SCOTT RIVER WATERSHED
ADULT COHO SALMON SPAWNING SURVEY
December 2002- January 2003

Submitted by:
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In fulfillment of contract with the
Siskiyou Resource Conservation District
Etna, California
and the
Department of Fish and Game
Dennis Maria, Associate Fisheries Biologist
Yreka, California

PREFACE & ACKNOWLEDGMENTS

As in 2001-2002, this project was essentially unfunded and was accomplished in a cooperative effort by individuals from several agencies and organizations and with the cooperation of many local landowners. A concerted effort was made to bring all interested and responsible parties together in order to continue to learn about the complexities of the coho salmon population in the Scott River watershed. Working together, we tried to cover as much area as possible and to share our findings with each other. It is our hope that we can continue to learn together, to build trust and reduce fear and polarization through acquiring knowledge and by working together toward solutions. Special thanks go to all the residents and landowners in the Scott River Watershed who supported this project.

This project was made possible by the efforts and contributions of the following individuals:

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TABLE OF CONTENTS

INTRODUCTION

Coho salmon (Oncorhynchus kisutch) migrate, spawn, and rear in the Scott River watershed (CDFG, 1974) but information on the run is quite limited (Leidy & Leidy, 1984). The habitat distribution of coho salmon in the Scott River stream system was referenced in the 1970s by the California Department of Fish and Game (CDFG) through stream lists (CDFG, 1972) and several maps, one of spawning areas (CDFG, 1974) and one of relative value of habitat (USSCS, 1972). More recently, the Klamath National Forest has compiled and updated a "map of anadromy" from various sources and surveys for the Scott River watershed (USFS, 2000). The Department of Fish and Game GIS system analysts are in the process of updating coho salmon distribution in the Scott River watershed and elsewhere in the Klamath River Basin, upstream of the Trinity River, based on observations through January 2003 (D.Maria, CDFG, pers.comm.). Brown et al. (1994) state that the Scott River probably holds the largest number of native coho fish of the Klamath River basin's larger tributary systems. Spawning data are sketchy. Observations of adult coho salmon in the mainstem of the Scott River were occasionally seen during the end of the annual CDFG spawning surveys for the fall-run Chinook salmon (Oncorhynchus tshawytscha), but were not noted in the annual reports (M. Pisano, CDFG, pers. comm.). Spawning coho adults (20+ redds) were observed in the Kelsey Creek spawning channel in 1987 (J.Kilgore, USFS, pers.comm.). In 2001-2002, the first field surveys that targeted the coho spawning population in the Scott River watershed took place (Maurer, 2002). The adult coho salmon run, reported at Iron Gate Hatchery in 2001-2002, totaled 2466 fish, of which 972 were males (107 were "jacks") and 1494 were females. In 2002-2003, the total number of coho salmon reported was 1193, of which 566 were males (108 were "jacks") and 627 were females (K.Rushton, CDFG, pers.comm.).

Recent data on juvenile coho in the Scott River system are scattered but improving. They are annually monitored by CDFG in French Creek (found in 1993, 1996, 1999, 2000, 2001,2002) as part of a watershed monitoring effort (Maria, 2002) and were incidentally observed in other tributaries: Tompkins Cr. (1989); Canyon Cr. (1988); Shackleford / Mill Cr. (1996); Kidder Creek (1996, 1997); upper Scott River (1996, 1997); and Big Mill Creek - Callahan (1994) (D.Maria, CDFG, pers.comm.). Juvenile presence/absence surveys are being conducted over a three-year period in those streams identified by Brown and Moyle (1994) by CDFG (B.Jong, CDFG, pers.comm.). Klamath National Forest biologists have also noted juvenile coho in Mill Cr.- Scott Bar (early 1980s) and lower Scott River (1989). Beginning in 2000, the CDFG and USFS together began monitoring downstream migrant coho in the lower Scott River (river mile 4.8) during the spring and summer with a rotary screw to measure abundance and timing during salmonid emigration (Chesney, 2002). Young of the year and 1+ coho salmon smolts have been observed at this outmigrant trap.

Although the 2002-2003 weather patterns were different than in 2001-2002, viewing conditions were favorable between storm windows for observing spawning activity of the coho salmon in the Scott River watershed, sub-basin of the Klamath River System. The 2002 fall flows were quite low until December 14, 2002 when the discharge (daily mean value) at the USGS gage (#11519500) increased from approximately 70 cubic feet per second (cfs) to 1060 cfs in the Scott River. Flows peaked on December 16th at 3920 cfs. Most of the fall Chinook salmon spawning was restricted to the lower reaches of the Scott River, but a few fish were observed in the valley reach in late November. One of the earliest observations of coho salmon in the Scott River occurred on November 26th when approximately 9 adult coho salmon were spotted near river mile 5.0 by crews participating in the Fall Chinook Salmon Cooperative Spawning Ground Survey. Another possible sighting of an adult coho salmon was reported by Mr. Gary Black on November 20, 2002 at Black Bridge, river mile 41.1 (G.Black, pers.comm.). Surface flows in the Scott River near the tailings at approximate river mile 52.0 were extremely low in early December, probably preventing passage above this point until the first storm on December 14, 2002.

Although funding proposals for this 2002-2003 survey were attempted by the Scott River Watershed Council, Fish Committee via the Siskiyou RCD to various funders, no grants were secured. Recognizing the need to continue to observe the coho spawning activity in the Scott River watershed, the Fish Committee agreed to coordinate a local effort with agencies and organizations contributing personnel to accomplish the field work. A small grant through CDFG was secured for this coordination effort, data management and final report writing. The objectives for the 2002-2003 survey, listed below, were determined and a workplan was developed by the Fish Committee, with approval by CDFG (included in Appendix).

Project Objectives:

1) Collect two sets of tissue samples for DNA analysis to understand the genetic relationship of the Scott River coho salmon to other stocks and collect two sets of scale samples to understand the life history of the Scott River coho salmon. One set of tissue and scale samples will go to NOAA Fisheries and one to CDFG.
2) Document the presence of coho salmon in streams within the historic range of distribution and in new tributaries not previously documented within the Scott River system. Survey "index reaches", as delineated in the 2001-2002 survey, once per week during the spawning season (December 1, 2002-January 31, 2003), or as determined by run timing. An additional index survey reach was added on the mainstem Scott River near the tailing piles.
3) Document the extent of distribution in each of the tributaries where adult coho salmon were observed.
4) Determine the run timing and duration of adult coho salmon spawning.
5) Determine additional site specific habitat information as they relate to spawning: velocity, substrate composition, temperature and stream gradient.

To determine coho salmon abundance within the watershed would have required a fully developed study plan, increased access to stream reaches and additional funding and number of field personnel. Therefore, estimation of coho salmon abundance was not incorporated into this year's survey effort.

Staff from the CDFG coordinated the initial contacts with private landowners, developed written landowner access agreements with them and organized local organizations and agency personnel to accomplish these objectives. (An example of the Landowner Agreement is contained in the Appendix). A training session was facilitated by CDFG on December 9th for all of the survey participants (see Training Agenda in Appendix). The contractor organized all field logistics and personnel, coordinated with landowners each day, maintained data management and quality control and completed this final report.

This report documents the findings during the survey period, from December 1, 2002 through January 31,2003. The data set and other supportive documents are included in the Appendices. This report, including the data set and photos, is available electronically through Dennis Maria, Associate Fishery Biologist, with the CDFG or through Carolyn Pimental, District Manager for the Siskiyou Resource Conservation District. The report is also available on the Siskiyou Resource Conservation District's web site, at www.sisqtel.net\~sisqrcd\srwc\index. An ArcInfo GIS coverage is available from Richard van de Water, GIS Specialist with the USFS, Klamath National Forest, Scott River Ranger District.

STUDY AREA

This report addresses adult coho salmon spawning and tissue sample collection surveys conducted within the Scott River sub-basin of the Klamath River Basin. (See Figure 1: Vicinity Map). Tributaries of the Scott River where the survey occurred are listed in Table 1 below. This table also shows the stream reaches surveyed within each tributary and indicates the river/stream mile and description of each reach.

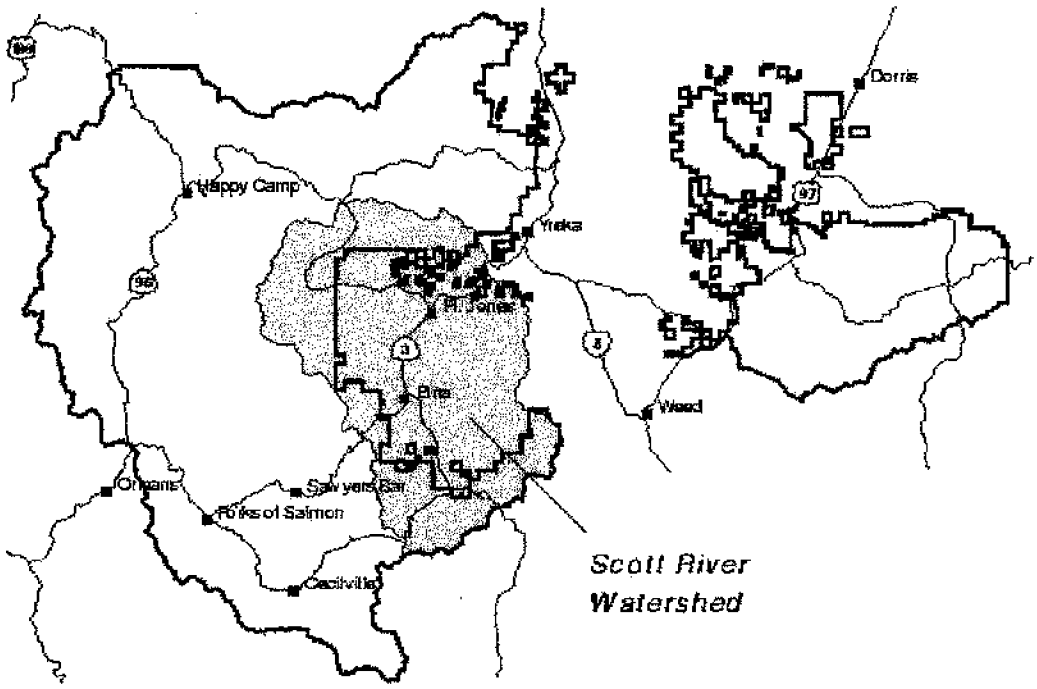
TABLE 1: LIST OF STREAMS SURVEYED BY REACH

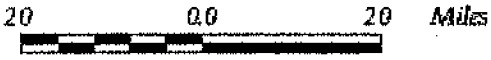
STREAM	REACH #	REACH DESCRIPTION	BEGINNING (RIVER MILE)	END (RIVER MILE)	LENGTH
Boulder Cr. (Scott River)	1	Lower Bridge-Scott River	0.2	0.0	0.2
Canyon Cr.	1	Lower-Cabin-Scott River	1.1	0.0	1.1
Clark Cr.	2	Mid	2.6	2.0	0.6
East Fork Scott	2	Lower Masterson Road	6.3	4.9	1.4
East Fork Scott	3	Upper Masterson Road	13.7	8.6	5.1
Grouse Creek (trib to East Fk.)	1	Lower	0.6	0.0	0.6
Kangaroo Cr. (trib to East Fk.)	2	Mid-USFS	2.1	1.4	0.7
Etna Cr.	1	Lower	4.1	3.6	0.5
Etna Cr.	2	Mid-TP/FGS	5.2	4.6	0.6
Ruffy Gap Trib. (trib to Etna Cr.)	1	Lower	0.4	0.0	0.4
French Cr.	2	Mid-Mainstem French	2.3	1.5	0.8
French Cr.	3	Horse Range Cr. Area	5.8	5.7	0.1
North Fk. French Cr. (trib to French Cr.)	1	Lower	0.7	0.1	0.6
Miners Cr. (trib. to French)	1	0.3 mi Upstream-Conf. of French Cr.	0.3	0.0	0.3
Miners Cr. (trib. to French)	1	Below 2nd Miners Cr. Rd Bridge	0.6	0.4	0.2
Miners Cr. (trib. to French)	2	Above 2nd Miners Cr. Rd Bridge	1.0	0.6	0.4
Horse Range Cr. (trib. to French)	1	Lower Braids-300 ft up	0.1	0.0	0.1
Indian Cr.	2	Upper	7.1	6.3	0.8
Johnson Cr.	2	Upper	4.3	4.0	0.3
Kelsey Channel	1	Channel	0.1	0.0	0.1
Kelsey Cr.	1	Barrier-Scott River	0.6	0.0	0.6
Kidder Cr	1	Lower Kidder below Hwy 3	5.8	4.7	1.1
Kidder Cr	2	Mid-Mainstem Kidder above Hwy 3	7.3	6.5	0.7
McAdams Cr. (trib to Moffett Cr.)	1	Lower	1.4	1.2	0.2
Meamber Gulch	1	Lower	0.6	0.0	0.6
Middle Cr.	1	Lower Cabin-Scott River	0.4	0.0	0.4

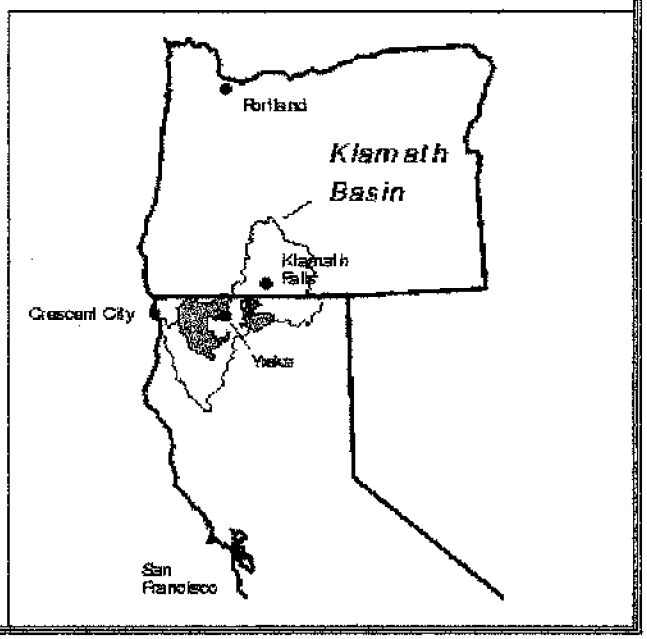
STREAM	REACH #	REACH DESCRIPTION	BEGINNING (RIVER MILE)	END (RIVER MILE)	LENGTH
Mill Cr. (Scott Bar)	1	Lower	0.5	0.0	0.5
Mill Cr. (Scott Bar)	2	Upper	2.5	1.8	0.7
Patterson Cr (Etna)	1	Mid-below Hwy 3	1.9	1.6	0.3
Patterson Cr (Etna)	2	Upper-FGS	6.1	4.7	1.4
Patterson Cr. (Scott River)	1	Lower	0.8	0.6	0.2
Rattlesnake Cr.	2	Upper	5.0	4.7	0.3
Scott River	5	Kelsey-Townsend	14.3	10.4	3.9
Scott River	6	Jones Beach-Kelsey	18.2	14.3	3.9
Scott River	7	Gaging Station-Jones Beach	21.0	18.2	2.8
Scott River	8	Meamber Gl-Above Gaging Station	21.8	21.4	0.4
Scott River	1	Mainstem in Tailings	53.8	52.7	1.1
Shackleford Cr.	1	Lower Bridge Area	1.0	0.0	1.0
Mill Cr. (trib. to Shackleford)	1	Lower- Shaclekford Cr.	0.8	0.0	0.8
Mill Cr. (trib. to Shackleford)	2	Mid-above Quartz Valley Bridge	3.1	1.7	1.4
Mill Cr. Side Ch. A	2	Mid-above Quartz Valley Bridge	unk.	unk.	0.5
Mill Cr. Side Ch. B	2	Mid-above Quartz Valley Bridge	1.1	0.0	1.1
Emigrant Cr. (trib to Mill Cr.)	1	Lower	0.8	0.0	0.8
South Fork Scott	1	Lower-Callahan/Cecilville Rd. Bridge	0.7	0.3	0.4
South Fork Scott	2	Fox Cr.-Boulder Cr.	4.0	2.1	1.9
Sugar Cr	1	Hwy 3 Bridge-Scott River	0.3	0.0	0.3
Sugar Cr	2	Upper FGS Bridge-FGS Lower Prop Line	3.3	1.2	2.1
Tompkins Cr.	1	Lower	0.6	0.0	0.6
Wildcat Cr.	1	Lower	1.1	0.0	1.1
Wildcat Cr.	2	Upper	1.7	1.7	0.0
TOTAL MILES					**46.0**

Figure 1

Klamath Basin Vicinity







STUDY METHODS

Early season observations began in late November, in conjunction with the Fall Chinook Salmon Cooperative Spawning Ground Survey (CDFG/USFS). "Spot checks" were conducted throughout the lower Scott River, by snorkel divers or from dry land by observers walking along the banks and bridge crossings to determine the beginning of the coho salmon spawning run entering the Scott River sub-basin. An all-day training session took place on December 9, 2002 for all participants. All of the persons that participated in the survey were either experienced fisheries biologists or trained field technicians. Fish identification (see details in next section), tissue and scale sample collection and handling procedures, field mapping, data sheets, use of hand-held Garmin GPS units and safety procedures were reviewed during the training session.

Fish Species Identification, Dennis Maria at Training, 12/9/02

Each morning of the survey, all crew members staged at the California Department of Forestry & Fire Protection (CDF) Station in Fort Jones. Streams and survey teams were determined, field logistics worked out, field kits were checked out and safety procedures were reviewed. Surveyors usually worked in teams of two and were sometimes accompanied by the landowner(s). Survey crews walked each reach in a downstream direction using neoprene waders, felt soled boots and wading staves. During each survey, crews recorded and mapped the total number of live fish, number of redds with fish present, number of redds without fish present and the number of carcasses for each stream surveyed. Tissues and scale samples were collected from carcasses following established protocols provided by the CDFG and NOAA Fisheries. Streams with high flows, like Canyon Cr., required the use of dry suits for safety reasons. Other tools used were polarized glasses, measuring tape, knife, scissors, pocket thermometer, flagging, permanent marking pen, GPS unit, field notebook, maps and data sheet.

The prioritized objectives of this inventory, detailed in the study plan and in the contract, guided the field strategy, as did the availability of personnel over the holiday vacation period. Index reaches, developed in 2001-2002, plus an additional reach in the mainstem Scott River near the tailings, were surveyed multiple times for the purpose of understanding run timing and in providing some comparison to the 2001-2002 run. Six streams, involving seven reaches, were identified as index streams and were surveyed three to four times between 12/4/02-1/23/03.

Index Reaches

East Fork Scott River	Lower Masterson Rd. B	3 passes
South Fork Scott River	Fox Cr.- Boulder Cr.	3 passes
	Lower Public- Callahan Bridge	4 passes
Sugar Creek	Hwy 3 Bridge-Scott River	5 passes
French Creek	Mid-Mainstem	4 passes
Canyon Creek	Lower-Scott River	2 passes
Scott River	Mainstem in Tailings	3 passes

The upper extent of the spawning distribution was investigated in most of the streams identified in the study plan, where spawning was observed and access was permitted. Presence was indicated by the sighting of a live fish, redd or carcass.

Weather and flow conditions at this time of year always play a major role in field observations, as they did in 2001-2002. Three storm events took place during the survey period from December 1, 2002 through January 31, 2003. (See Figure 2: Scott River Discharge, in Results). Four "storm windows" allowed surveying to occur during this time. These "storm windows" occurred before and after each of the three main storm events. During these periods, flows dropped and conditions were adequate to view spawning areas and to some degree live fish, although visibility was limited in deeper pools and in white water bubble curtains. Carcasses were flushed with each storm, but could have been observed during each of these storm windows. Surveys occurred during the following "storm window" periods and are noted in the data set and summary tables:

#1	Pre 12/14/02	Early Observations-Pass #1 in some reaches
#2	12/17/02-12/24/02	Pass #1 and #2
#3	1/2/03-1/10/03	Pass #2 and #3
#4	1/16/03-1/23/03	Pass #3 and #4
	1/23/03	Official end of survey (per D.Maria)

Additionally, limited personnel were available during the holiday period, although the December 26,2002 storm event eliminated surveying possibilities until January 2, 2003. Assistance from landowners and some volunteers was invaluable. Without their help the survey could not have been accomplished as thoroughly during this time.

The following methods were employed during the field survey:

Tissue and Scale Sample Collection

A Federal ESA Section 10 collection permit was issued by NOAA Fisheries for coho salmon tissue sample collection and a Scientific Collection permit was issued to non-CDFG participants by the CDFG (CDFG employees are covered automatically). The Tissue Collection protocol was coordinated between the CDFG and NOAA Fisheries. Tissue sampling protocol for coho salmon carcasses followed the direction provided by the NOAA Fisheries, Southwest Fisheries Science Center, Santa Cruz Laboratory. (See protocol in the Appendix).

Two sets of tissue samples were taken from each carcass by clipping with scissors a minimum of 1 cm^2 operculum tissue (gill plate). Tissue samples were taken from each side of the fish unless degraded operculum conditions required both samples to be taken from only one side. Each tissue was placed

between absorptive paper and placed in a separate sample envelope. Information about the carcass was taken, which included: species identification, fork length measurement (cm), sex determination (cut open, if necessary) and a check for hatchery markings. A unique code was assigned to each carcass. All of this information was noted on the sample envelope and on the data sheet and also included the date, location and surveyors initials. GPS location was recorded electronically using the Garmin GPS unit and the coordinates were recorded manually on the data sheet, as well. (See GPS procedure below).

Two sets of scale samples were also taken from each carcass. First, the protective coating (the slime) was scraped from the sample area, just below the dorsal fin and above the lateral line, with a knife in the direction from head to tail. The knife was then scraped in the opposite direction (tail to head) to remove the scale sample. Approximately 20 scales were placed between absorptive paper and inserted into a scale envelope, labeled as described above. A total of four samples were obtained from each carcass (2 tissues and 2 scales). The carcass was then returned to the stream.

At the end of each field day, all tissue and scale samples were deposited into a locked repository canister that secured to a chain at the CDF station in Fort Jones. Dennis Maria, CDFG, was identified as the custodian of these samples and was the only one with the lock's combination number that allowed only him to retrieve these at the end of each day. All samples were then under the custody of Dennis Maria, who took them back to his office in Yreka where each tissue and scale sample was air dried for a few days in the sample envelope and assigned a unique sample number for each carcass. A Chain-of-Custody (COC) tracking form was established by Dennis Maria and the CDFG was responsible for delivery of each tissue sample to both NOAA Fisheries, Santa Cruz Lab and to the CDFG genetic laboratory. All tissue samples and scales collected were hand delivered to Dr. Carlos Garza at NOAA Fisheries, Southwest Fisheries Science Center Laboratory in Santa Cruz, CA, where they currently reside.

Flow

Discharge data were obtained from the USGS Gage (#11519500), located near the upstream limit of the Scott River canyon near river mile 21.

Fish Identification

Positive identification of coho salmon was a crucial first step in conducting spawning surveys and in the gathering of tissue and scale samples. This is of particular importance to this project given that mixed stocks of coho and Chinook salmon were observed early in the season during the Fall Chinook Salmon Cooperative Spawning Ground Survey in the Scott River canyon and coho salmon and steelhead trout were observed together later in the survey period.

Morphological variation present in both coho and Chinook salmon requires utilizing a suite of characteristics to confirm the identity of coho salmon. Identification of live fish was considerably more difficult than carcasses due to field constraints (e.g. not spooking the fish, glare and fish movement, etc.) and a limited number of characteristics [spots, nares, coloration and kypes] were visible from a distance. Information from the Biological Sampling Manual for Salmonids and from the Salmon Identification Key, Canada was utilized in species identification. The following characteristics were used:

Gums – White gums at the base of the teeth has been acknowledged as the most reliable characteristic for identification of coho. The interior of the mouth and the exterior gums of coho found in the Scott River system were jet black with whites gums visible only at the

base of the teeth. This runs contrary to many identification charts distributed by CDFG and Oregon Department of Fish and Wildlife (ODFW), which show much more of the interior of the mouth as white.

Spots - These are black in color and can vary from circular "trout" spots to irregularly shaped spots and are generally small in size. The majority of the fish examined displayed fine spots on the head and rectangular spots on the dorsal surface.

Color - Coho salmon, both male and female, can exhibit extremely brilliant pink to red coloration over the lower 2/3rds of the body. In contrast, most chinook exhibit olive to red coloration and usually only in males.

Kype - Both males and females have a fairly pronounce kype, with the male being larger and more hooked than the female. In Chinook only the male develops a kype and it is much less pronounced than coho.

Nares -Nares are enlarged and white in coloration. This characteristic was extremely useful in identification of live fish due to the relative ease of visibility.

Caudal Peduncle - The caudal peduncle of a coho is generally thicker than that of a chinook. However, this characteristic was hard to see on live fish. It was noticeable when picking up the carcasses, however, as it was difficult to grip the coho by the peduncle, similar to a steelhead trout.

Sex - Males were identified by their larger more hooked kype, brilliant pink to red coloration and larger size.
Females were identified by their smaller kype, slightly duller coloration and smaller body size.
Jacks (2 yr. old males) were distinguished from other males and females by their smaller size (<40cm).
Additionally, if there was doubt on the sex of a carcass the anal opening was squeezed to determine the presence of milt, which indicates a male. Sometimes the carcass was opened up with a knife in order to view the egg skeins (female) or milt sacs (male).

Origin – Hatchery fish were identified by either the lack of an adipose fin or by a maxillary clip. A right maxillary clip is used at Trinity River Hatchery and a left maxillary clip is used at Iron Gate Hatchery. For adipose clipped fish the head was sampled (cut off with a knife) to determine the hatchery origin by coded-wire tag.

Redd Identification

The redd is the "nest" where the eggs have been deposited. The female coho salmon constructs her redd similarly to that of other salmonids. She selects an appropriate site, usually with the right size of gravel (generally 1/2"-4" diameter), depth and velocity of water (1-3 fps), then begins by digging a depression (pott) and depositing some of her eggs while the male fertilizes them. She then moves slightly upstream, digging another depression and at the same time backfilling and covering the eggs she previously deposited. The eggs are buried in the cleaned gravel several inches to a foot or more deep. Over the course of several days, the female continues to deposit her eggs, working in an upstream direction. When the redd is completed it looks like a tear-dropped shaped mound of gravel extending downstream,

approximately 4-5 feet long and 2-3 feet wide, below the last excavation, or pott (approx. 3-8 inches deep). The gravels are generally uniform in size and are often very shiny from recently being moved.

Redd identification followed the standard identification process used during the Fall Chinook Salmon Cooperative Spawning Ground Surveys. Redds were counted if they were nearly completed and if there was an 80% confidence by the surveyor that it was a redd. Redds with coho salmon on them were counted as "Redds with Fish" and were distinguished from "Redds without Fish" in the field notes. Most redds were marked with hot pink flagging hung on the bank opposite the head of the pott of each redd to prevent duplicate counting on subsequent passes. The flag was labeled with the date, site code and surveyors initials. Some redds on non-index reaches were counted in the same manner, but not flagged.

Following each storm event, redd identification became more difficult. Transport of gravels during high flow events often flattened the redd tail spill or deposited new gravels on top of redds making their identification more difficult. Therefore, only new redds constructed after the high flows were counted. Bedload movement had to be distinguished from gravel movement by a fish, relying much more on the form of the redd and less on the shininess of the gravels.

An attempt was made to measure the redd area and to identify the dominant and subdominant material used in the construction of the redd. The length of each redd was measured from the upstream limit of the pott to the end of the tail spill. The average width of each redd was estimated by averaging three width measurements taken approximately at .25, .50 and .75 distances based on total redd length. All redd measurements were taken with a marked wading staff to the nearest centimeter. Redd area was estimated by multiplying the total redd length by the average redd width. The actual pott depth was determined by measuring the depth at the deepest part of the pott from the water surface, then subtracting the depth from water surface to the substrate adjacent to the pott that was not disturbed, either just upstream or to the side. Redds that were clustered or irregular in shape were not measured.

Temperature

Water temperatures were measured with Onset Corp. electronic temperature devices (Hobo Temps and Optic Stowaways) deployed in the East Fork Scott River, French Cr., Grouse Cr. and in the Kelsey Channel. These devices recorded water temperature every hour during most of the survey period. Data was downloaded in the field at some sites, using a laptop computer, or the devices were retrieved and downloaded in the office. Onset BoxCar 4.0 software was used, the data set was exported to an Excel worksheet, where data points not representing stream temperature were deleted and graphs were generated. These are included in the Appendix.

Location by GPS

Hand-held Global Positioning System (GPS) units were used, when possible, to record the location (waypoint) of each carcass, redd or live fish. GPS waypoints were labeled with a stream code, sequential number and a single letter code, denoting carcass (C), redd (R), or fish (F), as well as the beginning and end of each reach surveyed (B or E). Other sites were noted with an (S), for "special".

Ex.: S F K 0 7 R = South Fork #7 Redd

All GPS units were set prior to the survey using Datum WGS 84 and coordinates in Lat/Long (h.ddd). Each GPS unit was checked prior to each survey to verify these settings and all GPS positions were recorded in the field notes, along with the code and the data for that location. A single code was assigned to each carcass and redd, but multiple fish observations were associated with just one code and GPS

location. The "averaging" feature on the GPS unit was used in the field to increase the accuracy of the GPS location. In most cases, all sightings were also field mapped.

Six Garmin GPS units, each numbered 1-6, were used during the survey (See GPS codes and settings in Metadata in Appendix). Data from each GPS unit was uploaded to an office computer using Garmin MapSource software after each survey day by the survey coordinator to protect the data. Each file was given a unique name using the GPS unit number and a date code. (i.e. "gps2122402", for data from GPS unit #2 on 12/24/02). Data sheets were also reviewed at this time to insure quality control. All GPS files were exported to text files and imported into an Excel file and joined to the data set. GPS positions, along with an attribute table, were then brought into an ArcInfo coverage by Richard Van de Water, USFS, GIS specialist. This coverage is available by contacting the USFS, Scott River Ranger District and can be brought into ArcView easily by those with GIS skills.

Accuracy of Garmin GPS locations, according to Garmin Corp., Technical Support, (per phone conversation, 1/4/02) is $\pm$ 40 ft. However, due to steep topography, some of the locations obtained during this survey may have greater error than this. Field locations where no GPS readings were obtained were noted on the field data sheet and were manually ("heads-up") digitized from field maps in the office at a later time. All GPS locations were indicated by a "Y" and the digitized locations were indicated by an "N" in the GPS field and by "HUD" ("Heads-Up-Digitized") in the notes field of the data set. (See Field Data Set in Appendix)

Data Management

All field data were entered from field forms into an Excel spreadsheet. GPS locations were joined to this spreadsheet in order to exhibit coordinates in Lat/Long in the final data set. Summary tables were created in Excel. All data and tables are available electronically in Excel and the final report is in Microsoft Word. The spatial data is in an ArcInfo coverage (ver. 7.2.1).

RESULTS

Tissue and Scale Sample Collection

Only two carcasses were retrieved this year for tissue and scale sampling. Both of these were from Mill Creek (Scott Bar) and were sampled on January 10, 2003 on Pass #3 and during Storm Window #3. Six other carcasses were found on December 6, 2002 by Fall Chinook Salmon Cooperative Spawning Ground Survey crew members in the lower Scott River canyon, near mile 5.0. Unfortunately this information was not made available until February 19, 2003, so no tissue or scale samples were collected from these carcasses (M.Hampton, pers.comm.)

Typically, a minimum of 75 samples is required to do genetic analysis, so without further genetic material from the 2002-2003 run, it is unknown whether these samples will be useful. No genetic analysis of the tissue samples from 2001-2002 has been done to date. This analysis will be completed by the NOAA Fisheries, Tissue Repository, located at the Southwest Fisheries Science Center and the results will be forthcoming. No scale analysis has been completed at this time. The NOAA Fisheries Tissue Repository, will also analyze the scales and the results will be forthcoming.

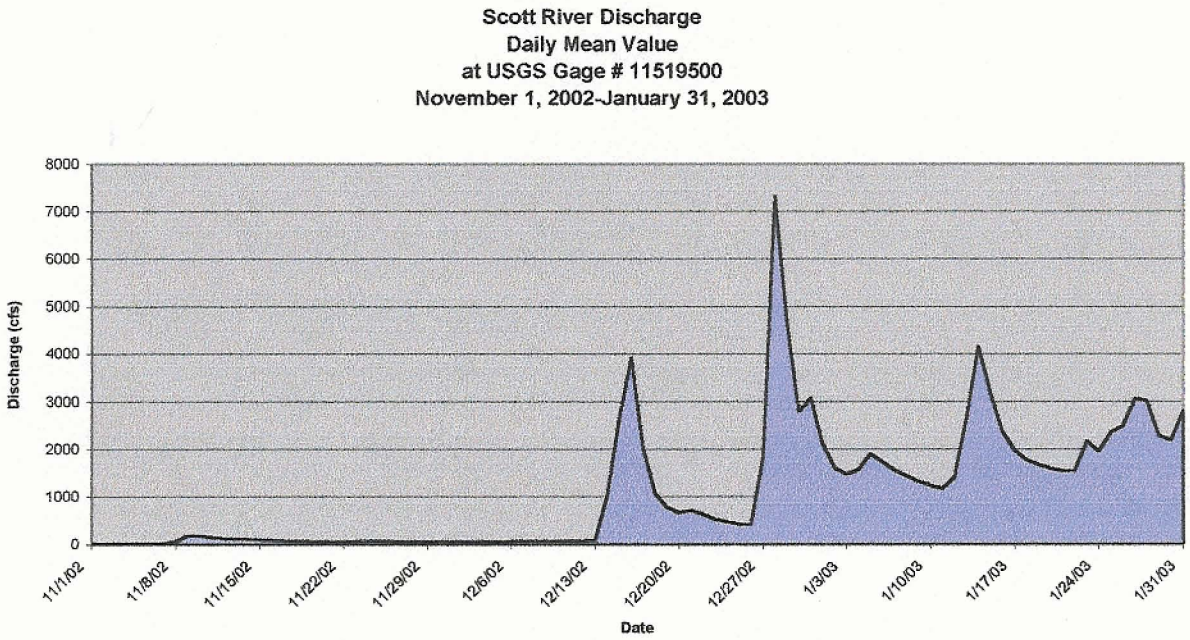
Hatchery Markings

Of the two carcasses handled during the survey, one was originally suspected of a left maxillary clip. However, after consultation with several other CDFG biologists, it is believed that the deformed left maxillary was most likely the result of hook scarring from having been caught at an earlier stage it its life. Maxillaries don't usually regenerate well and it would be very obvious if it had been cut off, according to these sources. (D.Maria, field observations and pers.comm).

Flow

Figure 2 shows the discharge at the USGS gage (#11519500) in the Scott River canyon from November 1, 2002- January 31, 2003.

Figure 2



Stream flow remained low throughout most of the Scott River watershed until December 14, 2002. Field observations on December 4, 2002 of tributaries from bridges throughout the watershed revealed that some of the tributaries were still disconnected from the Scott River and those that did have flow were quite low, making fish passage questionable. Kidder Cr. and Patterson Cr. (Etna) were dry at this time at the Hwy 3 bridge crossings. Flows in Etna Cr., French Cr., Sugar Cr. and the mainstem Scott River near the tailings (approx. mile 52.0) were very low. By December 15, 2002 all of the tributary streams were hydraulically connected to the Scott River, except for Moffett Cr, Indian Cr. and Rattlesnake Cr. After this first storm event, stream flows dropped to lower levels, once again, making fish passage questionable in some streams, like Patterson Cr. (Etna). After the second storm event passed through the watershed, all of the streams, including Moffett Cr, Rattlesnake Cr. and Indian Cr. were hydraulically connected to the mainstem and remained so throughout the rest of the survey period. Moffett Cr. remained turbid during the entire period, so no surveys were completed in that stream this year.

Distribution and Run Timing

A total of 46 miles of stream were surveyed within the Scott River watershed during the 2002-2003 season. This included 11.0 miles of the Scott River in the canyon and 7.0 miles of index stream reaches of tributaries that were also surveyed in 2001-2002. A mainstem reach of the Scott River near the tailings was added as an index reach this season and is included in this total. Index reaches were surveyed multiple times during the survey period. All other stream reaches were surveyed at least once and in many cases multiple times, as well.

A small number of adult coho salmon (approximately 9) were first observed in the lower Scott River canyon by a Fall Chinook Cooperative Spawning Ground Salmon Survey crew on November 26, 2002 near river mile 5.0 (field observations in Appendix). A possible sighting of an adult coho was reported on November 20, 2002 at Black Bridge, river mile 41.1 (G.Black, pers.comm.), but there was no confirmation of species at this time. Field spot checks by snorkeling and at various river access points and bridges in the Scott River canyon on November 26 and December 4, 2002 failed to find any coho salmon. The Fall Chinook Salmon Cooperative Spawning Ground Survey observed six coho salmon near river mile 5.0 on December 6, 2002, the last day of the survey. Based on this information, coho salmon probably first began spawning in the lower mainstem Scott River in late November or early December. Unfortunately, specific locations were not noted and no tissues or scale samples were taken. These data are not included in this data set. On December 10, 2002, the first live coho salmon were observed by coho survey crew members just below river mile 20, and this observation was confirmed by a snorkel survey on December 11, 2002. A pair of coho salmon were observed at the mouth of Shackleford Cr. (river mile 23.7) on December 12, 2002 (G.Black, pers.comm.). Spawning was first observed in French and Miners Creeks on December 18-19, 2002 and in Mill Cr. (Shackleford) on December 20, 2002. The last confirmed spawning was observed on January 8, 2002 in Mill Cr. (Shackleford) and the only carcasses found were on January 10, 2002 in Mill Cr. (Scott Bar). No spawning activity was observed in the upper tributaries of the Scott River watershed.

Figure 3: Coho Salmon Spawning Observations, 2002-2003, illustrates the extent of the sightings during the 2002-2003 survey period compared to the known and suspected range of historic coho presence (based on USFS, 2000 mapping and recent distribution mapping based on the 2001-2002 survey results). Confirmed sightings, which include redds with fish, live coho salmon or carcasses, are differentiated between unconfirmed sightings, which are redds without fish on them. Live fish that have no confirmed species identification are not included in the data totals.

Table 2 shows a comparison of the total number of redds, live fish and carcasses in <u>all</u> the streams surveyed during the 2001-2002 and 2002-2003 surveys. The number of miles surveyed and the

percentage of miles surveyed to the total accessible miles is also provided for both years' surveys. The total accessible miles is a rough estimate derived from USGS quad maps and does not indicate actual spawning habitat. This is useful for understanding the percentage of streams surveyed only.

Table 3 shows in detail the total number of redds, live fish and carcasses for all stream reaches surveyed by reach and during each pass. During the 2002-2003 survey period, a total of only 20 redds (4 with fish and 16 without fish on them), 17 live fish (2 additional fish, species unknown, not included in total) and 2 carcasses were observed during the survey period.

Table 4 shows the comparison of the total number of redds, live fish and carcasses for the index stream reaches during each pass during the 2001-2002 and 2002-2003 survey seasons. Only one redd, and no fish or carcasses were found in the index reaches during the 2002-2003 survey.

Table 5 shows redd dimensions and substrate compositions that was present at 14 redd locations.

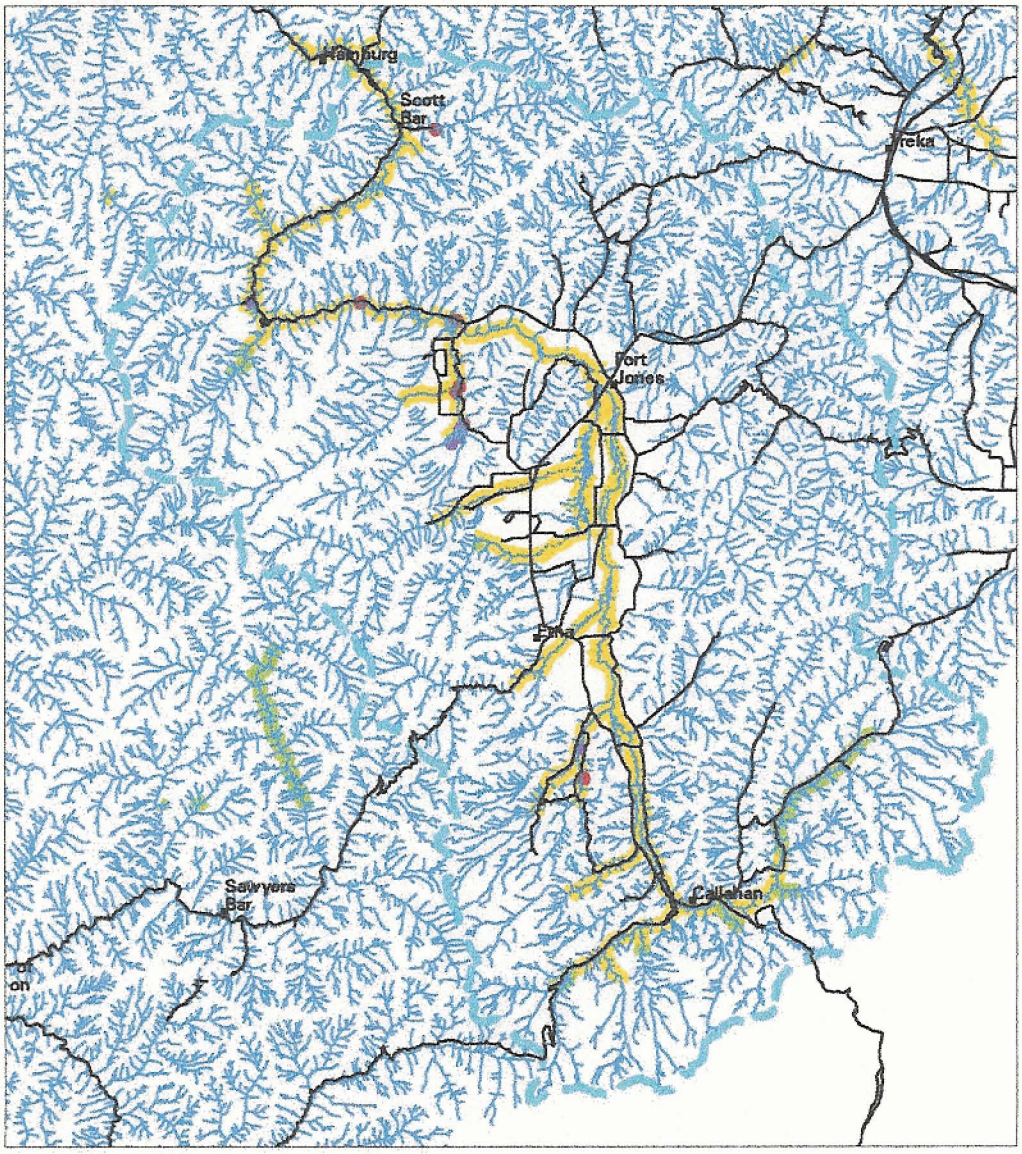
Table 6 shows the upper distribution of sightings (redd, fish or carcass) for the 2002-2003 survey.

A complete field data set containing all data by site is included in the Appendix. The spatial data, in an ArcInfo GIS coverage, is available at the USFS, Scott River Ranger District.

Temperature

Water temperatures were taken with pocket thermometers at the beginning and end of most survey days. In addition, Onset Corp.electronic temperature devices (Hobo Temps and Optic Stowaways) were deployed in the East Fork Scott River, French Cr., Grouse Cr. and in the Kelsey Channel. These devices recorded water temperature every hour during most of the survey period. Graphs of the temperatures at each of these sites is included in the Appendix. The December 14-16, 2002 high flows affected the devises in the East Fork Scott River and in Grouse Cr. The device in the East Fork Scott River was found buried under the snow up on the right bank on December 23, 2002. It was put back into the stream and continued to record stream temperature. The device in Grouse Cr. was buried approximately 1 ft. beneath the substrate in the stream channel. It was retrieved on February 6, 2003. This data represents sub-surface temperatures, but is included for interest. Temperatures were intended to be monitored with devices in the South Fork Scott River and in Sugar Cr., but due to technical difficulties, this did not occur this season.

Coho Salmon Spawning Observations
2002-2003
Scott River Watershed



Currently Mapped Range of Coho Salmon (Present)

Currently Mapped Range of Coho Salmon (Suspected)

December 2002 - January 2003 Confirmed Observations (includes adult fish, carcasses, or redds with fish)

December 2002 - January 2003 Unconfirmed Observations (redds without fish)

Scott River Watershed Boundary

Perennial Stream

Intermittent Stream

State Highway/County Road

7 0.0 7 Miles

April 28, 2003

Figure 1

TABLE 2: COMPARISON OF TOTAL NUMBER REDDS, FISH & CARCASSES BY STREAM FROM 2001-2002 AND 2002-2003 SURVEY																
STREAM	# REDDS W/FISH		# REDDS WO/FISH		# REDDS TOTAL		# LIVE FISH		# CARCASSES		Total # Miles Accessible (estimated)		Total # Miles Surveyed		% Miles Surveyed	
	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003
Clark Cr.	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	2.6	N/S	0.6	N/S	23
East Fork Scott	18	0	21	0	39	0	30	0	21	0	13.0	16.0	1.8	6.5	14	41
Grouse Cr. (trib to East Fk.)	0	0	0	0	0	0	0	0	0	0	incl.	2.0	incl.	0.6	10	30
Kangaroo Cr. (trib to East Fk.)	0	0	0	0	0	0	0	0	0	0	incl.	2.1	incl.	0.7	10	30
Etna	1	0	0	0	1	0	2	0	0	0	8.0	8.0	2.5	1.1	31	14
Ruffy Gap Trib (trib to Etna)	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0.4	N/S	0.4	N/S	100
French Cr.	5	0	22	1	27	1	16	0	28	0	5.9	5.9	1.3	0.9	22	15
Horse Range Cr. (trib to French)	0	0	0	0	0	0	0	0	0	0	incl.	0.2	0.2	0.1	100	50
Miners Cr. (trib to French)	2	1	12	0	14	1	8	1	4	0	2.0	2.0	0.3	0.9	15	45
North Fork French (trib to French)	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0.7	N/S	0.6	N/S	86
Indian Cr.	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	1.5	7.1	N/S	0.8	N/S	11
Johnson Cr.	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	2.0	4.3	N/S	0.3	N/S	7
Kidder Cr	0	0	0	0	0	0	0	0	0	0	11.0	11.0	1.4	1.8	13	16
Meamber Gulch	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0.6	N/S	0.6	N/S	100
Moffett Cr.	0	N/S	3	N/S	3	N/S	0	N/S	0	N/S	20.0	N/S	0.7	N/S	6	N/S
McAdams Cr. (trib to Moffett)	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	incl. N/S	8.0	N/S	0.2	N/S	3
Patterson Cr (Etna)	1	0	0	0	1	0	1	0	0	0	8[1]	5.6	1.3	1.7	16	30
Patterson Cr. (Scott River)	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	1.0	1.8	N/S	0.2	N/S	11
Rattlesnake Cr.	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0	1.5	5.0	N/S	0.3	N/S	6
Scott River	0	0	1	0	1	0	1	9	3	0	not incl.	55.5	0.1	12.1	N/A	22

STREAM	# REDDS W/FISH		# REDDS WO/FISH		# REDDS TOTAL		# LIVE FISH		# CARCASSES		Total # Miles Accessible (estimated)		Total # Miles Surveyed		% Miles Surveyed	
	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003	2001-2002	2002-2003
Scott River Canyon																
Boulder Cr. (Canyon)	0	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2	100	100
Canyon Cr.	0	0	0	0	0	0	0	0	0	0	1.7	1.7	1.1	1.1	65	65
Kelsey Channel	0	0	0	4	0	4	0	0	0	0	0.1	0.1	0.1	0.1	100	100
Kelsey Cr.	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.6	0.6	100	100
Middle Cr.	0	0	0	0	0	0	0	0	0	0	0.1	0.4	0.1	0.4	100	100
Mill Cr. (Scott Bar)	0	0	1	0	1	0	0	0	0	2	3.5	3.5	2.6[2]	1.2	74	38
Tompkins Cr.	0	0	0	0	0	0	0	0	0	0	2.2	1.7	1.6	0.6	73	35
Wooliver	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0.1	N/S	0.2	N/S	100	N/S
Shackleford Cr.	0	0	3	0	3	0	0	1	0	0	5.0	5.0	0.5	1.0	10	20
Mill Cr. (trib to Shackleford)	7	3	23	10	30	13	9	6	6	0	3.7	5.3	1.0	3.8	27	72
Emigrant Cr. (trib to Shackleford)	N/S	0	N/S	1	N/S	1	N/S	0	N/S	0	N/S	0.8	N/S	0.8	N/S	100
South Fork Scott	30	0	38	0	68	0	64	0	48	0	4.7	4.7	3.3	2.3	70	50
Boulder Cr. (trib to S.Fork)	0	N/S	1	N/S	1	N/S	0	N/S	0	N/S	incl.	N/S	0.2	N/S	100	N/S
Fox Cr. (trib to S. Fork)	0	N/S	0	N/S	0	N/S	0	N/S	0	N/S	incl.	N/S	0.1	N/S	100	N/S
Sugar Cr	15	0	8	0	23	0	42	0	5	0	4.0	4.0	2.4	2.4	60	60
Wildcat Cr.	N/S	0	0	0	0	0	0	0	0	0	1.0	1.7	0.1	1.1	10	65
TOTAL (excluding Scott River Mainstem)	**79**	**4**	**133**	**16**	**212**	**20**	**173**	**17**	**115**	**2**	**92.8**	**113.0**	**23.7**	**33.9**	**26**	**36[3]**
Total (including Scott River Mainstem)												**168.5**		**46.0**		**27**

NS= No Survey

[1] 2001-2002 includes approx. 2.4 mi of Big Slough, not included in 2002-2003 Patterson Cr. accessable length. Actual accessable length of Big Slough may be as much as 4.5 mi.

[2] spot check

[3] % calculated from 92.8 miles of accessable habitat, for comparison only and does not include Scott River Mainstem.

TABLE 3: TOTAL NUMBER REDDS, LIVE FISH & CARCASSES BY STREAM, REACH, PASS in 2002-2003												
STREAM	REACH #	REACH DESCRIPTION	BEGIN RIVER MILE	END RIVER MILE	LENGTH (MILES)	PASS #	STORM WINDOW #	# FISH	# REDDS W/FISH	# REDDS WO/FISH	# REDDS TOTAL	# CARCS
Boulder Cr. (Scott River)	1	Lower Bridge-Scott River	0.2	0.0	0.2	1	3	0	0	0	0	0
Canyon Cr.	1*	Lower Canyon Cr.-Scott River	1.1	0.0	1.1	1	2	0	0	0	0	0
Canyon Cr.	1*	Lower Canyon Cr.-Scott River	1.1	0.0	1.1	2	3	0	0	0	0	0
Clark Cr.	2	Mid	2.6	2.0	0.6	1	3	0	0	0	0	0
East Fork Scott	3	Upper Masterson Road	13.7	8.6	5.1	1	2	0	0	0	0	0
East Fork Scott	2*	Lower Masterson Road	6.3	4.9	1.4	1	2	0	0	0	0	0
East Fork Scott	2*	Lower Masterson Road	6.3	4.9	1.4	2	3	0	0	0	0	0
East Fork Scott	2*	Lower Masterson Road	6.3	4.9	1.4	3	4	0	0	0	0	0
Grouse (trib to East Fk)	1	Lower	0.6	0.0	0.6	1	3	0	0	0	0	0
Kangaroo Cr. (trib to East Fk)	2	Mid-USFS	2.1	1.4	0.7	1	3	0	0	0	0	0
Etna Cr.	1	Lower	3.7	3.6	0.1	1	3	0	0	0	0	0
Etna Cr.	1	Lower	4.1	3.6	0.5	2	4	0	0	0	0	0
Ruffy Gap Trib. (trib to Etna)	1	Lower	0.4	0.0	0.4	1	4	0	0	0	0	0
Etna Cr.	2	mid-TP/FGS	5.2	4.6	0.6	1	2	0	0	0	0	0
Etna Cr.	2	mid-TP/FGS	0.0	0.0	0.0	2	4	0	0	0	0	0
French Cr.	2	Upper-Bridge to Horse Range Cr.	5.8	5.7	0.1	1	4	0	0	0	0	0
French Cr.	1*	Mid-Mainstem French Cr.	2.3	1.5	0.8	1	1	0	0	0	0	0
French Cr.	1*	Mid-Mainstem French Cr.	2.3	1.5	0.8	2	2	0	0	1	1	0
French Cr.	1*	Mid-Mainstem French Cr.	2.3	1.5	0.8	3	3	0	0	0	0	0
French Cr.	1*	Mid-Mainstem French Cr.	2.3	1.5	0.8	4	4	0	0	0	0	0
Miners Cr. (trib to French)	1	0.3 mi Upstream-Conf. of French Cr.	0.3	0.0	0.3	1	1	0	0	0	0	0
Miners Cr. (trib to French)	1	0.3 mi Upstream-Conf. of French Cr.	0.3	0.0	0.3	2,3	2	0	0	0	0	0

STREAM	REACH #	REACH DESCRIPTION	BEGIN RIVER MILE	END RIVER MILE	LENGTH (MILES)	PASS #	STORM WINDOW #	# FISH	# REDDS W/FISH	# REDDS WO/FISH	# REDDS TOTAL	# CARCS
Miners Cr. (trib to French)	1	0.3 mi Upstream-Conf. of French Cr.	0.3	0.0	0.3	4	3	0	0	0	0	0
Miners Cr. (trib to French)	1	Below 2nd Miners Cr. Rd Bridge	0.6	0.4	0.2	1	3	0	0	0	0	0
Miners Cr. (trib to French)	2	Above 2nd Miners Cr. Rd Bridge	1.0	0.6	0.4	1	2	1	1	0	1	0
Miners Cr. (trib to French)	2	Above 2nd Miners Cr. Rd Bridge	0.7	0.6	0.1	2	3	0	0	0	0	0
Miners Cr. (trib to French)	2	Above 2nd Miners Cr. Rd Bridge	0.7	0.6	0.1	3	4	0	0	0	0	0
North Fork French Cr. (trib to French)	1	Lower	0.7	0.1	0.6	1	3	0	0	0	0	0
Horse Range Cr. (trib to French)	1	Lower	0.1	0.0	0.1	1	4	0	0	0	0	0
Indian Cr.	2	Upper	0.0	0.0	0.0	1	3	0	0	0	0	0
Indian Cr.	2	Upper	7.1	6.3	0.8	1	4	0	0	0	0	0
Johnson Cr.	2	Upper	4.3	4.0	0.3	1	4	0	0	0	0	0
Kelsey Channel	1	Channel	0.1	0.0	0.1	1	1	0	0	0	0	0
Kelsey Channel	1	Channel	0.1	0.0	0.1	1,2	3	0	0	4	4	0
Kelsey Channel	1	Channel	0.1	0.0	0.1	3	4	0	0	0	0	0
Kelsey Cr.	1	Barrier-Mouth	0.6	0.0	0.6	1	2	0	0	0	0	0
Kelsey Cr.	1	Barrier-Mouth	0.6	0.0	0.6	2	3	0	0	0	0	0
Kelsey Cr.	1	Barrier-Mouth	0.6	0.0	0.6	3	4	0	0	0	0	0
Kidder Cr.	1	Lower Kidder below Hwy 3	5.8	4.7	1.1	1	3	0	0	0	0	0
Kidder Cr.	2	Mid-Mainstem Kidder Cr. above Hwy 3	7.3	6.8	0.5	1	2	0	0	0	0	0
Kidder Cr.	2	Mid-Mainstem Kidder Cr. above Hwy 3	7.3	6.5	0.8	2	3	0	0	0	0	0

STREAM	REACH #	REACH DESCRIPTION	BEGIN RIVER MILE	END RIVER MILE	LENGTH (MILES)	PASS #	STORM WINDOW #	# FISH	# REDDS W/FISH	# REDDS WO/FISH	# REDDS TOTAL	# CARCS
Kidder Cr.	2	Mid-Mainstem Kidder Cr. above Hwy 3	7.3	6.8	0.5	3	4	0	0	0	0	0
McAdams Cr. (trib to Moffett)	2	Mid	1.4	1.2	0.2	1	4	0	0	0	0	0
Meamber Gulch	1	Lower	0.6	0.0	0.6	1,2	4	0	0	0	0	0
Middle Cr.	1	Lower	0.4	0.0	0.4	1	3	0	0	0	0	0
Middle Cr.	1	Lower	0.4	0.0	0.4	2	4	0	0	0	0	0
Mill Cr. (Scott Bar)	1	Lower	0.5	0.0	0.5	1	1	0	0	0	0	0
Mill Cr. (Scott Bar)	1	Lower	0.5	0.0	0.5	2,3	3	0	0	0	0	0
Mill Cr. (Scott Bar)	1	Lower	0.5	0.0	0.5	4	4	0	0	0	0	0
Mill Cr. (Scott Bar)	2	Upper	2.5	1.8	0.7	1	1	0	0	0	0	0
Mill Cr. (Scott Bar)	2	Upper	2.5	1.8	0.7	2,3	3	0	0	0	0	2
Patterson Cr. (Etna)	2	Mid-below Hwy 3	1.9	1.6	0.3	1	3	0	0	0	0	0
Patterson Cr. (Etna)	3	Upper-FGS	6.1	4.7	1.4	1	2	0	0	0	0	0
Patterson Cr. (Etna)	3	Upper-FGS	6.0	5.5	0.5	2	4	0	0	0	0	0
Patterson Cr. (Scott River)	1	Lower	0.8	0.6	0.2	1,2,3	4	2?	0	0	0	0
Rattlesnake Cr.	2	Upper	5.0	4.7	0.3	1	4	0	0	0	0	0
Scott River Canyon	5,6,7,8	Canyon	21.8	10.4	11.4	1	1	9	0	0	0	0
Scott River	1*	Mainstem in Tailings	53.8	52.7	1.1	1,2	1	0	0	0	0	0
Scott River	1*	Mainstem in Tailings	53.8	52.7	1.1	3	3	0	0	0	0	0
Shackleford Cr.	1	Lower Bridge Area	0.9	0.0	0.9	1	2	0	0	0	0	0
Shackleford Cr.	1	Lower Bridge Area	1.0	0.0	1.0	2	3	1	0	0	0	0
Shackleford Cr.	1	Lower Bridge Area	1.0	0.0	1.0	3	4	0	0	0	0	0
Mill Cr. (trib to Shackleford)	1	Lower-Shackleford Cr.	0.8	0.0	0.8	1,2	1	0	0	0	0	0
Mill Cr. (trib to Shackleford)	1	Lower-Shackleford Cr.	0.8	0.0	0.8	3	2	3	1	0	1	0

STREAM	REACH #	REACH DESCRIPTION	BEGIN RIVER MILE	END RIVER MILE	LENGTH (MILES)	PASS #	STORM WINDOW #	# FISH	# REDDS W/FISH	# REDDS WO/FISH	# REDDS TOTAL	# CARCS
Mill Cr. (trib to Shackleford)	1	Lower-Shackleford Cr.	0.8	0.0	0.8	4	3	0	0	0	0	0
Mill Cr. (trib to Shackleford)	2	Mid-Mill Cr.above Quartz Valley Bridge	2.4	1.7	0.7	1	2	3	2	8	10	0
Mill Cr. (trib to Shackleford)	2	Mid-Mill Cr.above Quartz Valley Bridge	3.1	1.7	1.4	2	3	0	0	2	2	0
Mill Cr. (trib to Shackleford)	2	Mid-Mill Cr.above Quartz Valley Bridge	3.1	1.7	1.4	3	4	0	0	0	0	0
Emigrant Cr. (trib to Shackleford)	1	Mill Cr. Road-Mill Cr.	0.8	0.0	0.8	1	2	0	0	1	1	0
Emigrant Cr. (trib to Shackleford)	1	Lower	0.1	0.0	0.1	2	3	0	0	0	0	0
Emigrant Cr. (trib to Shackleford)	1	Lower	0.1	0.0	0.1	3	4	0	0	0	0	0
South Fork Scott	1*	Lower-Callahan/Cecilville Rd. Bridge	0.7	0.3	0.4	1	1	0	0	0	0	0
South Fork Scott	1*	Lower-Callahan/Cecilville Rd. Bridge	0.7	0.3	0.4	2	2	0	0	0	0	0
South Fork Scott	1*	Lower-Callahan/Cecilville Rd. Bridge	0.7	0.3	0.4	3	3	0	0	0	0	0
South Fork Scott	1*	Lower-Callahan/Cecilville Rd. Bridge	0.7	0.3	0.4	4	4	0	0	0	0	0
South Fork Scott	2*	Fox-Boulder	4.0	2.1	1.9	1	2	0	0	0	0	0
South Fork Scott	2*	Fox-Boulder	4.0	2.1	1.9	2	3	0	0	0	0	0

Tompkins Cr.	1	Lower	0.6	0.0	0.6	1	2	0	0	0	0	0
Tompkins Cr.	1	Lower	0.6	0.0	0.6	2	3	0	0	0	0	0
Tompkins Cr.	1	Lower	0.6	0.0	0.6	3	4	0	0	0	0	0
Wildcat Cr.	1	Lower	1.1	0.0	1.1	1	3	0	0	0	0	0
TOTAL								**17**	**4**	**16**	**20**	**2**

* Index Reaches

2?-species unk.-not included in total

"Storm Window" Periods

#1	Pre 12/14/02	Early Observations-Pass #1 in some reaches
#2	12/17/02-12/24/02	Pass #1 and #2
#3	1/2/03-1/10/03	Pass #2 and #3
#4	1/16/03-1/23/03	Pass #3 and #4
	1/23/03	Official end of survey (per D.Maria)

TABLE 4: Comparison of Total Number of Redds, Live Fish & Carcasses by Index Stream/Reach by Pass in 2001-2002 & 2002-2003														
STREAM	REACH #	LENGTH (MILES)	PASS #	STORM WINDOW #	# LIVE FISH		# REDDS W/FISH		# REDDS WO/FISH		#REDDS TOTAL		# CARCASSES	
					01-02	02-03	01-02	02-03	01-02	02-03	01-02	02-03	01-02	02-03
Canyon Cr.	1	1.1	1	2	0	0	0	0	0	0	0	0	0	0
Canyon Cr.	1	1.1	2	3	0	0	0	0	0	0	0	0	0	0
Total					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
East Fork Scott	1	0.2	1	N/S	0	N/S	1	N/S	1	N/S	2	N/S	0	N/S
East Fork Scott	1	0.2	2	N/S	3	N/S	0	N/S	0	N/S	0	N/S	0	N/S
Total					**3**	**N/S**	**1**	**N/S**	**1**	**N/S**	**2**	**N/S**	**0**	**N/S**
East Fork Scott	2	1.4	1	2	9	0	5	0	15	0	20	0	12	0
East Fork Scott	2	1.4	2	3	1	0	0	0	1	0	1	0	6	0
East Fork Scott	2	1.4	3	4	0	0	0	0	0	0	0	0	3	0
Total					**10**	**0**	**5**	**0**	**16**	**0**	**21**	**0**	**21**	**0**
French Cr.	1	0.8	1	1	13	0	4	0	16	0	20	0	14	0
French Cr.	1	0.8	2	2	0	0	0	0	4	1	4	1	2	0
French Cr.	1	0.8	3	3	0	0	0	0	0	0	0	0	1	0
French Cr.	1	0.8	4	4	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0
Total					**13**	**0**	**4**	**0**	**20**	**1**	**24**	**1**	**17**	**0**
Scott River	1	1.1	1,2	1	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0
Scott River	1	1.1	3	3	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0
Total	1				**N/S**	**0**	**N/S**	**0**	**N/S**	**0**	**N/S**	**0**	**N/S**	**0**
South Fork Scott	1	0.4	1	1	20	0	12	0	5	0	17	0	4	0
South Fork Scott	1	0.4	2	2	0	0	0	0	0	0	0	0	0	0
South Fork Scott	1	0.4	3	3	0	0	0	0	0	0	0	0	0	0
South Fork Scott	1	0.4	4	4	N/S	0	N/S	0	N/S	0	N/S	0	N/S	0
Total					**20**	**0**	**12**	**0**	**5**	**0**	**17**	**0**	**4**	**0**
South Fork Scott	2	1.9	1	2	27	0	9	0	12	0	21	0	7	0
South Fork Scott	2	1.9	2	3	0	0	0	0	4	0	4	0	33	0
South Fork Scott	2	1.9	3	4	0	0	0	0	0	0	0	0	0	0
Total					**27**	**0**	**9**	**0**	**16**	**0**	**25**	**0**	**40**	**0**
Sugar Cr.	1	0.3	2	2	40	0	14	0	6	0	20	0	5	0
Sugar Cr.	1	0.3	3,4	3	2	0	1	0	0	0	1	0	0	0
Sugar Cr.	1	0.3	5	4	0	0	0	0	0	0	0	0	0	0
Total					**42**	**0**	**15**	**0**	**6**	**0**	**21**	**0**	**5**	**0**
TOTAL					**115**	**0**	**46**	**0**	**64**	**1**	**110**	**1**	**90**	**0**

TABLE 5: REDD DIMENSIONS & SUBSTRATE COMPOSITION											
STREAM	REACH #	Storm Window #	DATE	SITE#	HABITAT TYPE P,R,F[1]	REDD LENGTH M	REDD WIDTH M	REDD AREA M^2	POTT DEPTH M	SUB D/S[2]	NOTES
Emigrant Cr.	1	2	12/24/02	EMI02R	F	1.20	1.50	1.80	0.15	2/3	Redd just abv. confluence w/ Mill Cr.
French Cr.	1*	2	12/18/02	FRE04R	R	2.10	0.90	1.89	0.07	3/2	Somewhat ?? Because no other live fish or redds were observed. May not be complete.
Kelsey Channel	1	3	1/9/03	KCH01R	F	2.40	0.80	1.92	0.20	3	Redd is very irregular in length-in top spawning bay.
Kelsey Channel	1	3	1/9/03	KCH02R	F	.90	0.60	0.54	0.10	3	Redd is somewhat questionable-in top spawning bay.
Kelsey Channel	1	3	1/9/03	KCH03R	F	0.80	1.05	0.84	0.13	3	Typical redd-in top spawning bay.
Kelsey Channel	1	3	1/9/03	KCH04R	F	1.20	1.22	1.46	0.16	3	Redd in top spawning bay. Ladder Gage= .80.
Mill Cr. (Shackleford)	1	2	12/20/02	SML40R	R	2.80	1.40	3.92		4	Deep riffle.
Mill Cr. (Shackleford)	2	2	12/24/02	SML02R	R	1.80	1.40	2.54	0.10	2/3	Female on redd. Did not flag redd. HU
Mill Cr. (Shackleford)	2	2	12/24/02	SML06R	R	2.10	1.30	2.73	0.15	2/3	HUD
Mill Cr. (Shackleford)	2	2	12/24/02	SML10R	F	3.00	1.50	4.50	0.12	2/3	same GPS as SML09R
Mill Cr. (Shackleford)	2	2	12/24/02	SML11R	F	2.50	1.20	3.70	0.10	2/3	Redd located at major deer crossing. HUD
Mill Cr. (Shackleford)	2	3	1/8/03	SML17R	R	1.80	0.80	1.44	0.22	2/3	Redd on side channel-rt.
Mill Cr. (Shackleford)	2	3	1/8/03	SML18R	R	2.00	0.85	1.70	0.13	2/3	Redd on side channel-rt.
Miners Cr.	2	2	12/24/02	MIN09R	R	1.60	0.90	1.44	0.10	4/1	High flows have covered redd and made it difficult to measure. Probably had fines in it.
				"AVERAGE =>"		**2.01**	**1.10**	**2.17**	**0.13**		

[1] P=Pool R= Riffle F=Flatwater

[2] SUB D/S= Substrate- Dominant/Subdominant: 1=<0.2cm 2=0.2-5cm 3=6-9cm 4=10-13cm 5=>13cm

"HUD"= Heads-Up-Digitize, no GPS

Table 6: Upper Distribution of Sightings (Redd, Fish or Carcass)								
Stream	Reach #	Reach Description	Date	Site #	Sighting Type	Lat	Long	Extends Range Y/N
Miners Cr.	2	Above 2nd Miners Cr. Rd Bridge	12/24/02	MIN09R	redd w/fish-female	N41.37780	W122.96393	Y
French Cr.	1	Mid-Mainstem French Cr.	12/18/02	FRE04R	redd wo/fish	N41.39463	W122.87168	N
Mill Cr. (Shackleford)	2	Mid-Mill Cr.above Quartz Valley Bridge	12/24/02	SML10R	redd w/fish-female	N41.57333	W122.96062	Y
Mill Cr. (Shackleford)	2	Mid-Mill Cr.above Quartz Valley Bridge	1/8/03	SML18R	redd wo/fish	N41.56535	W122.96750	Y
Emigrant Cr.	1	Mill Cr. Road-Mill Cr.	12/24/02	EMI02R	redd wo/fish	N41.57422	W122.95931	Y
Shackleford Cr.	1	Lower Bridge Area	1/3/03	SHK04F	fish	N41.63422	W122.96349	N
Mill Cr. (Scott Bar)	2	Upper	1/10/03	SBM08C	carcass	N41.74180	W122.97943	Y
Kelsey Channel	1	Channel	1/9/03	KCH01R	redd wo/fish	N41.64481	W123.11776	N

DISCUSSION

Tissue and Scale Sample Collection

The DNA analysis derived from the tissue samples will depend upon the collection of tissues from throughout the Pacific Northwest. Comparison of genetic similarity to other stocks requires tissue from these stocks. That collection effort is underway, but is currently not adequate for analysis that will shed any light on the genetic origin or comparison of Scott River coho spawners from 2001-2002 or 2002-2003. The NOAA Fisheries, Southwest Fisheries Science Center projects that an analysis may occur within the next three years, but may be delayed until adequate samples can be collected throughout the range (T. Williams, pers.comm.).
A minimum sample size of 75 tissue samples is required in order to evaluate the DNA samples adequately. Only two samples were obtained during this year's survey. As an alternative, additional DNA tissue samples may be obtained from juvenile fish within the watershed to provide the sample size required. These samples may be collected at the rotary screw trap in the lower Scott River or during the summer fish rescue efforts at irrigation diversion screen sites, but this effort will have to be coordinated with these CDFG programs.

Scale analysis will help determine the life history and age of these adult spawners. Interpretation of the annuli of the fish scale, similar in concept to the rings of a tree, can provide valuable life history information and may provide some insight to the amount of time that each fish has spent in both fresh water and ocean environments. The length of time these fish spend in the fresh water system will be important to understand for management purposes. Scales from only two carcasses were obtained this season. Duplicate sets of scale samples were collected, one for the NOAA Fisheries, Southwest Fisheries Science Center and one for California Department of Fish and Game. It is unknown when these scale samples will be interpreted by either agency at this time. The scales are available from 2001-2002 and 2002-2003 to be analyzed if funding can be secured.

Flow

Stream discharge appears to have a direct relationship with the run timing and distribution of this year's adult coho salmon spawning run. Low flows limited coho salmon spawning to the lower Scott River during the early part of the run. It wasn't until after the first storm event of December 14-16, 2002 that spawning was observed in the lower valley tributaries. Although flow was adequate after this time, no spawning appeared to take place in tributaries above French Creek. Viewing conditions were less favorable during the 2002-2003 survey period, compared to the 2001-2002 season, however between each of the three storm events there was a "storm window" that allowed for adequate viewing of redds and for the retrieval of carcasses. Observation of live fish was more difficult with higher flows, especially in deeper pools and in the bubble curtain. During the second "storm window" (December 17-24, 2002), flows averaged approximately 600 cfs in the Scott River, which was similar to the discharge when most of the spawning had been observed in 2001-2002 season. Most of the spawning observed this season took place during this period as well. These flows also corresponded to the same time of year as last year (mid to late December). During the third and fourth "storm windows" (January 2-10, 2003 and January 16-23, 2003) flows averaged between 1000-2000 cfs in the Scott River, similar to the early January flows of 2002. The few redds observed during these periods were located in side channels, as they were in 2002.

Distribution and Run Timing

Because of the limited amount of sightings (redds, fish or carcasses) observed this season it is difficult to make many generalizations about the run. As in 2001-2002, it appears that the primary spawning period for adult coho salmon in the Scott River sub-basin occurs during the month of December. The first confirmed spawning occurred on December 20, 2002 in the lower reach of Mill Cr.(Shackleford), although a redd without a fish on it was observed on December 18, 2002 in the mid-mainstem reach of French Cr. Redds may have been constructed a few days prior to this time. There is high confidence in the identification of redds constructed during this second storm window because flows were stable and the redds were easy to identify. There is also high confidence that the redds without fish on them during this period were constructed by coho salmon, as no Chinook salmon carcasses were found and the timing would be quite late for Chinook salmon. During the third storm window (January 2-10, 2003), no live fish, and only a few new redds were observed, four of them were in the Kelsey Channel, but no live fish were seen with them. Two carcasses were retrieved from Mill Cr. (Scott Bar) during this period, but they had obviously been flushed during the storm event, so it is presumed that spawning occurred sometime prior to this. Redds without fish on them during this period are somewhat questionable because steelhead trout may also by spawning at this time.

The six carcasses found in the lower reach of the Scott River on December 6, 2002 by the Fall Chinook Salmon Cooperative Spawning Ground Survey, seems to indicate that some coho salmon spawned earlier in the mainstem Scott River near river mile 5.0. Surveys conducted on December 10-11, 2002 in the mainstem Scott River from river mile 10.4-21.4 failed to find any indication of coho salmon spawning activity, however 9 live adult coho salmon were observed. It appears that what little spawning took place this season was focused in the lower Scott River, Mill Cr. (Shackleford), Mill Cr. (Scott Bar) and in French and Miners Cr., a tributary to French Cr.

Temperature

Stream temperatures fluctuated during the survey period, but seemed to be similar throughout the sub-basin. This is probably a function of air temperature. The average stream temperature during "storm windows" #2 (December 17-24, 2002) and #3 (January 2-10, 2003) ranged between 38^0F-40^0F. The lowest water temperature (34^0F) was recorded in the East Fork Scott River and the highest water temperature (49^0F) observed was recorded in Emigrant Cr., a groundwater-fed tributary to Mill Cr. (Shackleford). During "storm window" #4 the average water temperatures increased to about 46^0F in most streams. This is nearly 10^0F warmer than at this time last year. Temperature graphs are included in the Appendix.

Other Observations

Spawning Habitat

An effort was made to quantify the physical area utilized by the spawning female coho salmon by measuring the length, width and pott depth of well defined redds. The sample size is too small and variable to make any definitive statements, as only 14 of the 20 redds were measured. Redds ranged in shape and size, from very long and narrow to short and wide (i.e. 2.40M long x 0.80M wide and 0.80M long x 1.05M wide). The maximum area used was 4.50 M^2 and the minimum area was 0.54 M^2. The deepest pott was 0.22M and the shallowest was 0.10M, with an average depth of 0.13M. Most females utilized small (0.2-5cm) and large (6-9cm) gravel sized substrate. Redds were constructed almost equally between riffle and flatwater habitat types. In Mill Cr. (Shackleford), where the most dense spawning was

observed, there appeared to be areas where the redds were clustered. Superimposition was not observed, however. Although stream velocity measurements were intended to be made while fish were spawning, this was not accomplished this season because so few redds (4) with fish on them were observed.

The run size was so small during the 2002-2003 season that many conclusions are hard to draw, such as why the spawning coho salmon did not go as far up into the watershed this season as during the 2001-2002 season. In the streams where spawning was observed, the fish did appear to migrate up as far as possible, which is consistent with the observations from 2001-2002. Again, the fish seemed to prefer side channels and braids and they seemed to select areas where there was some instream cover nearby.

A "jack" salmon (2 yr. old male), was observed with a full-sized female on a redd in Mill Cr. (Shackleford) on December 24, 2002. Another jack-sized fish was briefly observed in that same stream on that same date, but no confirmed species identification could be made. On January 16, 2003, two suspected jack salmon were observed in Patterson Cr. (Scott River), although there is the possibility that they could have been steelhead trout because of the late date. Interestingly, no jack salmon were observed at all during the 2001-2002 season, when 117 live fish were observed. Only 17 live fish were observed in 2002-2003, so it is of interest that the 2 yr. old cohort of this run seems to be present.

Beaver Activity

Beaver activity was again noted in Sugar Cr. and in French Cr. Observations of fresh cuttings and bank dens, as well as large, deep dams were present. The first high water appeared to wash these out, but the beaver were active throughout the spawning season.

Stream Characteristics

The total stream length of accessible habitat for coho salmon within the Scott River Watershed is estimated to be 113 mile, excluding the mainstem Scott River and 168.5 miles including the mainstem Scott River. Accessible habitat is defined as the length of stream accessible to adult coho salmon during their spawning migration. The type and quality of habitat (spawning, rearing) is unknown through most of this estimated accessible length. This estimate is an increase from the 92 miles that were estimated for the 2001-2002 season. This is based on an approximate length of the stream to the upper extent of coho distribution derived from the range and distribution maps from CDFG, 1974, and USFS, 2000 and from the past two years of field observations. Additional streams were surveyed this year, which appear to have accessible habitat, although no coho activity was observed in them. During this survey, approximately 27% (46.0 miles) of this total estimated accessible habitat, including the Scott River was surveyed at least once. 36 % of the accessible habitat, not including the Scott River, was surveyed this season compared to 26% in the 2001-2002 season. Only 6.5% (6.1 miles) was surveyed more than once during the 2001-2002 season, but 25% (28.4 miles) of the accessible habitat, not including the Scott River, was surveyed more than once during the 2002-2003 season. 17% of the total accessible habitat, including the Scott River, was surveyed more than once this season. Stream reach maps, indicating beginning and ending points, are included in the Appendix for reference.

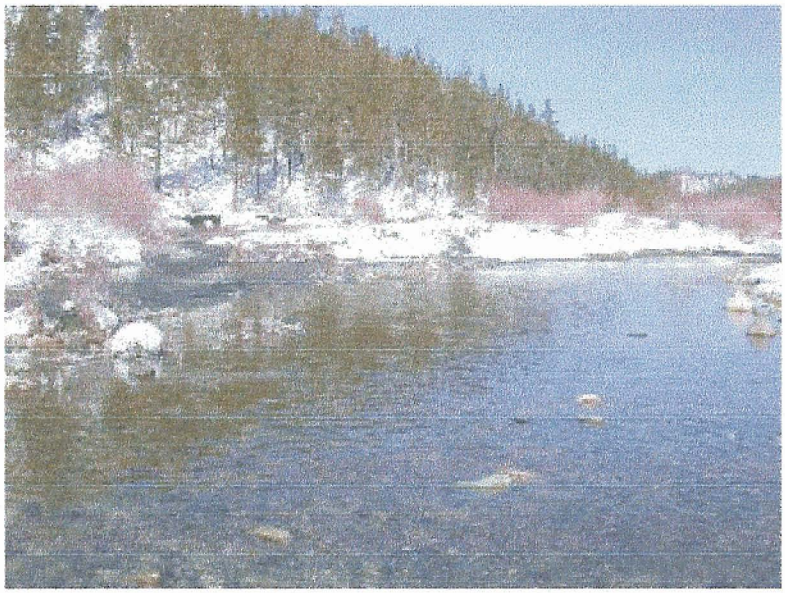
Although few fish, redds or carcasses were observed this season, compared to 2001-2002, more stream habitat was looked at from the standpoint of adult coho spawning. Details of these observations are discussed below by stream.

East Fork Scott River

There is estimated to be about 16 miles of potential spawning habitat in the East Fork of the Scott River, of which only 41% (6.5 miles) of stream length was surveyed at least once. 5.1 miles of the Upper Masterson Rd reach was actually surveyed once this season during storm window 2,

compared to last season, when only "spot checks" occurred from bridges. No surveys occurred above mile 13.7 and it is estimated that another 2.3 miles of accessible habitat may be present above this point. No surveys took place between mile 8.6 and 6.3.

The Lower Masterson Rd reach is an index reach (mile 6.3-4.9) and was surveyed three times this season during storm windows 2, 3, and 4. This reach was a heavily utilized by spawning coho salmon in 2001-2002, but no spawning activity, live fish or carcasses were observed this season. The December 14-16, 2002 storm event caused major channel changes in the upper portion of this reach, due to erosion that occurred in Kangaroo Cr., which is just upstream. The stream channel changed back to the right bank, just above mile 6.3, causing some bank erosion. New gravels were deposited throughout much of the reach and the left channel was dewatered.



East Fork Scott River, 12/23/02
Confluence-bottom of flow channel (river right)

More bank erosion was evident downstream, just above the lower Masterson Rd. bridge crossing. There appears to be a lot of suitable spawning gravel and some side channel habitats throughout this reach upstream of the confluence of Grouse Cr.

Below Grouse Cr. the stream gradient increases and the substrate is larger in size, with spawning gravels limited mainly to pool tailouts. Viewing conditions were relatively good during the three surveys, but the clarity of the water was slightly off color during the January 6, 2003 survey, making fish observations in deeper pools difficult. Deep snow during the December 23, 2002 survey required walking back upstream the only way out of the canyon. Water temperatures ranged from 34-41 ^{0}F. Optic Stowaway (Onset Corp.),electronic temperature devices, were deployed at the upsteam and downstream end of this survey reach. However, the December 14-16, 2002 storm event washed the upper device out of the stream and up on the left bank. This was discovered on December 23, 2002, at which time it was dug out of the snow and replaced into the stream. A graph of the data from this recording device is included in the Appendix. The device at the downstream end of the reach, was buried beneath the newly deposited sediment in the channel and has yet to be retrieved. This reach should continue to be surveyed as an index reach in future surveys.

East Fork Scott River
Suitable Spawning Gravel, 12/23/02

No surveys took place below mile 4.9 in the East Fork. The lower East Fork reach behind the Callahan Guard Station to the Hwy 3 bridge was not surveyed this season, as it was in 2001-2002 because permission to access this reach could not be acquired from the landowner. It is assumed that there may be considerable spawning habitat through much of this lower reach and permission to survey this reach should be attempted in the future.

Kangaroo Creek

Kangaroo Cr. is a tributary to the East Fork and was surveyed once this season during storm window 3 from mile 2.1- 1.4 (0.7 miles). No redds, live fish or carcasses were observed. Some spawning gravels were present, but gravel size is relatively small. A juvenile fish passage barrier was identified at the culvert under the 40N08 road crossing. The water temperature on January 9, 2003 was 42 ^{0}F. During the December 14-16, 2002 storm event, Kangaroo Cr, jumped its banks in the lower 0.5 miles, scouring a new course down road 40N08 and flooding two homes below.

Kangaroo Cr. Diverts down Road, 12/16/02

Sediments that were transported from Kangaroo Cr. during this storm event were deposited downstream in the East Fork on the Lower Masterson Rd index reach. It is recommended that Kangaroo Cr. be surveyed in the future and that access to the lower 1.4 miles try to be acquired.

Grouse Creek

Grouse Cr. is a tributary to the East Fork of the Scott River and its confluence is located within the Lower Masterson Rd index reach. The lower 0.6 miles of Grouse Cr. was surveyed once this season during storm window 3. This is a relatively high gradient stream with large cobble/boulder substrate, with very few pockets of spawning gravel. No spawning activity, live fish or carcasses were observed. The water temperature on January 6, 2003 was 38 ^{0}F. The lower reach of Grouse Cr., below the low water crossing at the Grouse Cr. Mine, was rearranged during the December 14-16, 2002 storm event. A temperature device had been deployed at this location and it was buried in the stream channel during the storm. The device was retrieved on February 6, 2003. A graph of the data is included in the Appendix, but represents sub-surface temperatures after December 14, 2002.

Other tributaries to the East Fork of the Scott River were not surveyed. These include Rail Cr., Houston Cr. and Mountain House Cr. With access permission, these streams should be surveyed in the future.

South Fork Scott River

There is roughly 4.7 miles of accessible habitat in the South Fork of the Scott River, of which 2.3 miles was surveyed (50%). The upper extent of spawning in the South Fork appears to be limited by a natural barrier in the gorge at mile 4.7, just below the USFS 40N21Y bridge crossing (Maurer, 2002). Two reaches, both index reaches, were surveyed this season, as they were in 2001-2002. No surveys took place above mile 4.0 or between mile 2.1 and 0.7 or below mile 0.3.

The Fox-Boulder reach, from mile 4.0-2.1, was surveyed three times during storm windows 2, 3 and 4. No spawning activity, live fish or carcasses were observed. This was a well-used reach during the 2001-2002 survey period, with several side-channels and available spawning gravel. Many juvenile steelhead (approximately 200 were observed in a side channel). Surface velocity was estimated to be approximately 4-5 ft./sec. Both irrigation diversions have been screened since last season, but a by-pass problem for fish on the lower diversion was noted on December 23, 2002. This problem was addressed and presumed corrected (G.Black, pers.comm.). Water temperature ranged from 35-39 ^{0}F. This reach is recommended to remain as an index reach for future surveys. No surveys took place in either Fox Cr. or Boulder Cr. this season, as both tributaries appeared to lack spawning habitat, having steeper gradients and larger substrates, with considerable quantities of decomposed granitic sand, as noted in the 2001-2002 survey.

The lower reach of the South Fork, from mile 0.7-0.3 at the Callahan/Cecilville Rd. crossing was surveyed four times during storm windows 1, 2, 3 and 4. Although flows were quite low on December 4, 2002, passage appeared possible throughout this reach. It is questionable whether passage was possible through the tailing reach of the mainstem Scott River at this time, however. This reach is densely vegetated, contains several braided channels and woody debris dams and was well utilized by coho salmon in the 2001-2002 survey. No spawning activity, live coho or carcasses were observed this season. One dead sculpin was found and several 1+ and 2+ steelhead trout were observed. Surface velocities were estimated to be approximately 5 ft./sec. on January 6, 2003. The water temperatures ranged between 40-42 ^{0}F. At the time of the last survey on January

20, 2003, the flows were high and visibility in deeper pools was poor, but visibility in spawning areas was adequate. This reach is recommended to be continued as an index reach.

A temperature monitoring device was deployed in the South Fork of the Scott River at approximately mile 1.6. However, the device apparently had some malfunction and did not record temperatures (D. Quigley, pers.comm.).

Wildcat Creek

The lower 1.1 miles of Wildcat Cr. were surveyed once on January 3, 2003 during storm window 3. No spawning activity, live fish or carcasses were observed. This reach has a fairly steep gradient, is dominated by cobble/boulder substrates and has limited amounts of spawning gravel available. There appears to be good, complex in-stream woody cover, with several debris jams and lateral scour pools (max. depth approximately 1 M) for cover and holding habitat. The water temperature was 40 ^{0}F on January 3, 2003. Juvenile coho salmon presence was documented in Wildcat Cr. (D.Maria, pers.comm.), so it will be important to continue to conduct spawning surveys in this lower reach in the future.

An attempt was made on December 19, 2002, during storm window 2, to survey an upper reach of Wildcat Cr., beginning at mile 1.7, but deep snow and high winds prevented surveying this reach for safety reasons.

Sugar Creek

There may be up to 4 miles of accessible habitat in Sugar Cr., of which 2.4 miles (60%) were surveyed this season, as they were during the 2001-2002 season. The Upper Fruit Growers Supply Co. (FGS) Bridge to Lower FGS Property Line reach, (mile 3.3-1.2), was surveyed twice during storm window 2 and 4. Spawning gravel is limited through this reach, although some suitable gravels are present at low water crossings and at pool tailouts. Conditions were adequate for viewing spawning areas, but poor for viewing fish in deeper pools due to slight coloration of the water and high flows on December 18, 2002. Visibility was better during the January 17, 2003 survey. No spawning activity, live fish or carcasses were observed at either time. The water temperatures ranged from 37-38 ^{0}F. If spawning is observed in the lower reach of Sugar Cr. in future years, it will be important to determine the upper extent of spawning by continuing to survey this reach and above in the future.

No surveys were conducted on Sugar Cr. between mile 1.2 and 0.3. This appears to be more suitable habitat for spawning than the upper reach, as the gradient is less and the stream may braid.

The Lower Sugar Cr. reach from the Hwy 3 Bridge (mile 0.3) to the Scott River is the index reach on Sugar Cr. Five surveys were conducted during storm windows 1, 2, 3 and 4. This reach was well utilized during 2001-2002 and has a low gradient, glide habitat with some channel braiding. No spawning activity, carcasses or confirmed sightings of live fish were observed this season. A phone message from the landowner on January 8, 2003, stated that a large fish was observed down near the mouth, but the survey the following day revealed no live fish in the reach. The active beaver dam, which was observed in 2001-2002, just above the confluence with the Scott River, was active this season as well. The beaver dam created a large pool and favorable habitat for over wintering juvenile salmonids, but the first high water partially removed it. Water temperatures in lower Sugar Cr. ranged from 39-42 ^{0}F. An electronic temperature device was not installed in Sugar Cr. this year (D.Quigley, pers.comm.).

Landowners are very interested in the study and participated in some of the surveys on this lower reach of Sugar Cr. It is recommended that this reach remain as an index reach for future surveys.

Scott River- Mainstem in Tailings

There is estimated to be 55.5 miles of accessible habitat in the mainstem reach of the Scott River from the confluence of the East and South Forks to the confluence with the Klamath River. 12.1 (22%) miles of this length were surveyed at least once during this season. Only 1.1 miles of the mainstem that was surveyed was in the Scott Valley. The remaining 11 miles was located in the canyon reach of the Scott River, described later in this discussion. An index reach on the upper Scott River in the area of the mine tailings (Mainstem in Tailings), between river mile 53.8 and 52.7 was added to the survey effort this season. This reach was surveyed three times, twice during storm window 1 and once during storm window 3. An early survey was conducted on December 4, 2002, but only covered the upper 0.3 miles, above and below the confluence of Sugar Cr. The other two surveys, conducted on December 12, 2002 and January 7, 2003, covered the entire reach. No live fish, carcasses or spawning activity were observed. The flows were low until the December 14, 2002 storm event, but fish passage looked possible. A possible low flow barrier may exist downstream in the Scott River, however that could not be confirmed. Flows were too high and visibility too poor to survey this reach during storm window 2, but they dropped enough for an adequate survey during storm window 3, although wading was somewhat of a safety concern. It may be necessary to use an inflatable kayak in some flow conditions, providing visibility is good. The habitat is primarily low gradient riffle, with large gravel/cobble sized material that appeared suitable for spawning. There were some side channels, but flows were not sufficient on the first two surveys for utilization by spawners. The Farmers Ditch intake is within this reach. The push-up dam was breached and fish passage was possible. There appears to be good spawning conditions in the intake to this diversion above the screen. There are not many pools in this reach, only some lateral scour pools, approximately 1 M deep against the banks. There is little riparian vegetation or woody cover in this stretch of stream. Some fresh cedars appeared to be washed down during the first storm event, however. Water temperatures ranged between 39-46 ^{0}F. It is recommended to continue to monitor this reach of the Scott River as an index reach in future surveys.

French Creek & Miners Creek/North Fork French/Horse Range Cr. (tributaries)

There is estimated to be 8.8 miles of accessible habitat in the French Cr. watershed (5.9 miles in French Cr., 2.0 miles in Miners Cr., 0.7 miles in North Fork French Cr. and 0.2 miles in Horse Range Cr.). A total of 2.5 miles were surveyed (28%): 0.9 miles in French Cr. (15%), 0.9 miles in Miners Cr. (45%), 0.6 miles in North Fork French (86%) and 0.1 miles in Horse Range Cr. (50%).

The Mid-Mainstem French Cr. reach is a 0.8 mile index reach and was surveyed four times during storm windows 1, 2, 3 and 4. Six adult Chinook salmon were reported in French Cr. near the mouth of French Cr. from the Hwy 3 Bridge on December 3, 2002 (G.Black, pers.comm.). The survey conducted on December 10, 2002 did not find any redds or live salmon in this index reach. During the second survey, on December 18, 2002, a single redd, with no fish present was observed in a side channel where coho spawning had occurred in 2001-2002. No other spawning activity, live fish or carcasses were observed on this reach during the rest of the survey period. Several juvenile salmonids (species unknown) were observed during the first survey throughout the reach. At approximate stream mile 2.1, the creek braids into several side channels. This reach has large quantities of spawning and rearing habitat and has abundant amounts of small and large woody instream cover with healthy riparian vegetation communities along the banks of the braided

channel sections. The December 14-16, 2002 storm event appeared to increase the volume of flow in the central braid, but the other braids appear to be unchanged and remain similar in conditions to that observed in 2001-2002. Beaver activity was observed in the lower part of the reach, below the braided area, as was the case in 2001-2002. A considerable amount of granitic sand has been deposited throughout this reach. Areas where spawning had occurred in 2001-2002, were buried in newly deposited sand, which appears to be quite mobile. Water temperatures ranged between 39-43 ^{0}F. A temperature device was deployed on December 10, 2002, on the far right side channel at stream mile 2.0, with assistance from the landowner. Data from this device is included in the Appendix.

Mid French Creek Reach
Central Channel in Braided Section, 12/18/02

An upper reach of French Cr., between stream mile 5.8-5.7, was surveyed once during storm window 4 on January 20, 2003. The landowner and his son participated in this survey. The upper most spawning in French Cr. in 2001-2002 was observed on this reach. However, no spawning activity was evident this season.

Miners Creek

Miners Cr. is the main tributary to French Cr. and is estimated to have 2.0 miles of accessible habitat. Although, not an index reach, several portions of the stream were surveyed several times during this field season. A total of 0.9 stream miles (45%) was surveyed. The lower 0.3 miles from the confluence of French Cr. was surveyed four times during storm windows 1, 2, and 3. One possible redd was observed on December 19, 2002, but there was only 50% confidence that it was a redd at that time, so it is not included in the data. Visibility was poor due to high flows and turbidity on the January 4, 2003, making viewing difficult for fish in deeper pools. A one-time survey took place between stream mile 0.6 and 0.4, below the 2nd Miners Cr. Rd. Bridge, on January 8, 2003 during storm window 3. Flows were high and visibility was not good for observing fish in pools, but spawning gravels were visible. No live coho, redds or carcasses were observed at this time. The reach is only suitable for spawning above the irrigation diversion intake just below the 2nd Miners Cr. Rd Bridge, as the substrate below this point in primarily bedrock and sand. An upper reach of Miners Cr. (Above 2nd Miners Cr. Bridge) from stream mile 1.0 to 0.6 was surveyed once during storm window 2. One redd with a fish on it was observed on December 24, 2002. This is the upper most extent

of confirmed spawning observed in Miners Cr. that is known to date. The redd substrate was composed of small cobble (10-13cm) and sand. A lower portion of this reach, from stream mile 0.7 to 0.6, was surveyed two additional times during storm windows 3 and 4. No other live coho, carcasses or spawning activity was observed. Water temperatures ranged between 36-40 ^{0}F. After the first storm event, Miners Cr. remained slightly turbid throughout the survey period. It may be important to consider adding a reach of Miners Cr. as an index reach in future surveys.

North Fork French Creek

The North Fork of French Cr. was surveyed once for the first time this season from stream mile 0.7 to 0.1 (Fish Screen site to the French Cr. Rd bridge) during storm window 3. The length of accessible habitat is unknown, so was estimated to be to the upper extent of this survey. 86% of this length was surveyed on January 7, 2003, but no spawning activity, live fish or carcasses were observed. Water temperatures ranged between 36-39 ^{0}F. Surveys are recommended to continue in this tributary to French Cr. in future years, especially through the lower 0.1 miles to the confluence with French Cr.

Horse Range Creek

The lower 0.1 miles of Horse Range Cr., an upper tributary to French Cr., was surveyed only once during storm window 4, with landowner participation. This is a steep gradient stream with large substrate and large volumes of sand. There are several braided channels present, however, it is unknown whether these channels provide suitable spawning habitat for adult coho. No live fish, carcasses or spawning activity was observed this season. This stream is probably not a high priority for future surveys, although juvenile coho have been documented in French Cr., just upstream of the confluence with Horse Range Cr.

Clark Creek

Clark Creek is a small watershed that drains the west side between French Cr. and Etna Cr. It was surveyed for the first time this season between stream mile 2.6 and 2.0. The lower 2.0 miles was not surveyed. The length of accessible habitat was estimated to be at the upper extent of this survey. 23% of this habitat was surveyed during storm window 3. No live coho, spawning activity or carcasses were observed. Suitable spawning habitat above stream mile 2.6 is questionable, as the gradient is steep and the habitat is limited. It is unknown whether the habitat is suitable below mile 2.0, but this potential habitat area should be investigated in future surveys. The water temperature was 39 ^{0}F.

Etna Creek and Ruffy Gap Tributary

Eight miles of accessible habitat is estimated to be present in Etna Cr. Only 1.1 miles (14%) of this length was surveyed this season, compared to 2.5 miles in 2001-2002, although much of that was "spot surveyed". No surveys took place above the City of Etna's municipal water supply intake dam due to high flows and poor access because of snow depth. The Mid-TP/FGS reach, from stream mile 5.2 –4.6 was surveyed two times during storm window 2 and 4. No live coho, spawning activity or carcasses were observed. A possible unscreened diversion was noted about 200 ft. above the end of the survey reach at stream mile 4.6. This information was passed on to the Siskiyou RCD (G.Black) to be investigated further. Spawning habitat appears limited throughout this reach, except at pool tailouts, due to steep gradient and large boulder substrate.

A middle reach of Etna Cr. (Lower) between stream mile 4.1 and 3.6 was surveyed for the first time this season. No surveys took place below mile 3.6. On January 8, 2003, a small portion of this reach between mile 3.7 and 3.6 was surveyed during storm window 3. No live fish, carcasses

or spawning activity was observed. There is little suitable spawning gravel, as most of the substrate is larger cobble/boulder material. The gradient is high, but there are some good lateral scour pools, with pool tailouts. The clarity of the water was excellent, even with the higher flows. On January 17, 2003, this lower reach of Etna Cr. was again surveyed, but from mile 4.1 to 3.6. No adult coho, carcasses or spawning activity was observed, but there were several areas of suitable spawning habitat present at pool tailouts and along the riffle margins of the stream. The riparian vegetation appears healthy, but lacks maturity in size. A major irrigation diversion is located at about mile 3.8. Some unstable, disturbed area exists on the left bank at the diversion because of historic push-up dam construction (H.Matteson, pers.comm.). The stream below this diversion runs subsurface during most years according to local landowners (R.Schmalenberger, pers.comm.). Water temperatures ranged between 38-40 ^{0}F. Surveys in Etna Cr. need to be expanded in the future to include a lower reach below mile 3.6. Future surveys including tributaries such as Whiskey Cr. and Ruffy Gap Trib. should be investigated as well.

Ruffy Gap Tributary

The lower 0.4 miles of Ruffy Gap Trib, an unnamed tributary to Etna Cr that drains the north side of Ruffy Gap, was also surveyed on January 17, 2003. No adult coho, carcasses or spawning activity was observed in this reach of stream. The landowner indicated that juvenile salmon have been observed in this stream in the past (H.Matteson, pers.comm.). The stream has a fairly low gradient, with several braided channels. The banks are grassy with some undercut lateral scour pools that have formed. Suitable spawning habitat for adult coho exists, however the mouth is fairly steep, with no jump pools, but may be passable at high flows. A large, historic earthen dam, which is currently blown out, exists at about mile 0.5. Above this, the creek fans out into low gradient wetlands, having good vegetation and winter flows, making this possibly suitable beaver habitat. Recent ATV activity was also observed in this area.

Johnson Creek

Johnson Creek was surveyed once, with landowner participation, on January 21, 2003 during storm window 4 from stream mile 4.3 to 4.0, (7% of the accessible habitat). There is estimated to be 4.3 miles of accessible habitat based on the upper extent of this survey. No adult coho, spawning activity or carcasses were observed. This reach has a steep gradient, with only a few areas suitable for spawning. The riparian vegetation is in good condition and there is good instream woody cover. It is probably more suitable for trout spawning, however, due to the small channel size and the steep gradient. No surveys took place below mile 4.0. Johnson Creek flows into Big Slough above Patterson Cr., which is known to be accessible to adult coho spawners up to Patterson Cr. (Maurer, 2002). It is recommended that the lower reach of Johnson Cr. and Big Slough be surveyed in the future.

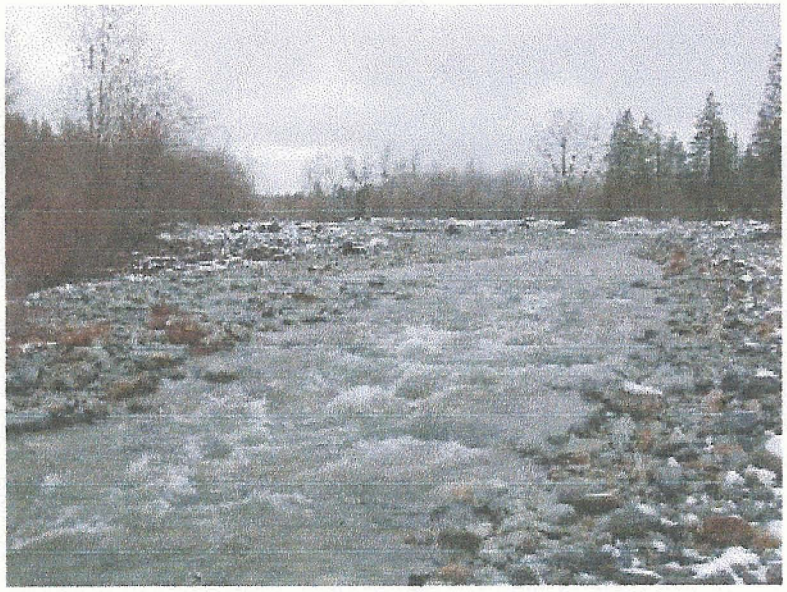
Patterson Creek (Etna)

There is estimated to be 5.6 miles of accessible habitat in Patterson Cr., of which 1.7 miles (30%) were surveyed. In 2001-2002, the estimated length of accessible habitat included approximately 2.4 miles of Big Slough, which is not included in this season's estimate. The actual length of Big Slough may be as much as 4.5 miles, as it is very sinuous. The Upper-FGS reach of Patterson Cr. was surveyed two times during storm windows 2 and 4. The survey on December 19, 2002 was from stream mile 6.1 to 4.7. A possible natural barrier was indicated at that time in the middle portion of the reach. A second survey took place on January 21, 2003 from mile 6.0 to 5.5. This possible barrier was observed at mile 5.7 and is a long, 200 ft. cascade, with a 15 ft. jump at the top and a confined bedrock chute at the bottom, which may be a velocity barrier. Further

investigation is needed to determine whether this is truly a barrier for adult and/or juvenile migration. No live fish, carcasses or spawning activity were observed in this upper reach.
A middle reach (Mid-below Hwy 3) of Patterson Cr. from mile 1.9 to 1.6 was surveyed once on January 6, 2003 during storm window 3. The flows were swift and there were few holding pools present. No adult coho, carcasses or spawning activity was observed. Water temperatures in Patterson Cr. ranged between 38-41 ^{0}F. No surveys took place below mile 1.6 or between mile 1.9 and 4.7. Patterson Cr. flows into Big Slough at approximately 2.4 miles upstream from its confluence with Kidder Cr. All of this area should be investigated in the future for both adult spawning and juvenile rearing.

Kidder Creek

Eleven miles of Kidder Cr. is estimated to be accessible habitat, of which 1.8 miles (16%) were surveyed. Two reaches of Kidder Cr. were surveyed this season. The Mid-Mainstem reach from mile 7.3 to 6.5 was surveyed three times during storm windows 2, 3 and 4. The first survey was conducted on December 17, 2002 and the last survey, which only went to mile 6.8 was conducted on January 21, 2003. No live coho, carcasses or spawning activity were seen on any of these surveys. One possible old redd was observed on the far left side channel on January 21, 2003, but there was no fish on it and confidence was less than 80% at that time, so it is not included in the data. This reach of Kidder Cr. has a wide flood plain. The stream braids throughout much of this area and contains one or two primary channels and several smaller side channels. The riparian vegetation is quite limited and the substrate is fairly large sized cobble and boulder. With sufficient flows, the side-channels may contain suitable spawning habitat that could be used by coho salmon. There is a large pond in the middle of the channel, apparently used to draft irrigation water. The stability of this pond could be vulnerable to high flows. The right bank has been stabilized with old automobiles. Kidder Cr. was very clear and visibility was good during the surveys. Kidder Cr. appeared to clear rapidly after each storm event. Water temperatures ranged between 40-43 ^{0}F. No surveys took place above mile 7.3 this season.



Mid Kidder Creek Reach
Main Channel at Top Reach, 12/17/02

A lower reach of Kidder Cr., below Hwy 3, was surveyed once on January 6, 2003 during storm window 3, between miles 5.8 and 4.7. No adult coho, carcasses or spawning activity were

observed at that time. No surveys took place below mile 4.7. It is recommended that this lower reach of Kidder Cr., below mile 4.7, be surveyed in the future, to determine whether there is suitable spawning conditions or juvenile rearing capability.

Moffett Creek and McAdams Cr. (tributary)

Moffett Cr. was disconnected from the Scott River until December 28, 2002. Once the flows came up, the visibility was poor due to turbidity. Moffett Cr. never cleared enough to survey during the remaining survey period. There may be up to 20 miles of accessible habitat in Moffett Cr., estimated from map distances and from the county road. No surveys were performed in Moffett Cr. this season, but conditions permitting, this stream should be surveyed in the future.

McAdams Creek

McAdams Cr. is a major tributary to Moffett Cr., the confluence of which is located approximately 2.5 miles upstream from the Scott River. There may be as much as 8.0 miles of accessible habitat based on observations from the county road along the stream and map distances. Only 0.2 miles (3%) of this length was surveyed and that survey occurred very late in the season on January 27, 2003. No live fish, carcasses or spawning activity was observed. The flows were high at the time of the survey and visibility was poor in pools and in the bubble curtain. The reach only contains a few pools and is dominated by riffle habitats that provide some suitable spawning gravels. Little riparian vegetation exists, except for on the right bank where some recent rip-rap/planting work has been done. The water temperature was 46 ^{0}F. This may be a more suitable reach of stream for steelhead, as it is a single thread channel with little cover or large wood. Future surveys should look closely at McAdams Cr, especially in reaches above that may contain more habitat suitable for coho salmon.

Indian Creek

This relatively small tributary flows from the east side of the valley below Fort Jones and was not hydraulically connected to the Scott River until December 28, 2002. An attempt to survey an upper reach was made on January 8, 2003, but deep snow blocked access. One survey did take place on January 21, 2003 during storm window 4, between miles 7.1 and 6.3. The length of accessible habitat was estimated to the end of this survey length, of which only 0.8 miles (11%) was surveyed. No live fish, carcasses or spawning activity were observed. Only a few pools were observed, but some suitable spawning gravels were available. There was considerable small woody debris in the channel, possibly blocking migration part way through the reach. Otherwise, the riparian condition appeared compromised. The water temperature was 44 ^{0}F. Investigation of the lower portion of Indian Cr. is recommended in future surveys.

Rattlesnake Creek

Like Indian Cr., Rattlesnake Cr. did not hydraulically connect to the Scott River until December 28, 2002. An initial survey attempt was made on January 8, 2003, but deep snow conditions prevented a full survey. On January 21, 2003 during storm window 4, the reach between mile 5.0 and 4.7 was surveyed. The length of accessible habitat was estimated based on this survey length. Only 0.3 miles (6%) of this length was surveyed. Visibility was poor due to turbidity and high flow. In addition, thick patches of poison oak and steep banks covered in snow made the survey difficult. There appeared to be very little amounts of spawning gravel, as most of the substrate was large. Water temperatures ranged between 40-44 ^{0}F. The lower reach of Rattlesnake Cr. has a lower gradient and appears to have suitable spawning gravels, as observed from the county road.

There may be some fish passage problems at culvert crossings below the surveyed area. Future surveys should investigate the lower reaches of this stream.

Patterson Creek (Scott River)

Patterson Cr. is a small tributary to the Scott River that drains from the east side of the lower valley just above Shackleford Cr. It is unknown when Patterson gained connectivity to the Scott River this winter, as the lower reach below Scott River Rd. often runs subsurface, but it was presumed to be connected by December 28, 2002. No surveys were conducted in Patterson Cr. until January 16, 2003, when a short reach above Scott River Rd., from mile 0.8 to 0.6 was surveyed. The estimated accessible habitat in Patterson Cr. may be as much as 1.8 miles, estimated from map distances. The distance surveyed was only 11% of that length. However, two adult fish were observed on the date of the survey. The species was not confirmed, but they appeared to be jack coho salmon. No redds or spawning behavior by these fish was observed. The water temperature was 46 ^{0}F. At a follow-up survey on January 21, 2003, one adult fish was observed briefly that fit the description from the previous survey, but positive identification of this fish could not be made. Again, no redds were observed. On January 23, 2003, CDFG personnel attempted to find and net one of these fish for identification purposes, however, no fish were seen at this time. The lower part of the reach to Scott River Rd. was also walked, with landowner verbal permission, but no fish were observed in this reach, except for one ½ lb. steelhead just below the Scott River Rd. crossing. Several redds were found in this lower reach and were thought to be steelhead redds by CDFG personnel. These two fish sightings are not included in the data totals, but observations are documented in the complete data set. The habitat in the reach where the fish were sighted appeared to be good coho habitat, with braiding, good riparian cover and spawning gravel. Patterson Cr. (Scott River) is recommended to be included in future surveys.

Shackleford Creek & Mill Creek/Emigrant Creek (tributaries)

There is a total of 11.1 miles of estimated accessible habitat in the Shackleford Creek watershed, including, 5.0 miles in Shackleford Cr., 5.3 miles in Mill Cr. and 0.8 miles in Emigrant Cr. In total, 5.6 miles (50%) of this watershed was surveyed: Shackleford Cr. 1.0 miles (20%), Mill Cr. 3.8 miles (72%) and Emigrant Cr. 0.8 miles (100%).

The lower 1.0 mile of Shackleford Cr., to the confluence with the Scott River, was surveyed three times during storm windows 2, 3 and 4. The first survey occurred on December 19, 2002 and began at mile 0.9. The other two surveys began at mile 1.0. One spawned out female coho was observed on January 3, 2003, just above the confluence with the Scott River. No other live fish, spawning activity or carcasses were observed on any of the three surveys. Approximately 100 yards above the confluence, a side channel goes off to the right, through willows in three braids for approximately 30 yards before entering the Scott River. Water temperatures ranged between 40-48 ^{0}F. Spawning habitat appeared suitable, with good sized gravels and braiding in this lower reach. No surveys took place above mile 1.0 this season.

Mill Creek

Mill Cr. is the primary tributary to Shackleford Cr. and dense spawning was observed in the lower portions of this reach in 2001-2002. This stream hosted the most spawning activity during the 2002-2003 survey period. A total of 14 redds, 3 with fish on them and 11 without fish, 6 live fish total, but no carcasses were observed in the Mill Cr. watershed, including Emigrant Cr., a small tributary. The lower 0.8 miles of Mill Cr. to the confluence of

Shackleford Cr. (Lower-Shackleford) was surveyed four times this season, two times during storm window 1 and two other times during storm windows 2 and 3. One redd with two fish were observed in a deep riffle on December 20, 2002. Another isolated fish was observed during that same survey. An older, suspected, redd (less than 80% confidence) was observed on January 10, 2003 in this same reach, but is not included in the data.

A middle reach (Mid above Quartz Valley Bridge) was also surveyed three times during storm windows 2,3 and 4, with landowner participation. On the December 24, 2002 a total of 10 redds, 2 with fish on them and 8 without fish, and three live fish were observed. No carcasses were recovered in this reach. There is a high level of confidence that those redds without fish present on them were coho redds, because of their freshness and the presence of live fish on nearby redds at the same time. Many redds seemed to be clustered, although little superimposition was observed. The surface area of redds measured on this survey date ranged from 4.50-2.54 M^3. Two additional redds were observed on side channels during the January 8, 2003 survey. The confidence in these redds is not as great because no live fish were observed on this survey date and the redds were smaller in area (1.70-1.44 M^3). Of the live fish observed, one may have been a jack (2 yr. old male), with the female on the redd. Another jack may have been observed briefly by one survey member, possibly having been flushed from another redd observed just upstream with an adult female coho on it. No confirmed observation was possible, however. This fish could have also been a small steelhead. The presence of jacks is of interest since no jacks were observed at all during the 2001-2002 survey, when many more fish and carcasses were observed. This reach of Mill Cr. has good riparian vegetation, with some braiding in the lower portion of the reach. There are several lateral scour pools and undercut banks for holding habitat and good spawning gravels are available.

Mid Mill Creek (Shackleford) Reach
Adult Coho Salmon Spawning under Woody Cover, 12/24/02

About 600 yards above the confluence with Emigrant Cr., the stream gradient increases and the substrate in mostly cobble. This section is dominated by a long, low gradient riffle habitat type, with little diversity and the channel lacks riparian vegetation. The flows go subsurface in this upper part of Mill Cr. in early summer, according to the landowner (J.Menke, pers.comm.). Water temperatures ranged between 41-46 F^0. There are several side channels, in

which the two redds from the January 8, 2003 survey were found. Just below the beginning of the survey reach (mile 3.1), an additional side channel (Channel A), which had shown recent human diversion activity, was followed to the edge of the property line where access had been granted (approximately 0.5 miles). It then appeared to flood out onto a pasture and had no channel connecting features back to Mill Cr. The Menke's, who participated in the survey, had not seen the diversion previously, but suspect a neighbor (former manager of the Menke property prior to their ownership) did the diversion during the recent drought to sub-irrigate his property and to recharge groundwater for his well. Later this winter, the Menke's reformed the diversion to stop flooding of the Pott's tritacale seeding (J.Menke, pers. comm.). This channel appears to flow only during the high flow period. Later the flow from this channel was found to reconnect just above the Quartz Valley Bridge, creating erosion problems at the Pott's private road crossing. Unlike the large cobble and small boulder dominated substrate in Mill Cr. proper, adequate spawning gravels were found throughout this side channel to the fenceline above the pasture, but flows are not sustainable (J.Menke, pers. comm.). No fish passage was possible from below. Another channel (Channel B) branched from this side channel (Channel A) within 75 ft. from where it left Mill Cr. During the survey on January 22, 2003, Channel B was followed for 1.1 miles back to its connection to Mill Cr. just above the confluence with Emigrant Cr. More flow was in this channel on this survey date. Some suitable spawning areas were present, but flows may fluctuate too much for dependable habitat to exist. No surveys took place above mile 3.1 on Mill Cr.

Emigrant Cr. is a small, groundwater fed tributary to Mill Cr. and was surveyed once for the entire 0.8 miles (100%) of accessible habitat. One redd, without a fish on it, was observed during the December 24, 2002 survey. This redd was located right above the confluence with Mill Cr. and there is high confidence that it was a coho redd because of the spawning activity in Mill Cr. observed on that same date. The redd area was smaller (1.80 M^3), however. Another possible redd was observed in deeper water about 100 yards above the confluence, but there was less than 80% confidence, so it is not included in the data. There is little spawning habitat in Emigrant Cr., although it appears to have good juvenile rearing habitat and has flows throughout the year, according to the landowner (J.Menke, pers.comm.). There have been large beaver dams in Emigrant Cr. in the past, one 7 ft. high, but they were blown out during the 1997 flood event (J.Menke, pers.comm.). Ron Dotson, CDFG, viewed these dams in 1993, soon after the Menke's purchased the property (J.Menke, pers.comm..). These beaver dams backed up sediment, which is now being distributed downstream. The substrate is made up of these fine-grained soils and fines with very small gravel. There is a lot of large woody debris present in the channel, which include old beaver logs. Fish passage is possible for adult spawners, but suitable spawning gravel appears to be limited. There are several tributaries that feed Emigrant Cr., all apparently fed from groundwater. The Selby-Baird's Drainage, a tributary on the right, literally drains the fields above through a previously installed process called tile drains on the Baird property (J.Menke, pers. comm.). This contributes a good flow of water to Emigrant Cr. Another tributary, which is also groundwater fed, located about 50 ft. above the Selby-Baird's Drainage, has an old Soil Conservation Service (SCS) designed baselite block check dam on it, approximately 5-6 ft. high, which may prohibit fish passage. Multi-date aerial photos (Menke's have them from NRCS) show that the dam was installed to repair a deep gully in the pasture. The stream above the dam had no willows previously, but is now almost completely willow lined. However, the willows are now becoming decadent (J.Menke, pers. comm.). Above this point Emigrant Cr. becomes somewhat sinuous, with 8-10 ft. high stream banks that are eroding and caving into the stream, especially at the outside of the meander bends. Historically, much of this lower portion of Emigrant Cr. has downcut. In a central part of this reach, about 3 ft. of cutting occurred during the 1997 storm event

(J.Menke, pers. comm.). There is good riparian vegetation in the upper portion of this reach, with large cottonwoods, willows and hawthorns. Suitable spawning habitat was not present, so surveys in Emigrant Cr. on January 8 and January 22, 2003 included only the lower 100 feet of the stream.

It is recommended that this reach of Mill Cr. (Mid-above Quartz Valley Bridge) be considered as an index reach for future surveys and that the lower 100 ft. of Emigrant Cr. also be included.

Meamber Gulch

Meamber Gulch is a small tributary which drains the east side of the lower valley right before the Scott River enters the canyon. Accessible habitat was estimated to be 0.6 miles, to the upper extent of this survey reach. A one-time survey on January 23, 2003 covered this entire length (100%). No spawning activity, live fish or carcasses were observed. The upper reach is high gradient with not much available spawning area. There is both large and small woody cover, but the substrate is fairly large, comprised of boulder/cobble. The lower half of the reach contains suitable sized spawning gravels. There is an old berm along the right side of the lower quarter of the reach, which has some erosion occurring, as the stream tries to reclaim its old meander pattern. The left bank also has some bank erosion occurring. At Scott River Rd, there is a 36" squashed culvert, which may present passage problems for adults due to high velocities and could also be a problem for juveniles. The water temperature was 45 ^{0}F. This stream should be surveyed in the future, especially in years when spawning seems to be occurring lower in the Scott River system.

Scott River Canyon

Live coho salmon were first reported being observed by the Fall Chinook Salmon Cooperative Spawning Ground Survey on November 26, 2002 near mile 5.0 in the lower Scott River. Six carcasses were later reported (February 19, 2003) near this same area on December 6, 2002. It is presumed that these fish spawned in the lower mainstem Scott River. One-time surveys took place between river mile 21.8 and 10.4 during storm window 1. Nine live coho salmon were observed on December 10, 2002, further up in the canyon, just below river mile 20, and these sightings were confirmed by a snorkel survey on December 11, 2002. No other live coho, carcasses or spawning activity was observed at this time. A pair of coho salmon were observed near the mouth of Shackleford Cr. on December 12, 2002 (G.Black, pers.comm.), but were not included in the total because they may have been the same fish that were reported on December 10, 2002. After the December 14, 2002 storm event, no other observations in the lower Scott River mainstem were possible due to high flows.

The same tributaries in the canyon reach of the Scott River that were surveyed in 2001-2002 were surveyed this season, with the exception of Wooliver Cr. These included: Boulder Cr., Canyon Cr., Kelsey Cr., Kelsey Spawning Channel, Middle Cr., Tompkins Cr., and Mill Cr. (Scott Bar). There may be up to 8.2 miles of combined accessible habitat in these Scott River canyon tributaries. A total of 4.2 miles (51%) of stream were surveyed. Only two carcasses were found in this entire portion of the watershed, in Mill Cr. (Scott Bar) on January 10, 2003. Four redds were found in the Kelsey Spawning Channel on January 9, 2003, however no fish were observed, lending uncertainty to whether these were coho redds or early steelhead redds. Although some of these streams appear to have adequate spawning habitat, the spawners did not seem to utilize them this year, which is similar to the observations in 2001-2002.

Mill Creek (Scott Bar)
Mill Cr. (Scott Bar) was surveyed more thoroughly this season than last season, when it was only "spot checked". Two reaches, from Singleton Cr. downstream, for a total of 1.2 miles were surveyed. The lower reach (0.5 miles) was surveyed four times, during storm windows 1, 3, and 4 and the upper reach (0.7 miles) was surveyed three times during storm windows 1, 3, and 4. No surveys were conducted during storm window 2, so it is unknown whether spawning occurred during this period. Stream temperatures ranged between 41-46 ^{0}F. Conditions appear favorable for spawning in Mill Cr. (Scott Bar) and it is estimated that there may be an additional mile of accessible habitat above Singleton Cr. The 1.3 miles between the two survey reaches should also be investigated for a more complete survey of this stream in the future. It is recommended that Mill Cr. (Scott Bar) be added as an index stream for future surveys because of its geographic location in the watershed and its suitability for spawning.

Tompkins Creek
The lower portion of Tompkins Cr. (0.6 miles) was surveyed three times this season during storm windows 2, 3, and 4, in contrast to last season when only the upper reach of 1.6 miles was surveyed. The stream gradient is steep and suitable spawning habitat areas are limited. The velocities were swift and visibility was marginal due to much whitewater. There is a series of small waterfalls located just above the confluence and water velocities are very swift throughout section. No spawning activity, live fish or carcasses were observed. Water temperatures ranged between 41-47 ^{0}F. Although the suitability for spawning in this stream is questionable, thorough surveys up to a possible barrier at mile 1.7, should continue in the future.

Middle Creek
The lower 0.4 miles of Middle Cr. was surveyed twice during storm window 3 and 4, which is the same reach that was surveyed in 2001-2002. The mouth of Middle Cr. is similar to that of Tompkins Cr., with a cascade over large boulders and very swift water. Little suitable spawning gravel is available and there may be a natural barrier to fish passage just below mile 0.4. Water temperatures ranged between 41-47 ^{0}F. No spawning, live fish or carcasses were observed. Like Tompkins Cr., spawning in this stream is questionable, but surveys should continue in future years.

Kelsey Creek
Kelsey Cr. was surveyed three times from the known barrier at mile 0.6 to the confluence with the Scott River during storm windows 2, 3 and 4. This is the same reach that was surveyed in 2001-2002. Although the stream gradient is relatively steep, the reach does contain suitable spawning habitat for coho salmon in pool tailout areas. No spawning activity, live coho or carcasses were seen, but many 0+ and 1+ steelhead were observed. Water temperatures ranged between 38-42 ^{0}F. Surveying this reach in a dry suit is recommended because of the high flows. Snorkel observations occurred during the first survey. The flows were up during the last survey, making visibility poor for observing live fish unless they were on a redd. This stream may be considered as a candidate as an index stream, instead of Canyon Cr. in future surveys.

Kelsey Spawning Channel
The Kelsey Spawning Channel was surveyed three times during storm windows 1, 3 and 4. Four redds without fish were observed on January 9, 2003. It is unknown whether these were coho or early steelhead redds. All four redds were found in the upper most bay of the channel. Surveys on January 7, 2003 revealed that the flow in the channel was extremely low due to

debris blocking the intake structure. This debris was cleaned out on January 9, 2003 at which time the redds were first noted. It is unknown when these redds were constructed, but it does not appear that the redds were dewatered completely. It is unknown how long the intake structure was blocked, as no surveys took place during storm window 2. Sampling of juveniles from these redds is recommended in order to identify species. Continued monitoring of Kelsey Spawning Channel is important for future surveys.

Canyon Creek

Canyon Cr. has been the index stream in the Scott River canyon for both the 2001-2002 and 2002-2003 surveys. The lower 1.1 miles was surveyed twice this season during storm windows 2 and 3. The stream channel in this reach has a fairly steep gradient and contains some areas of suitable spawning habitat and one side channel. Flows are often high requiring the use of dry suits for safety reasons. Snorkeling occurred during both passes, but no live coho, redds or carcasses were observed. Juvenile 1+ and 2+ steelhead were observed in some pools. Water temperatures ranged between 37-39 ^{0}F. Surveys were not conducted during storm window 4, when temperatures seemed to warm in most streams and flows were high. Because of the difficulty to survey during higher flows, reconsidering Canyon Cr. as an index stream may be required. However, presence of juvenile coho salmon in this stream may warrant continuation of the survey for adult spawning on a regular basis.

Boulder Creek

Boulder Cr. was surveyed from the county bridge to the confluence with the Scott River (0.2 miles) only once during storm window 3. As in 2001-2002, no spawning activity, live fish or carcasses were observed. This reach is similar to other creeks in the lower canyon in that it has a steep gradient and is confined in a narrow stream channel with a series of small, cascading step pools at the mouth. The substrate in the channel is dominated by boulders and cobble. Fish passage appears possible, but spawning gravels are limited. Many boulder falls and large woody debris jams were present throughout the reach. A debris jam just below the bridge may prevent passage. The water temperature on January 8, 2003 was 38 ^{0}F. Boulder Cr. does not appear to contain habitats suitable for coho spawning and may not need to be surveyed in the future.

RECOMMENDATIONS

Future Adult Coho Spawning Survey Needs

Locations: Future coho salmon spawning surveys should focus on those streams that were either not included or not thoroughly surveyed in either 2001-2002 or 2002-2003 seasons. Candidate streams include the East Fork tributaries (Kangaroo Cr., Rail Cr., Houston Cr., Crater Cr. and Mountain House Cr.), Etna Cr., Kidder Cr., Moffett Cr., McAdams Cr., Rattlesnake Cr., Indian Cr., Patterson Cr. (Etna), Patterson Cr. (Scott River), Oro Fino Creek, Sniktaw Creek, and Mill Cr. (Scott Bar). The upper extent of spawning in the East Fork, Miners Cr. fork of French Creek, Sugar Cr., Etna Cr., Mill Cr. (Shackleford) and Moffett Cr. still needs to be ascertained. Continued observation in the main canyon tributaries such as Canyon Cr., Kelsey Cr., Tompkins Cr., and Mill Cr. (Scott Bar) should continue. Coordination between the Fall Chinook Salmon Cooperative Spawning Ground Survey and the Coho Salmon Spawning Survey efforts need to improve in order to better document coho salmon migration timing and spawning activity in the lower Scott River. It is suggested that coho survey team members accompany Fall Chinook Salmon Cooperative Spawning Ground Survey team members during the last week of November and first week of December surveys on the Scott River. Index reaches that were established in 2001-2002 should continue to be monitored several times during the spawning period in subsequent years to establish long-term trend information and to help gather information necessary to improve our understanding of run timing. In addition to the mainstem reach near the tailings, that was added in 2002-2003, Miners Cr. and Mill Cr. (Shackleford) and Mill Cr. (Scott Bar) should be added as index streams in the future. Landowner access permission and education should continue to be a high priority if the survey is to be expanded in the future.

Redd and Spawning Ground Characteristics: Specific characteristics, such as redd dimensions, substrate preferences, velocity, temperature and gradient of Scott River coho redds and spawning ground conditions, such as instream cover and adjacent holding habitat and side-channel preferences is recommended for further investigation. This type of information could become extremely useful to aid in the design and implementation of restoration projects that will be crucial to the recovery of this species in the future.

Timing: The entire coho spawning run is needs to be monitored, beginning in late November through the end of January to gain a greater understanding of the life history timing which is important for management purposed throughout the watershed.

Population Estimate: Population monitoring will be a critical monitoring tool necessary to evaluate the recovery of the species through time. Therefore, a well thought out study design should be developed that identifies the level of effort and funding necessary to achieve this task. The study plan should incorporate and expand on the current coho salmon spawning effort described in this report. The plan should also identify additional tasks that are desired to increase our understanding of coho salmon life history characteristics, population structure, and habitat use for all life stages.

Genetics: Further genetic information is needed to describe genetic characteristics and origin of Scott River coho salmon. It will also be important to understand if there are any genetic differences associated with differing runs or geographic distribution of the species within and outside of the Scott River watershed. Because there is an inadequate sample size of tissues collected from the 2002-2003 survey, additional genetic material should be obtained from native juvenile coho salmon within the basin. This may be accomplished by sampling coho juveniles at the fish rescue traps at irrigation diversion screen sites or at the outmigrant rotary screw trap.

Other Needed Coho Information:

Emergent Survival Rates: Information about the survival rates, from eggs to emergence, for the progeny of these adult spawners would be valuable to know at the different sites (this will depend on various factors, such as sediment, flow and temperature).

Juvenile Rearing: A limiting factors analysis (LFA) should be developed for all life stages of the coho salmon. Habitat capacity functions should be developed for all life stages, in order to determine at what life stage the "bottle-neck" occurs.

Outmigration: Since 2000, the CDFG and USFS have cooperatively been monitoring coho salmon emigration from the Scott River with the use of an outmigrant screw trap located just above Scott Bar, at river mile 4.75. This data may provide information about the timing, relative abundance and population structure of Scott River coho salmon. Incorporation of pit tag studies and scale analysis of the juveniles handled at the trap could help with the understanding of the life history phase of the coho salmon in the Scott River watershed.

Beaver Dams: The role of beaver dams in the life cycle of the coho salmon, both as adults and juveniles, would be valuable to understand.

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Chesney, Bill. California Department of Fish and Game, SRAMP. Yreka, CA
Hampton, Mark. California Department of Fish and Game, Klamath River Project. Yreka, CA
Jong, Bill. California Department of Fish and Game. Arcata, CA
Kilgore, Jim. USFS, Klamath National Forest, Scott River Ranger District. Ft. Jones, CA
Maria, Dennis. California Department of Fish and Game. Yreka, CA
Matteson, Harry. Landowner. Etna, CA
Menke, John. Landowner. Ft. Jones, CA
Pisano, Mark. California Department of Fish and Game. Yreka, CA
Quigley, Danielle. Siskiyou Resource Conservation District. Etna, CA
Rushton, Kim. California Department of Fish and Game, Hornbrook, CA
Schmalenberger, Renee. Landowner. Etna, CA
Williams, Tommy. NOAA Fisheries. Santa Cruz, CA

APPENDICES

List of Contents | Page #

APPENDICES

TEMPORARY ENTRY PERMIT

Permission is hereby given to the California Department of Fish and Game (hereinafter "the State") to enter, with all equipment deemed necessary by State, upon that real property owned or leased by the undersigned (hereinafter "the Owner"), subject to the following provisions:

1. This Permit shall limit the State to reasonable access to the property herein described in the addendum in order to conduct the activities herein described in the addendum.

2. The State shall act reasonably to avoid damage to persons or property, and shall repair or pay for reasonable damages proximately caused its actions.

3. To the extent provided by law, including but not limited to the California Tort Claims Act (Government Code §810 et seq.), the State shall be liable for any injury to persons or property arising from any negligent acts or omissions of its employees, agents or representatives. This provision does not affect any potential State liability based on contract or the right of the Owner to obtain relief other than money or damages.

4. To the extent provided by law, including but not limited to the Government Code §14662.5, the State agrees to indemnify and hold harmless the Owner and agrees to repair or pay for any damage proximately caused by reason of the uses authorized by this right of entry agreement.

5. This Permit does not create an easement or right-of-way for the State over the property owned by Owner, nor does this Permit affect any existing riparian or appropriated water rights of the Owner.

6. The term of this Permit shall commence on, or after, the acceptance date below, and may be canceled by either party immediately upon receipt of a written notice of cancellation by the other party. Written notice must be provided to:

For State: Mr. Dennis Maria, 1625 South Main Street, Yreka, CA. 96097

For Owner: Landowner Name and Address

7. Attached addendum Items 8 through 9 are incorporated herein by reference and shall apply to all users of the Permit.

ACCEPTED this _____ day of _____, 200_.

By:_____
Owner/Lessee (signed)

_____
(print name)

By:_____
Don Koch

Regional Manager
Department of Fish and Game

FG-405 (Rev. 08/01/96)

ADDENDUM TO TEMPORARY ENTRY PERMIT ITEMS 8 THROUGH 10

8. The purpose of this Permit is to grant the State reasonable access to the following property:

Property is owned by Landowner Name. Access will be confined to an approximately Description of Property. This property is located in Section __ of Township __ N and Range __ West (MDB&M).

9. The activities the State proposes to engage in on this property consist of:

Adult coho salmon spawner surveys will be conducted, if and when, surface flow connectivity is established between _____ Creek and the Scott River . This activity will involve no more than once-a-week spawner surveys along _____ Creek by a two-person survey crew walking along the creek throughout the coho spawning season. Crew members will count adult coho and/or their redds and collect tissue, scale and otolith samples from spawned-out coho carcasses. Surveying will be conducted during the months of December through early February or until coho spawning activity ceases, whichever comes first.

10. Special Conditions (if applicable)

2002-2003 Scott River Adult Coho Salmon Cooperative Spawning Survey
Crew Training
December 9, 2002
CDF Station, Fort Jones
9:00- 4:00

AGENDA

9:00-11:00 Classroom Session
Introductions
Objectives of Survey
Landowner Access
Permits
Procedures:
- Species Identification
- Tissue and Scale Collection and Chain-of-Custody
- GPS Use
- Data Form/Field Notebooks
- Redd Identification and Measurement
- Safety/ Check-in
- Flagging-labeling

Scheduling/Availability

11:00-4:00 Field Session (location TBA)
(We will work together as a group, then break out into crews to begin the first survey.)
Stream Safety
Species Identification-Live Fish and Carcasses
Redd Identification, Measurement and Flagging
GPS Use

What to Bring:
Neoprene waders
Felt-soled wading boots
Field vest or day pack
Polarized glasses
Layers of warm clothing-gloves, hat
Lunch
Water

If you have any questions or need field equipment, please call Sue Maurer, Project Coordinator, 468-2657 or 468-2630.

Guidelines for sample collection and delivery

Collection Protocols

1). Live fish: Cut a 1cm square clip from **tail** fin using clean scissors and place in a piece of dry blotter/filter paper (e.g. Whatman brand). Fold blotter paper over for temporary storage. Samples must be airdried as soon as possible (don't wait more than 8 hours). Airdrying inside takes about 24 hours. Airdrying in the sun is much quicker. When tissue/paper is dry to the touch, place both into a clean envelope labeled with Sample ID Number. Seal envelope.

2). Live fish (alternate method): Cut a 1cm square clip from **tail** fin using clean scissors and store in small (e.g. 2ml) vial filled with pure ethanol. Sample must be fully immersed in ethanol. Ethanol dissolves all inks, so make sure vials are well sealed and outside is dry. Label with Sample ID Number.

3). Carcasses: Either a 1cm square clip from the operculum or **tail** fin, or alternately, complete scales (20-30) should be removed and placed on a piece of dry blotter/filter paper (e.g. Whatman brand). Fold blotter paper over for temporary storage. Samples must be airdried as soon as possible (don't wait more than 8 hours). When tissue/paper is dry to the touch, place into a clean envelope labeled with Sample ID Number. Seal envelope.

4). Previously frozen tissues: Excise a small (1cm square) clip from tail fin or gill and place in tube on regular ice for express shipping. Tissue should remain frozen during the whole process. Thawing/refreezing will destroy tissue.

-Never cut adipose fin

-Each sample must be stored in a separate tube or envelope

-Each sample must be clearly labeled with the Sample ID number

-Samples may be sent surface mail (except frozen tissues)

-Samples are for scientific research. Please take care in their collection.

Send samples to:

Genetic Tissue Repository
Southwest Fisheries Science Center
110 Shaffer Road
Santa Cruz CA 95060

Questions? Call 831 420-3903

Genetic Tissue Collection Data

Page___of___

Collection Date_____

Collection Location (County, River, Exact Location on River)_____

Collector Name_____ **Collector Affiliation/Phone**_____

Sample ID Number	Species	Tissue Type	Condition	Fork Length (mm)	Sex (M, F or Unk)	Adipose Fin Clip? (Y or N)	Tag? (Y or N)	Notes/ Comments

Please complete all fields

Genetic Tissue Repository
National Marine Fisheries Service
Southwest Fisheries Science Center
Santa Cruz Laboratory

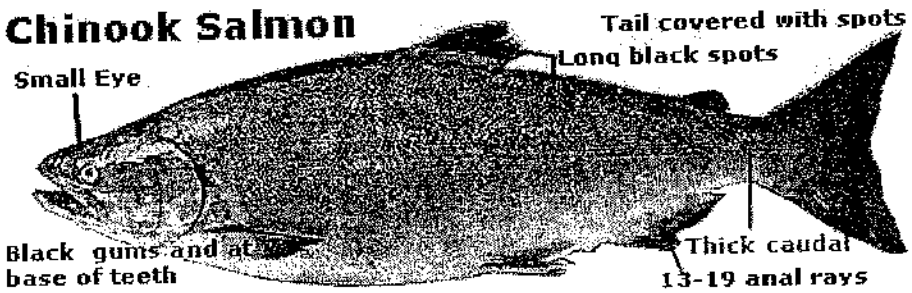
Fisheries and Oceans Canada Pêches et Océans Canada

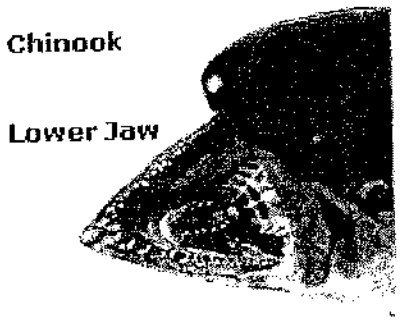
Canada

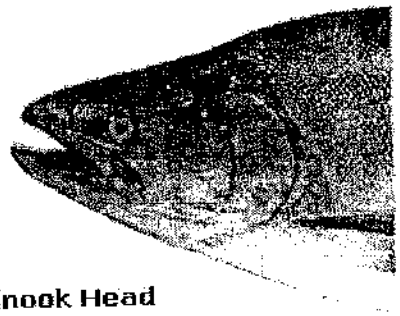
Salmon Identification Key

Chinook | Chum | Coho | Pink | Sockeye | Steelhead

CHINOOK

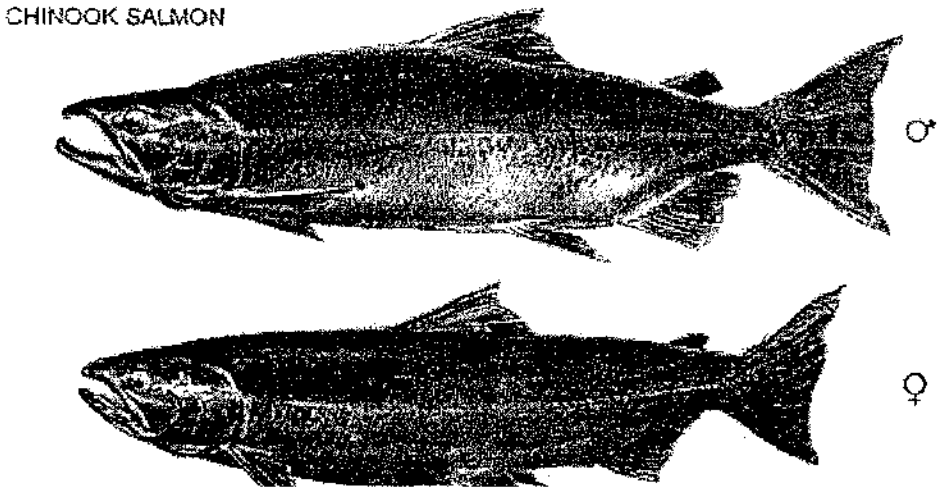






Black gums and a silver, spotted tail distinguish the chinook from other salmonids. It has a lightly spotted blue-green back and it the largest, most prized game fish. Chinook weigh between 1.5 and 30 kg.

Spawning Chinook



A6

Biological Sampling Manual for Salmonids

Schematic Drawings of Chinook Salmon

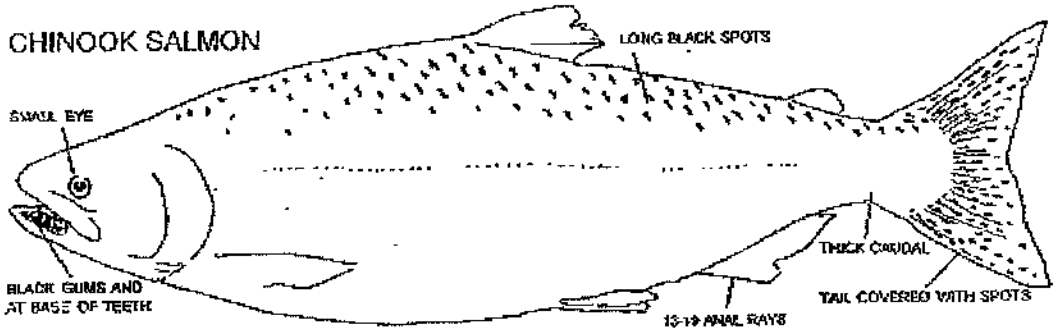


Figure 3. Schematic drawing of side profile of chinook salmon, displaying important identification characteristics and description.

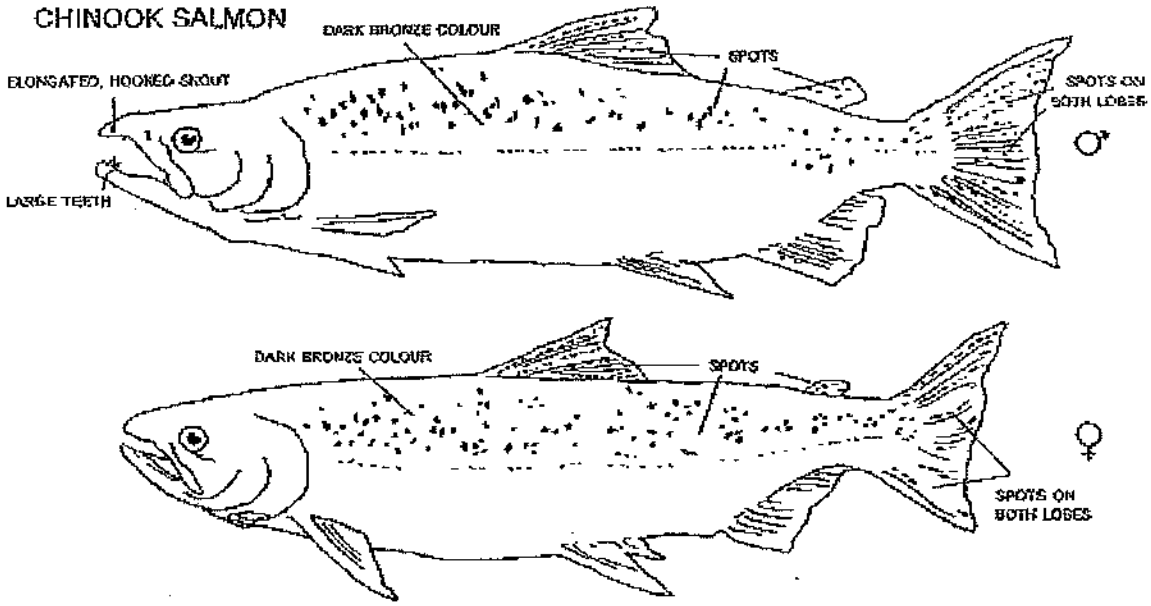


Figure 6. Schematic drawing of male and female chinook salmon, displaying important identification characteristics and description.

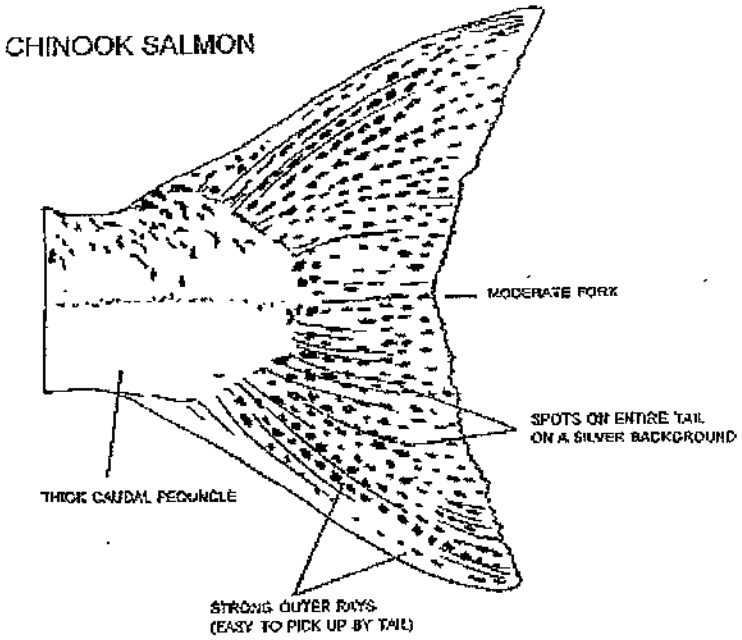


Figure 10. Schematic drawing of the caudal fin of chinook salmon, displaying important identification characteristics and description.

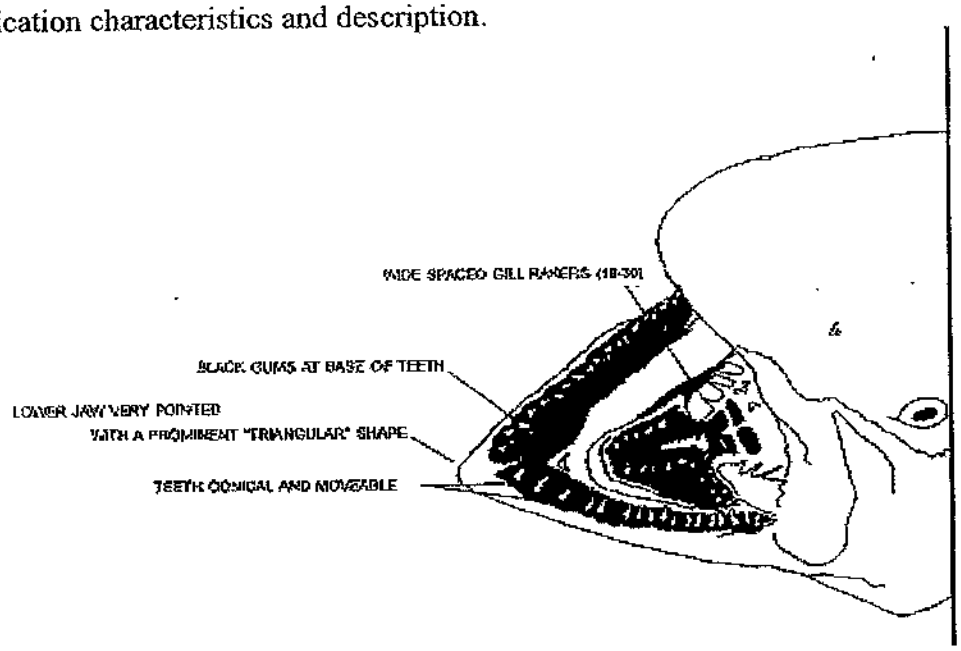


Figure 14. Schematic drawing of the lower jaw of chinook salmon, displaying important identification characteristics and description.

CHINOOK SALMON

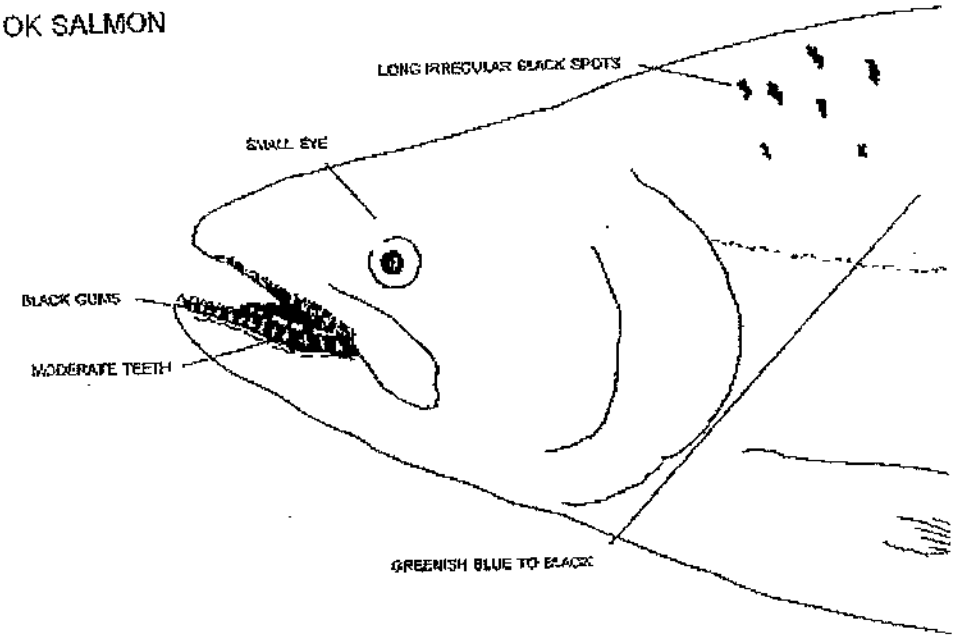
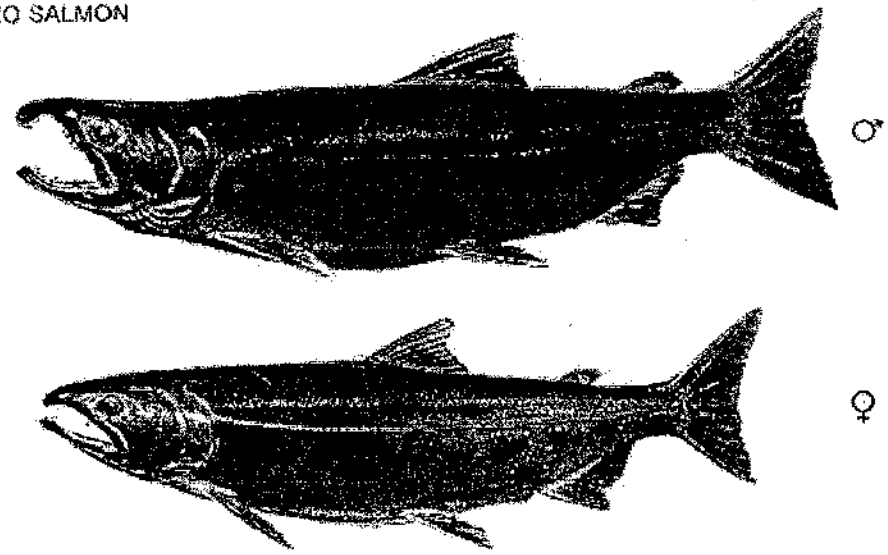
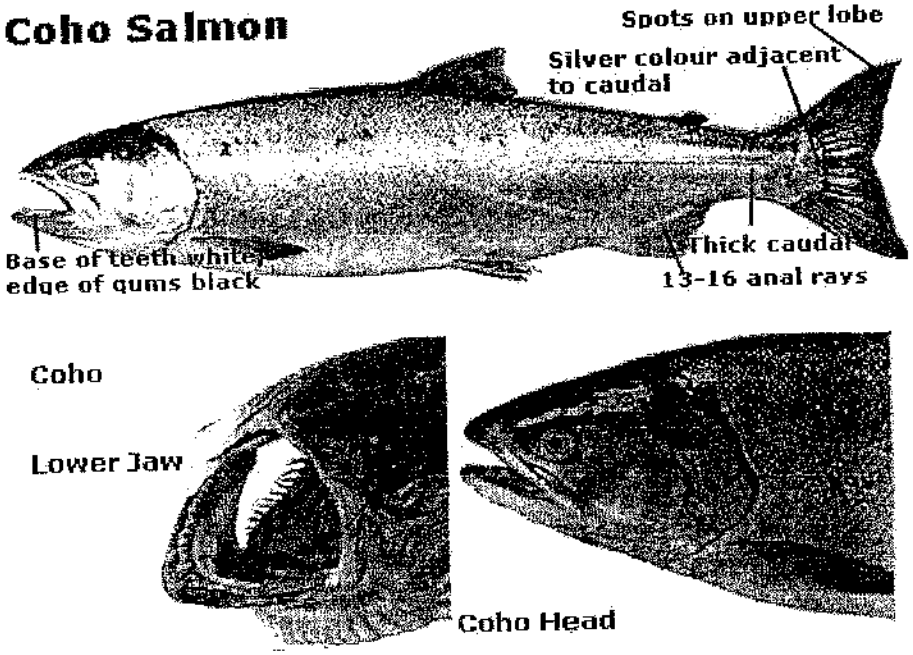


Figure 19. Schematic drawing of a chinook salmon head, displaying important identification characteristics and description.

COHO SALMON



COHO



Coho have white gums, black tongues and a few spots on the upper portion of thier silver-coloured tails. They have a wide tail base and are bright silver with a metallic blue dorsal surface. Coho weigh between 1.3 and 14 kg.

Spawning Coho

Biological Sampling Manual for Salmonids

Schematic Drawings of Coho Salmon

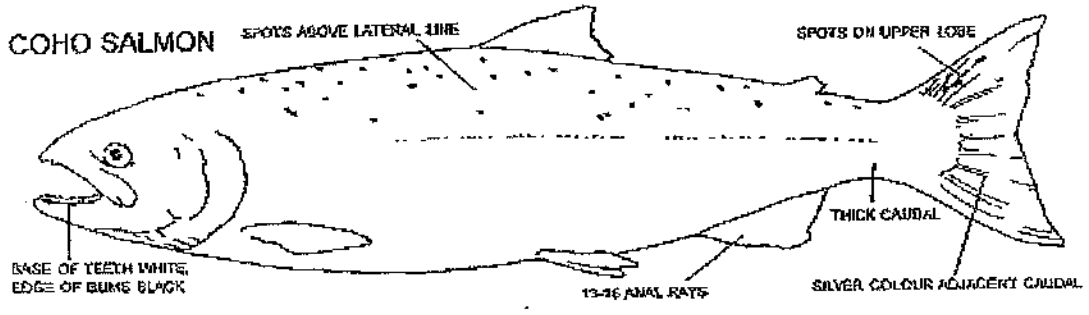


Figure 3. Schematic drawing of side profile of coho salmon, displaying important identification characteristics and description.

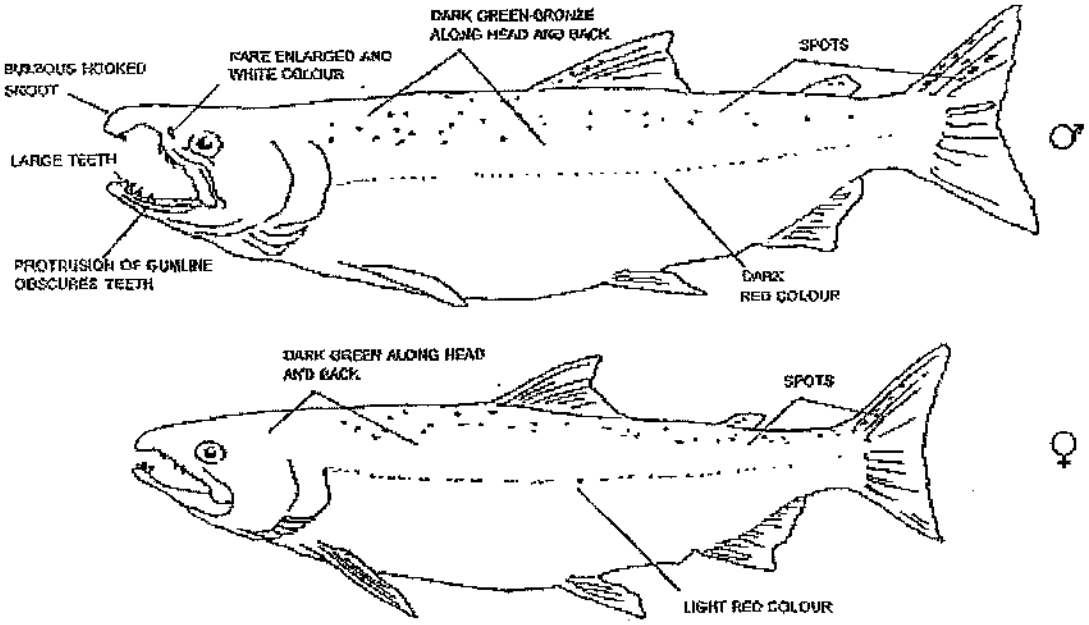


Figure 6. Schematic drawing of male and female coho salmon, displaying important identification characteristics and description.

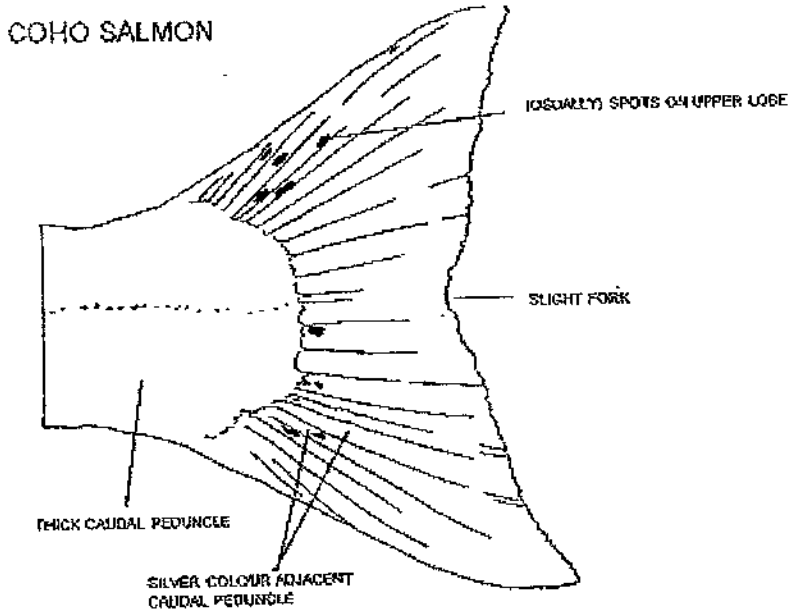


Figure 10. Schematic drawing of the caudal fin of coho salmon, displaying important identification characteristics and description.

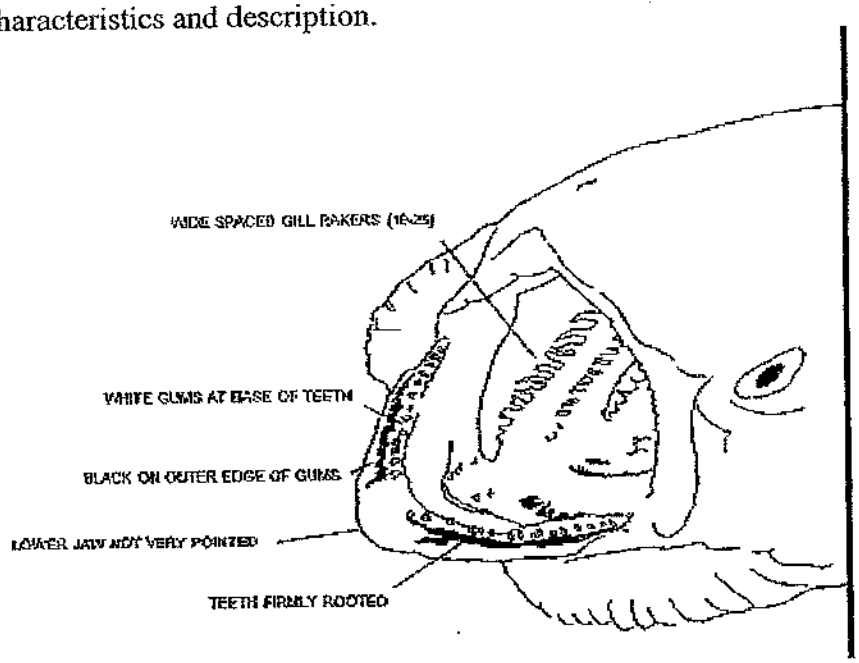


Figure 14. Schematic drawing of the lower jaw of coho salmon, displaying important identification characteristics and description.

COHO SALMON

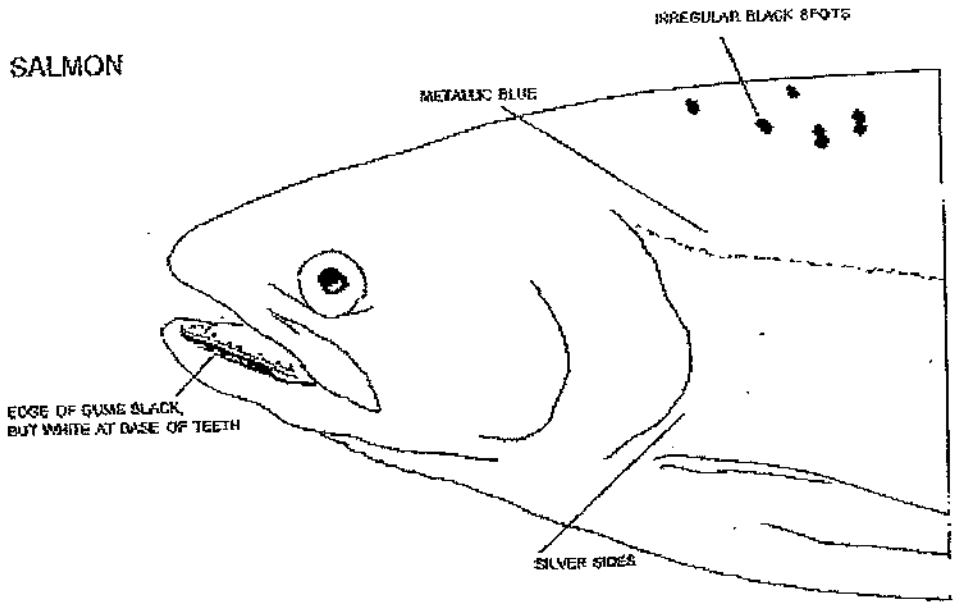
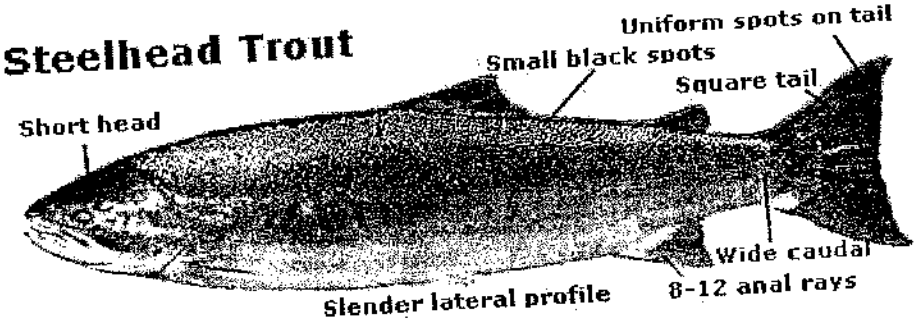
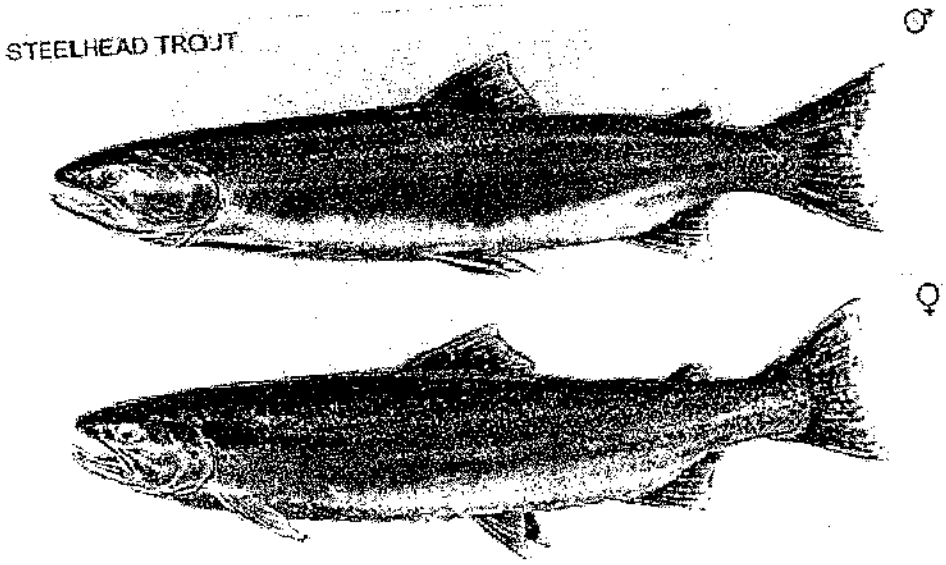


Figure 19. Schematic drawing of a coho salmon head, displaying important identification characteristics and description.

STEELHEAD / RAINBOW



Spawning Steelhead / Rainbow



Source: http://www.pac.dfo-mpo.gc.ca/ops/fm/Salmon/salmonid.htm

DRAFT
11/08/02

2002-2003
Coho Salmon Adult Spawning Surveys in the Scott River Watershed

Cooperators:
California Department of Fish & Game
NOAA Fisheries
USFS
USFWS
Scott River Watershed Council
Siskiyou RCD
SOSS-pending
Community volunteers

Objectives:
1) Collect two sets of tissue samples for DNA analysis to understand the genetic relationship of the Scott River coho salmon to other stocks and collect two sets of scale samples to understand the life history of the Scott River coho salmon. One set of tissue and scale samples will go to NOAA Fisheries and one to CDFG.
2) Document the presence of coho salmon in streams within the historic range of distribution and in new tributaries not previously documented within the Scott River system.
3) Document the extent of distribution in each of the tributaries where adult coho salmon were observed.
4) Determine the run timing and duration of adult coho salmon spawning.
5) Determine additional site specific information as they relate to spawning: velocity, substrate composition, temperature and stream gradient.

Study Design and Survey Area:

1) Track timing and estimate numbers of adult coho as they enter the Scott River system, in conjunction with the fall Chinook spawning survey, coordination with Mark Hampton.
Person days estimate= 6 days (1 crew x 2 persons/crew x 3 days)

2) Survey "index reaches", as delineated in the 2001-2002 survey, once per week once the spawning begins (December 1, 2002-January 31, 2003), or as determined by run timing. Add Mainstem Scott River-Kalpin/ Moore properties, pending access agreement.
Note- numbers prior to reach indicate possible reach clustering for crews.

Reach		Access Status
East Fork Scott River	2-Phelps Ranch	verbal
	1-Callahan Guard Station-Hwy 3 Bridge	pending

South Fork Scott River	3-Fox Cr.- Boulder Cr. (FGS)	verbal
	1-Lower Public- Callahan Bridge	Public
Sugar Creek	1-Hwy 3 Bridge-Scott River (Kalpin)	verbal
French Creek	4-Krum Ranch	verbal
Canyon Creek	5-Maurer Property-Scott River	verbal/Public
Mainstem Scott River	6-Kalpin/Moore property	verbal

Person days estimate= 108 days (6 crews x 2 persons/crew x 9 passes)

3) Survey all other potential coho streams for presence/absence and range/distribution twice during the spawning season, pending a written landowner access agreement. (* no contact made yet)

4)

Other Streams:

1-East Fork Tributaries: Grouse Cr., Kangaroo Cr., Houston Cr., Cabin Meadows Cr., Big Mill Cr.-private*/TP/USFS
2-South Fork-above Fox Cr.-FGS/USFS
2-South Fork Tributaries: Boulder Cr., Fox Cr.,
3-Wildcat Cr.-private*
3-Sugar Cr.-FGS
3-Tiger Fork-FGS
4-Miners Cr.-private*
4-French Cr-above Krum Ranch-private*
4-Horse Range Cr.-private
5-Etna Cr.-private*/TP/USFS
5-Mill Cr. (Etna)-USFS
5-Patterson Cr.(Etna)-FGS
6-Kidder Cr.-private*/FGS
7-Moffett Cr-USFS
7-Indian Cr-private*
7-Rattlesnake Cr-private*
8-Shackleford Cr.-private*/FGS
8-Mill Cr.-Shackelford-private*
9-Middle Cr.-USFS
9-Kelsey CR.-USFS
9-Kelsey Spawning Channel-USFS
10-Tompkins Cr.-USFS/private*
11-Mill Cr.-Scott Bar-TP/USFS

Person days estimate= 44 days (11 crews x 2 persons/crew x 2 passes)

Additional field information on index streams relating to: velocity, substrate, temperature and stream gradient, will be integrated throughout the regular survey schedule by field crew members.

Community volunteers will be authorized under a CDFG volunteer agreement and with landowner permission. Landowner participants will not be under volunteer agreements on their own property.

Landowner Access Agreements
All surveys on private properties will have a signed landowner access agreement in place prior to the survey. The CDFG format will be used. Mark Hampton, DFG, will be the authorized person for these agreements.

Field Methods:

Fish Identification

Positive identification of coho salmon is a crucial first step in conducting spawning surveys and in the gathering of tissue and scale samples. This is of particular importance to this project given that mixed stocks of coho and chinook are often observed at the end of the Chinook spawning period and at the beginning of the coho spawning period.

Morphological variation present in both coho and chinook requires utilizing a suite of characteristics to confirm the identity of coho salmon. Identification of live fish is considerably more difficult than carcasses due to field constraints (e.g. not spooking the fish, glare and fish movement, etc.) and a limited number of characteristics [spots, nares, coloration and kypes] are visible from a distance. Information from the Biological Sampling Manual for Salmonids will again be utilized in species identification. The following characteristics are used:

Gums ¥White gums at the base of the teeth has been acknowledged as the most reliable characteristic for identification of coho. The interior of the mouth and the exterior gums of coho found in the Scott River system were jet black with white gums visible only at the base of the teeth. This runs contrary to many identification charts distributed by CDFG and ODFW, which show much more of the interior of the mouth as white.

Spots - These are black in color and can vary from circular trout spots to irregularly shaped spots and are generally small in size. The majority of the fish examined in the 2001-2002 survey displayed fine spots on the head and rectangular spots on the dorsal surface.

Color - Coho salmon, both male and female, can exhibit extremely brilliant pink to red coloration over the lower 2/3rds of the body. In contrast, most chinook exhibit olive to red coloration and usually only in males.

Kype - Both males and females have a fairly pronounce kype, with the male being larger and more hooked than the female. In chinook only the male has a kype and it is much less pronounced than coho.

Nares -Nares are enlarged and white in coloration. This characteristic was extremely useful in identification of live fish due to the relative ease of visibility.

Caudal Peduncle - The caudal peduncle of a coho is generally thicker than that of a chinook. However, this characteristic can be hard to see on live fish. It is noticeable when picking up the carcasses, however, as it is difficult to grip the coho by the peduncle, similar to a steelhead trout.

Sex - Males are identified by their larger more hooked kype, brilliant pink to red coloration and larger size.
Females are identified by their smaller kype, slightly duller coloration and smaller body size.
Jacks (2 yr. old males) are distinguished from other males and females by their smaller size (<40cm).
Additionally, if there is doubt on the sex of a carcass the anal opening is squeezed to determine the presence of milt, which indicates a male. At times, the carcass is opened up with a knife in order to view the egg skeins (female) or milt sacs (male).

Origin – Hatchery fish are identified by either the lack of an adipose fin or by a maxillary clip (right indicating Trinity River Hatchery and left indicating Irongate Hatchery). For adipose clipped fish the head is sampled (cut off with a knife) to determine the hatchery origin by coded-wire tag.

Redd Identification

The salmon redd is the "nest" where the eggs have been deposited. The female coho salmon constructs her redd similarly to that of other salmonids. She selects an appropriate site, usually with the right size of gravel (generally 1/2"-4" diameter), depth and velocity of water (1-3 fps), then begins by digging a depression (pott) and depositing some of her eggs while the male fertilizes them. She then moves slightly upstream, digging another depression and at the same time backfilling and covering the eggs she has deposited. The eggs are buried in the cleaned gravel several inches to a foot or more deep. Over the course of several days, the female continues to deposit her eggs, working in an upstream direction. When the redd is completed it looks like a tear-dropped shaped mound of gravel extending downstream, approximately 4-5 feet long and 2-3 feet wide, below the last excavation, or pott (approx. 3-8 inches deep). The gravels are generally uniform in size and are often very shiny from recently being moved.

Redd identification will follow the standard identification process used during the fall Chinook salmon surveys. Redds are counted if they are nearly completed and if there is an 80% confidence by the surveyor that it is a redd. Redds with coho salmon on them will be counted as "Redds with Fish" and will be distinguished from "Redds without Fish" in the field notes. Redds

on index reaches will be marked with orange/white striped flagging hung on the bank opposite the head of the pott of the upper most redd in the group to prevent duplicate counting on subsequent passes. The flag will be labeled with the date, number of redds and number of fish. Redds on non-index reaches will be counted in the same manner, but not flagged.

Location by GPS

Hand-held Global Positioning System (GPS) units will be used when possible to record the location electronically (waypoint) of each carcass, redd or live fish. GPS waypoints will be labeled with a stream code, sequential number and a single letter code, denoting carcass (C), redd (R), or fish (F).

Ex.: S F K 0 7 R = South Fork #7 Redd

GPS coordinates, in Lat/Long will be recorded in the field notes, along with the code and the data for that location. A single code will be assigned to each carcass sampled, while more than one redd or fish may be associated with one code and GPS location. Locations will also field mapped. Field locations where no GPS readings can be obtained, will be noted in the data sheet and will later manually ("heads-up") digitized from field maps into the ArcInfo coverage. All GPS locations will be indicated by a "Y" and the digitized locations will be indicated by an "N" in the GPS field of the data set.

Flow

Discharge data will be obtained from the USGS Gage (#11519500), located in the Scott River canyon.

Tissue and Scale Sample Collection

A Federal ESA Section 10 collection permit has been issued by NOAA Fisheries for coho tissue sample collection by participants in the survey and a Scientific Collection permit will be or has been issued to participants by the California Department of Fish and Game. The following Tissue Collection protocol has been worked out between the California Department of Fish and Game and NOAA Fisheries. Tissue sampling protocol for coho salmon carcasses will follow the direction provided by the NOAA Fisheries, Southwest Fisheries Science Center, Santa Cruz Laboratory. A 1 cm^2 tissue sample will be taken from each operculum and placed into a scale sample envelope with the pertinent data filled out on the envelope. Additionally, a scale sample from just below the dorsal fin will be taken. At the end of each field day, these samples will then be transferred to Dennis Maria for air-drying and storage at a secure location at the CDFG Yreka office located at 1625 South Main Street. A Chain-of-Custody (COC) tracking form will be established indicating the date of the sample collection, sample collection number, name of the collector and the recording of every date and name when the sample was passed onto a new responsible party. Once the tissue samples are dried, they will be placed into an evidence envelope. At the conclusion of the field season one set of tissue samples and appropriate paperwork will be transferred Carlos Garza, NOAA Fisheries, Southwest Fisheries Science

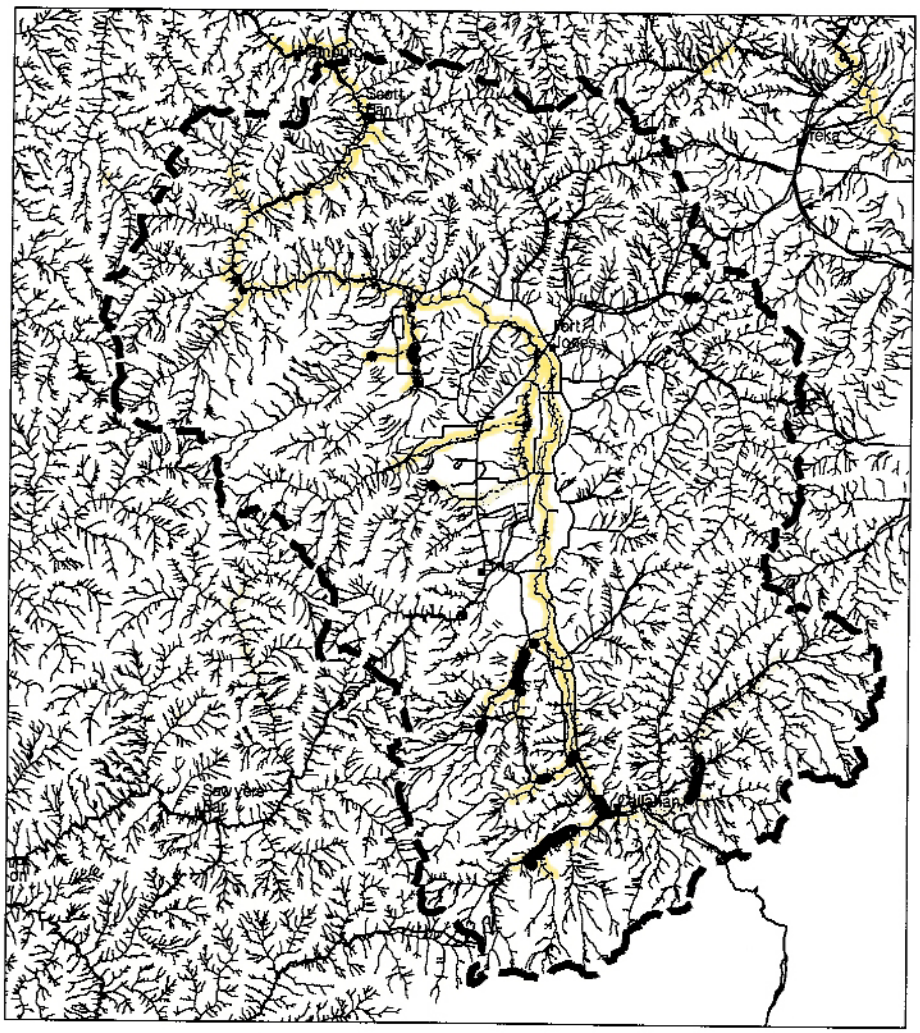
Center and the other set will be delivered to Jennifer Navicky, CDFG, Salmonid Tissue Archive Coordinator in Sacramento.

Data Management

All field data will be entered from field forms into an Excel spreadsheet. GPS locations will be linked by code using Microsoft Access, in order to exhibit coordinates in Lat/Long in the final data set. Summary tables will be created using Access, then exported to Excel. The spatial data will be input into an ArcInfo coverage (ver. 7.2.1), by USFS GIS Specialist and made available to all participants.

Coho Salmon Range & Recent Observations

Scott River Watershed



Currently Mapped Range of Coho Salmon (Present)

Currently Mapped Range of Coho Salmon (Suspected)

December 2001 –January 2002 Observations (includes adult fish, carcasses, or redds)

Scott River Watershed Boundary

Perennial Stream

Intermittent Stream

State Highway/County Road

7 0.0 7 Miles

March 11, 2002

Figure 3

2002-2003 Scott River Adult Coho Salmon Spawning Survey **Data Form** Page_____of_____

Stream _____ Reach _____ GPS #_____ Datum:_____

Date_____ Weather_____ Start Time_____ Air Temp °F_____ H_2O Temp °F_____ _____

End Time_____ Air Temp °F_____ H_2O Temp °F_____

Crew_____ Field Notebook #_____

ALL	REDDS/LIVE FISH						CARCASSES					ALL		
Site #	HT* P,R,F	# Fish	Redd Length M	Redd Width M	Pott Depth M	SUB* D/S	FL CM	Sex M/F Unk	Ad Clip Y/N	Left Max. Clip Y/N	Other Clips Y/N	Lat	Long	Notes Ref. Field Notebook #.

Habitat Type: P=Pool R=Riffle F=Flatwater
S=Side Channel (i.e. S/R)

Substrate: 1= <0.2cm SAND 2=0.2-5cm SM. GRAVEL 3=6-9cm LG.GRAVEL 4=10-13cm SM COBBLE 5=>13cm LG. COBBLE

Scott River Watershed Adult Coho Salmon Spawning Survey, 2002-2003
GPS Codes for Streams

Datum for all Garmin GPS units is WGS84 and projection in Lat/Long decimal degrees.
Sequential Numbering for each stream was updated after each survey.

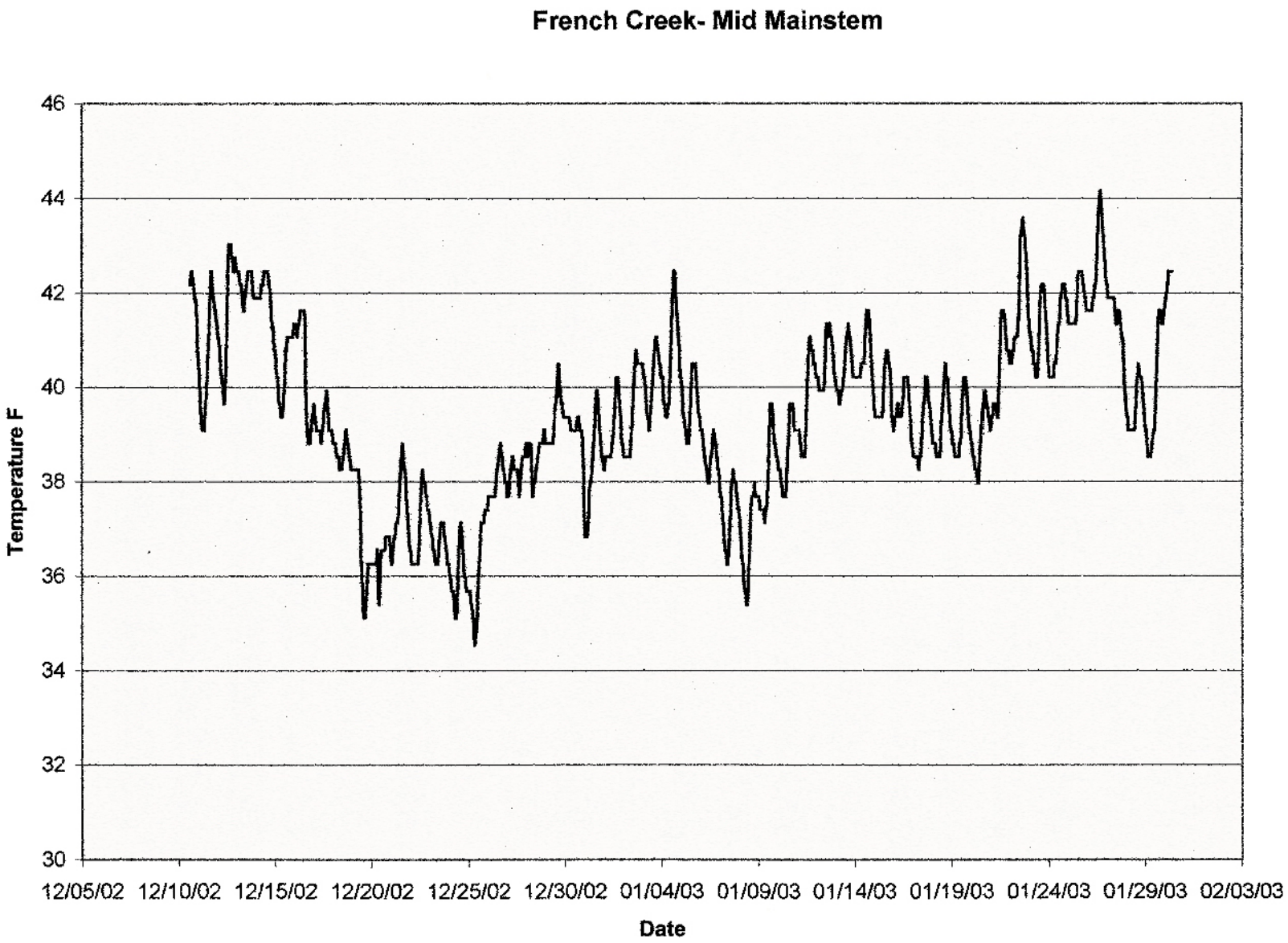
Code Convention: S F K 0 7 R = South Fork #7 Redd

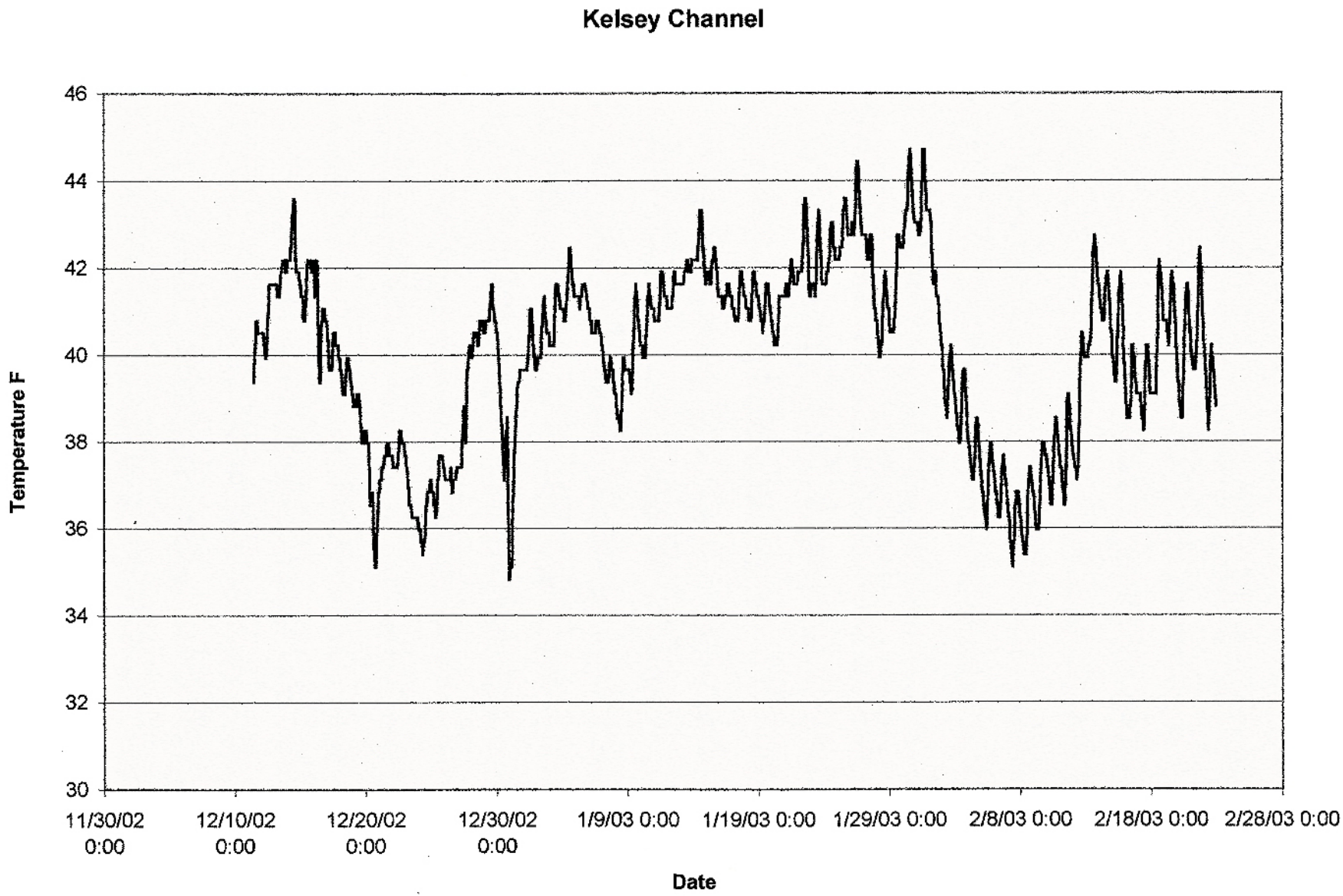
Last character is: R=redd(s)-individual
F=fish-ok to group (if fish on redd, use "R", indicate # of fish in notes)
C=carcass-one for each

Canyon Cr.	CAN
Emigrant Cr.	EMI
East Fork Scott	EFK
South Fork Scott	SFK
Kidder Cr.	KID
Patterson Cr.(Etna)	PAT
Wildcat Cr.	WIL
Etna Cr.	ETN
Wooliver	WOO
Mill Cr. (Scott Bar)	SBM
Shackleford	SHK
Mill Cr. (Shackleford)	SML
Sugar Cr.	SUG
French Cr.	FRE
Miners Cr.	MIN
Tompkins Cr.	TOM
Grouse Cr.	GRO
Kelsey Channel	KCH
Kelsey Cr.	KEL
Middle Cr.	MID
Indian Cr.	IND
Rattlesnake Cr.	RAT
Boulder Cr. (Scott River)	SRB
Boulder Cr. (South Fork)	BOU
Moffett Cr.	MOF
Johnson Cr.	JOH
Clark Cr.	CLA
North Fork French Cr.	NFF
Kangaroo Cr.	KAN
Patterson Cr. (Scott River)	PSR
Ruffy Gap Trib	RUF
Meamber Gulch	MEA
McAdams Cr.	MCA
Horse Range Cr.	HRC

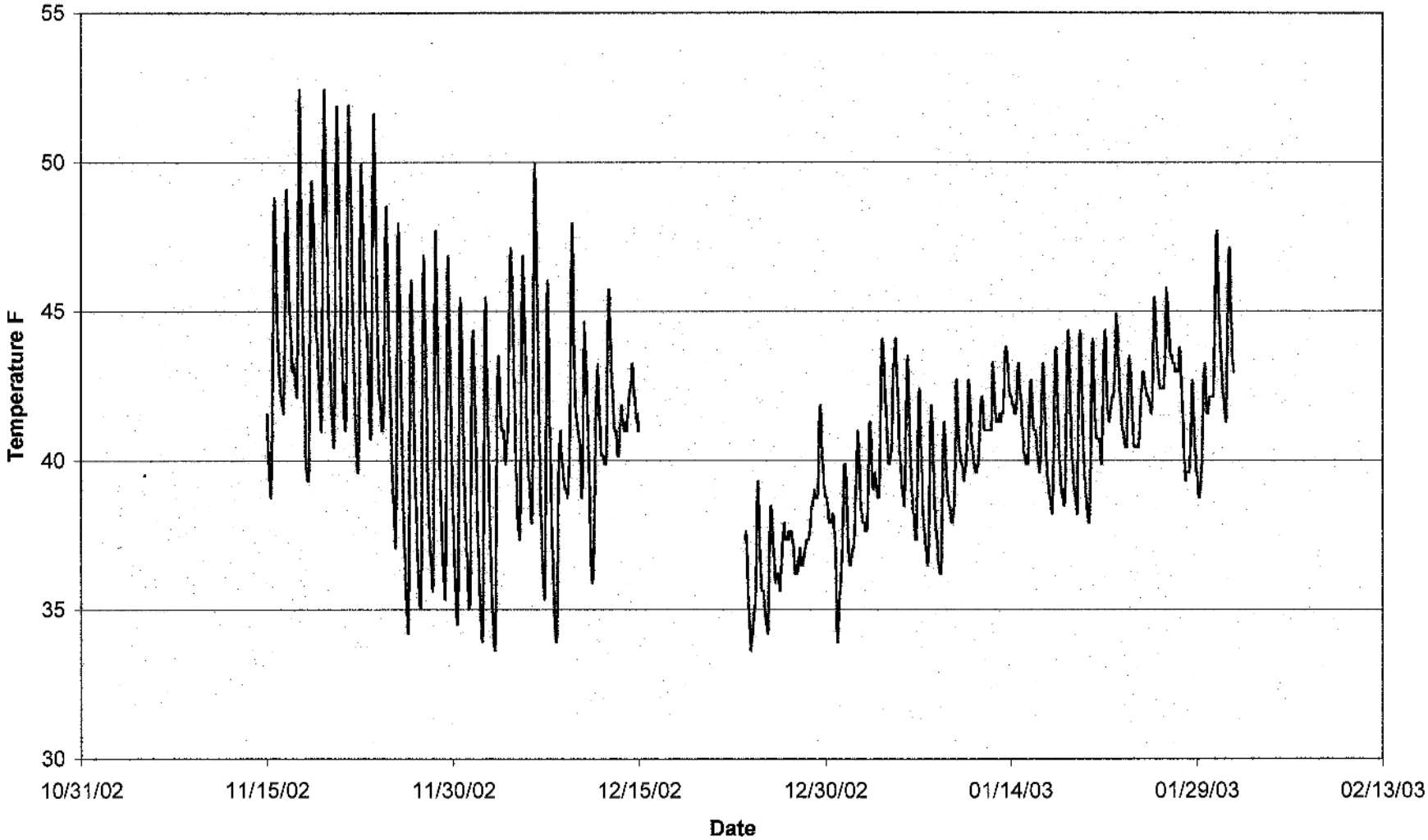
Scott River-Mainstem Index	SRM04
*Reach 7	SR7
*Reach 6	SR6
*Reach 5	SR5

*Note: Chinook redds gps'd on Scott River are coded with "K" in name and no "R" for redd (i.e. SR7K02). Coho redds are coded per convention.


French Creek- Mid Mainstem
Temperature F
46
44
42
40
38
36
34
32
30
12/05/02
12/10/02
12/15/02
12/20/02
12/25/02
12/30/02
01/04/03
01/09/03
01/14/03
01/19/03
01/24/03
01/29/03
02/03/03
Date


Kelsey Channel
Temperature F
46
44
42
40
38
36
34
32
30
11/30/02 0:00
12/10/02 0:00
12/20/02 0:00
12/30/02 0:00
1/9/03 0:00
1/19/03 0:00
1/29/03 0:00
2/8/03 0:00
2/18/03 0:00
2/28/03 0:00
Date

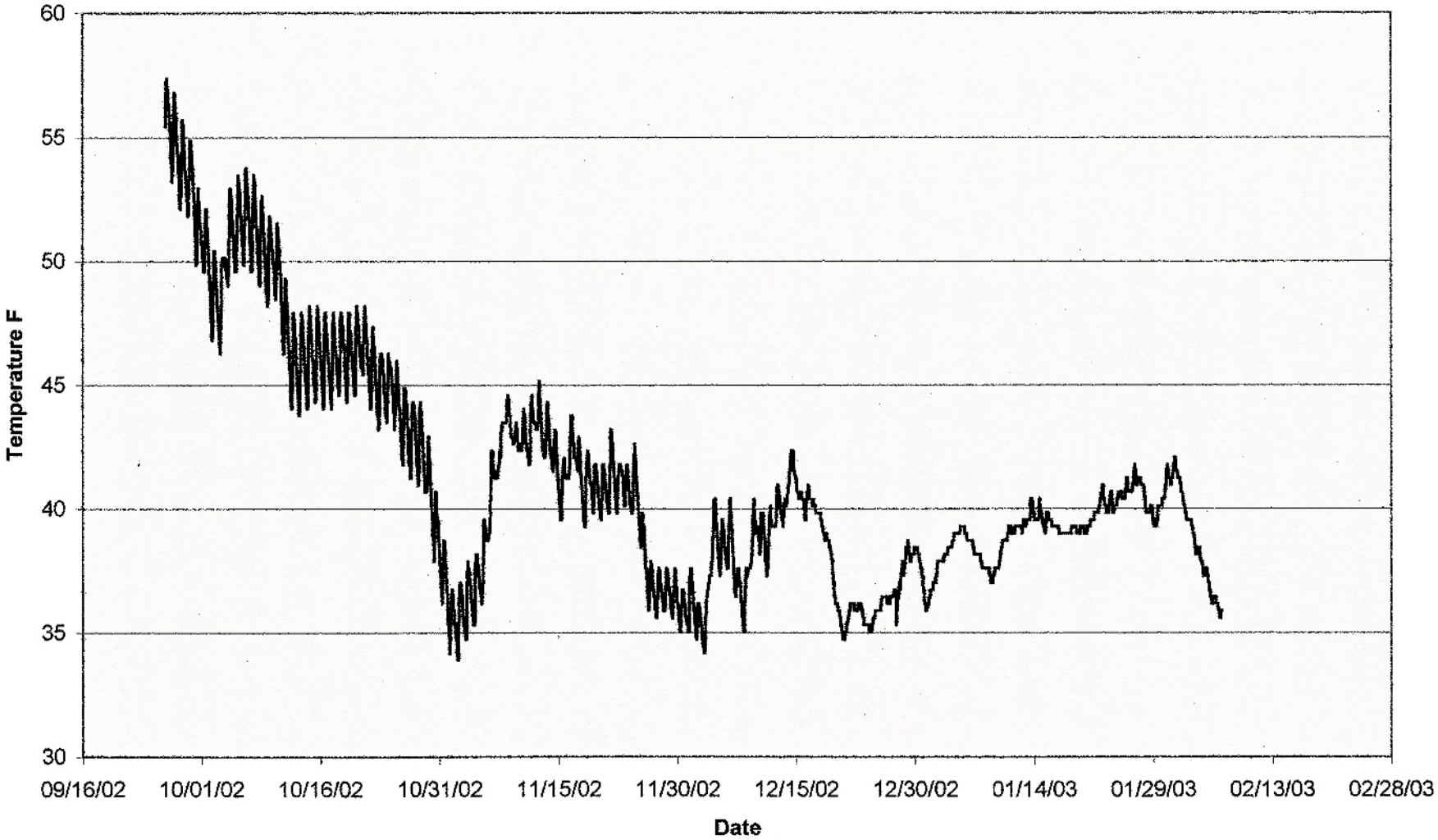
Upper East Fork Scott River -Lower Masterson Road Area



Data gap from 12/15/02-12/23/02 is due to unit being out of water.

A26

Lower Grouse Creek



Temperatures after 12/16/03 are sub-surface, due to unit buried in substrate during high flows.

Photo Index-121602 High Flows			
Dphoto #	Date	File Name	Description
403	12/9/2002	Coho Training 120902-Dmaria-Fish ID.jpg	Training-Fish ID-Dennis Maria
404	12/16/2002	Kidder Creek @ Hwy 3.jpg	High flows. Stream color green tea, but surveyable.
405	12/16/2002	Patterson @ Eller Ln-1.jpg	At screen site/weir project site-up. Slightly turbid
406	12/16/2002	Patterson @ Eller Ln-2.jpg	At screen site/weir project site-down. Slightly turbid, poor visability, flows high, may not be surveyable up higher.
407	12/16/2002	Scott River @ Black Bridge-up.jpg	High flows. Turbid, large wood and sediment colored.
408	12/16/2002	Scott River @ Black Bridge-down.jpg	High flows. Turbid, large wood and sediment colored.
409	12/16/2002	Etna Creek @ Hwy 3 Bridge-up.jpg	Flows up, clear, good visability.
411	12/16/2002	Etna Creek @ Hwy 3 Bridge-down.jpg	Flows up, clear, good visability.
412	12/16/2002	East Fk @ E Callahan Bridge-down.jpg	Turbid. Confluence of East and South Forks.
413	12/16/2002	East Fk @ E Callahan Bridge-up.jpg	Turbid. Confluence of East and South Forks.
414	12/16/2002	South Fk to Confluence E Fk.jpg	East Fk much more turbid than South Fk
415	12/16/2002	East Fk behind Trailer Pk-1.jpg	Behind Rodney's Trailer Park-flooded, stream out of channel.
416	12/16/2002	East Fk behind Trailer Pk-2.jpg	Behind Rodney's Trailer Park-flooded, stream out of channel.
417	12/16/2002	Plugged culvert-Callahan-Gazelle Rd-1.jpg	Small trib to Noyes Valley Cr.-plugged pipe.
418	12/16/2002	Plugged culvert-Callahan-Gazelle Rd-2.jpg	Small trib to Noyes Valley Cr.-plugged pipe.
419	12/16/2002	East Fk @ Rail Cr Bridge-1.jpg	Up. High flows-turbid. Run-off from many small tribs across fields.
420	12/16/2002	East Fk @ Rail Cr Bridge-2.jpg	Down. High flows-turbid. Run-off from many small tribs across fields.
421	12/16/2002	Kangaroo Cr @ Materson Rd-1.jpg	Up. High flows, turbid.
422	12/16/2002	Kangaroo Cr @ Materson Rd-2.jpg	Down. High flows, turbid.
423	12/16/2002	#1Kangaroo Cr. Rd-121602.jpg	Kangaroo Rd washout
424	12/16/2002	#2Kangaroo Cr.diversion pt.121602.jpg	Kangaroo Rd washout
425	12/16/2002	#3Kangaroo Cr. Rd 121602-washout abv. culvert.jpg	Kangaroo Rd washout
426	12/16/2002	#4Kangaroo Cr. Rd 121602-washout-abv.culvert.jpg	Kangaroo Rd washout
427	12/17/2002	Kidder Creek121702-begin	Looking up to start of reach on main channel.
428	12/17/2002	Kidder Cr-bank stabilization	"Bank Stabilization"-old cars
429	12/17/2002	Kidder Cr-ponds-1	intake pond in middle of channel
430	12/17/2002	Kidder Cr-ponds-2	intake pond in middle of channel. Scott Valley in distance
431	12/18/2002	French Cr121802-top braided channel	Beginning of braided channel-more flow appears to go into middle than last year.

Dphoto #	Date	File Name	Description
432	12/23/2002	East Fk-Phelps122302-new channel above.jpeg	AT Phelps upper prop. Line. Rt. Bank erosion. Flow has moved back to right channel.
433	12/23/2002	East Fk-Phelps122302-conf of new channel-bot.jpeg	Confluence of new channel-bottom, just above Phelps ditch intake.
435	12/23/2002	East Fk-Phelps122302-spawning gravel.jpeg	Spawning gravel at tailout of pool abv. Grouse Cr. at second bend.
437	12/24/2002	Mill_Shackleford122402-spawning coho.jpg	Close up of female coho and male jack on redd MIL09R.