Scott River Adult Coho Spawning Ground Surveys

December 2009- January 2010

Final Report prepared by the Siskiyou RCD

For the United States Fish and Wildlife Service

Agreement # 813339G030

March 3, 2010

Acknowledgements

Funding for this survey effort was provided by the United States Fish and Wildlife Service. The RCD would like to thank all participating landowners for their continued support of this activity.

Abstract

Adult coho spawning ground surveys were completed in the Scott River watershed between December 10th, 2009 and January 14th, 2010. A total of 32.37 miles of survey were completed, 20.82 miles of tributary and 11.55 miles of mainstem Scott River. Adult coho access was limited by low flows, periods of frozen water, and beaver dams for varying periods during the spawning season. A total of five live coho, two coho carcasses, and six redds were observed during the Spawning Ground Surveys. The adult counting facility operated by the California Dept of Fish and Game counted 81 adult coho passing through the weir.

It is recommended that future survey efforts focus on gathering adult distribution data and biological data. The count provided by CDFG at the weir will provide better numbers of total live fish than mark and recapture efforts.

Introduction

Coho salmon in the Klamath River Basin (Southern Oregon-Northern California ESU) were listed by the California Fish and Game Commission as an endangered and threatened species on March 30th, 2005

Adult coho spawning ground surveys have been performed cooperatively in the Scott River Watershed annually since the winter of 2001-2002. Scott River adult coho spawning ground surveys began in December 2001 as a cooperative effort between local landowners, agencies, and volunteers. The primary purpose of the 2001-2002 survey effort was to document the extent of adult coho distribution throughout the Scott River Basin. The ongoing annual survey efforts are intended to document the distribution of the current brood year to aid in prioritization of restoration activities and locations. This information is particularly important in prioritizing reaches for the Scott River Water Trust, Dry and Critically Dry Year Planning, watershed restoration, and other water conservation efforts.

Spawning Ground surveys in the Scott River Watershed aim to address the following goals:

- Determine and map the distribution of coho spawning
- Determine the timing of adult coho migration and spawning
- Estimate populations utilizing different tributaries
- Sample biological parameters
- Observe spawning habitats utilized by coho salmon

Project Objectives

1.) Document the presence of coho salmon in the Scott River and tributaries. Survey "index reaches" as defined in the 2001-2002 surveys once per week once spawning begins, or as determined by run timing.

2.) Document the distribution and upper extend of spawning in each of the tributaries wher adult coho salmon are observed..

3.) Determine run timing, and duration of adult coho spawning in the Scott River.

4.) Collect tissue samples for DNA analysis to understand the genetic relationship of the Scott River coho salmon to other stock. Collect scale and otolith samples to understand the life history of Scott River coho salmon.

5.) Population Estimates; when feasible, complete mark and recapture on recovered coho salmon carcasses.

Methods

Project Location

This data collection effort took place in the Scott River sub-basin of the Klamath River Basin. The Scott River is located in Siskiyou County , CA. The Scott River drains approximately 813.5 square miles. See **Map 1 Vicinity Map**

Survey Locations

Adult Coho Spawning Ground Surveys were completed in Scott River mainstem and tributaries. Mainstem locations included Scott Reach 8, 13, 14, 15 (as defined in the Fall Chinook Cooperative Spawning Ground Surveys) and the Scott Tailings. Tributaries surveyed included the East Fork, South Fork, Sugar Creek, French Creek, Etna Creek, Patterson Creek, Kidder Creek, Shackleford Creek, Mill Creek, and Thompkins Creek.

Low flow conditions in the Scott River and tributaries in the fall of 2009 prevented many tributaries from connecting until well into(or past) the coho spawning season. See discussion for details.

See **Map 2. Reach locations**.

Survey Schedule

Flow conditions and extremely cold conditions (surface water frozen) prevented keeping a formal weekly survey schedule. The first surveys were attempted on the Scott River tailings and French Creek on December 9th, 2009. At this time, flatwater habitat units were completely frozen, and pools were estimated to be 70% frozen. See results for details of tributary connectivity.

See **Table I. Survey Schedule**

Table I. Survey Schedule 2009-2010

Watershed	Reach Description	Begin Mile	End Mile	# of Surveys	Survey Crew	Total Miles
Mill Cr. (Scott Bar						
Lower	Lowest ½ mile up of Mill Creek	0.4	0	0	CDFG	0
Upper	From RM 2.5 to RM 1.8	2.5	1.8	0	CDFG	0
Tompkins Creek						
Lower.	Lowest 1.25 miles of Thompkins Creek	1.8	0	0	CDFG	0

Upper	From USFS road # 46N64 crossing to Potato Patch	2	1	1	CDFG	1.0
Middle Creek	Lowest .4 miles of Middle Creek	0.4	0	0		0
Kelsey Creek	Lower Kelsey from barrier to mouth	0.6	0	0	RCD	0
Kelsey Spawning Channel	Spawning channel	0.2	0	0	RCD	0
Canyon Creek	From the uppermost Maurer property line to the mouth of Canyon Creek	1.1	0	0	RCD/QVIR	1.1
Boulder Creek	County bridge to mouth	0.2	0	1	RCD/QVIR	0.2
Shackleford-Mill Creek						
Lower Shackleford-Mill	From Milepost 2 on Dangel lane to mouth (expanded reach)	2.17	0	4	RCD	2.17
Upper Shackleford	Below the falls	5	4.5	0	QVIR	0
Lower Mill	From the QV road bridge to road crossing ~ 300 meters below conf of Shackleford (expanded reach)	1.6	0	2	RCD	1.6
Middle Mill	From the Quartz Valley Rd bridge to above Emigrant Cr.	3.1	1.7	0	RCD	0
Emmigrant Creek(trib to Mill)	Confluence with Mill Creek to County Road	0.1	0	0	RCD	0.1
Upper Mill Creek	From county road crossing to 1/2 mile above	3.8	3.3	1	RCD	0.5

Kidder Creek						
Lower	Below Hwy 3 bridge			1	RCD	1.1
Middle	Above Hwy 3 bridge outside of Greenview			0	RCD	0
Upper	Upper FGS property			0	RCD	0

Watershed	**Reach Description**	**Begin Mile**	**End Mile**	**Survey Schedule**	**Survey Crew**	**Total Miles**
Patterson(Etna)						
Lower	Confluence of Johnson and Patterson Creek to 1/2 mile below Hwy 3(Note this reach is split with lack of access in the center)	1.05 1.5	0 1.25	1	RCD	1.30
Mid (FGS)	From Upper Youngs Diversion to Hwy 3 (New Reach)	6.2	4.6	1	RCD	1.6
Upper (FGS)	From the Falls down	7.9	7.6	1	RCD	0.3
Etna Creek						
Lower	200 yards below Highway 3 to mouth (New Reach)	2.25	0	1	RCD	2.25
Middle	From Etna City Diversion to End of FGS property above town; Schmalenberg and Mattson Propery near Ruffy Gap	5.2 4.1	4.6 3.7	1	RCD	1
Upper	From Mill Creek to Alder Creek	8	6.35	0	RCD	0
Ruffy Gap (Trib to Etna)	area above mouth	0.2	0	NS	RCD	0
French Creek						

Lower	Hwy 3 to mouth (New Reach 2003)	0.7	0	5	RCD	0
Middle	Confluence w/Miners to bottom of Tobias. (Expanded Reach)	2.43	0.8	5	RCD	0
North Fork Area	From below North Fork to confluence of French and Miners	3.43	2.43	NS	RCD	0
Paynes Creek Area	French Creek from 1/4 mile above Paynes Creek to 1/4 mile below (New Reach)	5.25	4.75	NS	RCD	0
Duck Lake Area	Above and below mouth of Duck Lake	6.3	5.8	NS	RCD	0
Miners Creek	Confluence with French Creek to upper Phelps Property(above second Miners Cr. Road bridge) Expanded Reach in 2003	0.9	0	NS	RCD	0
Watershed	**Reach Description**	**Begin Mile**	**End Mile**	**Survey Schedule**	**Survey Crew**	**Total Miles**
Paynes Cr.	Lowest .2 miles	0.2	0	NS	RCD	0
North Fork French Cr.	Timber Products	0.7	0	NS	TP	0
Tailings (INDEX)	From .30 miles below Wildcat Cr. To 1/2 mile upstream from Messner gulch.	55	52.25	3	RCD	2.75
Reach 8						
Reach 13	Horn Lane to Whipple			3	RCD	1.9
Reach 14	SVID to Horn Lane			4	RCD	3.4
Reach 15	Fay Lane to SVID			2	RCD	3.5
Sugar Creek						

Lower	From Hwy 3 to mouth	0.7	0	1	RCD	0.7
Upper	From bridge crossing on Rd # 40N23 to cattle guard on Sugar Cr. Rd.	4	1.9	1	RCD /NOAA	2.1
Wildcat	Mouth up 2 mile			NS	RCD	
South Fork						
Lower S. Fork	USFS piece	0.7	0.3	NS	RCD/NOAA	0
Upper S. Fork	800 meters above Fox Cr. to Boulder Cr.	4	2.1	2	RCD/NOAA	1.9
Boulder Creek	Mouth area			2	RCD/NOAA	0
Fox Creek	Mouth Area			2	RCD/NOAA	0
East Fork						
E. Fork-Lower Masterson	Beginning 1.4 miles above mouth of Grouse Cr.	6.3	4.9	3	RCD	1.4
East Fork-Upper Masterson	AP Cattle Ranch	12.1	7	NS	RCD	0
Upper East Fork	Confluence of Crater and Houston Creek downstream	13.8	12.8	NS	RCD	0.0
Grouse Cr.	lower .6mile	0.6	0	NS	RCD	0
Kangaroo Cr. - Lower	Lower 1 mile of creek	1.1	0.1	NS	RCD	0
Kangaroo Cr. - Upper	USFS piece	2.1	1.4	NS	RCD/USFS	0
Rail Creek(new)	Rd 41N39 to end of USFS land	1.25	1.75	0	RCD/USFS	0.5
				Total		32.37

Results

Crew training/pre-survey organization

The annual crew training occurred on Wednesday December 3rd, 2009. Representatives of the RCD and California Dept of Fish and Game were present. All in attendance were already experienced in spawning ground surveys, so the meeting focused on organizing for the survey effort. During this meeting it was agreed that CDFG would be primarily responsible for reaches below the CDFG operated weir and the RCD primarily responsible for those above the weir.

See **Appendix A. Training Materials**

Spawning Ground and Carcass Surveys

Stream surveys were completed by a two person field crew. A stream survey is completed by walking instream, or on the bank (to avoid disturbing Redds) beginning upstream and moving downstream. Crew members walk on opposite sides of the stream, looking for redds and fish. The location of any fish, redd, or carcass was recorded by GPS, and noted on the data sheet. In addition, flagging was hung at Redds to mark for the next survey crew, preventing double counting of redds. Carcasses are processed and then chopped to prevent double counting. Tissue and scale samples were taken from a subset of carcasses, and the species, sex, forklength, and any marking recorded on the data sheet. Additionally, otoliths were collected from a subset of carcasses sampled. One member of each crew had a State of California Scientific Collection Permit.

During redd surveys, the following data was collected from redds, if it did not disturb the spawning fish: redd length, width, pott depth, and substrate composition. Substrate composition categories are: Sand (<.2 cm), small gravel (.2-5 cm), large gravel (6-9 cm), small cobble (10-13 cm), and large cobble (> 13 cm).

Biological Sample Collection

Tissue samples were collected by clipping a one cm^2 piece of operculum tissue. Samples were placed in absorptive paper, and placed into labeled envelopes. Scale samples were collected below the dorsal fin, but above the lateral line. Samples were collected by scraping with a knife blade in the direction from head to tail. Scale samples were placed in a labeled scale envelope. When possible, both left and right otoliths were collected using a pocket knife. The otoliths were then cleaned, dried, and placed in a labeled envelope.

GPS data collection

Hand-held Global Positioning System (GPS) units were used to record the location of the beginning and end of each survey reach, and location of each carcass, redd, and live fish identified. However, large concentrations of redds within ten meters of each other received only one GPS point. Only carcasses which were sampled were marked, and live fish sightings were grouped. The exception to this was if the fish or carcass was found in a unique location, or beyond the upper extent previously observed. In that case a GPS point was taken.

GPS waypoints were assigned an ID based on a stream code, sequential number, and a letter code denoting carcass (C), redd (R), or live fish (F).

Ex.) F C 0 4 C = French Creek # 4 Carcass

In addition, the GPS coordinates in Lat/Long were recorded on the field data sheet, along with the ID code assigned to that datapoint. See A**ppendix A** for further detail on naming conventions.

Fish ID and Mark Identification

Fish ID

Positive identification of coho salmon was a crucial step in conducting the spawning ground surveys, and the collection of the tissue and scale samples.The following characteristics are used to identify coho salmon:

Gums: Coho salmon have white gums at the base of the teeth only, typically the rest of the gum is gray.

Spots: These spots are black in color and can vary from circular to irregularly shaped spots. Both sexes have spots on the back, dorsal fin, and upper lobe of the caudal fin, with no spots on the lower lobe.

Color: Many coho salmon, both male and female, can exhibit extremely brilliant pink to red coloration of the lower 2/3 of the body.

Kype: Both males and females can have a fairly pronounced kype

Nares: Nares are enlarged and white in coloration. This characteristic is useful in identification of live fish due to the visibility.

Caudal Peduncle: the caudal peduncle is thicker than that of a Chinook. This is most noticeable when picking up a carcass, making it difficult to hold in one hand.

Anal Fin: The anal fin of coho salmon have 12-17 rays, and the outermost rays are longer than the inner rays, which is not the case with Chinook or steelhead.

Sex: Males generally are larger, have larger hooked kypes, and brilliant pink to red coloration. To verify the sex the anal opening was squeezed to determine the presence of milt (male) or eggs (female).

Origin: Hatchery fish are identified by either the lack of an adipose fin, or by a maxillary clip. (Right maxillary clip = Trinity River Hatchery, Left maxillary clip = Iron Gate Hatchery) Adipose clipped fish have the snout removed and submitted to CDFG for coded-wire tag recovery.

Mark and Recapture

No mark and recapture was completed this season due to the low number of coho observed.

Results

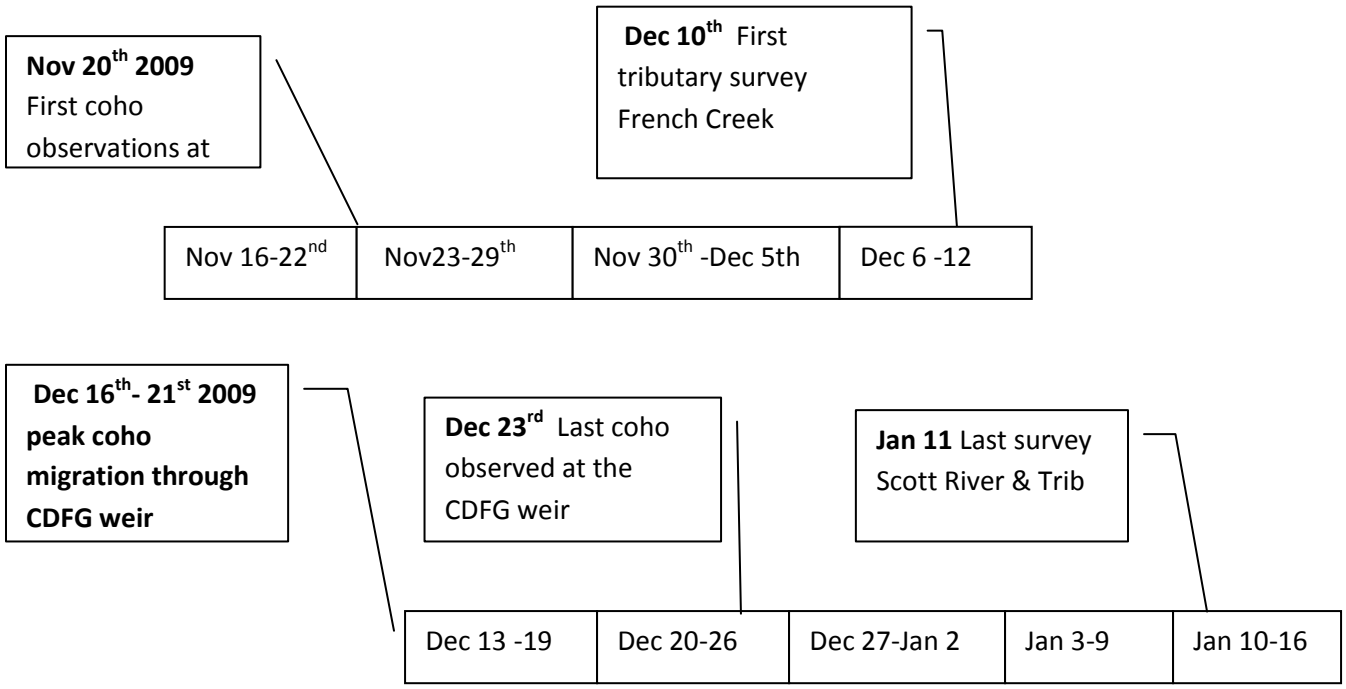
Run Timing

California Department of Fish and Game Adult Salmon Video Weir

The installation of an adult salmon counting facility (weir) on the Scott River at RM 18.0 in 2007 has contributed valuable information to understanding the total coho population utilizing the Scott River Watershed. Preliminary data for 2009 (Morgan Knectle-Yreka) shows 81 coho salmon utilizing the weir.

The first coho were recordeded going through the CDFG video weir on November 20th, 2009. However, due to the time involved in processing the video tape, this was not known until December 9th, 2009.

The first official coho spawning ground surveys were attempted on December 9th, 2009. At this time the Scott River Tailings (RM 52-55) were mostly frozen, and the reach had dried up below the Alexander residence. In addition, Lower Sugar Creek was frozen from the Hwy 3 bridge to the confluence with the Scott River. French Creek was surveyed on December 10th, and was also mostly frozen. One potential redd was observed at this time, but no fish were ever observed, and the redd did not seem to develop over the course of the survey season.



Timing of adult coho observations

Because no coho were observed in the tributaries during spawning surveys, a more expansive mainstem survey effort was conducted. Beginning on December 30th, Scott River Reach 14 (SVID to Horn Lane) was surveyed, at which time three live coho, two redds, and one male coho carcass was observed. The last live Chinook were observed in this reach on November 30th, 2009, and the last active chinook redd building was observed prior to Thanksgiving (Nov 27th, 2009). Based on these observations, it is reasonably confident that the lives observed in the Etna Vicinity on December 30th were coho. Nine chinook were observed going through the weir on 12/19-12/21, but it is hypothesized that they spawned in Scott Reach 8, which typically has the highest Chinook spawning density.

The only coho observed during spawning ground surveys were in the Scott River Mainstem. Spawning appeared to occur between Etna Creek and the SVID diversion structure. No coho or redds were observed in tributaries to the Scott River. It is possible that a few coho moved into tributaries during isolated flow events.

See **Table II**. **Survey observations by reach**

Table II. Results by Reach 2009-2010

Stream	Reach Description		Live Fish[a]	Carcass[a]	Redds
Boulder Creek(Scott)	Lower	Lower Bridge to Scott	NS	NS	NS
Canyon Creek **(Index)**	Lower	Lower 1.1 miles	NS	NS	NS
Clarks Creek		TP property	NS	NS	NS
East Fork -Lower Masterson (**INDEX)**		~ 1 mile above Grouse Cr. To below Grouse	0	0	0
East Fork Upper Masterson		Above Rail Creek to Kangaroo Creek	NS	NS	NS
East Fork*	Upper	Gregg Ranch	NS	NS	NS
Emmigrant (trib to Mill)	Lower	Mouth up	NS	NS	NS
Etna*	Lower	Hwy 3 to mouth			
Etna	Middle	Split Reach (**formerly Lower Etna**)	0	0	0
Etna	Upper	Mill Creek to City Diversion	NS	NS	NS
French Creek	Lower	Hwy 3 to mouth	0	0	0
French Cr. **(INDEX)**	MID	From confluence with Miners down	0	0	0
French Creek	Middle	From bottom of Mid-to just above Hwy 3	0	0	0
French Creek	Upper	Upper Bridge to Horse Range	NS	NS	NS
French Creek*	Upper	Paynes Creek area	NS	NS	NS
French Creek*	Upper	Duck Lake area	NS	NS	NS
French Creek		Below N Fork to mouth of Miners	NS	NS	NS
Grouse Creek (trib to East Fork)		Lower	NS	NS	NS
Horse Range Cr. (trib to French)			NS	NS	NS
Indian Creek	Upper		NS	NS	NS
Johnson Creek	Upper		NS	NS	NS
Kangaroo	Middle	USFS	NS	NS	NS
Kangaroo*	Lower		NS	NS	NS
Kelsey Creek		Barrier to mouth	0	0	0
Kelsey Spawning Channel		USFS artificial spawning channel	0	0	0
Kidder Creek	Lower	Below Hwy 3	0	0	0
Kidder Creek	Middle	Mid Kidder - above Hwy 3	NS	NS	NS
Kidder Creek	Upper	Upper FGS			
Mcadams			NS	NS	NS
Meamber Gulch	Lower		NS	NS	NS
Middle Creek	Lower		0	0	0

a, - for index reaches, live fish counts and carcass counts could not be separated from the overall reach on that stream. Total counts are refered to under the 2004 reach

NC= Not connected, NA = No access, NS = not surveyed

* = New reach in 2004

Shaded reaches surveyed in 2001-2002

Stream	Reach Description		Live Fish[a]	Carcass[a]	Redds
Mill Creek (Shackleford)	Middle	Above Quartz Valley Road Bridge	NS	NS	NS
Mill Creek (Shackleford)	Upper	Lowest FGS to Bridge	0	0	0
Mill Creek (Shackleford)	Lower a	Lower .6 miles of Mill Creek	0	0	0
Mill Creek (Shackleford)*	Lower b	From Quartz Valley Rd Bridge to top of Lower a	0	0	0
Miners Creek	Lower a	lowest .3 mi	NS	NS	NS
Miners Creek	Lower b	Upper Phelps to top of Lower a	NS	NS	NS
Moffet Creek	Middle	USFS	NS	NS	NS
North Fork French	Lower		NS	NS	NS
Patterson*	Lower		0	0	0
Patterson	Middle	Lower FGS to Hwy 3	0	0	0
Patterson	Upper	Uppermost FGS from Falls down	0	0	0
Patterson (Fort Jones)	Lower		NS	NS	NS
Rail Creek	Upper	USFS	NS	NS	NS
Rattlesnake Creek	Upper		NS	NS	NS
Ruffy Gap (trib to Etna)		Lowest	NS	NS	NS
Scott Bar Mill	Lower	Lower	NS	NS	NS
Scott Bar Mill	Upper	Upper	NS	NS	NS
Shackleford - 2004*	Lower	Mile 2 to Lower Bridge	0	0	0
Shackleford	Lower	Lower Bridge to Scott	0	0	0
Shackleford	Upper	Shackleford at the falls	NS	NS	NS
Tompkins Creek	Lower	Mouth up	Pers. Comm from CDFG wha		
Tompkins Creek	Upper	Low water crossing to Potatoe Patch	NS	NS	NS
South Fork **(Index)**	Lower	USFS	0	0	0
South Fork **(INDEX)**	Upper	Above Fox Creek to Boulder Creek	0	0	0
Sugar Creek **(INDEX)**	Lower	Hwy 3 to mouth	0	0	0
Sugar Creek	Upper	From Upper FGS bridge to CattleGuard	0	0	0
Scott River Mainstem	Reach 6		0	0	0
Scott River Mainstem	Reach 13		1	1	1
Scott River Mainstem	Reach 14		4	1	5
Scott River Mainstem	Reach 15		0	0	0
Scott River Tailings		Rm 53.45-52.35	0	0	0
Scott River Talings- 2004*		Rm 55-53.45	0	0	0
Wildcat		Lower 2 miles	NS	NS	NS
		Totals	5	2	6

the overall reach on that stream. Total counts are refered to under the 2004 reach designation.

NC= Not connected, NA = No access, NS = not surveyed

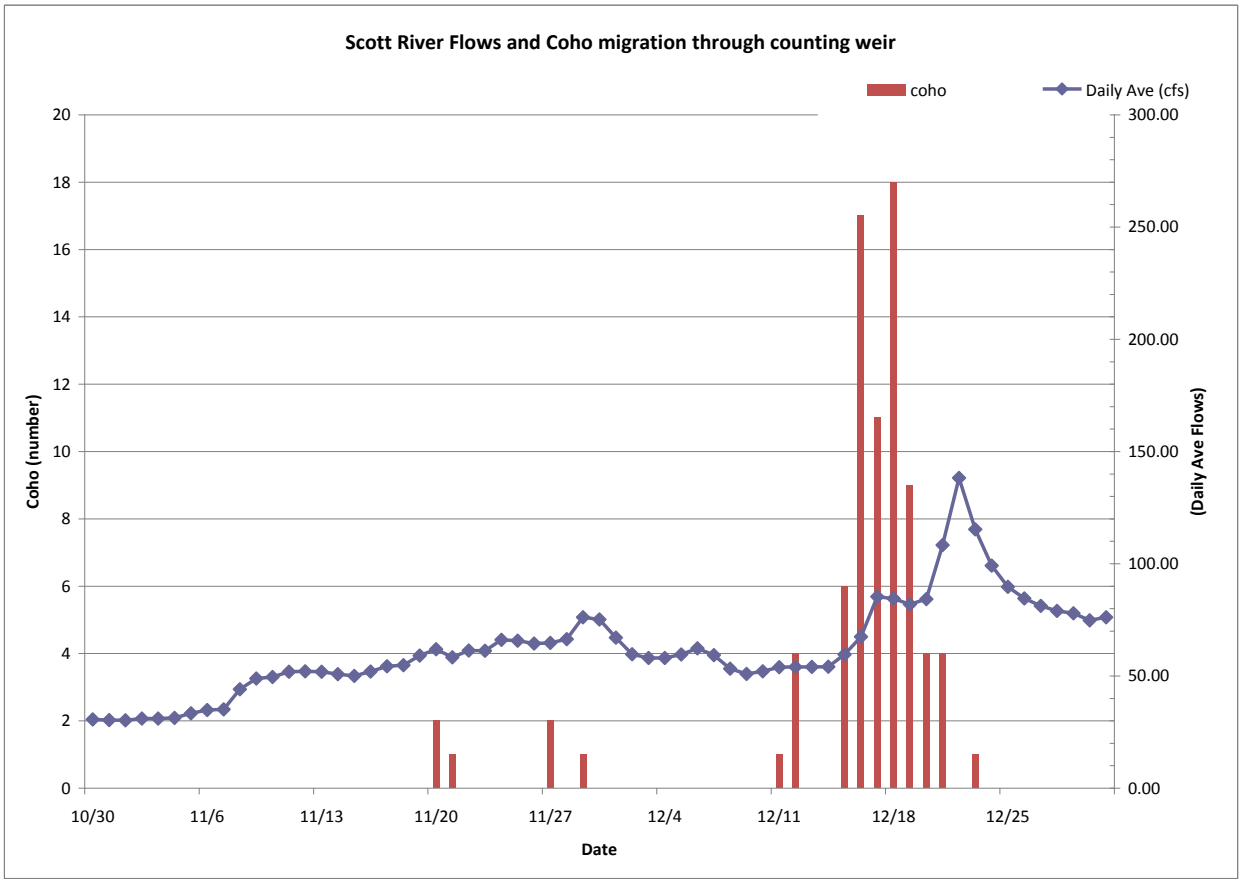
* = New reach in 2004

Shaded reaches surveyed in 2001-2002

Tributary connectivity

Flow barriers

Graph # 1



Scott River Flows at the USGS Gage (RM 21) Preliminary Data

A lack of significant precipitation events during the fall of 2009 contributed to continued low flows in the Scott River Mainstem and Tributaries. See **Graph #1,** Scott River Flows 2009. As has been observed in previous years, coho appear to migrate during flow events.

During much of the coho spawning period the tributaries on the westside experienced varying periods of disconnectivity. Shackleford Creek itself did not connect to the Scott River until December 21st, 2009, and disconnected again a few days later. Patterson Creek was observed as connected on December 31st, 2009. Kidder Creek connected in December, but by December 31st was dry again approximately ¾ of a mile below the Hwy 3 bridge.

The CDFG video weir showed that all but one coho had passed the weir by December 21st, with 85% of the fish moving between December 15th and 21st. See **Graph # 1**. No coho (or Chinook) were observed in Shackleford or Mill Creek. Shackleford was surveyed three times during the spawning season and Mill

Creek was surveyed twice. Based on weir and CDWR flow data, it is highly likely that Shackleford Creek did not connect during the coho spawning period.

The same is expected of Patterson Creek which was not observed to be connected until December 31st, 2009. It was surveyed twice following connectivity and no coho (or Chinook) were observed.

Other barriers

French Creek, Shackleford Creek, and Sugar Creek all have large beaver dams near the mouths. These dams are barriers during low flows, but may allow passage during flow events.

Beaver Dams

Beaver dam at mouth of French Creek

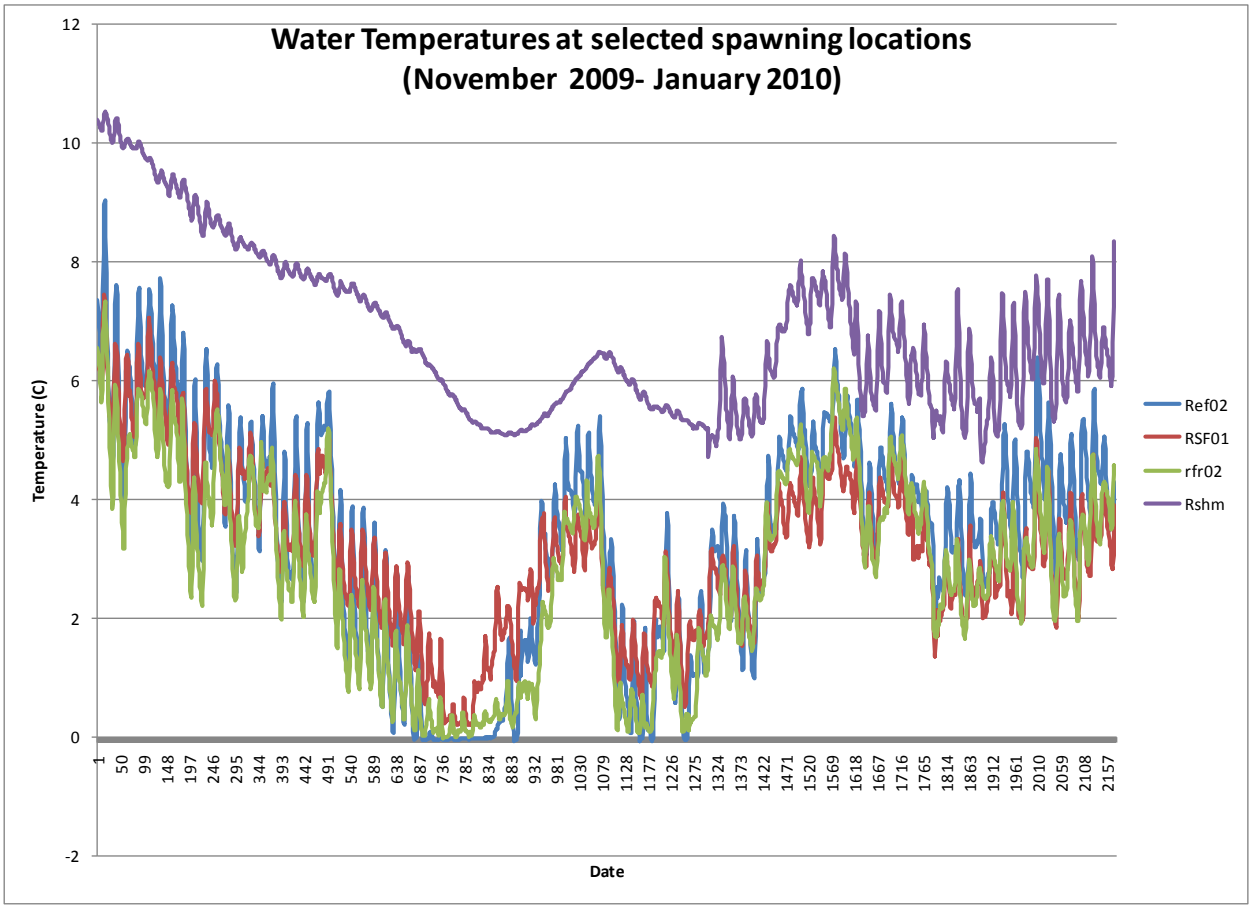
Beaver Dam below RM 2 on Shackleford Creek

Beaver Dam on Sugar Creek (~ RM 1)

Other data

Stream temperature data was collected in tributaries to the Scott River during the coho spawning season.

Graph # 2 shows stream temperature data collected during the spawning survey season.



Graph # 2 Water Temperature Data

Discussion

The 2009 spawning season is the first since 2001 were no spawning was observed in tributaries to the Scott River. During the previous low brood years of 2005 and 2006 spawning was observed in French, Shackleford, Sugar Creek (2005) and Kidder Creek. It is believed that persistent low flow conditions, combined with significant beaver dams contributed to this lack of distribution during the 2009 spawning season.

During the 2009-2010 surveys, only six redds, five live fish and three carcasses were observed. Preliminary weir data (CDFG 2010) shows that 81 adult coho potentially went through the weir during the spawning season. This highlights the difficulty of observing live fish in a large potential spawning universe.

Recommendations

Adult coho spawning ground surveys completed in the last few years, especially during the more repressed brood years, has highlighted the difficulty in finding a few fish in a large watershed. Despite the

difficulty in observing live salmon, some knowledge of distribution is still valuable for planning conservation efforts, such as the water trust.

For future survey efforts it is recommended that the survey effort be scaled back. Rather than the previous efforts which were focused on getting population data, a presence/absence approach should be used. Initial surveys should be completed in the areas of key quality habitat (index reaches). If fish are observed in one of those reaches, surveys will work upstream to document the upper extent of spawning. Survey crews will work closely with CDFG regarding weir data to determine the timing of peak spawning.

It is recommended that collection of biological data continue to be completed during the spawning ground surveys.