

Report revised April 14, 2006
Report Completed 2001
Assessment Completed 1999
CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAM INVENTORY REPORT
North Branch Little Sulphur Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1999 on North Branch Little Sulphur 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. The objective of the biological inventory was to document the presence and distribution of salmonids and other aquatic species.

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

WATERSHED OVERVIEW

North Branch Little Sulphur Creek, located in Sonoma County, is a tributary to Little Sulphur Creek, which flows into Big Sulphur Creek, a tributary of the Russian River (see North Branch Little Sulphur Creek map, page 2). The legal description at the confluence with the Little Sulphur Creek is T11N, R9W, S19. Its location is 38°47'24" N. latitude and 122°54'39" W. longitude. Year round vehicle access exists from Highway 101 near Cloverdale via Geysers Road.

North Branch Little Sulphur Creek and its tributaries drain a basin of approximately 7.5 square miles. It is a third order stream and has approximately 5.4 miles of blue line stream, according to the USGS "Asti" and "The Geysers" 7.5 minute quadrangles. Summer flow was measured as approximately 2.0. Elevations range from about 720 feet at the mouth of the creek to 2703 feet in the headwaters. Oak woodland dominates the watershed, but there are zones of mixed conifer forest in the upper watershed. The predominant upland vegetation throughout the watershed consists of annual grasses, buckeye, oak, California laurel, madrone, and fir, while the riparian corridor is dominated by alder and willow. The watershed is entirely privately owned and some land within it is managed for grazing (though cattle have very limited access to the stream channel) and vineyard production, with scattered rural development. Sensitive plants and animals listed from the CNPS Inventory and DFG's Natural Diversity Database within North Branch Little Sulphur watershed include *Rana boylei*, the foothill yellow-legged frog, and *Streptanthus brachiatus* ssp *brachiatus*, the Socrates mine jewel-flower.

METHODS

The habitat inventory conducted in North Branch Little Sulphur 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 (1998). This form was used in North Branch Little Sulphur 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 a Marsh-McBirney Model 2000 flow meter.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity. Channel characteristics are measured using a clinometer, hand level, hip chain, tape measure, and a stadia rod.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". North Branch Little Sulphur

Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. All measurements are in feet to the nearest tenth. Habitat characteristics are measured using a clinometer, hip chain, and stadia rod.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out areas is measured by the percent of the cobble that is surrounded or buried by fine sediment. In North Branch Little Sulphur Creek, embeddedness was visually 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 particle size, bedrock, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In North Branch Little Sulphur 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 visually 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 densimeters as described in the *California Salmonid Stream Habitat Restoration Manual*. Canopy density relates to the amount of stream shaded from the sun. In North Branch Little Sulphur 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 and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In North Branch Little Sulphur 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 stream inventory is used to determine fish species present 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, and 3) electro-fishing. These sampling techniques are discussed in the California Salmonid Stream Habitat Restoration Manual (1998).

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 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 North Branch Little Sulphur 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 a survey of North Branch Little Sulphur in August 1968.

North Branch Little Sulphur is the main tributary to Little Sulphur and has an approximate drainage area of 6 square miles and an elevation of about 800 feet at the confluence with Little Sulphur and about 2,000 feet in the headwaters. It has a length of 4.5 miles.

In 1968 the flow was recorded at 0.53 c.f.s. immediately upstream from the confluence with Little Sulphur and was again measured at 0.27 c.f.s. near the headwaters. The velocity was noted as being generally rapid with a gradient of approximately 5 feet per 100 feet of stream.

The average width of N.B. Little Sulphur was about 3 feet, with a range from ½ foot to 8 feet. The average depth was about 3 inches, with a range of about 1 inch to about 3 feet. The substrate was composed of 50% rubble, 25% gravel, 15% silt, 5% sand and 5% boulders. Pools in the creek averaged about 10 feet by 5 feet by 1 foot deep and were generally long and narrow. The frequency was approximately 75% pools and 25% ripples. The shelter consisted of undercut banks, deep pools and overhanging vegetation.

About 15% of North Branch Little Sulphur was believed to be suitable for steelhead spawning. Silt appeared to be the limiting factor by restricting use of additional gravels. The water temperature was recorded at 70_F at 1:30 p.m. near the confluence of Little Sulphur. The water temperature near the headwaters was recorded at 67_F with an air temperature of 64_F.

One logjam and a 7-foot high fall that were located approximately 4 miles upstream from Big Sulphur Creek were considered barriers. The falls were believed to be a complete barrier and were considered to be in need of clearance.

HABITAT INVENTORY RESULTS

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

The habitat inventory of July 28-August 12, 1999 was conducted by Morgan Knechtle, Gary Neargardner Aaron Fairbrook, Stephanie Carey, Bryan Freele (CDFG) and Sean Higgins, (Americorps) with supervision and analysis by CDFG. The survey began at the confluence with Little Sulphur Creek and extended up North Branch Little Sulphur Creek to the end of granted access. The total length of the stream surveyed was 17837 feet, with an additional 723 feet of side channel.

A flow of 2.02 cfs was measured at the upstream end of habitat unit #138, 10680 feet above survey start, with a Marsh-McBirney Model 2000 flowmeter.

This section of North Branch Little Sulphur Creek has 4 channel types: from the mouth to 7960 feet an F4; next 4426 feet a B3; next 1504 feet a B2; next 3546 feet an F3 and the upper 401 feet a B2.

B channel types are moderately entrenched, moderate gradient (2-4%), riffle dominated channels, with infrequently spaced pools, a very stable plan and profile, and stable banks. B2 channels have a predominantly boulder substrate, while B3 channels have a predominantly cobble substrate.

F channel types are entrenched meandering riffle/pool channels on low gradients (<2%) with a high width/depth ratio. F3 channels have a predominantly cobble substrate, while F4 channels have a predominantly gravel substrate.

Water temperatures on the survey dates ranged from 59°F to 74°F. Air temperatures ranged from 65°F to 82°F. Summer temperatures were also measured using a remote temperature recorder placed in a pool above habitat unit #83. (see Temperature Summary graphs at end of report). The recorder logged temperatures every 2 hours from July 01–September 21, 1999. The highest temperature recorded was 82°F in July and the lowest was 55°F in September. The mean of the daily highs was 76°F for the month of July, 72°F for August, and 67°F for September.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 40% pool units, 35% flatwater units, and 24% riffle units, with no dry streambed units. Based on total **length** there were 50% flatwater units, 31% riffle units, and 18% pool units.

Two hundred and sixty-three habitat units were measured and 20% 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 22%, followed by bedrock scour pools 17%, step runs 16% and runs 10%. By percent total **length**, low gradient riffles made up 29%, step runs 28%, runs 14%, and bedrock scour pools 9%.

One hundred and five pools were identified (Table 3). Scour pools were most often encountered at 57%, and comprised 58% of the total length of pools.

Table 4 is a summary of maximum pool depths by pool habitat types. Pool quality for salmonids increases with depth. Sixty-one of the 105 pools (58%) had a depth of two feet or greater. These deeper pools comprised 12% 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 22. Riffle had the lowest rating with 1 and flatwater rated 8 (Table 1). Of the pool types, the backwater pools

had the highest mean shelter rating at 33, scour pools rated 20, and main channel pools rated 20 (Table 3).

Table 5 summarizes fish shelter by habitat type. By percent area, the dominant pool shelter types were boulders at 44%, followed by bedrock ledges at 18%, large woody debris at 12%, and white water at 8%.

Table 6 summarizes the dominant substrate by habitat type. Small cobble was dominant in 6 of the 8 low gradient riffles measured.

No mechanical gravel sampling was conducted in 1999 surveys due to inadequate staffing levels.

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 98 pool tail-outs measured, 27 had a value of 1 (28%); 48 had a value of 2 (49%); 18 had a value of 3 (18%); and 3 had a value of 4 (3%). Two (2%) riffles rated a 5 (unsuitable substrate type for spawning). On this scale, a value of one is best for fisheries.

The mean percent canopy density for the stream reach surveyed was 64%. The mean percentages of deciduous and evergreen trees were 61% and 39%, respectively.

For the entire stream reach surveyed, the mean percent right bank vegetated was 47% and the mean percent left bank vegetated was 46%. For the habitat units measured, the dominant vegetation type for the stream banks was deciduous trees (48%), followed by evergreen trees (26%), grass (16%), bare soil (5%) and brush (4%). The dominant substrate for the stream banks was cobble/gravel (48%), followed by bedrock (21%), silt/clay/sand (19%) and boulder (12%).

BIOLOGICAL INVENTORY

JUVENILE SURVEYS:

In 1968 there were steelhead, rainbow trout, roach and suckers observed. The number of juvenile steelhead found was approximately 60 per 100 feet of stream. These salmonids averaged 3 inches in length and ranged from 1 to 4 inches. The number of roach present was estimated at approximately 40 per 100 feet of stream. Suckers and roach were observed only at the first 3 miles of stream. Copepods were observed in large numbers on fish within the first 3 miles of stream.

It is unknown if past stocking of North Branch Little Sulphur occurred.

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

Table 1. Species Observed in Historical Surveys No biological surveys were conducted in NBLs in 1999			
YEARS	SPECIES	SOURCE	Native/Introduced
1968	Steelhead	DFG	N
1968	Roach	DFG	N
1968	Sucker	DFG	N
1968	Salamander	DFG	N
1968	Frog	DFG	N

DISCUSSION

North Branch Little Sulphur Creek has 4 channel types: F4 (7960 ft.), B3 (4426 ft.), B2 (1504 ft.), F3 (3546 ft.) and B2 (401 ft.). Many site specific projects can be designed within these channel types, especially to increase pool frequency, volume and shelter.

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. B3 channel types are excellent for low-stage plunge weirs, boulder clusters, bank placed boulders, single and opposing wing-deflectors and log cover. They are also good for medium-stage plunge weirs. These channel types have suitable gradients and the stable stream banks that are necessary for the installation of instream structures designed to increase pool habitat, trap spawning gravels, and provide protective shelter for fish.

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. 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. Any work considered for F-type channels will require careful design, placement, and construction that must include protection for any unstable banks.

The water temperatures recorded on the survey days ranged from 59°F to 74°F. Air temperatures ranged from 65°F to 82°F. The warmer water temperatures were recorded in Reach 2. 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 82°. The Temperature Summary graph shows that for much of the summer (July through September) the watershed exhibited temperatures above the optimal for salmonids.

Pools comprised 18% of the total **length** of this survey. In third and fourth order streams a primary pool is defined to have a maximum depth of at least three feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. In North Branch Little Sulphur Creek, the pools are relatively shallow with 23% having a maximum depth of at least 3 feet. These pools comprised 6% 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 22. 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 (44%), followed by bedrock ledges (18%), large woody debris (12%), and white water (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.

Six of the 8 low gradient riffles measured (75%) had either gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

Twenty-one of the pool tail-outs measured had embeddedness ratings of either 3 or 4. Only 28% 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 1 and 4 had the best ratings and Reach 5 had the poorest ratings.

The mean percent canopy for the survey was 64%.

This is a fairly low percentage of canopy, since 80% is generally considered desirable. Cooler water temperatures are desirable in North Branch Little Sulphur 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.

GENERAL MANAGEMENT RECOMMENDATIONS

North Branch Little Sulphur Creek should be managed as an anadromous, natural production stream.

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) Increase the canopy on North Branch Little Sulphur Creek by planting willow, alder, redwood, and Douglas fir along the stream where shade canopy is not at acceptable levels (portions of Reaches 1-4). In many cases, planting will need to be coordinated to follow bank stabilization or upslope erosion control projects.
- 2) North Branch Little Sulphur Creek would benefit from 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) Where feasible, increase woody cover in the pool and flatwater habitat units along the entire stream. Most of the existing shelter is from boulders and bedrock ledges. 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 2, 3 and 5) or in conjunction with stream bank armor to prevent erosion (Reaches 1 and 4). In some areas the material is at hand.
- 4) Where feasible, design and engineer pool enhancement structures to increase the number and depth of pools throughout the stream. This must be done where the banks are stable (Reaches 2, 3 and 5) or in conjunction with stream bank armor to prevent erosion (Reaches 1 and 4). In some areas the material is at hand.
- 5) 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) If riparian areas are not improved in Reaches 1-4, temperatures in throughout North Branch Little Sulphur Creek, should be monitored to determine if they are having a deleterious effect upon juvenile salmonids. To achieve this, biological sampling is also required.

APPENDIX B: PROBLEM SITES AND LANDMARKS:
NORTH BRANCH LITTLE SULPHUR CREEK SURVEY COMMENTS

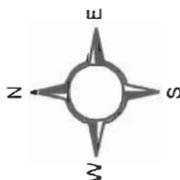
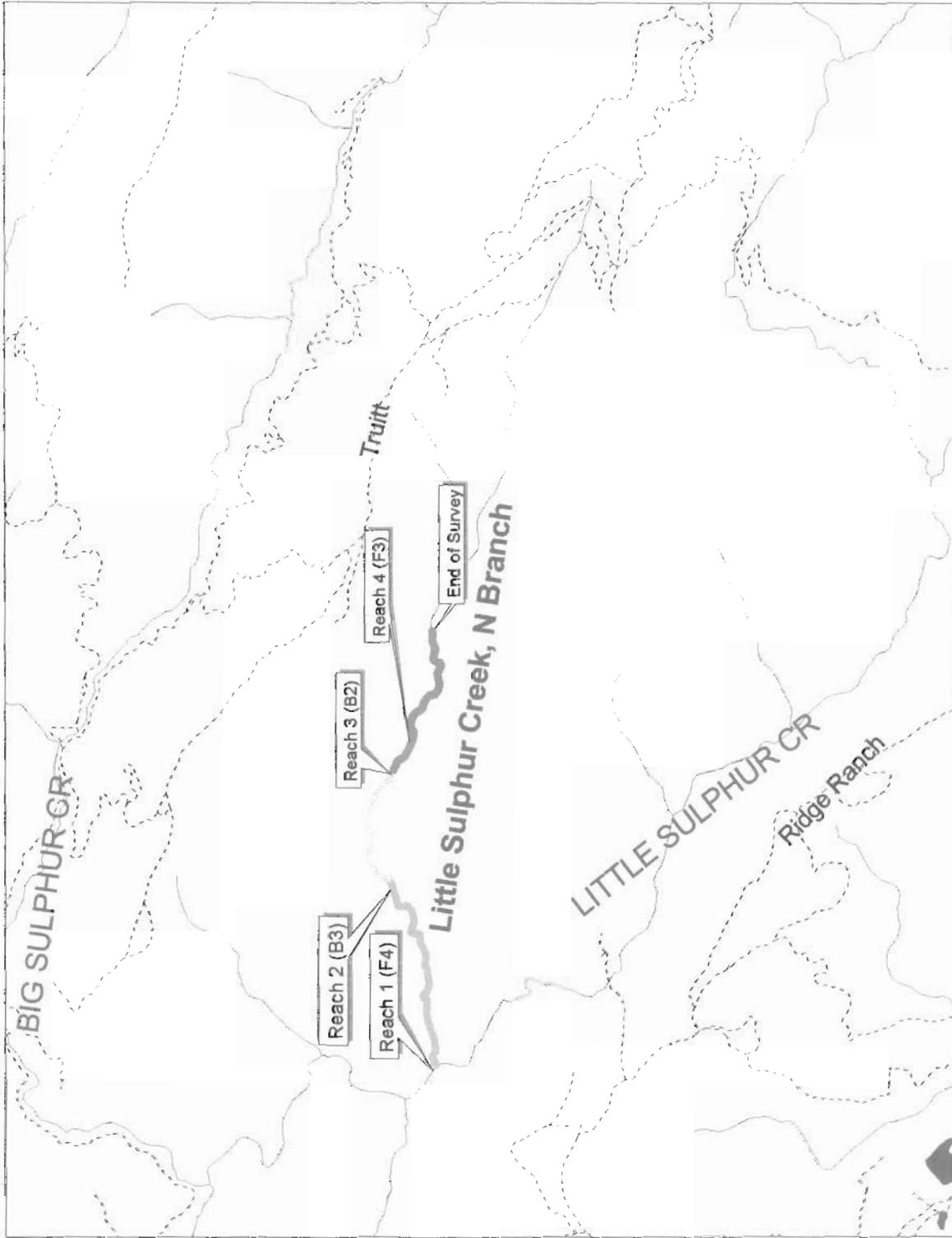
The following landmarks and possible problem sites were noted.
All distances are approximate and taken from the beginning of the survey reach.

HABITAT UNIT #	DISTANCE UPSTREAM	COMMENTS	
	1.00	127	Mouth flowing into Little Sulphur Creek; green algae- 80% covered
	12.00	1055	LB dripping water
	19.00	1661	RB saturated
	22.00	1804	Slide RB 100' long at base- possible willow work
	34.00	2541	2 dead oak trees on slope- 3' diameter; 70F water temp
	35.00	2598	6-8" SHD; saturated RB
	36.00	2775	1+ SHD
	42.00	3372	4 yellow-legged frogs
	47.00	3544	Spring LB
	48.00	3544	Debris torrent on trib LB
	49.00	3580	Trib LB; debris torrent ends
	57.00	4295	Huge landslide
	65.10	5074	Fed by small seepage/stream
	66.00	5074	Hobo temp?
	71.00	5306	Small dripping trib RB
	76.00	6049	Wet trib RB- too small to HT, H2O temp 55F; Dry trib
	80.00	6389	Steep wash LB
	83.00	6755	Wet trib RB- too small to HT, may lead to lake
	92.00	7233	PGS (0.8)- looks like something bit it
	100.00	7981	Channel change to B3
	101.00	8033	Spring RB forming small, shallow pool
	102.00	8287	Dead yoy SHD; spring LB
	103.00	8304	Slide LB
	104.00	8514	Slide LB
	104.10	8540	Fed by RB spring; SHD, yellow-legged frog, sculpin
	105.00	8559	1+ SHD
	107.00	8621	2 dozen 0+ SHD; 2-3 1+ SHD

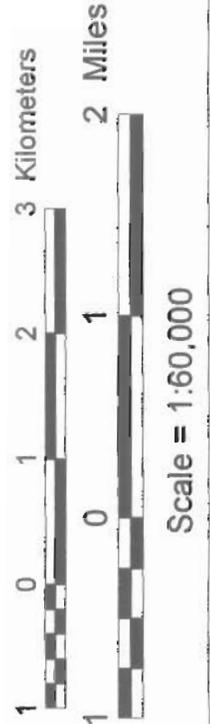
108.00	8673	Dense canopy cover (alders)
111.00	8851	Mouth of trib w/ dam
116.00	9387	YOY
118.00	9479	1+ SHD; YOY
119.00	9527	YOY, 1+, & 2+ SHD
121.00	9573	Spring LB
122.00	9666	YOY
124.00	9854	Start of slide LB
125.00	9939	Slide LB; cow manure
130.00	10155	End of slide LB
135.00	10465	Small (40') slide LB
139.00	10683	0+ SHD; subsurface flow entering on LB
140.00	10718	Access pt. RB; 0+ SHD
143.00	11091	Dry trib RB
145.00	11303	60' slide LB
146.00	11359	4 1+ SHD; LB saturated
148.00	11506	Wet trib LB- water temp 61F
151.00	11716	No fish seen
152.00	11781	YOY SHD
153.00	11812	2 1+ SHD
154.00	11862	1+ SHD
155.00	11914	YOY SHD
156.00	12018	3 1+ SHD
157.10	12088	0+ SHD
161.00	12257	1+ SHD
163.00	12286	1+ SHD
165.00	12386	(3) 2+ SHD
166.00	12472	0+ SHD & sculpin; channel change
167.00	12536	1+ SHD
168.00	12618	Dead 1+ SHD
170.00	12746	Spring LB
171.00	12763	1+ shd
172.00	12864	Spring LB
173.00	12884	(2) 2+ SHD
176.00	13015	2+ SHD, 0+ SHD; LB trib/spring- water temp 62F
177.00	13139	1+ SHD; Red-legged frog?

178.00	13173	YOY SHD
179.10	13383	120' UP FROM 178
180.00	13392	0+, 1+, & 2+ SHD (many)
182.00	13448	2+ & 0+ SHD
184.00	13528	2+ SHD
185.00	13611	3+ resident trout
187.00	13718	YOY, 1+ SHD
190.00	13890	Old road LB; SHD & roach
191.00	14014	Trib RB
192.00	14027	(2) 1+ SHD
197.00	14322	0+, 1+, 2+ SHD
199.00	14426	Wet trib RB- trib temp 62F; NBLs temp 62F
204.00	14892	8" western pond turtle
206.00	14942	Nice pool- needs shelter; (8) 2+ SHD, (5) 3+ SHD, (12) 1+ SHD
207.00	15055	RB saturated
208.00	15090	(3) 1+ SHD
211.00	15779	@170' wet trib LB- trib temp 60F
213.00	15982	LB wet trib @ end of unit- trib temp 63F
214.00	16026	(3) 2+ SHD & YOY SHD
217.00	16166	Dry trib RB
223.00	16525	2 Dry tribs LB
224.00	16545	Garter snake
226.00	16604	Dry trib LB
228.00	16727	DSC- dry side channel
229.00	16774	DSC
230.00	16814	DSC
231.00	17274	Erosion RB- 100'Hx5'Dx20'L; dry trib LB
232.00	17295	Trib RB- H2O trickling, no fish, trib temp 62F
233.00	17403	Wet trib LB- trib temp 60F
235.00	17463	Channel change to B2
239.00	17837	****END OF ACCESS- END OF SURVEY ****

Little Sulphur Creek, North Branch

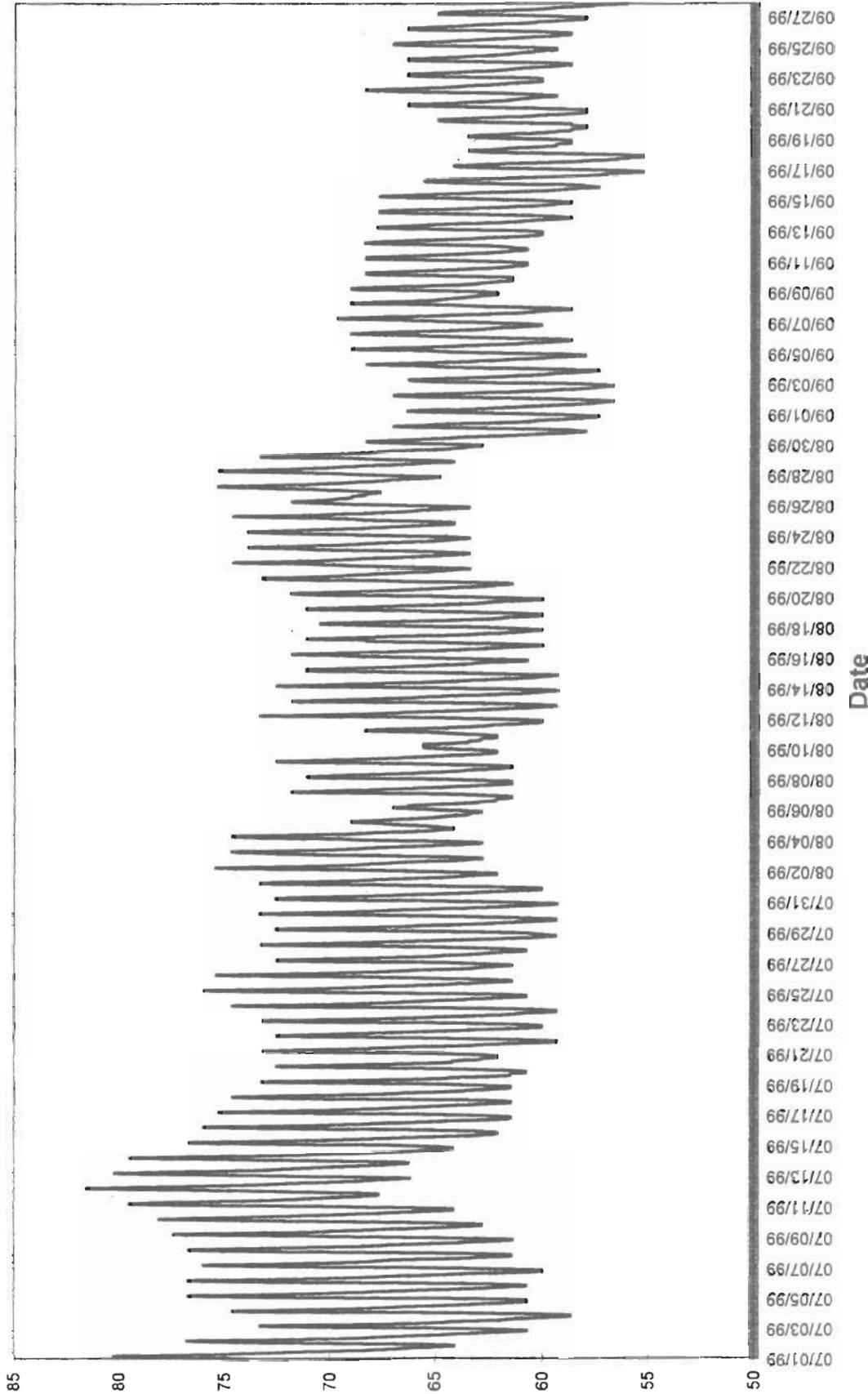


Central Coast Region
 Department of Fish and Game



- l sulphnb.shp
- B2
- B3
- F3
- F4
- Roads, Sonoma Co. (sonocds99-alt)
- Waterodies (hhd-slb region we)
- Streams, routed (russ-routed)
- Streams, Reach File 3 (russ1)

North Branch Little Sulphur Creek Water Temperatures



NE Little Sulphur Creek Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES Survey Dates: 07/28/99 to 08/12/99

Confluence Location: QUAD: Asti, Geysers LEGAL DESCRIPTION: T11NR09WS19 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

HABITAT UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	MEAN WIDTH (ft.)	TOTAL WIDTH (ft.)	MEAN DEPTH (ft.)	TOTAL DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN ESTIMATED VOLUME (cu.ft.)	TOTAL ESTIMATED VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	TOTAL RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
3	1	73	219	1	11.0	1.3	707	2120	703	2110	700	7			
63	10	91	5738	31	12.2	0.4	1160	73068	415	26139	0	1			
92	16	102	9377	50	10.5	0.6	961	88382	567	52168	0	8			
105	25	23	3444	18	10.9	1.3	366	38431	497	52210	430	22			
TOTAL UNITS	263	52	TOTAL LENGTH (ft.)	18778	TOTAL AREA (sq. ft.)	202000	TOTAL VOLUME (cu. ft.)	132627							

NE Little Sulphur Creek Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS Survey Dates: 07/28/99 to 08/12/99

Confluence Location: QUAD: Asti, Geysers LEGAL DESCRIPTION: T11NR09MS19 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT OCCURRENCE %	MEAN LENGTH	MEAN WIDTH	MEAN DEPTH	MEAN MAXIMUM DEPTH	EST.		MEAN RESIDUAL VOLUME	MEAN SHELTER	MEAN CANOPY
								sq.ft.	cu.ft.			
3	1	LGR	1	73	11	1.3	3.4	707	2120	703	2110	700
59	8	LGR	22	92	12	0.4	1.4	1179	69542	419	24746	0
4	2	HGR	2	76	13	0.4	1.0	905	3621	354	1416	0
22	4	GLD	8	62	11	0.7	2.0	686	15083	443	9744	0
27	3	RUN	10	98	11	0.6	1.8	1307	35284	745	20128	0
42	8	SRM	16	127	10	0.6	1.4	908	38138	524	22009	0
1	1	EDW	0	18	7	1.4	2.0	126	126	176	176	0
22	4	MCP	8	33	13	1.5	4.8	448	9846	713	15693	569
4	1	STP	2	91	9	0.9	1.9	811	3243	769	3077	607
3	2	LSL	1	30	14	1.4	3.0	409	1228	578	1735	513
3	1	LGR	1	19	9	1.0	2.4	177	531	206	618	36
46	7	LSBK	17	36	11	1.2	5.9	406	18696	536	24673	412
6	3	LSBO	2	22	12	1.2	3.1	274	1645	397	2380	371
2	1	PLP	1	29	9	1.6	2.8	244	487	360	719	271
5	3	SCP	2	23	7	0.7	1.8	164	820	139	694	269
14	3	BPB	5	18	7	1.2	3.9	138	1935	187	2620	183

TOTAL UNITS	TOTAL UNITS	LENGTH (ft.)	AREA (sq.ft)	TOTAL VOL. (cu.ft)
283	52	18778	202344	132540

NE Little Sulphur Creek Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 3 - SUMMARY OF POOL TYPES Survey Dates: 07/28/99 to 08/12/99

Confluence Location: QUAD: Asti, Geysers LEGAL DESCRIPTION: T11NR09W519 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

HABITAT UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq-ft.)	TOTAL AREA (sq-ft.)	MEAN VOLUME (cu-ft.)	TOTAL VOLUME (cu-ft.)	MEAN RESIDUAL POOL VOL. (cu-ft.)	MEAN SHELTER RATING
			LENGTH (ft.)	LENGTH (ft.)	LENGTH (ft.)	AREA (sq-ft.)	EST. AREA (sq-ft.)	AREA (sq-ft.)	EST. VOLUME (cu-ft.)	VOLUME (cu-ft.)	RATING
3	1	3	73	11.0	1.3	707	2120	703	2110	700	7
26	5	24	42	12.7	1.4	503	13088	722	18770	575	20
60	14	56	33	11.2	1.2	376	22587	502	30126	399	20
19	6	18	19	7.4	1.0	145	2755	174	3314	193	33
TOTAL UNITS	108	26	TOTAL LENGTH (ft.)	TOTAL LENGTH (ft.)	TOTAL LENGTH (ft.)	TOTAL AREA (sq-ft.)	TOTAL AREA (sq-ft.)	TOTAL VOLUME (cu-ft.)	TOTAL VOLUME (cu-ft.)	TOTAL VOLUME (cu-ft.)	
			3663	3663	3663	40550	40550	54320	54320	54320	

NE Little Sulphur Creek Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES Survey Dates: 07/28/99 to 08/12/99

Confluence Location: QUAD: Asti., Geysers LEGAL DESCRIPTION: T11NR09MS19 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT			1-<2 FT.			2-<3 FT.			3-<4 FT.			≥4 FEET		
			MAXIMUM DEPTH	PERCENT OCCURRENCE	DEPTH OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	DEPTH OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	DEPTH OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	DEPTH OCCURRENCE	MAXIMUM DEPTH	PERCENT OCCURRENCE	DEPTH OCCURRENCE
3		3	1	33	0	0	0	0	0	0	2	67	0	0	0	0	
22	MCP	20	0	0	7	32	9	41	18	4	4	18	2	9	0	0	
4	STP	4	0	0	4	100	0	0	0	0	0	0	0	0	0	0	
3	LSL	3	0	0	0	0	2	67	1	1	33	0	0	0	0	0	
3	LSR	3	0	0	2	67	1	33	0	0	0	0	0	0	0	0	
46	LSBK	43	0	0	15	33	16	35	14	14	30	1	2	0	0	0	
6	LSBO	6	0	0	4	67	1	17	1	1	17	0	0	0	0	0	
2	PLP	2	0	0	0	0	2	100	0	0	0	0	0	0	0	0	
5	SCP	5	2	40	3	60	0	0	0	0	0	0	0	0	0	0	
14	BPE	13	0	0	7	50	6	43	1	1	7	0	0	0	0	0	

TOTAL UNITS 108

North Branch Little Sulphur Creek Tables Graphs Map Assessment Completed 1999 Page 7 of 11

Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 5 - Summary of Shelter by Habitat Type

Survey Dates: 07/28/99 to 08/12/99

Confluence Location: Quad: Asti, Geysers LEGAL DESCRIPTION: T11N09W519 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

UNITS MEASURED	HABITAT TYPE	UNDERCUT BANKS	SND	LND	ROOT MASS VEGETATION	TERR. VEGETATION	AQUATIC VEGETATION	WHITE WATER	BOULDERS	TOTAL	% TOTAL	BEDROCK LEDGES
3	3	0	0	0	0	75	0	0	0	0	0	25
59	53 LGR	0	4	0	9	13	0	2	0	2	72	0
4	4 HGR	0	0	0	0	0	0	0	0	0	100	0
22	22 GLD	23	0	0	18	1	0	1	0	1	58	0
27	25 RUN	0	1	1	0	7	7	4	0	4	66	14
42	27 SRN	1	0	0	0	1	0	21	0	21	77	0
1	1 EDW	0	0	0	100	0	0	0	0	0	0	0
22	22 MCP	0	5	5	0	0	5	8	0	8	70	8
4	3 STP	0	0	0	0	0	0	0	0	0	50	0
3	3 LSL	0	30	60	11	0	0	0	0	0	0	0
3	3 LSR	0	0	24	76	0	0	0	0	0	0	0
46	46 LSBK	0	3	9	8	3	1	0	0	33	43	0
6	6 LSBO	9	0	0	0	9	0	0	0	76	6	0
2	2 PLP	0	0	0	0	0	0	41	0	59	0	0
5	5 SCP	0	0	0	0	32	0	0	0	68	0	0
14	14 BPE	0	1	0	24	4	0	0	0	43	28	0
262	239	2	2	6	6	4	2	9	58	11		
TOTAL HABITAT TYPES												
105	104	0	6	12	8	2	2	8	44	18		

ONLY

NE Little Sulphur Creek Drainage: Little Sulphur Creek; Big Sulphur Creek; Russian River

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE Survey Dates: 07/28/99 to 08/12/99

Confluence Location: QUAD: Acti, Geysers LEGAL DESCRIPTION: T11NR09WS19 LATITUDE: 38°47'24" LONGITUDE: 122°54'39"

TOTAL HABITAT UNITS	SUBSTRATE	UNITS MEASURED	HABITAT TYPE	SILT/CLAY		SAND		GRAVEL		SM COBBLE		LG COBBLE		BOULDER		BEDROCK	
				% TOTAL DOMINANT	% TOTAL	% TOTAL DOMINANT											
3		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	LGR	8	LGR	0	0	0	0	0	0	75	0	13	0	13	0	0	0
4	HGR	2	HGR	0	0	0	0	0	0	0	100	0	0	0	0	0	0
22	GLD	4	GLD	0	0	0	0	75	0	25	0	0	0	0	0	0	0
77	RUN	3	RUN	0	0	0	0	0	0	67	0	33	0	0	0	0	0
22	SRN	9	SRN	0	0	0	0	11	0	33	0	56	0	0	0	0	0
11	EDW	1	EDW	0	0	0	0	100	0	0	0	0	0	0	0	0	0
22	MCP	5	MCP	0	0	0	0	0	0	20	0	20	0	20	0	40	0
4	STP	1	STP	0	0	0	0	100	0	0	0	0	0	0	0	0	0
33	LSL	2	LSL	0	0	0	0	50	0	50	0	0	0	0	0	0	0
33	LSR	1	LSR	0	0	0	0	100	0	0	0	0	0	0	0	0	0
26	LSBK	7	LSBK	0	0	0	0	43	0	29	0	14	0	0	0	29	0
16	LSBG	3	LSBG	0	0	0	0	33	0	0	0	33	0	33	0	0	0
22	PLP	2	PLP	0	0	0	0	0	0	0	0	0	0	100	0	0	0
55	SCP	3	SCP	0	0	0	0	33	0	0	0	67	0	0	0	0	0
4	BFB	4	BFB	25	50	0	0	0	0	0	0	0	0	25	0	0	0

NB Little Sulphur 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
64.31	39.15	60.85	47.00	46.25

APPENDIX B.

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Bedrock	14	10	21.43
Boulder	6	7	11.61
Cobble/Gravel	28	26	48.21
Silt/clay	8	13	18.75

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Percent Total Units
Grass	8	10	16.07
Brush	2	3	4.46
Deciduous Trees	31	23	48.21
Evergreen Trees	12	17	25.89
No Vegetation	3	3	5.36

APPENDIX C. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: NB Little Sulphur Creek
 SAMPLE DATES: 07/28/99 to 08/12/99
 SURVEY LENGTH:

MAIN CHANNEL: 18056 ft. SIDE CHANNEL: 942 ft.
 LOCATION OF STREAM MOUTH:
 USGS Quad Map: Asti, Geysers Latitude: 38°47'24"
 Legal Description: T11NR09WS19 Longitude: 122°54'39"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-99)

Channel Type: F4	Mean Canopy Density: 57%
Main Channel Length: 8149 ft.	Evergreen Component: 43%
Side Channel Length: 559 ft.	Deciduous Component: 58%
Riffle/Flatwater Mean Width: 13.5 ft.	Pools by Stream Length: 18%
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 78%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 41%
Water: 59-70°F Air: 65-80°F	Mean Pool Shelter Rtn: 8
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 46%	Occurrence of LOD: 39%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddness Value: 1. 38% 2. 43% 3. 18% 4. 3% 5. 0%	

STREAM REACH 2 (Units 100-165)

Channel Type: B3	Mean Canopy Density: 63%
Main Channel Length: 4456 ft.	Evergreen Component: 39%
Side Channel Length: 184 ft.	Deciduous Component: 61%
Riffle/Flatwater Mean Width: 9.4 ft.	Pools by Stream Length: 19%
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 62%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 24%
Water: 66-74°F Air: 72-82°F	Mean Pool Shelter Rtn: 45
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 42%	Occurrence of LOD: 39%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddness Value: 1. 14% 2. 68% 3. 11% 4. 7% 5. 0%	

STREAM REACH 3 (Units 166-190)

Channel Type: B2	Mean Canopy Density: 72%
Main Channel Length: 1504 ft.	Evergreen Component: 61%
Side Channel Length: 34 ft.	Deciduous Component: 39%
Riffle/Flatwater Mean Width: 8.9 ft.	Pools by Stream Length: 14%
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 25%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 0%
Water: 68-70°F Air: 72-73°F	Mean Pool Shelter Rtn: 24
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 21%	Occurrence of LOD: 0%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddness Value: 1. 36% 2. 27% 3. 18% 4. 0% 5. 18%	

STREAM REACH 4 (Units 191-234)

Channel Type: F3	Mean Canopy Density: 72%
Main Channel Length: 3546 ft.	Evergreen Component: 25%
Side Channel Length: 165 ft.	Deciduous Component: 75%
Riffle/Flatwater Mean Width: 11.1 ft.	Pools by Stream Length: 14%
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 53%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 18%
Water: 61-70°F Air: 71-75°F	Mean Pool Shelter Rtn: 20
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 58%	Occurrence of LOD: 60%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddness Value: 1. 24% 2. 47% 3. 29% 4. 0% 5. 0%	

STREAM REACH 5 (Units 235-239)

Channel Type: B2	Mean Canopy Density: 95%
Main Channel Length: 401 ft.	Evergreen Component: 15%
Side Channel Length: 0 ft.	Deciduous Component: 85%
Riffle/Flatwater Mean Width: 9.0 ft.	Pools by Stream Length: 18%
Pool Mean Depth: 0.8 ft.	Pools >=2 ft. Deep: 0%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 0%
Water: 64-67°F Air: 72-76°F	Mean Pool Shelter Rtn: 10
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 67%	Occurrence of LOD: 0%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddness Value: 1. 0% 2. 50% 3. 50% 4. 0% 5. 0%	

APPENDIX A: FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: North Branch Little Sulphur Creek

SAMPLE DATES: 07/28/99 to 08/12/99

SURVEY LENGTH:

MAIN CHANNEL: 18056 ft.

SIDE CHANNEL: 942 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: Asti, Geysers

Latitude: 38°47'24"

Legal Description: T11NR09WS19

Longitude: 122°54'39"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 1 (Units 1-99)

Channel Type: F4

Main Channel Length: 8149 ft.

Side Channel Length: 559 ft.

Riffle/Flatwater Mean Width: 13.5 ft.

Pool Mean Depth: 1.3 ft.

Base Flow: 2.0 cfs

Water: 59-70°F Air: 65-80°F

Dom. Bank Veg.: Deciduous Trees

Bank Vegetative Cover: 46%

Dom. Bank Substrate: Cobble/Gravel

Embeddedness Value: 1. 38% 2. 43% 3. 18% 4. 3% 5.

Mean Canopy Density: 57%

Evergreen Component: 43%

Deciduous Component: 58%

Pools by Stream Length: 18%

Pools >=2 ft. Deep: 78%

Pools >=3 ft. Deep: 41%

Mean Pool Shelter Rtn: 8

Dom. Shelter: Boulders

Occurrence of LOD: 39%

Dry Channel: 0 ft.

STREAM REACH 2 (Units 100-165)

Channel Type: B3

Main Channel Length: 4456 ft.

Side Channel Length: 184 ft.

Riffle/Flatwater Mean Width: 9.4 ft.

Pool Mean Depth: 1.3 ft.

Base Flow: 2.0 cfs

Water: 66-74°F Air: 72-82°F

Dom. Bank Veg.: Deciduous Trees

Bank Vegetative Cover: 41%

Dom. Bank Substrate: Cobble/Gravel

Embeddedness Value: 1. 14% 2. 68% 3. 11% 4. 7% 5.

Mean Canopy Density: 63%

Evergreen Component: 39%

Deciduous Component: 61%

Pools by Stream Length: 19%

Pools >=2 ft. Deep: 62%

Pools >=3 ft. Deep: 24%

Mean Pool Shelter Rtn: 45

Dom. Shelter: Boulders

Occurrence of LOD: 39%

Dry Channel: 0 ft.

STREAM REACH 3 (Units 166-190)

Channel Type: B2

Main Channel Length: 1504 ft.

Side Channel Length: 34 ft.

Riffle/Flatwater Mean Width: 8.9 ft.

Mean Canopy Density: 72%

Evergreen Component: 61%

Deciduous Component: 39%

Pools by Stream Length: 14%

Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 25%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 0%
Water: 68-70°F Air: 72-73°F	Mean Pool Shelter Rtn: 24
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 21%	Occurrence of LOD: 0%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddedness Value: 1. 36% 2. 27% 3. 18% 4. 0% 5.	

STREAM REACH 4 (Units 191-234)

Channel Type: F3	Mean Canopy Density: 72%
Main Channel Length: 3546 ft.	Evergreen Component: 25%
Side Channel Length: 165 ft.	Deciduous Component: 75%
Riffle/Flatwater Mean Width: 11.1 ft.	Pools by Stream Length: 14%
Pool Mean Depth: 1.3 ft.	Pools >=2 ft. Deep: 53%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 18%
Water: 61-70°F Air: 71-75°F	Mean Pool Shelter Rtn: 20
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 58%	Occurrence of LOD: 60%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddedness Value: 1. 24% 2. 47% 3. 29% 4. 0% 5.	

STREAM REACH 5 (Units 235-239)

Channel Type: B2	Mean Canopy Density: 95%
Main Channel Length: 401 ft.	Evergreen Component: 15%
Side Channel Length: 0 ft.	Deciduous Component: 85%
Riffle/Flatwater Mean Width: 9.0 ft.	Pools by Stream Length: 18%
Pool Mean Depth: 0.8 ft.	Pools >=2 ft. Deep: 0%
Base Flow: 2.0 cfs	Pools >=3 ft. Deep: 0%
Water: 64-67°F Air: 72-76°F	Mean Pool Shelter Rtn: 10
Dom. Bank Veg.: Deciduous Trees	Dom. Shelter: Boulders
Bank Vegetative Cover: 67%	Occurrence of LOD: 0%
Dom. Bank Substrate: Cobble/Gravel	Dry Channel: 0 ft.
Embeddedness Value: 1. 0% 2. 50% 3. 50% 4. 0% 5. 0%	