | 0 | 0 | 100 |
| 18 | 9 | GLD | 0 | 0 | 56 | 0 | 22 | 22 | 0 |
| 57 | 14 | RUN | 0 | 0 | 7 | 21 | 29 | 36 | 7 |
| 102 | 26 | SRN | 0 | 0 | 4 | 12 | 12 | 62 | 12 |
| 43 | 11 | MCP | 0 | 55 | 18 | 0 | 0 | 18 | 9 |
| 2 | 2 | CCP | 0 | 50 | 50 | 0 | 0 | 0 | 0 |
| 15 | 7 | STP | 0 | 14 | 14 | 0 | 0 | 29 | 43 |
| 1 | 1 | CRP | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 7 | 4 | LSR | 0 | 25 | 50 | 0 | 0 | 25 | 0 |
| 40 | 14 | LSBk | 0 | 7 | 57 | 14 | 0 | 21 | 0 |
| 19 | 9 | LSBo | 0 | 0 | 33 | 0 | 0 | 44 | 22 |
| 5 | 4 | PLP | 0 | 0 | 0 | 25 | 0 | 75 | 0 |
| 4 | 2 | SCP | 0 | 50 | 0 | 0 | 50 | 0 | 0 |
| 4 | 3 | BPB | 0 | 0 | 0 | 0 | 0 | 100 | 0 |

## Table 7 - Summary of Mean Percent Canopy for Entire Stream

Stream Name: Squaw Creek

LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| Mean Percent Canopy | Mean Percent Conifer | Mean Percent Hardwood | Mean Percent Open Units | Mean Right Bank % Cover | Mean Left Bank % Cover |
|---|---|---|---|---|---|
| 58 | 66 | 34 | 0 | 20 | 18 |

Note: Mean percent conifer and hardwood for the entire reach are means of canopy components from units with canopy values greater than zero.

Open units represent habitat units with zero canopy cover.

## Table 9 - Mean Percentage of Dominant Substrate and Vegetation

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

### Mean Percentage of Dominant Stream Bank Substrate

| Dominant Class of Substrate | Number of Units Right Bank | Number of Units Left Bank | Total Mean Percent (%) |
|---|---|---|---|
| Bedrock | 40 | 53 | 31.6 |
| Boulder | 77 | 67 | 49.0 |
| Cobble / Gravel | 26 | 22 | 16.3 |
| Sand / Silt / Clay | 4 | 4 | 2.7 |

### Mean Percentage of Dominant Stream Bank Vegetation

| Dominant Class of Vegetation | Number of Units Right Bank | Number of Units Left Bank | Total Mean Percent (%) |
|---|---|---|---|
| Grass | 27 | 28 | 18.7 |
| Brush | 14 | 23 | 12.6 |
| Hardwood Trees | 46 | 53 | 33.7 |
| Coniferous Trees | 47 | 34 | 27.6 |
| No Vegetation | 12 | 8 | 6.8 |

### Total Stream Cobble Embeddedness Values: 3

## Table 10 - Mean Percent of Shelter Cover Types For Entire Stream

StreamName: Squaw Creek LLID: 1228770388243 Drainage: Russian River - Middle

Survey Dates: 6/20/2001 to 8/1/2001

Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

| | Riffles | Flatwater | Pools |
|---|---|---|---|
| UNDERCUT BANKS (%) | 0 | 0 | 0 |
| SMALL WOODY DEBRIS (%) | 0 | 3 | 4 |
| LARGE WOODY DEBRIS (%) | 0 | 1 | 0 |
| ROOT MASS (%) | 0 | 0 | 2 |
| TERRESTRIAL VEGETATION (%) | 4 | 11 | 6 |
| AQUATIC VEGETATION (%) | 4 | 3 | 0 |
| WHITEWATER (%) | 13 | 2 | 5 |
| BOULDERS (%) | 68 | 71 | 52 |
| BEDROCK LEDGES (%) | 10 | 9 | 29 |

# APPENDIX C - **Fish Habitat Inventory Data Summary**

Stream Name: Squaw Creek LLID: 1228770388243 Drainage: Russian River -
Survey Dates: 6/20/2001 to 8/1/2001 Survey Length (ft.): 36024 Main Channel (ft.): 34485 Side Channel (ft.): 1539
Confluence Location: Quad: ASTI Legal Description: T11NR09WS04 Latitude: 38:49:27.0N Longitude: 122:52:37.0W

## Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 1**

Channel Type: B2
Reach Length (ft.): 7894
Riffle/Flatwater Mean Width (ft.): 13.3
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs):
Water (F): 0 - 80 Air (F): 64 - 93
Dry Channel (ft.): 0

Canopy Density (%): 38.0
Coniferous Component (%): 74.9
Hardwood Component (%): 25.1
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 16.7
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 0.1
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 17.0
Pool Frequency (%): 27.5
Residual Pool Depth (%):
< 2 Feet Deep: 43.3
2 to 2.9 Feet Deep: 40.0
3 to 3.9 Feet Deep: 16.7
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 1.99
Mean Pool Shelter Rating: 14

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 43.3 Sm Cobble: 26.7 Lg Cobble: 6.7 Boulder: 20.0 Bedrock: 3.3
Embeddedness Values (%): 1. 20.0 2. 60.0 3. 13.3 4. 0.0 5. 6.7

**STREAM REACH: 2**

Channel Type: A2
Reach Length (ft.): 404
Riffle/Flatwater Mean Width (ft.): 12.5
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 63 - 63 Air (F): 64 - 64
Dry Channel (ft.): 0

Canopy Density (%): 42.5
Coniferous Component (%): 36.9
Hardwood Component (%): 63.1
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 12.5
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 29.5
Pool Frequency (%): 30.0
Residual Pool Depth (%):
< 2 Feet Deep: 66.7
2 to 2.9 Feet Deep: 33.3
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.03
Mean Pool Shelter Rating: 13

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 33.3 Sm Cobble: 66.7 Lg Cobble: 0.0 Boulder: 0.0 Bedrock: 0.0
Embeddedness Values (%): 1. 33.3 2. 33.3 3. 33.3 4. 0.0 5. 0.0

## Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 3**

Channel Type: B2
Reach Length (ft.): 7243
Riffle/Flatwater Mean Width (ft.): 11.2
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 61 - 69 Air (F): 59 - 81
Dry Channel (ft.): 0

Canopy Density (%): 44.6
Coniferous Component (%): 66.8
Hardwood Component (%): 33.2
Dominant Bank Vegetation: Hardwood Trees
Vegetative Cover (%): 18.8
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 0.9
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 10.8
Pool Frequency (%): 30.5
Residual Pool Depth (%):
< 2 Feet Deep: 44.8
2 to 2.9 Feet Deep: 34.5
3 to 3.9 Feet Deep: 17.2
>= 4 Feet Deep: 3.4
Mean Max Residual Pool Depth (ft.): 2.27
Mean Pool Shelter Rating: 16

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 41.4 Sm Cobble: 17.2 Lg Cobble: 10.3 Boulder: 31.0 Bedrock: 0.0
Embeddedness Values (%): 1. 6.9 2. 65.5 3. 17.2 4. 0.0 5. 10.3

**STREAM REACH: 4**

Channel Type: A1
Reach Length (ft.): 2917
Riffle/Flatwater Mean Width (ft.): 10.4
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 60 - 64 Air (F): 65 - 70
Dry Channel (ft.): 70

Canopy Density (%): 70.8
Coniferous Component (%): 76.3
Hardwood Component (%): 23.8
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 24.8
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 0.0
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 13.8
Pool Frequency (%): 34.2
Residual Pool Depth (%):
< 2 Feet Deep: 50.0
2 to 2.9 Feet Deep: 33.3
3 to 3.9 Feet Deep: 16.7
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.18
Mean Pool Shelter Rating: 13

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 41.7 Sm Cobble: 0.0 Lg Cobble: 0.0 Boulder: 33.3 Bedrock: 25.0
Embeddedness Values (%): 1. 0.0 2. 36.4 3. 0.0 4. 0.0 5. 63.6

## Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 5**

Channel Type: F3
Reach Length (ft.): 5154
Riffle/Flatwater Mean Width (ft.): 8.7
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 61 - 68 Air (F): 70 - 76
Dry Channel (ft.): 0

Canopy Density (%): 66.8
Coniferous Component (%): 45.5
Hardwood Component (%): 54.5
Dominant Bank Vegetation: Grass
Vegetative Cover (%): 25.8
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 1.1
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 4.2
Pool Frequency (%): 38.9
Residual Pool Depth (%):
< 2 Feet Deep: 28.6
2 to 2.9 Feet Deep: 71.4
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2
Mean Pool Shelter Rating: 10

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 71.4 Sm Cobble: 14.3 Lg Cobble: 0.0 Boulder: 14.3 Bedrock: 0.0
Embeddedness Values (%): 1. 0.0 2. 71.4 3. 14.3 4. 0.0 5. 14.3

**STREAM REACH: 6**

Channel Type: B2
Reach Length (ft.): 6225
Riffle/Flatwater Mean Width (ft.): 9.4
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 60 - 68 Air (F): 65 - 76
Dry Channel (ft.): 0

Canopy Density (%): 82.4
Coniferous Component (%): 67.8
Hardwood Component (%): 32.2
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 23.0
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 0.5
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 10.9
Pool Frequency (%): 31.1
Residual Pool Depth (%):
< 2 Feet Deep: 52.2
2 to 2.9 Feet Deep: 43.5
3 to 3.9 Feet Deep: 4.3
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.01
Mean Pool Shelter Rating: 8

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 34.8 Sm Cobble: 34.8 Lg Cobble: 8.7 Boulder: 17.4 Bedrock: 4.3
Embeddedness Values (%): 1. 0.0 2. 47.8 3. 30.4 4. 0.0 5. 21.7

## Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 7**

Channel Type: G1
Reach Length (ft.): 1634
Riffle/Flatwater Mean Width (ft.): 5.8
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 61 - 65 Air (F): 72 - 80
Dry Channel (ft.): 0

Canopy Density (%): 73.6
Coniferous Component (%): 65.9
Hardwood Component (%): 34.1
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 16.1
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Bedrock
Occurrence of LWD (%): 1.4
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 14.8
Pool Frequency (%): 37.1
Residual Pool Depth (%):
< 2 Feet Deep: 58.3
2 to 2.9 Feet Deep: 33.3
3 to 3.9 Feet Deep: 0.0
>= 4 Feet Deep: 8.3
Mean Max Residual Pool Depth (ft.): 2.01
Mean Pool Shelter Rating: 12

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 50.0 Sm Cobble: 25.0 Lg Cobble: 8.3 Boulder: 8.3 Bedrock: 8.3
Embeddedness Values (%): 1. 8.3 2. 25.0 3. 41.7 4. 8.3 5. 16.7

**STREAM REACH: 8**

Channel Type: A3
Reach Length (ft.): 2555
Riffle/Flatwater Mean Width (ft.): 6.1
BFW:
Range (ft.): to
Mean (ft.):
Std. Dev.:
Base Flow (cfs): 0
Water (F): 62 - 67 Air (F): 76 - 80
Dry Channel (ft.): 33

Canopy Density (%): 81.9
Coniferous Component (%): 62.1
Hardwood Component (%): 37.9
Dominant Bank Vegetation: Coniferous Trees
Vegetative Cover (%): 16.8
Dominant Shelter: Boulders
Dominant Bank Substrate Type: Boulder
Occurrence of LWD (%): 2.9
LWD per 100 ft.:
Riffles:
Pools:
Flat:

Pools by Stream Length (%): 4.4
Pool Frequency (%): 23.7
Residual Pool Depth (%):
< 2 Feet Deep: 33.3
2 to 2.9 Feet Deep: 44.4
3 to 3.9 Feet Deep: 22.2
>= 4 Feet Deep: 0.0
Mean Max Residual Pool Depth (ft.): 2.35
Mean Pool Shelter Rating: 11

Pool Tail Substrate (%): Silt/Clay: 0.0 Sand: 0.0 Gravel: 11.1 Sm Cobble: 55.6 Lg Cobble: 0.0 Boulder: 11.1 Bedrock: 22.2
Embeddedness Values (%): 1. 0.0 2. 22.2 3. 44.4 4. 0.0 5. 33.3

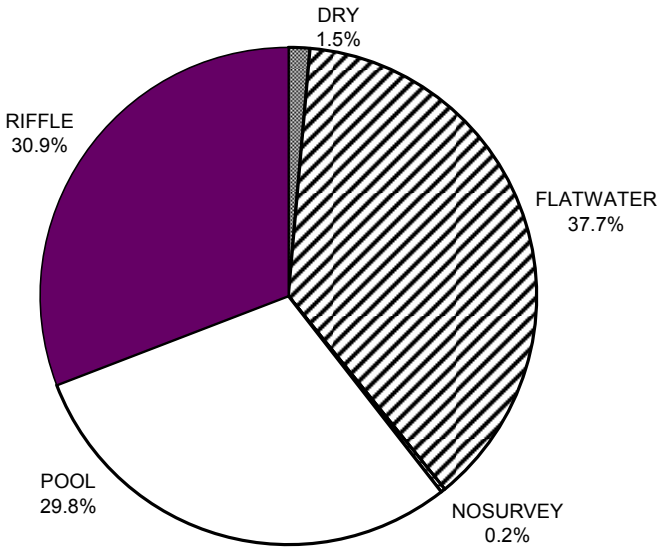
## Summary of Fish Habitat Elements By Stream Reach

**STREAM REACH: 9**

| | | |
|---|---|---|
| Channel Type: AA+ | Canopy Density (%): 80.0 | Pools by Stream Length (%): 0.0 |
| Reach Length (ft.): 459 | Coniferous Component (%): 42.0 | Pool Frequency (%): 0.0 |
| Riffle/Flatwater Mean Width (ft.): 3.0 | Hardwood Component (%): 58.0 | Residual Pool Depth (%): |
| BFW: | Dominant Bank Vegetation: Hardwood Trees | < 2 Feet Deep: |
| Range (ft.): to | Vegetative Cover (%): 6.5 | 2 to 2.9 Feet Deep: |
| Mean (ft.): | Dominant Shelter: | 3 to 3.9 Feet Deep: |
| Std. Dev.: | Dominant Bank Substrate Type: Boulder | >= 4 Feet Deep: |
| Base Flow (cfs): 0 | Occurrence of LWD (%): | Mean Max Residual Pool Depth (ft.): |
| Water (F): 63 - 67 Air (F): 78 - 78 | LWD per 100 ft.: | Mean Pool Shelter Rating: |
| Dry Channel (ft.): 355 | Riffles: | |
| | Pools: | |
| | Flat: | |

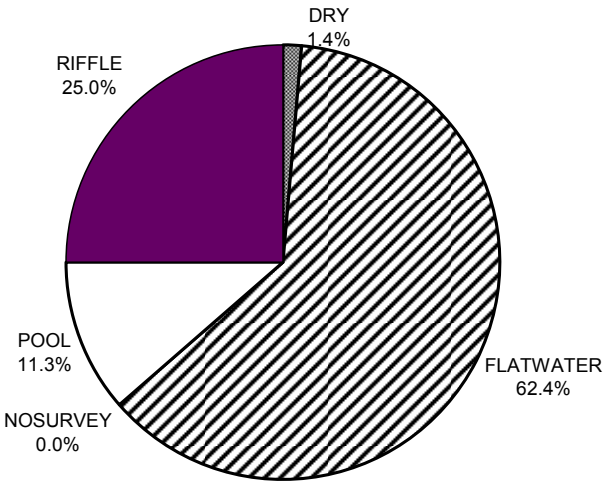
| Pool Tail Substrate (%): | Silt/Clay: | Sand: | Gravel: | Sm Cobble: | Lg Cobble: | Boulder: | Bedrock: |
|---|---|---|---|---|---|---|---|
| Embeddedness Values (%): | 1. | 2. | 3. | 4. | 5. 0.0 | | |

**SQUAW CREEK 2001**
**HABITAT TYPES BY PERCENT OCCURRENCE**



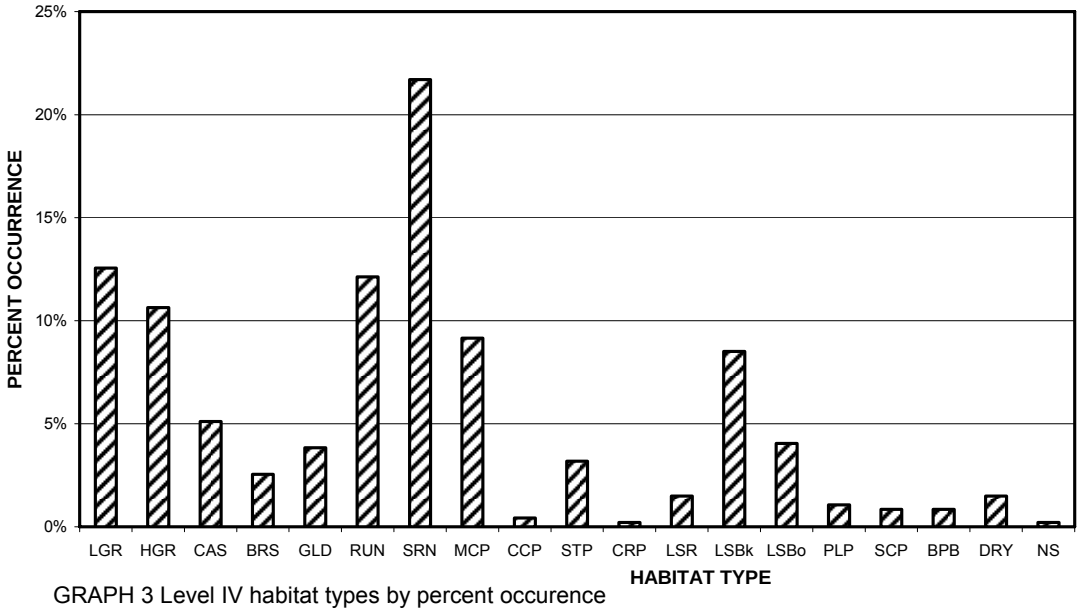

GRAPH 1 Level II habitat types by percent occurence

**SQUAW CREEK 2001**
**HABITAT TYPES BY PERCENT TOTAL LENGTH**



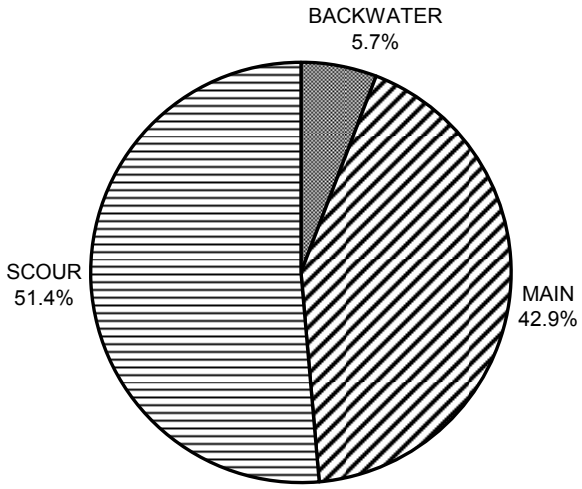

GRAPH 2 Level II habitat types by percent total length

## SQUAW CREEK 2001
## HABITAT TYPES BY PERCENT OCCURRENCE



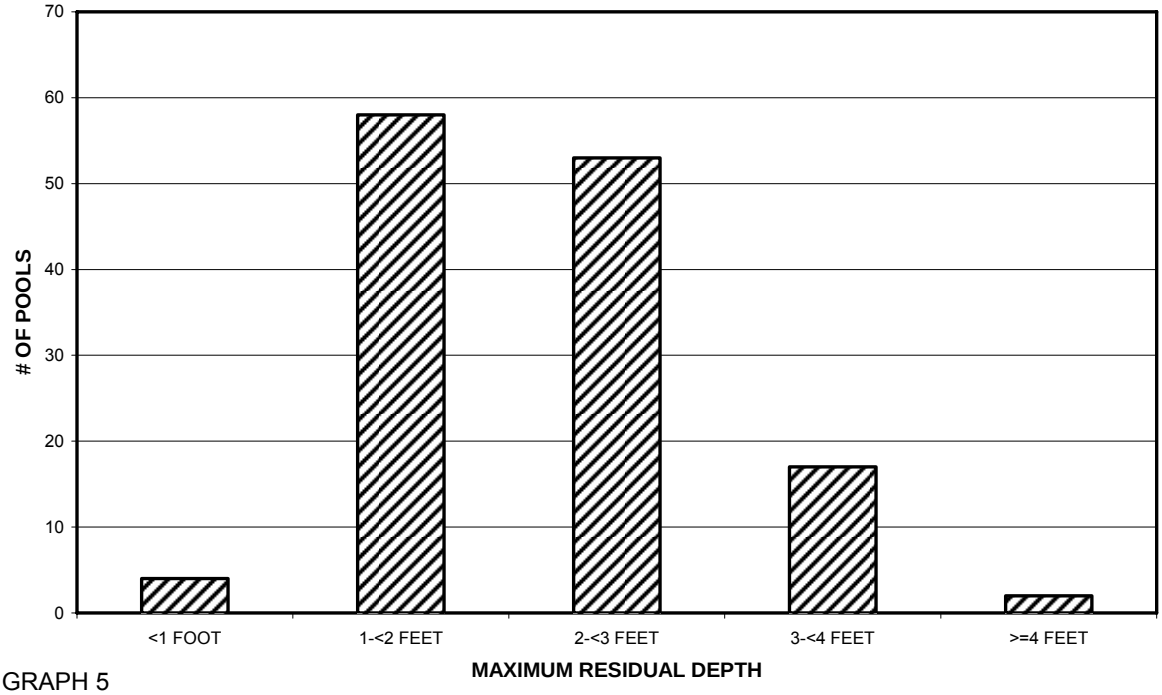

GRAPH 3 Level IV habitat types by percent occurence

## SQUAW CREEK 2001
## POOL TYPES BY PERCENT OCCURRENCE



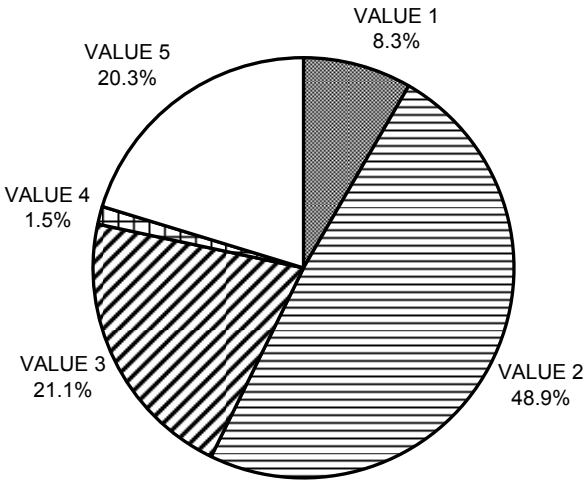

GRAPH 4 Level I pool types by percent occurence

## SQUAW CREEK 2001
## MAXIMUM DEPTH IN POOLS



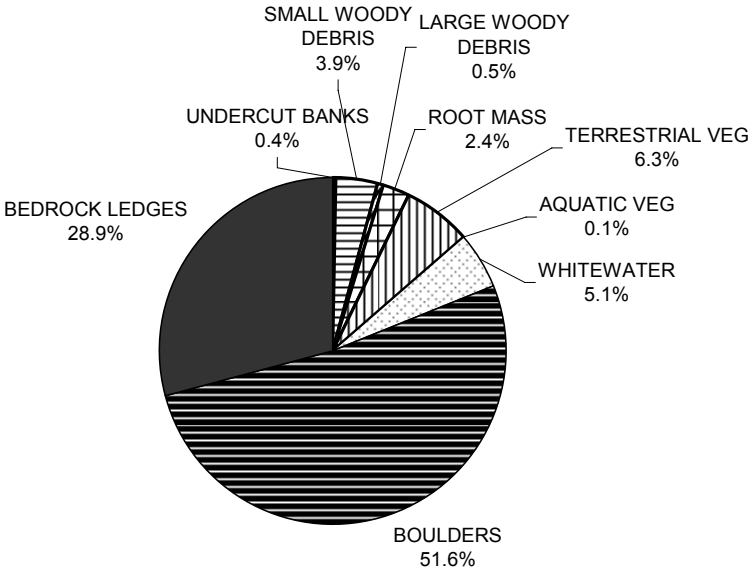

GRAPH 5

## SQUAW CREEK 2001
## PERCENT EMBEDDEDNESS



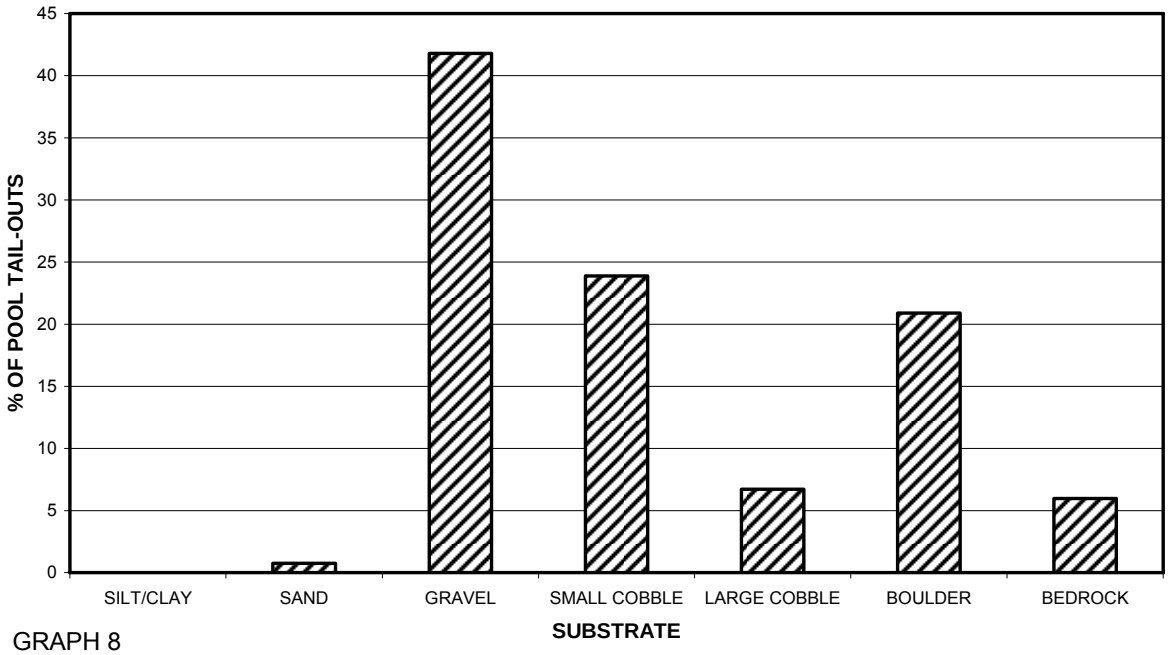

GRAPH 6

## SQUAW CREEK 2001
## MEAN PERCENT COVER TYPES IN POOLS




GRAPH 7

## SQUAW CREEK 2001
## SUBSTRATE COMPOSITION IN POOL TAIL-OUTS

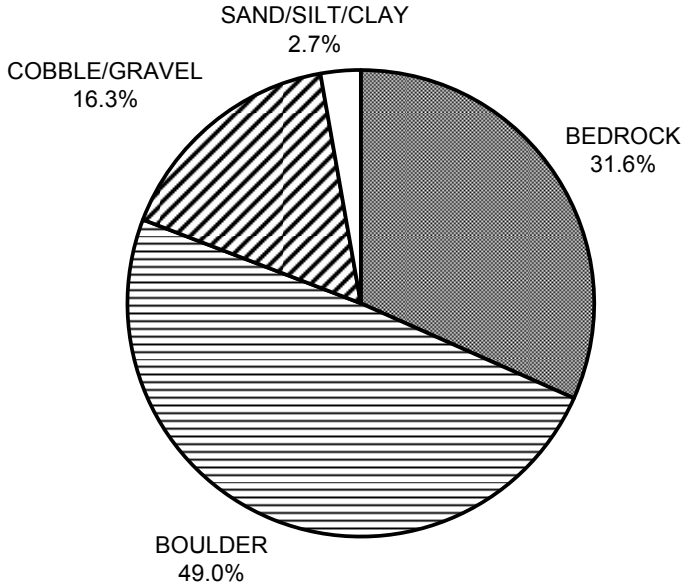



GRAPH 8

**SQUAW CREEK 2001**
**MEAN PERCENT CANOPY**

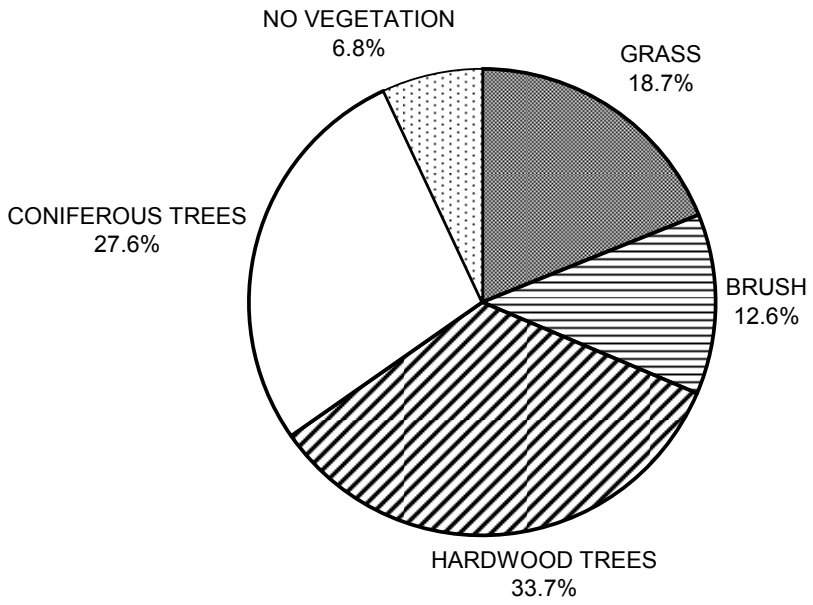

GRAPH 9

## SQUAW CREEK 2001
## DOMINANT BANK COMPOSITION



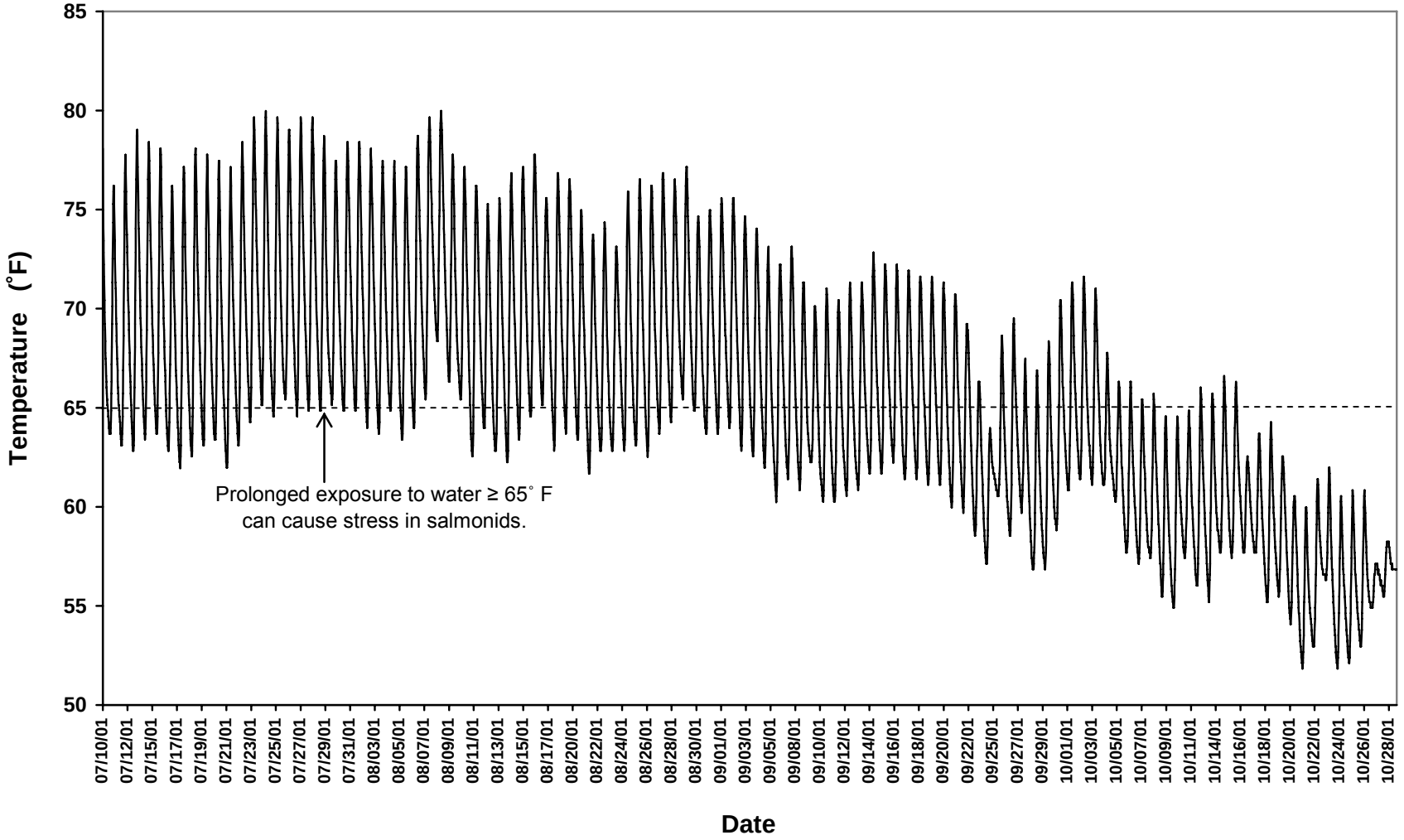

GRAPH 10

## SQUAW CREEK 2001
## DOMINANT BANK VEGETATION

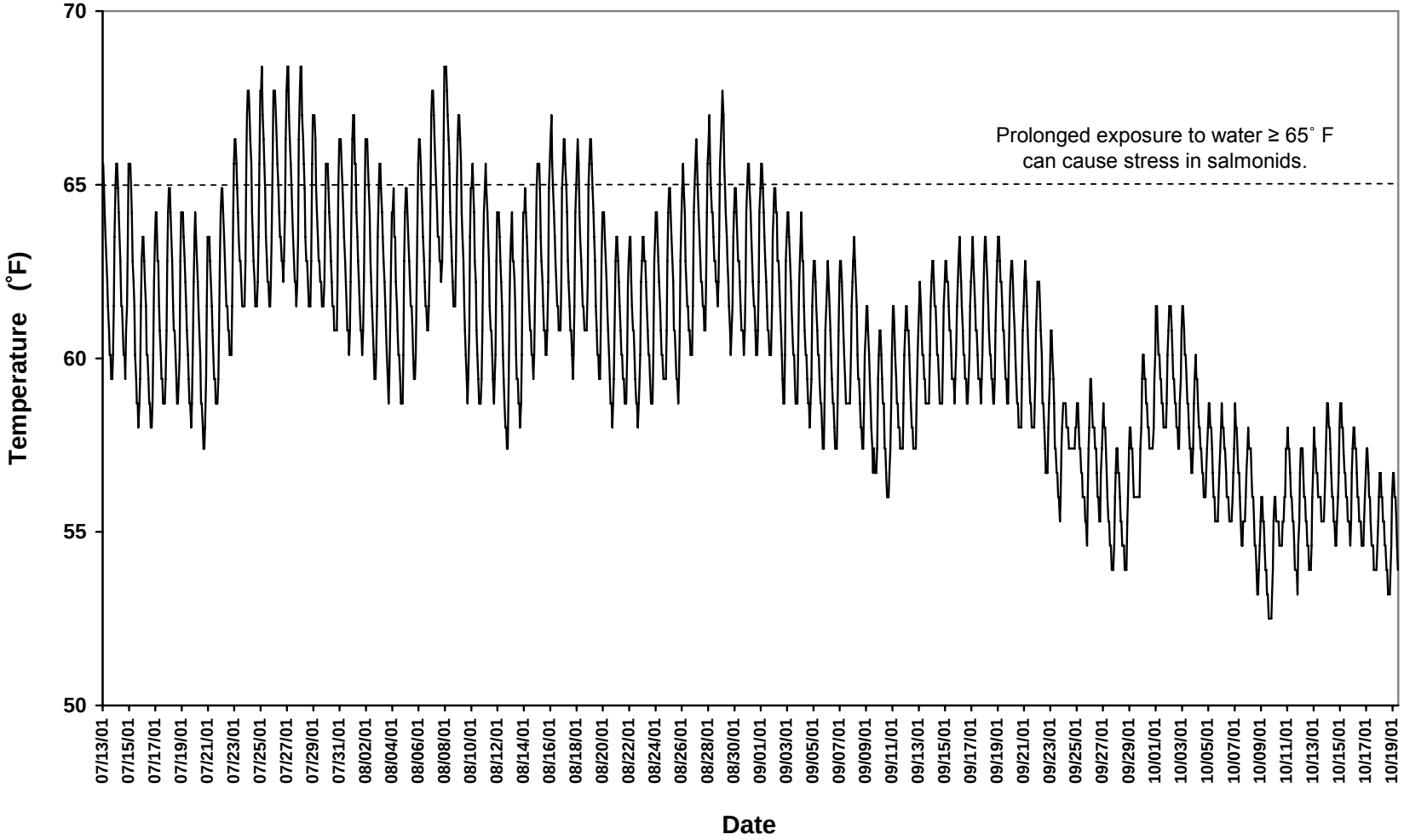



GRAPH 11

## Squaw Creek (lower section) Water Temperatures



## Squaw Creek (upper section) Water Temperatures



**Watershed Hydroid** **452** Squaw Creek

**Hydrologic Sub-Areas covered by the watershed:**

| Name: | LLId: (1:24k) | County: |
|---|---|---|
| Squaw Creek | 1228770388243 | Mendocino/Sonom |

**Tributary to** Big Sulphur Creek
**Tributary to** Russian River
**Tributary to**

**Location:** **T:** 11N **R:** 9W **S:** 4 **Latitude:** 38.8243579471132 **Longitude** 122.877014412042

Hydrologic Boundary Delineation: Watershed boundaries were delineated using the Watershed Point tool in ArcHydro, running under ArcMap 8.3 (ArcInfo version). A 1:24k stream network was "burned" into the underlying DEM to enforce hydrologic routing.

Aerial Photos (Source): For Mendocino County watersheds, 1993 USGS DOQQs are available in the Teale Albers, NAD27 projection. For Sonoma County watersheds, 2000 County-created orthophotos in the State Plane, NAD83 projection are also available.

**Stream Order:** 3 **Total Length:** 7.46 Miles 12.01 Km

Note: Stream order is by Strahler method, recorded in CDF-NCWAP "nchydro1" 1:24k streams layer.

Note: Length is for the USGS blue-line 1:24,000 stream.

**Drainage Area:** 3677 Hectares; 9086 Acres; 14.19 sq. mi.

**Elevations:** Mouth: 876 feet; Headwaters: 3658 feet

Note: Headwaters elevation is the highest elevation found in the watershed.

**Lakes in Watershed:** Number: 0 Surface area: 0 sq. mi.

Note: Source for lakes data is the USGS-DFG 1:100k lakes layer "lakes.shp"

**Fish Species (as indicated by historical salmonid streams layer created by Bob Coey):** Steelhead

**Ownership, for the watershed, in acres (and % of total watershed):**

| Federal: | State: | Local: | Private: |
|---|---|---|---|
| 99.0 acres | 0.0 | 0.0 | 8986.5 |
| 1.08 % | 0.00 % | 0.00 % | 98.92 % |

Note: Source for owneship data is 2002 DFG-CCR "ccr_public_lands.shp" GIS layer.

**Major Land Uses in the Watershed, in acres (and % of total watershed)**

| Mixed hardwood/conifer: | Hardwood: | Conifer: | Agriculture: | Urban: |
|---|---|---|---|---|
| 682.93 acres | 4030.73 | 76.13 | 0.00 | 34.74 |
| 7.5 % | 44.4 % | 0.8 % | 0.0 % | 0.4 % |

| Shrub: | Herbaceous: | Barren/rock: | Water: |
|---|---|---|---|
| 3355.05 | 645.56 | 250.03 | 3.39 |
| 36.9 % | 7.1 % | 2.7 % | 0.1 % |

Note: Land use areas were calculated using the 1994 CDF-USFS "Calveg" GIS layer.

**USGS 7.5' Topographic Quads completely or partially in the watershed:**

| Quad Name | USGS Code |
|---|---|
| THE GEYSERS | 38122G7 |
| ASTI | 38122G8 |

**Endangered/Threatened/Sensitive Species: (California Natural Diversity Database, May 5, 2003 version )**

| Scientific Name | Common Name |
|---|---|
| Rana boylii | foothill yellow-legged frog |
| Layia septentrionalis | Colusa layia |
| Arctostaphylos manzanita ssp. elegans | Konocti manzanita |
| Arctostaphylos manzanita ssp. elegans | Konocti manzanita |
| Oncorhynchus mykiss irideus | steelhead-central California coast esu |

**Hydrologic Sub-Areas covered by the watershed**

| Hydrologic Sub-Area Name: | ID code (RBUAS) | Hydrologic Area Name | % of watershed in this HSA |
|---|---|---|---|
| Ukiah | 111431 | Upper Russian River | 0.12 |
| Sulphur Creek | 111426 | Middle Russian River | 99.8 |
| Lakeport | 551355 | Upper Cache Creek | 0.08 |