# STREAM INVENTORY REPORT

## South Fork Elk Creek

## 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 the South Fork Elk Creek. The creek is named South Fork Elk Creek on US Geological Survey maps. 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

South Fork Elk, located in Mendocino County, California, is a tributary to Elk Creek. SF Elk's legal description at the confluence with Elk Creek is T14NR16WS7. Its mouth is located at 39°5'26" north latitude and 123°40'29" west longitude. SF Elk is a second order stream and has approximately 2.5 miles of blue line stream according to the USGS Mallo Pass 7.5 minute quadrangle map. SF Elk drains a watershed of approximately four square miles. Elevations range from about 120 feet at the mouth to 1580 feet in the headwater areas.

Mixed deciduous forest dominates the watershed. Mendocino Redwood Company owns the whole South Fork Elk watershed. Past land use in the watershed was mainly timber harvests and road construction. The present land use in the watershed is logging.

Vehicle access exists via the MRC logging road about 1 mile north of the mouth of Elk Creek on Highway 1. The access road to the creek is closed to the public, and controlled by MRC. At the 3.5-mile marker turn right down the logging road and take it down to the creek. The South Fork is about a 15-minute walk down stream from the road.

## METHODS

The habitat inventory conducted in South Fork of Elk Creek 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.

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

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

**South Fork Elk Creek**

- 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, Kate Grossman, and Beth Wood (WSP/AmeriCorps) conducted the habitat inventory field survey from October 17, 2001. The total length of stream surveyed was 2241 feet.

Flow measurements were not taken on South Fork Elk Creek.

South Fork of Elk Creek was classified as a B4 channel type for the whole reach surveyed. B4 channel types are moderately entrenched, moderate gradient, riffle dominated channel with infrequently spaced pools. Very stable plan and profile. Stable banks with mainly a gravel channel.

Water temperatures taken during the survey period ranged from 54 to 55 degrees Fahrenheit. Air temperatures ranged from 60 to 64 degrees Fahrenheit.

Based on frequency of occurrence of Level II habitat types there were 31% riffle units, 23% flatwater units, and 44% pool units (Table 1). Based on total length of Level II habitat types there were 19% riffle units, 34% flatwater units, and 21% pool units (Table 1).

Five Level IV habitat types were identified (Table 2). The most frequent habitat types by percent occurrence were low gradient riffles 31%, lateral-scour log pools at 26%, step-runs at 23%, and mid-channel pools at 13%. Based on percent total length, step runs comprised 34%, low gradient riffles 19%, and lateral-scour logs at 14%.

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A total of 17 pools were identified (Table 3). Scour pools were most frequently encountered at 71% and comprised 76% of the total length of all pools followed by mid-channel pools at 29% and comprised 24% of the total length. Of the 17 pools, 4 (23%) had a depth of two feet or greater (Table 4).

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 South Fork Elk, primary pools totaled 477 feet, or 21% of the total stream surveyed.

Of the 17 pool tail crest embeddedness estimates, none had a value of 1 (0%), 10 had a value of 2 (59%), 6 had a value of 3 (35%), 1 had a value of 4 (6%), and none had a value of 5 (0%) (Table 8). None of the pool tail crests were rated with an embeddedness value of 5, which would mean they were unsuitable for spawning.

Riffle habitat types had a mean shelter rating of 5, flatwater habitat types had a mean shelter rating of 10, and pool habitats had a mean shelter rating of 19 (Table 1). Lateral-scour pools, the dominant pool type, had a mean shelter rating of 22 (Table 2).

Cover in South Fork Elk is provided mainly by a mix of large and small woody debris, undercut banks, root mass, and terrestrial vegetation. (Table 5). Large woody debris, small woody debris, and roots provided the main cover in pools (Table 10).

Gravel was the dominant substrate in the main habitat types (Table 6). Three of the five main habitat types were dominated by gravel. Two low-gradient riffles were fully measured with gravel dominating 50% and small cobble dominating 50%. Gravel was the dominant pool tail crest substrate in all of the 17 pool units (100%).

The mean percent canopy density for the stream reach surveyed was 91%, with deciduous and coniferous trees comprising 69% and 31%, respectively (Table 7).

Sand/silt/clay dominated the streambank substrate in 94% of the fully measured units, followed by cobble/gravel dominating in 5% (Table 9). In the fully measured units, right streambanks had a mean vegetative cover of 90%. Left streambanks had a mean vegetative cover of 88% (Table 7). Streambank vegetation was mainly composed of deciduous trees (55%) followed by coniferous trees (38%) (Table 9).

## DISCUSSION

The suitability of B4 channel types for fish habitat improvement structures is excellent for low stage plunge weirs; boulder clusters and bank placed boulders as well as 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 South Fork Elk, recorded on the survey days (54 – 55 F) were within the suitable ranges for rearing of coho salmon and steelhead. But continuous monitoring of

temperature throughout the warm season would be needed to verify temperature suitability. Given South Fork Elk's location near the coast and the canopy density (91%), it is doubtful that the stream temperatures are unsuitable for coho or steelhead.

For South Fork Elk, riffles comprised 19% flatwater comprised 34%, and pools comprised 21% of the total length of this survey (Table 1). Primary pools composed 21% 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 South Fork Elk are all much below the desirable rating of 100 (Tables 1 and 2).

The prevalence of gravel (100%) 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 and 4 (Table 8) in South Fork Elk indicate lower spawning substrate quality due to the presence of fine sediments found within the gravel.

The mean percent canopy density for South Fork Elk was 91%.

## RECOMMENDATIONS

1) South Fork Elk 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: |
|---|---|
| 38 | Begin survey 72 feet up from the confluence with Elk Creek. There were 72 feet of dry channel from the confluence to where the habitat inventory began. |

**South Fork Elk Creek**

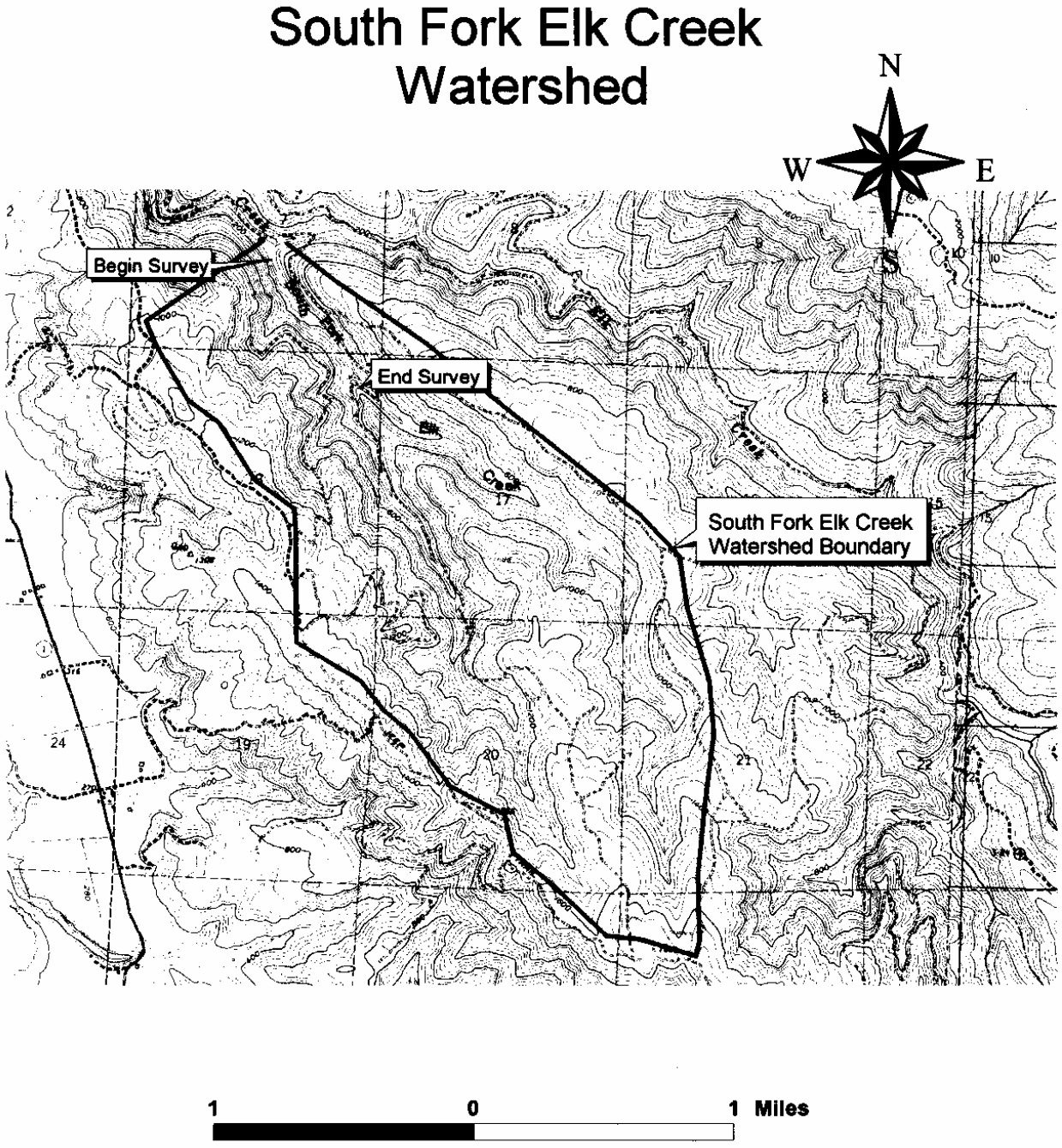
| | |
|---|---|
| 119 | MRC hobo temp gage located 44 feet into this unit. |
| 143 | Salmonid noted in this unit. |
| 438 | Salmonids noted in this unit. |
| 701 | Bank undercut beneath log. About 1.5 deep and three feet long. |
| 749 | Log weir in channel at the top of the unit about 15 feet long. |
| 761 | LWD pile on the left bank. Three feet high and 20 feet long. |
| 817 | LWD accumulation 10 feet high, 20 feet wide, and 20 feet long. |
| 1072 | Log jam 18 feet long, 10 feet high, and 25 feet wide with sediment piled at the top of the jam. Possible barrier for downstream migrating young-of-the-year (YOY). Salmonids observed upstream from the logjam. |
| 1104 | Salmonids noted. |
| 1301 | Most of this unit was under a LWD pile. Eight feet high, 33 feet long, and 40 feet wide. Retaining sediment at the top of the pile. |
| 1472 | LWD pile seven feet high, 20 feet long, and 30 feet wide. |
| 1525 | Small tributary enters on the left bank. Non-anadromous. |
| 2103 | Dry channel for 578 feet. 400 feet up the dry channel a tributary enters on the left bank that is currently dry. |
| 2241 | End of survey. LWD accumulation at the top of the pool. 15 feet high, 30 feet wide, 12 feet long. Significant gradient increase at the top of the LWD pile between 10 and 20 percent increase. Sediment covering the entire bottom of the pool. Believed to be the end of anadromy. |

REFERENCES

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

Appendix 1: HABITAT TYPE KEY

| **LEVEL II** *Name* | **LEVEL III** *Name* | **LEVEL IV** *Name* | *Letter Number* |
|---|---|---|---|
| **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 |


South Fork Elk Creek
Watershed
N
W
E
S
Begin Survey
End Survey
South Fork Elk Creek
Watershed Boundary
1
0
1 Miles

## South Fork Elk Creek

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 1 - SUMMARY OF RIFFLE, FLATWATER, AND POOL HABITAT TYPES — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| HABITAT UNITS | UNITS FULLY MEASURED | HABITAT TYPE | HABITAT PERCENT OCCURRENCE | MEAN LENGTH (ft.) | TOTAL LENGTH (ft.) | PERCENT TOTAL LENGTH | MEAN WIDTH (ft.) | MEAN DEPTH (ft.) | MEAN AREA (sq.ft.) | ESTIMATED TOTAL AREA (sq.ft.) | MEAN VOLUME (cu.ft.) | ESTIMATED TOTAL VOLUME (cu.ft.) | MEAN RESIDUAL POOL VOL (cu.ft.) | MEAN SHELTER RATING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 2 | RIFFLE | 31 | 35 | 417 | 19 | 7.5 | 0.2 | 159 | 1906 | 30 | 355 | 0 | 5 |
| 9 | 1 | FLATWATER | 23 | 85 | 769 | 34 | 8.0 | 0.5 | 616 | 5540 | 308 | 2770 | 0 | 10 |
| 17 | 17 | POOL | 44 | 28 | 477 | 21 | 10.4 | 1.1 | 302 | 5141 | 351 | 5967 | 227 | 19 |

| TOTAL UNITS | TOTAL UNITS | TOTAL LENGTH (ft.) | TOTAL AREA (sq. ft.) | TOTAL VOL. (cu. ft.) |
|---|---|---|---|---|
| 38 | 20 | 1663 | 12588 | 9092 |

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 2 - SUMMARY OF HABITAT TYPES AND MEASURED PARAMETERS — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| HABITAT UNITS | UNITS FULLY MEASURED | HABITAT TYPE | HABITAT OCCURRENCE | MEAN LENGTH | TOTAL LENGTH | TOTAL LENGTH | MEAN WIDTH | MEAN DEPTH | MAXIMUM DEPTH | MEAN AREA | TOTAL AREA EST. | MEAN VOLUME | TOTAL VOLUME EST. | MEAN RESIDUAL POOL VOL | MEAN SHELTER RATING | MEAN CANOPY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | | | % | ft. | ft. | % | ft. | ft. | ft. | sq.ft. | sq.ft. | cu.ft. | cu.ft. | cu.ft. | | % |
| 12 | 2 | LGR | 31 | 35 | 417 | 19 | 8 | 0.2 | 0.5 | 159 | 1906 | 30 | 355 | 0 | 5 | 80 |
| 9 | 1 | SRN | 23 | 85 | 769 | 34 | 8 | 0.5 | 1.3 | 616 | 5540 | 308 | 2770 | 0 | 10 | 88 |
| 5 | 5 | MCP | 13 | 23 | 115 | 5 | 10 | 1.1 | 2.7 | 225 | 1126 | 266 | 1330 | 166 | 7 | 96 |
| 10 | 10 | LSL | 26 | 32 | 319 | 14 | 11 | 1.1 | 2.5 | 362 | 3624 | 424 | 4236 | 279 | 22 | 92 |
| 2 | 2 | LSR | 5 | 22 | 43 | 2 | 10 | 1.0 | 2.5 | 196 | 391 | 201 | 401 | 117 | 38 | 90 |

| TOTAL UNITS | TOTAL UNITS | LENGTH (ft.) | AREA (sq.ft) | TOTAL VOL. (cu.ft) |
|---|---|---|---|---|
| 38 | 20 | 1663 | 12588 | 9092 |

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 3 - SUMMARY OF POOL TYPES — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| 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 EST. (sq.ft.) | MEAN VOLUME (cu.ft.) | TOTAL VOLUME EST. (cu.ft.) | MEAN RESIDUAL POOL VOL. (cu.ft.) | MEAN SHELTER RATING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | MAIN | 29 | 23 | 115 | 24 | 9.6 | 1.1 | 225 | 1126 | 266 | 1330 | 166 | 7 |
| 12 | 12 | SCOUR | 71 | 30 | 362 | 76 | 10.7 | 1.1 | 335 | 4015 | 386 | 4637 | 252 | 24 |

| TOTAL UNITS | TOTAL UNITS | TOTAL LENGTH (ft.) | TOTAL AREA (sq.ft.) | TOTAL VOL. (cu.ft.) |
|---|---|---|---|---|
| 17 | 17 | 477 | 5141 | 5967 |

## South Fork Elk Creek

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 4 - SUMMARY OF MAXIMUM POOL DEPTHS BY POOL HABITAT TYPES — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| UNITS MEASURED | HABITAT TYPE | HABITAT PERCENT OCCURRENCE | <1 FOOT MAXIMUM DEPTH | <1 FOOT PERCENT OCCURRENCE | 1-<2 FT. MAXIMUM DEPTH | 1-<2 FOOT PERCENT OCCURRENCE | 2-<3 FT. MAXIMUM DEPTH | 2-<3 FOOT PERCENT OCCURRENCE | 3-<4 FT. MAXIMUM DEPTH | 3-<4 FOOT PERCENT OCCURRENCE | >=4 FEET MAXIMUM DEPTH | >=4 FEET PERCENT OCCURRENCE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | MCP | 29 | 0 | 0 | 4 | 80 | 1 | 20 | 0 | 0 | 0 | 0 |
| 10 | LSL | 59 | 0 | 0 | 8 | 80 | 2 | 20 | 0 | 0 | 0 | 0 |
| 2 | LSR | 12 | 0 | 0 | 1 | 50 | 1 | 50 | 0 | 0 | 0 | 0 |

TOTAL UNITS
17

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 5 - SUMMARY OF MEAN PERCENT COVER BY HABITAT TYPE — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| UNITS MEASURED | UNITS FULLY MEASURED | HABITAT TYPE | MEAN % UNDERCUT BANKS | MEAN % SMD | MEAN % LMD | MEAN % ROOT MASS | MEAN % TERR. VEGETATION | MEAN % AQUATIC VEGETATION | MEAN % WHITE WATER | MEAN % BOULDERS | MEAN % BEDROCK LEDGES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 2 | LGR | 0 | 25 | 50 | 0 | 25 | 0 | 0 | 0 | 0 |
| 9 | 1 | SRN | 70 | 0 | 25 | 0 | 5 | 0 | 0 | 0 | 0 |
| 5 | 3 | MCP | 12 | 65 | 20 | 3 | 0 | 0 | 0 | 0 | 0 |
| 10 | 3 | LSL | 0 | 7 | 57 | 0 | 0 | 0 | 3 | 0 | 0 |
| 2 | 1 | LSR | 0 | 10 | 60 | 30 | 0 | 0 | 0 | 0 | 0 |

SOUTH FORK ELK CREEK — Drainage: MAIN STEM ELK CREEK

Table 6 - SUMMARY OF DOMINANT SUBSTRATES BY HABITAT TYPE — Survey Dates: 10/16/01 - 10/17/01

Confluence Location: QUAD: MALLO PASS LEGAL DESCRIPTION: T14NR16WS07 LATITUDE:39°5'27" LONGITUDE:123°40'29"

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 12 | 2 | LGR | 0 | 0 | 50 | 50 | 0 | 0 | 0 |
| 9 | 1 | SRN | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 5 | 3 | MCP | 0 | 33 | 67 | 0 | 0 | 0 | 0 |
| 10 | 2 | LSL | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| 2 | 1 | LSR | 0 | 0 | 100 | 0 | 0 | 0 | 0 |

**TABLE 7**

SOUTH 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 |
|---|---|---|---|---|---|
| 91 | 31 | 69 | 0 | 90 | 88 |

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: SOUTH FORK ELK CREEK
SAMPLE DATES:
STREAM LENGTH: 2241 ft.
LOCATION OF STREAM MOUTH:
USGS Quad Map: MALLO PASS — Latitude: 39°5'27"
Legal Description: T14NR16WS07 — Longitude: 123°40'29"

SUMMARY OF FISH HABITAT ELEMENTS BY STREAM REACH

STREAM REACH 01

| | |
|---|---|
| Channel Type: B4 | Canopy Density: 91% |
| Channel Length: 1663 ft. | Coniferous Component: 31% |
| Riffle/flatwater Mean Width: 8 ft. | Deciduous Component: 69% |
| Total Pool Mean Depth: 1.1 ft. | Pools by Stream Length: 29% |
| Base Flow: 0.0 cfs | Pools >=3 ft.deep: 0% |
| Water: 054- 055°F Air: 060-064°F | Mean Pool Shelter Rtn: 46 |
| Dom. Bank Veg.: Deciduous Trees | Dom. Shelter: Large Woody Debris |
| Vegetative Cover: 89% | Occurrence of LOD: 42% |
| Dom. Bank Substrate: Silt/Clay/Sand | Dry Channel: 0 ft. |

Embeddness Value: 1. 0% 2.59% 3. 35% 4. 6% 5. 0%

Length of stream section not surveyed within survey reach and not included in above totals or calculations: 578 ft.

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

**Stream: SOUTH FORK ELK CREEKDrainage: ELK CREEK**

**Survey Date: 10/16/01 - 10/17/01**

| | RIFFLES | FLATWATER | POOLS |
|---|---|---|---|
| UNDERCUT BANKS | 10.50 | 70 | 5 |
| SMALL WOODY DEBRIS | 27.50 | 0 | 32.14 |
| LARGE WOODY DEBRIS | 41.50 | 25 | 41.43 |
| ROOTS | 4 | 0 | 5.71 |
| TERRESTRIAL VEG | 5.50 | 5 | 0 |
| AQUATIC VEG | 0 | 0 | 0 |
| WHITEWATER | 1 | 0 | 1.43 |
| BOULDERS | 0 | 0 | 0 |
| BEDROCK LEDGES | 0 | 0 | 0 |

**TABLE 9**

**SOUTH FORK ELK CREEK**

Mean Percentage of Dominant Substrate

| Dominant Class of Substrate | Number Units Right Bank | Number Units Left Bank | Total Mean Percent |
|---|---|---|---|
| Bedrock | 0 | 0 | 0 |
| Boulder | 0 | 0 | 0 |
| Cobble/Gravel | 0 | 1 | 5.56 |
| Silt/clay | 9 | 8 | 94.44 |

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 | 5.56 |
| Decid. Trees | 6 | 4 | 55.56 |
| Conif. Trees | 3 | 4 | 38.89 |
| No Vegetation | 0 | 0 | 0 |

Total stream average embeddedness value for pool 2.47

South Fork Elk Creek: Substrate Composition in Pool Tail-Outs