

STREAM INVENTORY REPORT

Sulphur Fork

INTRODUCTION

A California Department of Fish and Game (DFG) fisheries inventory was conducted in summer 2001 on Elk Creek and its tributaries. Habitat inventory was conducted on Sulphur Fork, which is a tributary to Elk Creek. The objective of the habitat inventory is to document the habitat available to anadromous salmonids. This report presents the inventory results and recommends options for potential habitat improvements for coho salmon and steelhead trout. The recommendations are based on target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Sulphur Fork, located in Mendocino County, California, is a tributary to Elk Creek. Sulphur Fork's legal description at the confluence with Elk Creek is T14NR16WS36. Its mouth is located at 39°2'13" north latitude and 123°34'40" west longitude. Sulphur Fork is a second order stream and has approximately 2 miles of blue line stream according to the USGS Cold Springs 7.5 minute quadrangle map. Sulphur Fork drains a watershed of approximately 4 square miles. Elevations range from about 580 feet at the mouth to 1800 feet in the headwater areas.

Mixed deciduous forest dominates the watershed. Mendocino Redwood Company owns the whole Sulphur Fork watershed. Past land uses in the watershed include timber harvests. The present land uses in the watershed are logging as well as hunting on the Wilderness Unlimited area, which is owned by MRC.

Vehicle access exists via the MRC logging road about 1 mile north of the mouth. The access road to the creek is closed to the public, and controlled by MRC. The Sulphur Fork Bridge is about 13.5 miles down the logging road.

METHODS

The habitat inventory conducted in Sulphur Fork followed the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi *et al.*, 1998). Two-person teams of DFG Scientific Aids and AmeriCorps Watershed Stewards Project (WSP) members, trained in standardized habitat inventory methods by DFG, conducted the field inventory.

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HABITAT INVENTORY COMPONENTS

The standardized habitat inventory protocol has nine components:

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated.

2. Channel Type:

As described in the *California Salmonid Stream Habitat Restoration Manual*, channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity.

3. Temperatures:

Water and air temperatures are taken in degrees Fahrenheit at the middle of the habitat unit, within one foot of the water surface.

4. Habitat Unit Type and Dimensions:

Habitat units are numbered sequentially and assigned a habitat type selected from a standard list of 24 habitat types (Appendix 1). Dewatered units are labeled "dry". The length of a described habitat unit must be equal to or greater than the streams mean wetted width. Habitat unit dimensions of mean length, mean width, mean depth, and maximum depth are measured. In pool units, maximum depth at the pool tail crest is also measured. Measurements are taken to the nearest 1/10 foot using hip chains, measuring tapes, or stadia rods.

5. Embeddedness:

Embeddedness is defined as the percent of a cobble that is surrounded or buried by fine sediment. The values are 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 is assigned to substrates deemed unsuitable for spawning due to inappropriate substrate particle size (e.g. bedrock) or other considerations. On this scale, a value of 1 indicates the highest quality of spawning substrate and a value of 5 indicates the tail crest is not suitable for spawning. Embeddedness, estimated by eye, is taken in pool habitat units at the pool tail crest.

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 by multiplying shelter value and percent cover. Using an overhead view, a

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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. A standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) is assigned according to the complexity of the cover. Thus shelter rating can range from 0-300.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. Dominant and sub-dominant substrate elements in the habitat unit are estimated by eye using a list of seven size classes. In addition, the dominant substrate composing the pool tail outs is recorded in pool habitat units.

8. Canopy:

Canopy density relates to the amount of stream shaded from the sun. Stream canopy density in the habitat unit is estimated using a handheld spherical densiometer. In addition, the area of canopy is estimated by eye into percentages of coniferous and deciduous trees.

9. Streambank Substrate and Vegetation:

Streambank substrate ranges from bedrock to silt/clay/sand, and may be covered with vegetation that enhances streambank stability. The dominant substrate type and the dominant vegetation type of both the right and left banks of the habitat unit are estimated by eye and recorded. Additionally, the percent of each bank covered by vegetation is estimated by eye and recorded.

SAMPLING STRATEGY

The sampling protocol calls for partial sampling of all habitat units within the survey reach and full sampling in approximately 10% of the habitat units. All habitat units are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth, depth of pool tail crest, dominant substrate composing the pool tail crest, and embeddedness. Habitat types encountered for the first time are fully sampled for all parameters on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for full sampling. Canopy density is recorded for every third unit, in addition to every fully described unit, giving an approximate 30% sub-sample. Air temperature, water temperature, and time of day are recorded at every tenth habitat unit (once per field form page).

DATA ANALYSIS

Data from the habitat inventory form are entered into *Habitat*, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, DFG. This program processes and summarizes the data, and produces the following tables:

- Summary of riffle, flatwater, and pool habitat types
- Summary of habitat types and measured parameters

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- Summary of pool types
- Summary of maximum pool depths by pool habitat types
- Summary of mean percent cover by habitat type
- Summary of dominant substrates by habitat type
- Summary of mean percent vegetative cover for entire stream
- Fish habitat inventory data summary
- Summary of streambank substrate and vegetation, and pool tail crest cobble embeddedness
- Mean percent of shelter cover types for entire stream

A standard set of graphics is produced from the tables for selected habitat parameters. Those included in this report are:

- Riffle, flatwater, pool habitats by percent total length
- Total pools by maximum depths
- Embeddedness
- Dominant substrate in the pool tail crests

HABITAT INVENTORY RESULTS

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

Kristi Knechtle of DFG and Josh Carron (WSP/AmeriCorps) conducted the habitat inventory field survey from September 4 & 5, 2001. The total length of stream surveyed was 2527 feet.

Flow measurements were not taken for Sulphur Fork.

Sulphur Fork was classified as an B4 channel type for the whole reach surveyed. B4 channel types are generally moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools; very stable plan and profile as well as stable banks with gravel as the dominant substrate.

Water temperatures taken during the survey period ranged from 54 to 55 degrees Fahrenheit. Air temperatures ranged from 68 to 70 degrees Fahrenheit.

Based on frequency of occurrence of Level II habitat types there were 39% riffle units, 27% flatwater units, and 17% pool units (Table 1). Based on total length of Level II habitat types there were 53% riffle units, 32% flatwater units, and 15% pool units (Table 1, Graph 2).

Nine Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles 27%, lateral-scour bedrock pools 19%, step-runs 15%, and lateral-scour boulder pools at 13%. Based on percent total length, step runs comprised 34%; low gradient riffles 28%, and lateral-scour bedrock at 12%.

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A total of 17 pools were identified (Table 3). Scour pools were most frequently encountered at 94% and comprised 94% of the total length of all pools followed by mid-channel pools at 6% and comprised 5% of the total length. Of the 17 pools, 11 (64%) had a depth of two feet or greater (Table 4, Graph 5).

A primary pool is defined as a pool with a maximum depth of at least 2 feet, occupies at least half the width of the low flow channel, and is as long as the low flow channel width. In Sulphur Fork, primary pools totaled 385 feet, or 15% of the total stream surveyed.

Of the 17 pool tail crest embeddedness estimates, 4 had a value of 1 (24%), 4 had a value of 2 (24%), 7 had a value of 3 (41%), none had a value of 4 (0%), and 2 had a value of 5 (11%) (Table 8, Graph 6). The 2 pool tail crests with an embeddedness value of 5 were rated unsuitable for spawning due to the amount of sedimentation/sand found within the gravel.

Riffle habitat types had a mean shelter rating of 7, flatwater habitat types had a mean shelter rating of 10, and pool habitats had a mean shelter rating of 4 (Table 1). Lateral-scour pools, the dominant pool type, had a mean shelter rating of 5 (Table 2).

Cover in Sulphur Fork is provided mainly by a mix of boulders, bedrock ledges, small and large woody debris, root masses, and undercut banks (Table 5). Boulders, bedrock ledges, large and small woody debris, and root masses provided the main cover in pools (Table 10).

Sand was the dominant substrate in the main habitat types (Table 6). Four of the 5 pools fully measured were dominated by sand at 100%. Three low-gradient riffles were fully measured with gravel dominating 67% and bedrock dominating 33%. Gravel was the dominant pool tail crest substrate in 14 of the 17 pool units (82%).

The mean percent canopy density for the stream reach surveyed was 87%, with deciduous and coniferous trees comprising 61% and 39%, respectively (Table 7).

Sand/silt/clay dominated the streambank substrate in 92% of the fully measured units, followed by bedrock dominating in 8% (Table 9). In the fully measured units, right streambanks had a mean vegetative cover of 72%. Left streambanks had a mean vegetative cover of 72% (Table 7). Streambank vegetation was mainly composed of deciduous trees (38%) followed by coniferous trees (57%) (Table 9).

DISCUSSION

The suitability of B4 channel types for fish habitat improvement structures is: excellent for low-stage weirs; boulder clusters; bank placed boulders; single and opposing wing-deflectors; and log cover. Numerous locations show evidence that the creek is down cutting through debris slide material, and is thus recovering from past land use practices. This kind of recovery is evident on numerous north coast streams purging themselves of excess sediment.

Water temperatures, for Sulphur Fork, recorded on the survey days were within the suitable ranges for rearing of coho salmon and steelhead. But continuous monitoring of temperature

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throughout the warm season would be needed to verify temperature suitability. Given Sulphur Fork's location near the coast and the canopy density (84%), it is doubtful that the stream temperatures are unsuitable for coho or steelhead.

For Sulphur Fork, riffles comprised 53% flatwater comprised 32%, and pools comprised 15% of the total length of this survey (Table 1, Graph 2). Primary pools composed 15% of the total length surveyed. DFG data indicates that the better coastal coho streams have as much as 40% of their total habitat length in primary pools. Pool enhancement should be considered when primary pools comprise less than that percentage.

The mean shelter ratings for flatwater, riffle, and especially pool habitats for Sulphur Fork are all much below the desirable rating of 100 (Tables 1 and 2).

The prevalence of gravel (82%) as the dominant pool tail crest substrate is generally considered suitable for spawning salmonids (Table 6, Graph 8). However, frequencies of embeddedness ratings of 3, 4, or 5 (Table 8) in Sulphur Fork indicate lower spawning substrate quality due to the presence of fine sediments, large cobble, and boulders.

The mean percent canopy density for Sulphur Fork was 84%.

RECOMMENDATIONS

- 1) Sulphur Fork should be managed as an anadromous, natural production stream. If habitat conditions sufficiently recover, consideration should be given to introduction of a compatible strain of coho salmon.
- 2) Active and potential sediment delivery from roads and other sources in the watershed should be identified, mapped, and quantified. Sources should be treated according to their potential for sediment yield to the stream and its tributaries. This kind of source control will hasten stream recovery from excess sedimentation.
- 3) Greatly increase instream wood to improve shelter rating, help sort sediments, and increase the depths of existing pools.

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

Position
(ft):

Comments:

72	Begin survey under the bridge about 30 feet upstream from the confluence with Elk Creek.
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- 258 Left bank erosion about 25 feet high and 20 feet long. Contributing fines.
- 294 Salmonid young-of-the-year (YOY) noted in this unit. Around five or six were observed.
- 364 Undercut bank erosion about four feet high and 35 feet long.
- 387 Undercut bank from previous unit extends into this unit.
- 457 Undercut bank shelter on the left bank. One to two feet deep and 25 feet long.
- 635 Salmonids present in pool.
- 851 Salmonids present.
- 1019 Salmonids present.
- 1038 Purple moss/ bacteria / sulphur oozing from cracks in a boulder into the pool. Producing a purple milky substance on the bottom of the pool and top layer of the water.
- 1122 Narrow gage rail tracks in the stream channel.
- 1142 Large woody debris (LWD) pile on the right bank. Eight feet high, and 20 feet long. Water flows over root wad and plunges into the pool below.
- 1192 Possible barrier to YOY going upstream. Substrate pile up at the top of a LWD accumulation. Left bank erosion 12 feet long and 20 feet high.
- 1205 LWD accumulation 10 feet high, 25 feet wide, and 10 feet deep. Possible fish barrier. Sediment pile at the top of the LWD pile.
- 1360 This unit was 155 feet of dry channel. Water seeping under the sediment.
- 1620 Root wad with LWD and small woody debris (SWD) on the right bank contributing to the scour on the left bank.
- 1983 Past restoration work done in this unit. Tree stumps cabled into the channel to create pool and stop bank erosion.
- 2233 Water seeping from a spring on the right bank.
- 2517 Tributary enters on the left bank hardly any flow at the time of the survey.
- 2527 End of survey. Car size boulder in the middle of the channel with a LWD accumulation on top of the boulder with sedimentation piled behind. No salmonids have been noted since habitat unit 0028. Salamander noted in this unit.

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REFERENCES

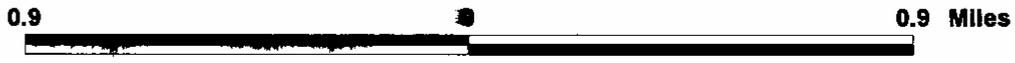
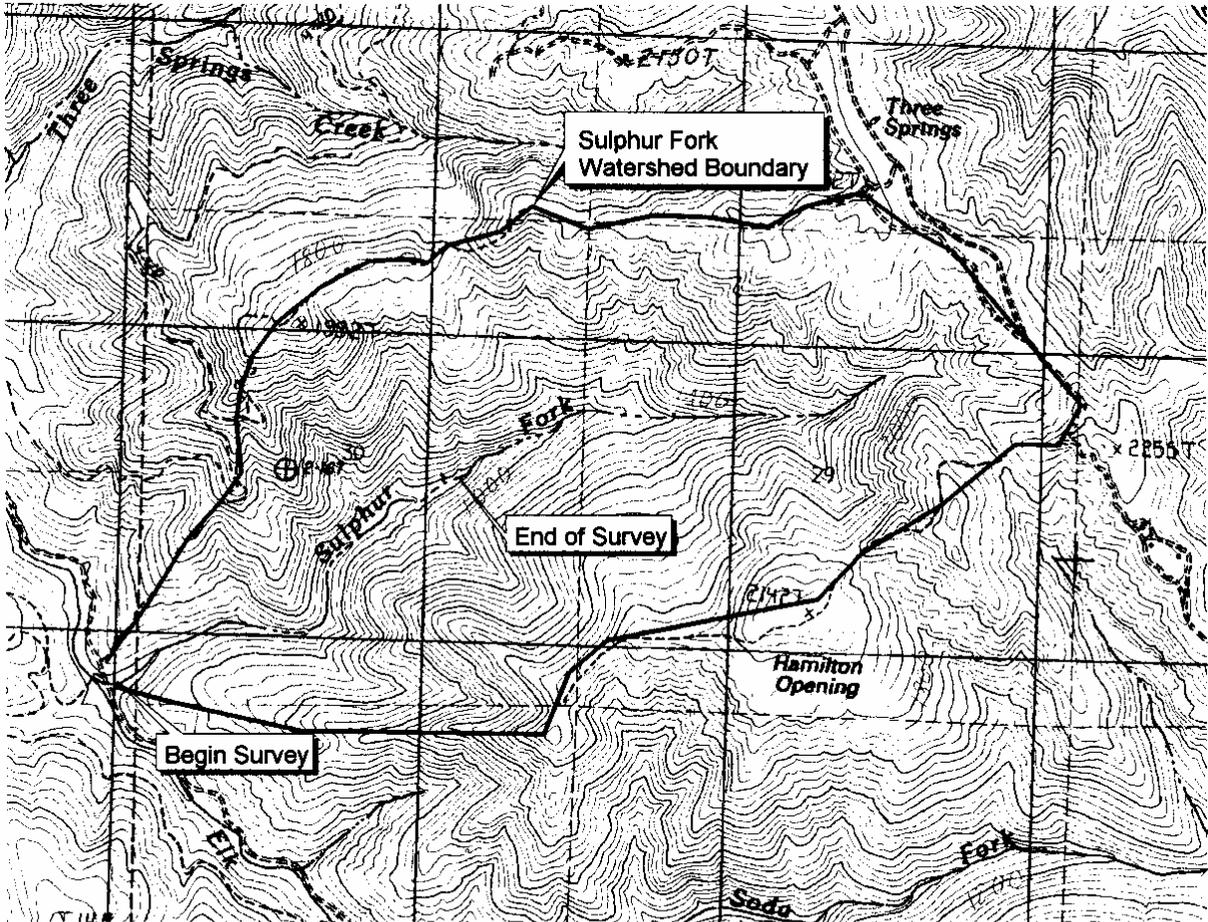
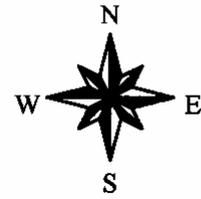
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Appendix 1: HABITAT TYPE KEY

<u>LEVEL II</u> <i>Name</i>	<u>LEVEL III</u> <i>Name</i>	<u>LEVEL IV</u> <i>Name</i>	<i>Letter, Number</i>
RIFFLE	Riffle	Low Gradient Riffle	[LGR] 1.1
		High Gradient Riffle	[HGR] 1.2
	Cascade	Cascade	[CAS] 2.1
		Bedrock Sheet	[BRS] 2.2
FLATWATER	Flatwater	Pocket Water	[POW] 3.1
		Glide	[GLD] 3.2
		Run	[RUN] 3.3
		Step Run	[SRN] 3.4
		Edgewater	[EDW] 3.5
POOL	Main Channel Pool	Trench Pool	[TRP] 4.1
		Mid-Channel Pool	[MCP] 4.2
		Channel Confluence Pool	[CCP] 4.3
		Step Pool	[STP] 4.4
	Scour Pool	Corner Pool	[CRP] 5.1
		Lateral Scour Pool - Log Enhanced	[LSL] 5.2
		Lateral Scour Pool - Root Wad Enhanced	[LSR] 5.3
		Lateral Scour Pool - Bedrock Formed	[LSBk] 5.4
		Lateral Scour Pool - Boulder Formed	[LSBo] 5.5
		Plunge Pool	[PLP] 5.6
	Backwater Pool	Secondary Channel Pool	[SCP] 6.1
		Backwater Pool - Boulder Formed	[BPB] 6.2
		Backwater Pool - Root Wad Formed	[BPR] 6.3
		Backwater Pool - Log Formed	[BPL] 6.4
		Dammed Pool	[DPL] 6.5

Sulphur Fork Watershed Tributary to Elk Creek



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SULPHUR FORK TRIB TO ELK

Drainage: ELK CREEK TO PACIFIC OCEAN

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

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:122°34'40"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	ESTIMATED TOTAL AREA (sq.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN ESTIMATED TOTAL VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
19	3	RIFFLE	39	70	1336	53	5.3	0.3	293	5566	86	1641	0	7
13	4	FLATWATER	27	62	806	32	7.5	0.5	285	3703	121	1572	0	10
17	17	POOL	35	23	385	15	11.8	1.4	245	4161	356	6047	291	4
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq. ft.)		TOTAL VOL. (cu. ft.)			
49	24				2527				13421		9260			

SULPHUR FORK TRIB TO ELK

Drainage: ELK CREEK TO PACIFIC OCEAN

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:122°34'40"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN MAXIMUM DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN EST. VOLUME (cu.ft.)	TOTAL EST. VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING	MEAN CANOPY
19	3	LGR	39	70	1336	53	5	0.3	0.7	293	5566	86	1641	0	7	84
7	3	RIN	14	37	259	10	7	0.5	1.0	205	1439	91	640	0	12	92
6	1	SRN	12	91	547	22	8	0.4	1.0	523	3139	209	1256	0	5	66
1	1	MCP	2	23	23	1	10	1.1	1.5	230	230	253	253	184	5	91
1	1	LSL	2	19	19	1	9	1.3	2.0	163	163	211	211	146	10	91
6	6	LSR	12	23	135	5	13	1.3	2.3	257	1544	371	2227	100	5	94
7	7	LSRk	14	23	158	6	12	1.3	2.8	251	1759	365	2552	309	1	87
1	1	LSBo	2	30	30	1	9	1.1	2.1	257	257	282	282	205	5	89
1	1	PLP	2	20	20	1	11	2.5	3.3	209	209	523	523	460	20	75
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)					TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)				
49	24				2527					14305		9584				

SULPHUR FORK TRIB TO ELK

Drainage: ELK CREEK TO PACIFIC OCEAN

Table 3 - SUMMARY OF POOL TYPES

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:122°34'40"

HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	MEAN LENGTH (ft.)	TOTAL LENGTH (ft.)	PERCENT TOTAL LENGTH	MEAN WIDTH (ft.)	MEAN DEPTH (ft.)	MEAN AREA (sq.ft.)	TOTAL AREA (sq.ft.)	MEAN EST. VOLUME (cu.ft.)	TOTAL EST. VOLUME (cu.ft.)	MEAN RESIDUAL POOL VOL (cu.ft.)	MEAN SHELTER RATING
1	1	MAIN	6	23	23	6	10.0	1.1	230	230	253	253	184	5
16	16	SCOUR	94	23	362	94	11.9	1.4	246	3921	362	5794	298	4
TOTAL UNITS	TOTAL UNITS				TOTAL LENGTH (ft.)				TOTAL AREA (sq.ft.)		TOTAL VOL. (cu.ft.)			
17	17				385				4161		6047			

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SULPHUR FORK TRIB TO ELK

Drainage: ELK CREEK TO PACIFIC OCEAN

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

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:123°34'40"

UNITS MEASURED	HABITAT TYPE	HABITAT PERCENT OCCURRENCE	<1 FOOT		1--<2 FT.		2--<3 FT.		3--<4 FT.		≥4 FEET	
			MAXIMUM DEPTH	PERCENT OCCURRENCE								
1	MCP	6	0	0	1	100	0	0	0	0	0	0
1	L&L	6	0	0	0	0	1	100	0	0	0	0
6	L&R	35	0	0	2	33	4	67	0	0	0	0
7	L&Rk	41	0	0	3	43	4	57	0	0	0	0
1	L&Bo	6	0	0	0	0	1	100	0	0	0	0
1	FLP	6	0	0	0	0	0	0	1	100	0	0

TOTAL
UNITS
17

SULPHUR FORK TRIB TO ELK

Drainage: ELK CREEK TO PACIFIC OCEAN

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:123°34'40"

UNITS MEASURED	UNITS FULLY MEASURED	HABITAT TYPE	MEAN % UNDERCUT	MEAN % SAND	MEAN % LMD	MEAN % ROOT MASS	MEAN % TERR. VEGETATION	MEAN % AQUATIC VEGETATION	MEAN % WHITE WATER	MEAN % BOULDERS	MEAN % BEDROCK LEDGES
			BANKS								
19	3	L&R	0	0	0	0	15	0	0	68	17
7	3	RUN	2	7	7	7	0	0	0	78	0
6	1	SEN	10	0	0	10	10	0	0	70	0
1	1	MCP	0	10	20	20	0	0	0	50	0
1	1	L&L	0	0	15	0	0	0	0	60	25
6	1	L&R	10	20	10	40	0	0	0	20	0
7	1	L&Rk	0	10	0	0	10	0	0	20	60
1	1	L&Bo	0	0	0	0	0	0	0	100	0
1	1	FLP	0	10	40	0	0	0	10	20	20

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Drainage: ELK CREEK TO PACIFIC OCEAN

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE

Survey Dates: 09/04/01

Confluence Location: QUAD: COLD SPRIN LEGAL DESCRIPTION: T14NR16WS36 LATITUDE:39°2'13" LONGITUDE:123°34'40"

TOTAL HABITAT UNITS	UNITS FULLY MEASURED	HABITAT TYPE	% TOTAL SILT/CLAY DOMINANT	% TOTAL SAND DOMINANT	% TOTAL GRAVEL DOMINANT	% TOTAL SM COBBLE DOMINANT	% TOTAL LG COBBLE DOMINANT	% TOTAL BOULDER DOMINANT	% TOTAL BEDROCK DOMINANT
19	3	LGR	0	0	67	0	0	0	33
7	3	RUN	0	33	33	0	0	33	0
6	1	SRN	0	0	100	0	0	0	0
1	1	MCP	0	100	0	0	0	0	0
1	1	LSL	0	100	0	0	0	0	0
6	1	LGR	0	0	0	0	100	0	0
7	1	LSBK	0	100	0	0	0	0	0
1	1	LSBO	0	100	0	0	0	0	0
1	1	FLP	0	0	0	0	0	100	0

TABLE 7

SULPHUR FORK - ELK CREEK

Summary of Mean Percent Vegetative Cover for Entire Stream

Mean Percent Canopy	Mean Percent Conifer	Mean Percent Deciduous	Mean Percent Open Units	Mean Right Bank Percent Cover	Mean Left Bank Percent Cover
87	39	61	0	72	72

Note: Mean percent conifer and deciduous 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 8. FISH HABITAT INVENTORY DATA SUMMARY

STREAM NAME: SULPHUR FORK TRIB TO ELK

SAMPLE DATES:

STREAM LENGTH: 2527 ft.

LOCATION OF STREAM MOUTH:

USGS Quad Map: COLD SPRIN

Legal Description: T14NR16WS36

Latitude: 39°2'13"

Longitude: 123°34'40"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

Channel Type: B4

Channel Length: 2527 ft.

Riffle/flatwater Mean Width: 7 ft.

Total Pool Mean Depth: 1.4 ft.

Base Flow: 0.0 cfs

Water: 054- 055°F Air: 068-070°F

Dom. Bank Veg.: Coniferous Trees

Vegetative Cover: 72%

Dom. Bank Substrate: Silt/Clay/Sand

Canopy Density: 84%

Coniferous Component: 39%

Deciduous Component: 61%

Pools by Stream Length: 15%

Pools >=3 ft.deep: 6%

Mean Pool Shelter Rtn: 13

Dom. Shelter: Boulders

Occurrence of LOD: 8%

Dry Channel: 0 ft.

Embeddness Value: 1. 24% 2. 29% 3. 35% 4. 0% 5. 12%

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TABLE 9

SULPHUR FORK

Mean Percentage of Dominant Substrate

Dominant Class of Substrate	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Bedrock	0	2	7.69
Boulder	0	0	0
Cobble/Gravel	0	0	0
Silt/clay	13	11	92.31

Mean Percentage of Dominant Vegetation

Dominant Class of Vegetation	Number Units Right Bank	Number Units Left Bank	Total Mean Percent
Grass	0	0	0
Brush	0	1	3.85
Decid. Trees	6	4	38.46
Conif. Trees	7	8	57.69
No Vegetation	0	0	0

Total stream average embeddedness value for pool 2.47

TABLE 10. MEAN PERCENT OF SHELTER COVER TYPES FOR ENTIRE STREAM

Stream: SULPHUR FORK TRIB TO Drainage: ELK CREEK TO PACIFIC OCEAN

Survey Date: 09/04/01

	RIFFLES	FLATWATER	POOLS
UNDERCUT BANKS	1.92	3.75	1.67
SMALL WOODY DEBRIS	5.38	5	8.33
LARGE WOODY DEBRIS	8.08	5	14.17
ROOTS	6.92	7.50	10
TERRESTRIAL VEG	5	2.50	1.67
AQUATIC VEG	0	0	0
WHITEWATER	0.77	0	1.67
BOULDERS	60	76.25	45
BEDROCK LEDGES	11.92	0	17.50

Sulphur Aid

Sulphur Fork: Substrate Composition in Pool Tail-Outs

